University of Augsburg

Handbook of Modules

Austauschstudium

Faculty of Philosophy and Social Sciences

You can see the other use cases of the modules in Digicampus.

Important additional information due to the corona pandemic:

Please notice that due to the developments of the corona pandemic the information on the respective examination formats in the module handbooks are maybe not up to date. Which examination formats finally for which modules will be possible will be clarified and determined during the semester.

Index by Groups of Modules

1) Faculty of Catholic Theology

KTH-2700: Introduction to Biblical Studies (5 ECTS/LP)........ 23

KTH-3501: Intermediate Module 5: Compulsory Elective Module: Biblical & Historical Theology (6 ECTS/LP) *........ 25

KTH-3502: Intermediate Module 6: Compulsory Elective Module: Systematic Theology (6 ECTS/LP) *........ 27

KTH-5601: Compulsory Module M2a: Human, Nature, Culture (8 ECTS/LP) *........ 29

KTH-5602: Compulsory Module M2b: Human, Nature, Culture (6 ECTS/LP) *........ 31

2) Faculty of Business and Economics - Bachelor Level

WIW-0007: Management Information Systems (5 ECTS/LP)........ 33

WIW-0157: Modeling and Optimization in Service Operations Management (6 ECTS/LP)........ 34

WIW-0217: Services Marketing: Research (Bachelor) (6 ECTS/LP) *........ 35

WIW-0226: New Media Marketing: Research (Bachelor) (6 ECTS/LP)........ 36

WIW-0230: Simulation in Service Operations Management (6 ECTS/LP) *........ 37

WIW-0235: Bachelor Seminar Innovation & International Management (English) (6 ECTS/LP) *........ 38

WIW-0262: Electronic Commerce (5 ECTS/LP)........ 39

WIW-0268: International Accounting (5 ECTS/LP) *........ 40

WIW-0269: International Entrepreneurship (5 ECTS/LP) *........ 41

WIW-0270: International Finance (5 ECTS/LP) *........ 42

WIW-0271: International Taxation (5 ECTS/LP) *........ 44

WIW-0289: Service Operations (5 ECTS/LP) *........ 45

WIW-0302: International Monetary Economics (5 ECTS/LP)........ 46

WIW-0303: Cases in Simulation (5 ECTS/LP) *........ 47

WIW-0326: Summer School on Global Perspectives of Public and Private Sector Interaction I (5 LP) (5 ECTS/LP) *........ 48

WIW-0338: Services Marketing: Principles (5 LP) (5 ECTS/LP)........ 49

WIW-0343: Industrial Services Management (5 ECTS/LP) *........ 50

WIW-0344: International Marketing (5 ECTS/LP) *........ 52

WIW-0347: Service Management (5 ECTS/LP)........ 53

WIW-0355: Cases in Business Analytics (5 ECTS/LP) *... 54

WIW-0363: Summer School on Strategic Management in the International Context: Public, Private and Nonprofit Organizations I (5 ECTS/LP) *...55

WIW-0367: Systematic Creativity (Design Thinking/Lean Startup/SCRUM) (5 ECTS/LP).................. 57

WIW-0370: Metropolitan Development (5 ECTS/LP).. 58

WIW-0372: Green Finance (5 ECTS/LP).. 60

WIW-0377: nternational Environmental Policy (5 ECTS/LP)...62

WIW-0378: Cases in Resilient Supply Chains: A business game application (5 ECTS/LP) *..............64

WIW-4701: Macroeconomics (5 ECTS/LP) *..65

WIW-4706: Intercultural Management (5 ECTS/LP) *...67

WIW-4707: International Business and Economics (5 ECTS/LP).. 69

WIW-4708: Project Management (5 ECTS/LP).. 70

WIW-4721: New Media Marketing: Principles (5 ECTS/LP) *.. 71

WIW-4723: Digital Government Management (5 ECTS/LP) *..72

WIW-4725: International Trade (5 ECTS/LP) *.. 74

WIW-4994: Industry Analysis (5 ECTS/LP) *... 76

WIW-9842: IT Innovation Research (5 ECTS/LP) *.. 78

WIW-9854: Online User Behavior Research (5 ECTS/LP) *..79

WIW-9865: Digital Transformation Research (5 ECTS/LP) *..81

3) Faculty of Business and Economics - Master Level

WIW-5016: Advanced Management Information Systems (6 ECTS/LP)...82

WIW-5020: Quantitative Methods in Finance (6 ECTS/LP)...83

WIW-5040: Transfer Pricing (6 ECTS/LP) *... 85

WIW-5058: Investment Funds (6 ECTS/LP) *...86

WIW-5089: Health Care Operations Management (6 ECTS/LP) *..88

WIW-5090: Seminar Health Care Operations Management (6 ECTS/LP) *...90

WIW-5093: Global E-Business and Electronic Markets (6 ECTS/LP) *..91

WIW-5094: Information Systems Research (6 ECTS/LP) *...93

WIW-5096: Performance Analysis of Stochastic Systems (6 ECTS/LP)..94

WIW-5099: Advanced Topics in Modeling and Optimization (6 ECTS/LP).. 95

WIW-5101: Integer Programming (6 ECTS/LP) *...96

WIW-5102: Advanced Management Support (6 ECTS/LP) *...98

WIW-5115: Corporate Governance: Research (6 ECTS/LP) *...100

WIW-5123: Services Marketing: Case Studies (6 ECTS/LP)..101

WIW-5124: New Media Marketing: Research (Master) (6 ECTS/LP)...102

WIW-5134: New Media Marketing: Case Studies (6 ECTS/LP) *..103

WIW-5135: Advanced Value Based Marketing (6 ECTS/LP) *..104

WIW-5136: Services Marketing: Research (Master) (6 ECTS/LP) *..106

WIW-5137: Corporate Governance: Concepts (6 ECTS/LP) *..107

WIW-5138: Advanced Services Marketing (6 ECTS/LP)...109

WIW-5147: Summer School on Global Perspectives of Public and Private Sector Interaction II (6 ECTS/LP) *...111

WIW-5155: Computational Macroeconomics II (6 ECTS/LP) *...112

WIW-5160: Health Economics (6 ECTS/LP) *...114

WIW-5200: Management: Innovation and International Business (6 ECTS/LP) *..........................116

WIW-5202: Management: Research (English) (6 ECTS/LP) *..118

WIW-5211: Master Seminar in Taxation II (6 ECTS/LP) *..119

WIW-5243: Machine Learning in Health Care (6 ECTS/LP) *...120

WIW-5250: Master Seminar in Taxation IV (6 ECTS/LP) *...122

WIW-5252: Health Economics – Financing (6 ECTS/LP)..123

WIW-5253: Health Economics – Topics (6 ECTS/LP)..125

WIW-5257: Summer School on Strategic Management in the International Context: Public, Private and Nonprofit Organizations II (6 ECTS/LP) *...127

WIW-5262: Advanced Topics in Service Operations Management (6 ECTS/LP) *...........................129

WIW-5263: Machine Learning (6 ECTS/LP)...130

WIW-5264: Artificial Intelligence in Business (6 ECTS/LP) *..132

WIW-5268: Topics in Behavioural Controlling (6 ECTS/LP)..133

WIW-5275: Empirical Research in Innovation and Entrepreneurship (6 ECTS/LP).........................134

4) Faculty of Law

JUR-8301: Introduction to Common Law (6 ECTS/LP) *...136

JUR-8302: Introduction to Anglo-American Legal Systems (6 ECTS/LP) *......................................137

JUR-8310: Contract Law (6 ECTS/LP) *...139

JUR-8311: Tort Law (6 ECTS/LP) *... 140

JUR-8312: Intellectual Property Law (FRA) (6 ECTS/LP) *.. 142

JUR-8313: Independent Legal Studies (6 ECTS/LP) *...144

JUR-8315: Case Analysis (6 ECTS/LP) *...146

JUR-8316: Business Law Topics 2 (6 ECTS/LP) *... 148

JUR-8317: Concepts of Law and Business II (12 ECTS/LP).. 150

JUR-8319: Practical Law: Case Preparation and Presentation (6 ECTS/LP) *................................. 152

JUR-8320: United Nations Convention on Contracts for the International Sale of Goods (CISG) (3 ECTS/LP) *...154

JUR-8321: Comparative Venture Capital Law (3 ECTS/LP) *..157

JUR-8322: European and WTO Law (6 ECTS/LP) *...159

JUR-8323: European Contract Law (3 ECTS/LP) *..161

JUR-8324: German and European Company Law (6 ECTS/LP) *...164

JUR-8325: Intellectual Property Law (SP) (3 ECTS/LP) *..166

JUR-8326: International Arbitration (3 ECTS/LP) *.. 167

JUR-8327: International Investment Law (3 ECTS/LP) *.. 168

JUR-8328: Law and Economics (3 ECTS/LP) *...169

JUR-8329: Performance and Financial Guarantees as Encountered in International Commercial Contracts (3 ECTS/LP) *.. 170

JUR-8330: Transnational Litigation: The Practice of International Dispute Resolution (3 ECTS/LP) *.. 172

JUR-8331: US/EU Antitrust Law (3 ECTS/LP) *... 174

JUR-8401: Introduction au droit français (6 ECTS/LP) *...177

JUR-8406: Drot des contracts (6 ECTS/LP) *..178

JUR-8407: Droit de la responsabilité extracontractuelle (6 ECTS/LP) *...179

JUR-8408: Droit du travail (6 ECTS/LP) *..180

JUR-8409: Pratique du droit des affaires (6 ECTS/LP)...181

5) Faculty of Philology and History - Bachelor Level

ASW-1201: Intermediate Module Applied Linguistics (Media Linguistics/ Technical and Research Communication/ Lexicography) (5 ECTS/LP) *... 182

ASW-1202: Intermediate Module Applied Linguistics (Second and Third Language Acquisition/ Multilingualism/ Language Contact/ Translation) (5 ECTS/LP) *...184

ASW-1301: Advanced Module Applied Linguistics (Second and Third Language Learning and Teaching/ Translation Studies/ Lexicography/ Terminology) (8 ECTS/LP) *...................................... 186

EAS-1011: Literary Studies: Introduction (6 ECTS/LP, compulsory) (6 ECTS/LP) *.......................... 188

EAS-1210: Literary Studies Backgrounds: Periods (4 ECTS/LP) *.. 190

EAS-1411: Literary Studies Intermediate : Genres (6 ECTS/LP, compulsory) (6 ECTS/LP) *...........192

EAS-1412: Literary Studies: Intermediate 2 (6 ECTS/LP) *.. 194

EAS-1731: Literary Studies Advanced: Literary Analysis (8 ECTS/LP, compulsory) (8 ECTS/LP) *.. 195

EAS-2211: Linguistics Background: Linguistics and Language in Use (4 ECTS/LP, compulsory) (4 ECTS/LP) *..196

EAS-2410: Linguistics Intermediate: Grammar in Context (6 ECTS/LP) *....................................... 198

EAS-2731: Linguistics Advanced: System and Variation (8 ECTS/LP, compulsory) (8 ECTS/LP) *...200

EAS-3060: Didactics: Introduction (6 ECTS/LP) *...202

EAS-3200: Didactics: Intermediate (3 ECTS/LP) *..204

EAS-4441: Cultural Studies: Key Concepts (4 ECTS/LP, compulsory) (4 ECTS/LP) *...................... 206

EAS-4442: Cultural Studies: Cultural Analysis (4 ECTS/LP, compulsory) (4 ECTS/LP) *.................. 207

FRA-2101: Basic Module Literary and Cultural Studies French (Methods + Introductory Course) (8 ECTS/LP) *..208

FRA-2203: Intermediate Module Literary and Cultural Studies French (Lecture) (5 ECTS/LP) *........209

FRA-2302: Advanced Module Literary and Cultural Studies French (Core Seminar) (8 ECTS/LP) *.. 210

FRA-3301: Advanced Module Didactics French (seminar + colloquium) (9 ECTS/LP) *....................211

GER-1001: Modern German Literature: basic module (10 ECTS/LP) *.. 213

GER-1002: Modern German Literature: basic module (subsidiary subject) (7 ECTS/LP) *................214

GER-1003: Modem German Literature: intermediate module (10 ECTS/LP) *................................. 215

GER-1005: Modern German Literature: intermediate module (elective area : theory of literature) (5 ECTS/LP) *..217

GER-1006: Modern German Literature: advanced module (bachelor) (8 ECTS/LP) *....................... 219

GER-1010: Modern German Literature: advanced module (elective area) (5 ECTS/LP) *.................220

GER-1013: Academic specialisation: Modern German Literature (bachelor) (4 ECTS/LP) *.............222

GER-1026: Modern German Literature: intermediate module (elective area : scientific and creative writing) (5 ECTS/LP) *.. 224

GER-1027: Modern German Literature: intermediate module (elective area: contemporary literature) (5 ECTS/LP) *..226

GES-1019: Ancient History: Lecture Elective Area BA (2 ECTS/LP) *..228

GES-1020: Ancient History: Fundamental Course Elective Area BA (6 ECTS/LP) *..........................229

GES-1021: Ancient History: Fundamental Course Elective Area BA (6 ECTS/LP)........................... 230

GES-2019: Medieval History: Lecture Elective Area BA (2 ECTS/LP) *.. 231

GES-2020: Medieval History: Fundamental Course Elective Area BA (6 ECTS/LP).........................232

GES-3019: Early Modern History: Lecture Elective Area BA (2 ECTS/LP) *.................................... 233

GES-3020: Early Modern History: Fundamental Course Elective Area BA (6 ECTS/LP) *................ 234

GES-4019: Modern and Contemporary History: Lecture Elective Area BA (2 ECTS/LP) *................ 235

GES-4020: Modern and Contemporary History: Fundamental Course Elective Area BA (6 ECTS/LP) *.. 236

GES-5021: Bavarian and Swabian Regional History: Lecture Elective Area BA (2 ECTS/LP) *.........237

GES-5022: Bavarian and Swabian Regional History: Fundamental Course Elective Area BA (6 ECTS/LP) *.. 238

GES-6001: Introduction to European Cultural History (7 ECTS/LP).. 239

GES-6002: Cultural History and Cultural Theory (7 ECTS/LP).. 240

GES-6003: Europe as a Cultural Space (7 ECTS/LP)... 241

GES-6004: History and Theory of Media (7 ECTS/LP)..242

GES-7113: Didactics of History: Fundamental Course Elective Area BA (3 ECTS/LP)......................243

GES-7115: Didactics of History: Lecture Elective Area BA (3 ECTS/LP)..245

ITA-2101: Basic Module Literary and Cultural Studies Italian (Methods + Introductory Course) (8 ECTS/LP) *..246

ITA-2203: Intermediate Module Literary and Cultural Studies Italian (Lecture) (5 ECTS/LP) *...........247

ITA-2302: Advanced Module Literary and Cultural Studies Italian (Core Seminar) (8 ECTS/LP) *.....248

ITA-3301: Advanced Module Didactics Italian (seminar + colloquium) (9 ECTS/LP) *...................... 249

KAR-0001: Introduction to Classical Archaeology (10 ECTS/LP)...251

KEE-0001: Introduction to European Ethnology (10 ECTS/LP)... 252

KKG-0001: Introduction to Art History (10 ECTS/LP)...253

KLG-0001: Introduction to European Regional History and Bavarian and Swabian Regional History (10 ECTS/LP)... 254

KUK-0001: Interdisciplinary Perspectives – Methods and Contexts (10 ECTS/LP) *........................ 255

SPA-1101: Basic Module Linguistics Spanish (Introduction A + B) (6 ECTS/LP) *........................... 257

SPA-1201: Intermediate Module Linguistics Spanish (Text Linguistics or History of the Spanish Language + Varieties) (7 ECTS/LP) *.. 259

SPA-1202: Intermediate Module Linguistics Spanish (Introductory Seminar) (6 ECTS/LP) *............261

SPA-1204: Intermediate Module Linguistics Spanish (Text Linguistics or History of the Spanish Language) (5 ECTS/LP) *......262

SPA-1302: Advanced Module Linguistics Spanish (Core Seminar) (8 ECTS/LP) *............263

SPA-1402: Specialisation module linguistics: Old Spanish (5 ECTS/LP)............264

SPA-3301: Advanced Module Didactics Spanish (seminar + colloquium) (9 ECTS/LP) *............265

6) Faculty of Philology and History - Master Level

EAS-1711: Literary Studies: Advanced (8 ECTS/LP) *............267

EAS-1834: Cultural and Theoretical Approaches to Literature (8 ECTS/LP) *............269

EAS-1844: Backgrounds in Literary Studies: Literary Texts and Cultural Contexts (10 ECTS/LP, compulsory) (10 ECTS/LP) *............270

EAS-1854: Advanced Literary Studies (10 ECTS/LP, compulsory) (10 ECTS/LP) *............271

EAS-2511: Linguistics: Backgrounds 2 (4 ECTS/LP, compulsory) (4 ECTS/LP) *............273

EAS-2934: Linguistics: Form and Meaning (8 ECTS/LP, compulsory) (8 ECTS/LP) *............274

EAS-2954: Linguistics: Text and Discourse (8 ECTS/LP, compulsory) (8 ECTS/LP) *............275

EAS-3000: Didactics: Introduction (5 ECTS/LP) *............277

EAS-3270: Mediation practice I (E) (5 ECTS/LP) *............280

EAS-3600: Didactics: Advanced (7 ECTS/LP) *............281

EAS-3650: Didactics: Subjects and Methods (8 ECTS/LP, compulsory) (8 ECTS/LP) *............282

EAS-4445: Topics in Cultural Studies I: Cultural Analysis (8 ECTS/LP, compulsory) (8 ECTS/LP) *............283

EAS-4446: Topics in Cultural Studies II: Cultural Theory (8 ECTS/LP, compulsory) (8 ECTS/LP) *............284

EAS-4447: Cultural Studies: Backgrounds (4 ECTS/LP, compulsory) (4 ECTS/LP) *............285

FRA-4514: Specialisation Module: Cultural Dimensions of Enlightenment (10 ECTS/LP)............286

GER-1008: Modern German Literature: advanced module (master) (8 ECTS/LP) *............288

GER-1009: Modern German Literature: advanced module plus (master) (8 ECTS/LP) *............289

GER-1018: Modern German Literature: developing a personal profile (master) (5 ECTS/LP) *............290

GER-1019: Modern German Literature: developing a personal profile plus (master) (5 ECTS/LP) *............292

GER-1020: Modern German Literature: developing a personal profile plus plus (master) (5 ECTS/LP) *............294

GER-1021: Modern German Literature: professional orientation (master) (5 ECTS/LP) *............296

GER-1022: Modern German Literature: professional orientation (master) plus (5 ECTS/LP) *.......... 298

GES-1032: Ancient History: Tutorial or Mentoring (6 ECTS/LP) *.. 300

GES-2031: Medieval History: Tutorial or Mentoring (6 ECTS/LP) *... 302

GES-3031: Early Modern History: Tutorial or Mentoring (6 ECTS/LP) *.. 304

GES-4031: Modern and Contemporary History: Tutorial or Mentoring (6 ECTS/LP) *....................... 306

GES-5033: Bavarian and Swabian Regional History: Tutorial or Mentoring (6 ECTS/LP) *............... 308

GES-6002: Cultural History and Cultural Theory (7 ECTS/LP).. 310

GES-6003: Europe as a Cultural Space (7 ECTS/LP)... 311

GES-6004: History and Theory of Media (7 ECTS/LP).. 312

GES-6135: European Cultural History: Tutorial or Mentoring (6 ECTS/LP)..................................... 313

GES-7135: Didactics of History: Tutorial or Mentoring (6 ECTS/LP) *.. 314

GES-7137: Didactics of History: Tutorial or Mentoring (6 ECTS/LP) *.. 316

KUK-0016: Methods and Theories 1 (8 ECTS/LP) *.. 318

KUK-0019: Methods and Theories 2 (10 ECTS/LP) *.. 320

7) Faculty of Mathematics, Natural Sciences, and Materials Engineering - Bachelor Level

MRM-0086: Sustainable Chemistry of Materials and Resources - Modelling (6 ECTS/LP) *............ 322

MRM-0118: Engineering mechanics (6 ECTS/LP).. 324

MRM-1000: Mathematics I (5 ECTS/LP)... 326

MRM-1001: Mathematics II (8 ECTS/LP) *... 328

MRM-1002: Technical Physics I (6 ECTS/LP)... 330

MTH-1000: Linear Algebra I (8 ECTS/LP) *... 332

MTH-1010: Linear Algebra II (10 ECTS/LP) *.. 334

MTH-1020: Analysis I (8 ECTS/LP) *... 336

MTH-1030: Analysis II (10 ECTS/LP) *... 338

MTH-1040: Analysis III (9 ECTS/LP)... 339

MTH-1050: Introduction to algebra (9 ECTS/LP).. 340

MTH-1070: Introduction to Geometry (9 ECTS/LP)... 342

MTH-1080: Complex Analysis (9 ECTS/LP) *... 343

MTH-1100: Funktionalanalysis (9 ECTS/LP) *.. 345

MTH-1110: Ordinary differential equations (9 ECTS/LP).. 346

MTH-1130: Introduction to Numerical Analysis (9 ECTS/LP)..348

MTH-1140: Introduction to Optimization (9 ECTS/LP) *..350

MTH-1150: Probability I (9 ECTS/LP)..352

MTH-1160: Probability II (9 ECTS/LP) *..354

MTH-1200: Introduction to Nonlinear and Combinatorial Optimization (9 ECTS/LP)....................355

MTH-1240: Numerical analysis of ordinary differential equations (9 ECTS/LP) *....................357

MTH-1350: Mathematical Seminar (6 ECTS/LP) *..359

MTH-2080: Evolution equations (15 ECTS/LP)..361

MTH-2550: Elementary algebraic geometry (9 ECTS/LP) *..363

PHM-0001: Physics I (Mechanics, Thermodynamics) (8 ECTS/LP)..365

PHM-0003: Physics II (Electrodynamics, Optics) (8 ECTS/LP) *..367

PHM-0035: Chemistry I (General and Inorganic Chemistry) (8 ECTS/LP)....................................369

PHM-0036: Chemistry II (Organic Chemistry) (8 ECTS/LP) *..371

PHM-0191: Technical Physics II (6 ECTS/LP) *..373

8) Faculty of Mathematics, Natural Sciences, and Materials Engineering - Master Level

MRM-0021: Commodity Risk Management (6 ECTS/LP)..375

MRM-0126: Ceramic Matrix Composites (6 ECTS/LP)..376

MRM-0128: Bioinspired Composites (6 ECTS/LP)..378

MRM-0136: Mechanical Characterization of Materials (6 ECTS/LP) *....................................380

MRM-0142: Complex 3D Structures and Components from 2D Materials (6 ECTS/LP)....................382

MTH-1360: Seminar Analysis (6 ECTS/LP) *..384

MTH-1380: Seminar in Geometry (6 ECTS/LP) *..386

MTH-1510: Riemannian Geometry (9 ECTS/LP)..389

MTH-1520: Differential Topology (9 ECTS/LP)..391

MTH-1530: Algebraic Topology (9 ECTS/LP)..393

MTH-1560: Stochastic Differential Equations (9 ECTS/LP)..394

MTH-1570: Dynamical Systems (9 ECTS/LP) *..396

MTH-1590: Numerical analysis of partial differential equations (9 ECTS/LP)....................................398

MTH-1600: Multiscale methods (9 ECTS/LP)..400

MTH-1610: Mathematical modelling (9 ECTS/LP)..402

MTH-1630: Mathematical Game Theory (9 ECTS/LP)........ 403
MTH-1730: Research Seminar Analysis (6 ECTS/LP) *........ 404
MTH-1770: Mathematical software project (6 ECTS/LP)........ 406
MTH-1810: Topological Combinatorics (9 ECTS/LP)........ 407
MTH-1940: String Topology (9 ECTS/LP)........ 409
MTH-2010: Numerics of stochastic differential equations (6 ECTS/LP)........ 410
MTH-2090: Seminar on numerical mathematics (6 ECTS/LP) *........ 412
MTH-2210: Stochastic Evolution Equations (9 ECTS/LP)........ 415
MTH-2215: Evolution Equations (9 ECTS/LP)........ 416
MTH-2250: Symplectic Geometry (9 ECTS/LP)........ 417
MTH-2270: Advanced Topics in Algebraic Topology (9 ECTS/LP) *........ 418
MTH-2440: Approximation Algorithms (3 ECTS/LP)........ 419
MTH-2510: Advanced Methods in Machine Learning (3 ECTS/LP)........ 420
MTH-2511: Advanced Methods in Machine Learning II (3 ECTS/LP)........ 421
MTH-2520: Algebraic groups and homogeneous spaces (9 ECTS/LP)........ 422
MTH-2590: Topics in Galois Fields (9 ECTS/LP)........ 423
MTH-2640: Category Theory (9 ECTS/LP)........ 425
MTH-2650: Homotopy Type Theory (9 ECTS/LP)........ 426
MTH-2710: Homotopical Algebra (18 ECTS/LP) *........ 427
MTH-3000: Topics in Geometry (6 ECTS/LP)........ 428
MTH-3240: Morse Homology (9 ECTS/LP)........ 429
MTH-3250: Complex Geometry (9 ECTS/LP)........ 430
MTH-3270: Algebraic K-Theory (3 ECTS/LP)........ 431
MTH-3280: Nonlinear Functional Analysis (9 ECTS/LP)........ 432
MTH-3290: Introduction to Celestial Mechanics (3 ECTS/LP)........ 433
MTH-3560: Ausgewählte Kapitel der Variationsrechnung (9 ECTS/LP)........ 434
MTH-3570: Reading Course Dynamical Systems (6 ECTS/LP)........ 435
MTH-3590: Computational uncertainty quantification for partial differential equations (9 ECTS/LP) *........ 436
MTH-3610: Complements on analysis (6 ECTS/LP)........ 437
MTH-3620: Complements on functional analysis/partial differential equations (6 ECTS/LP)........ 438

MTH-3630: Complements on stochastics (6 ECTS/LP)........ 439
MTH-3640: Complements on numerics (6 ECTS/LP)........ 440
PHM-0046: Theoretical Solid State Physics (8 ECTS/LP)........ 441
PHM-0048: Physics and Technology of Semiconductor Devices (6 ECTS/LP) *........ 443
PHM-0049: Nanostructures / Nanophysics (6 ECTS/LP) *........ 445
PHM-0050: Electronics for Physicists and Materials Scientists (6 ECTS/LP)........ 447
PHM-0051: Biophysics and Biomaterials (6 ECTS/LP) *........ 449
PHM-0052: Solid State Spectroscopy with Synchrotron Radiation and Neutrons (6 ECTS/LP) *........ 452
PHM-0053: Chemical Physics I (6 ECTS/LP)........ 454
PHM-0054: Chemical Physics II (6 ECTS/LP) *........ 456
PHM-0056: Ion-Solid Interaction (6 ECTS/LP)........ 458
PHM-0057: Physics of Thin Films (6 ECTS/LP)........ 460
PHM-0058: Organic Semiconductors (6 ECTS/LP)........ 462
PHM-0059: Magnetism (6 ECTS/LP) *........ 464
PHM-0060: Low Temperature Physics (6 ECTS/LP)........ 466
PHM-0061: Plasma Physics and Fusion Research (6 ECTS/LP) *........ 468
PHM-0063: Physics of the Atmosphere I (6 ECTS/LP)........ 470
PHM-0065: Physics of the Atmosphere II (6 ECTS/LP) *........ 472
PHM-0066: Superconductivity (6 ECTS/LP)........ 474
PHM-0067: Complex materials: Fundamentals and Applications (8 ECTS/LP)........ 476
PHM-0068: Spintronics (6 ECTS/LP)........ 478
PHM-0069: Applied Magnetic Materials and Methods (6 ECTS/LP)........ 480
PHM-0070: Many-Body Theory (8 ECTS/LP)........ 482
PHM-0071: Nonequilibrium Statistical Physics (8 ECTS/LP)........ 484
PHM-0073: Relativistic Quantum Field Theory (8 ECTS/LP) *........ 486
PHM-0077: Theory of Magnetism (8 ECTS/LP)........ 488
PHM-0080: Theory of Superconductivity (8 ECTS/LP)........ 490
PHM-0083: Computational Physics and Materials Science (8 ECTS/LP)........ 492
PHM-0084: Condensed Matter Theory (8 ECTS/LP) *........ 495
PHM-0085: Theoretical Biophysics (8 ECTS/LP)........ 497
PHM-0086: Dynamics of Nonlinear and Chaotic Systems (8 ECTS/LP)........ 500

PHM-0087: Basics of Quantum Computing (8 ECTS/LP)........ 502
PHM-0088: Seminar Journal Club (4 ECTS/LP)........ 504
PHM-0092: Seminar on Thermodynamics and Transport in Solids (4 ECTS/LP)........ 505
PHM-0096: Seminar on Glass Physics (4 ECTS/LP) *........ 507
PHM-0099: Seminar on Plasmas in Research and Industry (4 ECTS/LP) *........ 509
PHM-0106: Seminar on Thermoelectric Properties of Nano- and Heterostructures (4 ECTS/LP)........ 511
PHM-0107: Practical Training (15 ECTS/LP)........ 513
PHM-0108: Project Work (15 ECTS/LP)........ 515
PHM-0110: Materials Chemistry (6 ECTS/LP)........ 517
PHM-0113: Advanced Solid State Materials (6 ECTS/LP) *........ 519
PHM-0114: Porous Functional Materials (6 ECTS/LP)........ 521
PHM-0116: Advanced Materials Physics (6 ECTS/LP)........ 523
PHM-0117: Surfaces and Interfaces (6 ECTS/LP)........ 525
PHM-0118: Physics of Surfaces and Interfaces (5 ECTS/LP)........ 527
PHM-0121: Processing of Materials (5 ECTS/LP)........ 529
PHM-0122: Non-Destructive Testing (6 ECTS/LP)........ 531
PHM-0144: Materials Physics (6 ECTS/LP)........ 533
PHM-0145: Practical Laboratory Project (6 ECTS/LP)........ 535
PHM-0146: Method Course: Electronics for Physicists and Materials Scientists (8 ECTS/LP) *........ 536
PHM-0147: Method Course: Electron Microscopy (8 ECTS/LP) *........ 538
PHM-0149: Method Course: Methods in Biophysics (8 ECTS/LP)........ 541
PHM-0150: Method Course: Spectroscopy on Condensed Matter (8 ECTS/LP) *........ 543
PHM-0151: Method Course: Porous Materials - Synthesis and Characterization (8 ECTS/LP)........ 545
PHM-0152: Method Course: Structure Determination in Solids (8 ECTS/LP)........ 547
PHM-0153: Method Course: Magnetic and Superconducting Materials (8 ECTS/LP) *........ 549
PHM-0154: Method Course: Modern Solid State NMR Spectroscopy (8 ECTS/LP)........ 551
PHM-0156: Method Course: Materials Synthesis (8 ECTS/LP)........ 553
PHM-0158: Introduction to Materials (4 ECTS/LP)........ 555
PHM-0159: Laboratory Project (10 ECTS/LP)........ 556
PHM-0161: Coordination Materials (6 ECTS/LP)........ 557
PHM-0163: Fiber Reinforced Composites: Processing and Materials Properties (6 ECTS/LP)........ 559

PHM-0164: Characterization of Composite Materials (6 ECTS/LP)........ 561

PHM-0166: Carbon-based functional Materials (Carboterials) (6 ECTS/LP)........ 563

PHM-0167: Oxidation and Corrosion (6 ECTS/LP) *........ 565

PHM-0168: Modern Metallic Materials (6 ECTS/LP)........ 567

PHM-0171: Method Course: Coordination Materials (8 ECTS/LP)........ 569

PHM-0172: Method Course: Functional Silicate-analogous Materials (8 ECTS/LP) *........ 571

PHM-0173: Method Course: Finite element modeling of multiphysics phenomena (8 ECTS/LP)........ 573

PHM-0174: Theoretical Concepts and Simulation (6 ECTS/LP)........ 575

PHM-0180: Characterization of Materials (6 ECTS/LP)........ 577

PHM-0182: Method Course: Thin Film Analysis with Ion Beams (8 ECTS/LP)........ 579

PHM-0187: Mathematics and Physics of Space-Time (8 ECTS/LP)........ 581

PHM-0188: Seminar on Spectroscopy of Organic Semiconductors (4 ECTS/LP) *........ 583

PHM-0193: Plasma Material Interaction (6 ECTS/LP) *........ 585

PHM-0197: Seminar on Selected Topics in Nanomagnetism (4 ECTS/LP)........ 587

PHM-0199: Understanding Correlated Materials (6 ECTS/LP)........ 589

PHM-0203: Physics of Cells (6 ECTS/LP)........ 591

PHM-0216: Method Course: Thermal Analysis (8 ECTS/LP)........ 593

PHM-0217: Advanced X-ray and Neutron Diffraction Techniques (6 ECTS/LP) *........ 595

PHM-0221: Method Course: X-ray Diffraction Techniques (8 ECTS/LP)........ 597

PHM-0223: Method Course: Tools for Scientific Computing (8 ECTS/LP) *........ 599

PHM-0224: Method Course: Theoretical Concepts and Simulation (8 ECTS/LP)........ 602

PHM-0225: Analog Electronics for Physicists and Materials Scientists (6 ECTS/LP)........ 604

PHM-0226: Digital Electronics for Physicists and Materials Scientists (6 ECTS/LP) *........ 605

PHM-0228: Symmetry concepts and their applications in solid state physics and materials science (6 ECTS/LP) *........ 606

PHM-0249: Seminar on Magnetic skyrmions in crystals and thin films (4 ECTS/LP) *........ 608

PHM-0251: Theory of magnetic skyrmions (8 ECTS/LP)........ 610

PHM-0252: Optical Excitations in Materials (6 ECTS/LP) *........ 612

PHM-0253: Dielectric Materials (6 ECTS/LP) *........ 614

PHM-0258: Method course: Charge doping effects in semiconductors (8 ECTS/LP) *........ 616

PHM-0264: Functional and Smart Macromolecular Materials (6 ECTS/LP)........ 618

PHM-0265: Research challenges in cell biophysics (6 ECTS/LP).. 620

PHM-0267: Fundamentals of Materials for Energy (6 ECTS/LP).. 622

9) Faculty of Applied Computer Science - Bachelor Level

INF-0029: Research Module Software Methodologies for Distributed Systems (6 ECTS/LP) *..........623

INF-0048: Research Module Theoretical Computer Science (6 ECTS/LP) *.................................... 624

INF-0062: Seminar: Selforganization in Distributed Systems (4 ECTS/LP) *....................................625

INF-0063: Seminar Ad Hoc and Sensor Networks (4 ECTS/LP).. 627

INF-0064: Research Module Organic Computing (6 ECTS/LP) *..629

INF-0075: Research Module Databases and Information Systems (6 ECTS/LP) *............................630

INF-0089: Seminar Multimedia Computing & Computer Vision (BA) (4 ECTS/LP) *..........................631

INF-0090: Research Module Multimedia Computing & Computer Vision (BA) (6 ECTS/LP) *........... 633

INF-0105: Research Module Teaching Professorship Informatics (6 ECTS/LP) *..............................634

INF-0124: Seminar Robotics (4 ECTS/LP) *.. 635

INF-0125: Seminar Internet Security (4 ECTS/LP) *..637

INF-0126: Seminar Software- and Systems Engineering (Bachelor) (4 ECTS/LP)............................ 639

INF-0127: Research Module Software- and Systems Engineering (6 ECTS/LP) *.............................641

INF-0173: Research Module Human-Centered Multimedia (6 ECTS/LP) *..642

INF-0188: Seminar Algorithms and Data Structures for Bachelors (4 ECTS/LP)..............................643

INF-0226: Seminar Database Systems Bachelor (4 ECTS/LP) *..644

INF-0231: Seminar Medical Information Sciences (BA) (4 ECTS/LP) *.. 646

INF-0261: Practical Module on Manufacturing Technology (5 ECTS/LP) *..648

INF-0267: Practical Module Deep Learning (5 ECTS/LP) *... 650

INF-0268: Practical Module Computational Intelligence (5 ECTS/LP).. 652

INF-0269: Seminar Embedded Intelligence for Health Care and Wellbeing (Bachelor) (4 ECTS/LP).. 654

INF-0271: Research Module Embedded Intelligence for Health Care and Wellbeing (6 ECTS/LP) *... 656

INF-0276: Practical Module Automotive Software Engineering (BA) (6 ECTS/LP)............................ 657

INF-0313: Seminar IT Infrastructure in Medical Information Systems for Bachelor Students (4 ECTS/LP) *.. 659

INF-0321: Practical Module Speech Pathology (5 ECTS/LP)... 661

INF-0327: Research Module IT Infrastructure in Medical Information Systems (6 ECTS/LP) *.......... 663

INF-0330: Seminar Computational Intelligence (Bachelor) (4 ECTS/LP) *..664

INF-0332: Artificial Intelligence (5 ECTS/LP).. 666

INF-0334: Practical Module Human-Centered Artificial Intelligence for Health Care Applications (8 ECTS/LP) *..668

INF-0336: Seminar Embedded Systems (Bachelor) (4 ECTS/LP) *...669

INF-0338: Research Module Embedded Systems (6 ECTS/LP) *.. 671

INF-0341: Seminar Digital Health (Bachelor) (4 ECTS/LP) *.. 672

INF-0343: Seminar Software Engineering of Distributed Systems (BA) (4 ECTS/LP) *..................... 674

INF-0345: Seminar Automotive Software and Systems Engineering (BA) (4 ECTS/LP)................... 676

INF-0347: Seminar Avionic Software and Systems Engineering (BA) (4 ECTS/LP).......................... 677

INF-0350: Practical Module Engineering 4.0 (6 ECTS/LP) *..679

INF-0352: Practical Module Biomedical Programming (Bachelor) (6 ECTS/LP)................................ 681

INF-0363: Seminar Software Engineering in Safety- and Security-Critical Systems (BA) (4 ECTS/LP) *.. 683

INF-0365: Practical Module Interaction Design and Engineering for Health Care Applications (8 ECTS/LP).. 685

INF-0372: Research Module Resource Aware Algorithmics (6 ECTS/LP) *......................................686

INF-0384: Seminar Resource Aware Algorithmics (Bachelor) (4 ECTS/LP) *...................................687

INF-0386: Practical Module Biomedical Analysis of Single Cell Data (8 ECTS/LP) *.........................688

INF-0406: Seminar Digital Ethics (Bachelor) (4 ECTS/LP).. 690

10) Faculty of Applied Computer Science - Master Level

INF-0037: Practical Module Automotive Software Engineering (6 ECTS/LP)....................................692

INF-0042: Project Module Software Methodologies for Distributed Systems (10 ECTS/LP) *............694

INF-0058: Seminar Algorithms and Data Structures for Masters (4 ECTS/LP).................................. 695

INF-0059: Project Module Theoretical Computer Science (10 ECTS/LP) *.......................................696

INF-0070: Seminar Organic Computing (4 ECTS/LP)..697

INF-0071: Seminar Nature inspired Algorithms and Multi Agent Systems (4 ECTS/LP) *..................699

INF-0072: Project Module Organic Computing (10 ECTS/LP) *..701

INF-0080: Project Module Databases and Information Systems (10 ECTS/LP) *.............................. 702

INF-0088: Bayesian Networks (5 ECTS/LP).. 703

INF-0093: Probabilistic Robotics (5 ECTS/LP) *... 705

INF-0095: Seminar Multimedia Computing & Computer Vision (MA) (4 ECTS/LP) *......................... 707

INF-0096: Project Module Multimedia Computing (10 ECTS/LP) *.......... 709
INF-0108: Project Module Teaching Professorship Informatics (10 ECTS/LP) *.......... 710
INF-0136: Seminar Software- and Systems Engineering (Master) (4 ECTS/LP).......... 711
INF-0137: Project Module Software- and Systems Engineering (10 ECTS/LP) *.......... 713
INF-0149: Practical Module Embedded Systems (5 ECTS/LP) *.......... 715
INF-0170: Project Module Human-Centered Multimedia (10 ECTS/LP) *.......... 717
INF-0182: Practical Module Multimodal Real Time Signal Processing (8 ECTS/LP).......... 718
INF-0183: Practical Module Game Programming (8 ECTS/LP).......... 719
INF-0217: Practical Module Autonomous Driving (10 ECTS/LP) *.......... 720
INF-0227: Seminar Database Systems Master (4 ECTS/LP) *.......... 722
INF-0232: Seminar Medical Information Sciences (MA) (4 ECTS/LP) *.......... 724
INF-0240: Seminar Information Systems Master (4 ECTS/LP).......... 726
INF-0247: Practical Module on Digital Manufacturing (6 ECTS/LP).......... 728
INF-0250: Practical Module Reinforcement Learning (8 ECTS/LP) *.......... 729
INF-0251: Seminar Artificial Intelligence (4 ECTS/LP) *.......... 730
INF-0272: Intelligent Signal Analysis in Medicine (5 ECTS/LP).......... 732
INF-0273: Practical Module Sensing for Fitness and Wellbeing (5 ECTS/LP).......... 734
INF-0274: Seminar Embedded Intelligence for Health Care and Wellbeing (Master) (4 ECTS/LP).... 736
INF-0275: Project Module Embedded Intelligence for Health Care and Wellbeing (10 ECTS/LP) *... 738
INF-0277: Analyzing Massive Data Sets (8 ECTS/LP).......... 739
INF-0279: Music Informatics (5 ECTS/LP).......... 741
INF-0284: Practical Module Mobile Application Development (5 ECTS/LP).......... 743
INF-0291: Practical Module Self-Learning Systems (8 ECTS/LP) *.......... 745
INF-0293: Advanced Deep Learning (8 ECTS/LP).......... 747
INF-0294: Speech Pathology (5 ECTS/LP).......... 749
INF-0296: Practical Module Interactive Machine Learning (8 ECTS/LP).......... 751
INF-0297: Practical Module Processor Design (5 ECTS/LP) *.......... 752
INF-0307: Model-Based Development and Analysis of Software Systems (6 ECTS/LP) *.......... 754
INF-0308: Software-intensive Systems (6 ECTS/LP).......... 756
INF-0309: Real-Time Systems (8 ECTS/LP).......... 758

INF-0314: Seminar IT Infrastructure in Medical Information Systems for Master Students (4 ECTS/LP) *.. 760

INF-0315: Deep Learning (5 ECTS/LP) *...762

INF-0316: Machine Learning and Computer Vision (8 ECTS/LP) *.. 764

INF-0318: Practice Module on Simulation of Autonomous Vehicles (8 ECTS/LP)............................ 766

INF-0319: Interdisciplinary Project Engineering Informatics (6 ECTS/LP)..767

INF-0320: Seminar Process Mining (4 ECTS/LP).. 768

INF-0328: Project Module IT Infrastructure in Medical Information Systems (10 ECTS/LP) *............ 770

INF-0331: Seminar Computational Intelligence (Master) (4 ECTS/LP) *..771

INF-0337: Seminar Embedded Systems (Master) (4 ECTS/LP) *..773

INF-0340: Project Module Embedded Systems (10 ECTS/LP) *..775

INF-0342: Seminar Digital Health (Master) (4 ECTS/LP) *.. 776

INF-0344: Seminar Software Engineering of Distributed Systems (MA) (4 ECTS/LP) *.....................778

INF-0346: Seminar Automotive Software and Systems Engineering (MA) (4 ECTS/LP).................. 780

INF-0348: Seminar Avionic Software and Systems Engineering (MA) (4 ECTS/LP).........................782

INF-0349: Seminar Human-Centered Artificial Intelligence (4 ECTS/LP) *...................................... 784

INF-0353: Practical Module Biomedical Programming (Master) (6 ECTS/LP)................................. 786

INF-0364: Seminar Software Engineering in Safety- and Security-Critical Systems (MA) (4 ECTS/LP) *.. 788

INF-0367: Advanced Machine Learning and Computer Vision (5 ECTS/LP)................................... 790

INF-0371: Approximation Algorithms (5 ECTS/LP).. 792

INF-0374: Project Module Resource Aware Algorithmics (10 ECTS/LP) *.......................................794

INF-0379: Practical Module Simulation of Cyber-Physical Systems (6 ECTS/LP) *..........................795

INF-0380: Digital Health (5 ECTS/LP)..797

INF-0383: Algorithms for Big Data (5 ECTS/LP) *.. 799

INF-0385: Seminar Resource Aware Algorithmics (Master) (4 ECTS/LP) *......................................801

INF-0398: Software-intensive Systems and Medical Products (6 ECTS/LP)....................................802

INF-0400: Knowledge Representation in Biomedicine (5 ECTS/LP)..804

INF-0407: Seminar Digital Ethics (Master) (4 ECTS/LP)... 806

INF-0408: Extremal Combinatorics (5 ECTS/LP) *..807

INF-0409: Cyber Security (6 ECTS/LP) *..809

INF-0410: Gesture-Based Communication in Human-Computer Interaction (8 ECTS/LP) *.............. 811

INF-0418: Practical Module Conversational AI: Virtual Assistants and Chatbots (5 ECTS/LP) *........813

11) Language Centre

SZD-0224: German, partial completion of A1 CEFR: Four Skills (6 ECTS/LP) *.............................. 814

SZD-0225: German A1 CEFR: Four Skills (6 ECTS/LP) *..815

SZD-0226: German A1 CEFR: Listening and Pronunciation (3 ECTS/LP) *.....................................816

SZD-0227: German A1 CEFR: Communication and Vocabulary (3 ECTS/LP) *...............................817

SZD-0228: German, partial completion of A2 CEFR: Four Skills (6 ECTS/LP).................................818

SZD-0229: German A2 CEFR: Four Skills (6 ECTS/LP) *..819

SZD-0230: German A2 CEFR: Listening and Pronunciation (3 ECTS/LP) *.....................................820

SZD-0231: German A2 CEFR: Writing and Vocabulary (3 ECTS/LP) *..821

SZD-0232: German, partial completion of B1 CEFR: Four Skills (6 ECTS/LP).................................822

SZD-0233: German B1 CEFR: Four Skills (6 ECTS/LP) *..823

SZD-0234: German B1 CEFR: Listening (3 ECTS/LP) *.. 824

SZD-0235: German B1 CEFR: Conversation and Pronunciation (3 ECTS/LP) *.............................. 825

SZD-0236: German B1 CEFR: Reading and Vocabulary (3 ECTS/LP) *..826

SZD-0237: German B1 CEFR: Writing (3 ECTS/LP) *...827

SZD-0238: German, partial completion of B2 CEFR: Four Skills (6 ECTS/LP).................................828

SZD-0239: German B2 CEFR: Four Skills (6 ECTS/LP) *..829

SZD-0242: German B2 CEFR: Pronunciation (3 ECTS/LP) *...830

SZD-0240: German B2 CEFR: Grammar and Vocabulary (6 ECTS/LP) *...831

SZD-0241: German B2 CEFR: Listening (3 ECTS/LP) *.. 832

SZD-0205: German B2 CEFR: Cultural Studies (3 ECTS/LP) *...833

SZD-0206: German B2 CEFR: Reading and Discussion (3 ECTS/LP) *... 834

SZD-0208: German B2 CEFR: Text Production (3 ECTS/LP) *...835

SZD-0210: German C1 CEFR: Grammar and Writing Skills 1 (6 ECTS/LP) *.................................. 836

SZD-0212: German C1 CEFR: Grammar and Writing Skills 2 (6 ECTS/LP) *.................................. 837

SZD-0214: German C1 CEFR: Listening and Phonetic Skills (6 ECTS/LP) *................................... 838

SZD-0216: German C1 CEFR: Cultural Competence in Communication (6 ECTS/LP) *.................. 839

SZD-0219: German C1 CEFR: Vocabulary and Text Production (6 ECTS/LP) *..............................840

SZD-0221: German C2 CEFR: Academic Language 1 (6 ECTS/LP)...841

SZD-0223: German C2 CEFR: Academic Language 2 (6 ECTS/LP) * 842
SZA-0202: Arabic 1 (6 ECTS/LP) 843
SZA-0205: Arabic 2 (6 ECTS/LP) * 844
SZA-0208: Arabic 3 (6 ECTS/LP) 845
SZA-0211: Arabic 4 (6 ECTS/LP) * 846
SZC-0202: Chinese 1 (6 ECTS/LP) 847
SZC-0205: Chinese 2 (6 ECTS/LP) * 848
SZC-0208: Chinese 3 (6 ECTS/LP) 849
SZC-0211: Chinese 4 (6 ECTS/LP) * 850
SZE-0801: English for Exchange Students (6 ECTS/LP) * 851
SZE-0602: Academic and Professional English 1 (6 ECTS/LP) * 852
SZE-0604: Academic and Professional English 2 (6 ECTS/LP) * 853
SZE-0101: English: Grammar and Pronunciation (6 ECTS/LP) * 854
SZE-0103: British and American Cultural Studies (8 ECTS/LP) * 856
SZE-0105: English: Text Production and Translation 1 (6 ECTS/LP) * 858
SZE-0107: English: Text Production and Translation 2 (6 ECTS/LP) * 860
SZE-0112: English: Grammar and Vocabulary (4 ECTS/LP) * 862
SZE-0301: Business English 1 (5 ECTS/LP) * 863
SZE-0303: Business English 2 (5 ECTS/LP) * 864
SZE-0305: Business English 3 (5 ECTS/LP) * 865
SZE-0307: Business English 4 (5 ECTS/LP) * 866
SZF-0201: French 1 (6 ECTS/LP) * 867
SZF-0202: French 2 (6 ECTS/LP) * 868
SZF-0204: French 3 (6 ECTS/LP) * 869
SZF-0205: French 4 (6 ECTS/LP) * 870
SZF-0206: French 5 (6 ECTS/LP) * 871
SZF-0207: French 6 (6 ECTS/LP) * 872
SZF-0101: French: Oral Skills (5 ECTS/LP) * 873
SZF-0103: French: Grammar and Analytical Skills (5 ECTS/LP) * 875
SZF-0104: French: Text Production and Grammar (6 ECTS/LP) * 877
SZF-0105: French Cultural Studies (8 ECTS/LP) * 879

SZF-0106: French: Text Production and Translation (6 ECTS/LP) * 880
SZF-0108: French: Oral Communication (5 ECTS/LP) * 882
SZF-0109: French: Oral and Intercultural Communication (7 ECTS/LP) * 883
SZF-0301: Business French 1 (5 ECTS/LP) 884
SZF-0303: Business French 2 (5 ECTS/LP) * 885
SZF-0305: Business French 3 (5 ECTS/LP) 886
SZF-0307: Business French 4 (5 ECTS/LP) * 887
SZI-0201: Italian 1 (6 ECTS/LP) * 888
SZI-0204: Italian 2 (6 ECTS/LP) * 889
SZI-0207: Italian 3 (6 ECTS/LP) * 890
SZI-0210: Italian 4 (6 ECTS/LP) * 891
SZI-0101: Italian: Oral Skills (5 ECTS/LP) * 892
SZI-0103: Italian: Grammar and Analytical Skills (5 ECTS/LP) * 893
SZI-0104: Italian: Text Production and Grammar (6 ECTS/LP) * 895
SZI-0105: Italian Cultural Studies (8 ECTS/LP) * 897
SZI-0106: Italian: Text Production and Translation (6 ECTS/LP) * 898
SZI-0108: Italian: Oral Communication (5 ECTS/LP) * 900
SZI-0109: Italian: Oral Communication and Cultural Studies (7 ECTS/LP) * 901
SZX-0202: Japanese 1 (6 ECTS/LP) 903
SZX-0205: Japanese 2 (6 ECTS/LP) * 904
SZX-0208: Japanese 3 (6 ECTS/LP) 905
SZX-0211: Japanese 4 (6 ECTS/LP) * 906
SZP-0201: Portuguese 1 (6 ECTS/LP) 907
SZP-0204: Portuguese 2 (6 ECTS/LP) * 908
SZP-0207: Portuguese 3 (6 ECTS/LP) 909
SZP-0210: Portuguese 4 (6 ECTS/LP) * 910
SZQ-0201: Romanian 1 (6 ECTS/LP) 911
SZQ-0204: Romanian 2 (6 ECTS/LP) * 912
SZQ-0207: Romanian 3 (6 ECTS/LP) 913
SZQ-0210: Romanian 4 (6 ECTS/LP) * 914
SZR-0202: Russian 1 (6 ECTS/LP) 915

SZR-0205: Russian 2 (6 ECTS/LP) * 916
SZR-0208: Russian 3 (6 ECTS/LP) 917
SZR-0211: Russian 4 (6 ECTS/LP) * 918
SZS-0201: Spanish 1 (6 ECTS/LP) * 919
SZS-0204: Spanish 2 (6 ECTS/LP) * 920
SZS-0207: Spanish 3 (6 ECTS/LP) * 921
SZS-0210: Spanish 4 (6 ECTS/LP) * 922
SZS-0101: Spanish: Oral Skills (5 ECTS/LP) * 923
SZS-0103: Spanish: Grammar and Analytical Skills (5 ECTS/LP) * 924
SZS-0104: Spanish: Text Production and Grammar (6 ECTS/LP) * 926
SZS-0105: Spanish Cultural Studies (8 ECTS/LP) * 928
SZS-0106: Spanish: Text Production and Translation (6 ECTS/LP) * 930
SZS-0108: Spanish: Oral Communication (5 ECTS/LP) * 932
SZS-0109: Spanish: Oral Communication and Cultural Studies (7 ECTS/LP) * 933
SZS-0301: Business Spanish A (5 ECTS/LP) 934
SZS-0303: Business Spanish B (5 ECTS/LP) * 935
SZW-0201: Swedish 1 (6 ECTS/LP) 936
SZW-0204: Swedish 2 (6 ECTS/LP) * 937
SZW-0207: Swedish 3 (6 ECTS/LP) 938
SZW-0210: Swedish 4 (6 ECTS/LP) * 939
SZT-0202: Turkish 1 (6 ECTS/LP) 940
SZT-0205: Turkish 2 (6 ECTS/LP) * 941
SZT-0208: Turkish 3 (6 ECTS/LP) 942
SZT-0211: Turkish 4 (6 ECTS/LP) * 943

12) International Office

AAA-0001: "Understanding the Germans" - Intercultural Communication and Awareness (4 ECTS/LP) * 944
AAA-0002: Germany from an Intercultural Perspective (4 ECTS/LP) * 945
AAA-0003: Exploring German Culture (4 ECTS/LP) * 946
AAA-0004: "Studying and Living in Germany" - Intercultural Competence for Exchange Students (4 ECTS/LP) * 947

Module KTH-2700: Introduction to Biblical Studies *Einführung in die Bibelwissenschaft 5LP*	5 ECTS/LP

Version 2.0.0 (since SoSe22)
Person responsible for module: Prof. Erasmus Gass

Contents:

Old Testament

Basic knowledge of

- structure and scope of the Old Testament (canon, canon versions)
- most important ancient translations (Septuagint, Vetus Latina, Vulgate)
- history of Israel (at a glance)
- development and central content of the Old Testament books (focus on Pentateuch, historical books)

New Testament

Basic knowledge about

- structure, origin and character of the Gospels
- the Pauline epistolary literature
- the question of the historical Jesus
- life and work of the apostle Paul
- New Testament contemporary history (overview)

Learning Outcomes / Competences:

Old Testament

The students

can – on the basis of the basic knowledge acquired – answer to

- the structure and scope of the Old Testament (canon, canon versions)
- the most important ancient translations (Septuagint, Vetus Latina, Vulgate)
- the history of Israel (at a glance).
- the development and content of the Old Testament books (focus: Pentateuch, historical books).

They will train an awareness of hermeneutic problems being necessary for understanding Old Testament texts.

New Testament

The students are enabled to independently apply the most important methods in biblical interpretation.

On the basis of the acquired basic knowledge, they will be able to give information and account about

- The structure, origin and character of the Gospels.
- the Pauline epistolary literature.
- the question of the historical Jesus.
- life and work of the apostle Paul.
- New Testament contemporary history (in overview).

They develop an awareness of problems necessary for the understanding of New Testament texts.

Remarks: Regular attendance and independent preparation and follow-up of the courses are expected.		
Workload: Total: 150 h		
Conditions: none		
Frequency: each winter semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Introduction to the Old Testament (Old Testament Studies) **Language:** German **Contact Hours:** 2
Part of the Module: The New Testament: Origins, History, Message (New Testament Studies) **Language:** German **Contact Hours:** 2

Examination

KTH-2700 Overall Module Exam

written exam / length of examination: 120 minutes

Module KTH-3501: Intermediate Module 5: Compulsory Elective Module: Biblical & Historical Theology *Aufbau 5: Wahlpflicht Biblische & Historische Theologie 6LP*		6 ECTS/LP
Version 2.0.0 (since SoSe22) Person responsible for module: Prof. Dr. Stefan Schreiber		
Contents: Topics from Biblical and Historical Theology. The exact contents will be explained in the courses.		
Learning Outcomes / Competences: Content and methodological competences in the area of Biblical and Historical Theology. The exact objectives will be explained in the courses.		
Remarks: Regular attendance and independent preparation and follow-up of the courses are expected.		
Workload: Total: 180 h		
Conditions: none		
Frequency: each semester	**Recommended Semester:** 3. - 6.	**Minimal Duration of the Module:** 2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar in Biblical Theology
Language: German
Contact Hours: 2

Assigned Courses:

"Selbst wenn ich mit dir sterben müsste..." Früheste Reaktionen auf das Todesgeschick Jesu (advanced seminar)

Das Hohe Lied - in Bibel, Spiritualität und Kunst - Seminar im Kloster Weltenburg (seminar)

Hermeneutik und wissenschaftliche Auslegung alttestamentlicher Texte (seminar)

Herren der See – Die Phönizier in der Bibel und in der Antiken Welt (mit Exkursion nach Trier - Römerschiff Bissula) (seminar)

Part of the Module: Seminar in Historical Theology
Language: German
Contact Hours: 2

Assigned Courses:

Sozialfürsorge in der antiken Welt (seminar)

Zwischen Widerstand und politischer Neutralität - Die Kirche(n) im Dritten Reich (seminar)

Examination
KTH-3501 Overall Module Exam
portfolio exam

Module KTH-3502: Intermediate Module 6: Compulsory Elective Module: Systematic Theology *Aufbau 6: Wahlpflicht Systematische Theologie 6LP*		6 ECTS/LP
Version 2.0.0 (since SoSe22) Person responsible for module: Prof. Dr. Stefan Schreiber		
Contents: Topics from Systematic Theology. The exact contents will be explained in the courses.		
Learning Outcomes / Competences: Content and methodological competences in the area of Systematic Theology. The exact objectives will be explained in the courses.		
Remarks: Regular attendance and independent preparation and follow-up of the courses are expected.		
Workload: Total: 180 h		
Conditions: none		
Frequency: each semester	**Recommended Semester:** 3. - 6.	**Minimal Duration of the Module:** 2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar in Dogmatics, Philosophy or Fundamental Theology
Language: German
Contact Hours: 2

Assigned Courses:

Das Zweite Vatikanische Konzil in dogmatischer Perspektive (seminar)

Die Philosophie des Transhumanismus (seminar)

Grundzüge der theologischen Anthropologie (seminar)

Inkarnation (advanced seminar)

Karl Jaspers: Psychologie der Weltanschauungen (seminar)

Negative Theologie – Konzepte, Kontexte, Kritik (seminar)

Offenbarung und Offenbarungen (seminar)

Offenbarungen im Museum. Moderne Kunst und Theologie (seminar)

Theologisch(es) Lesen (seminar)

Unterwerfungsstrategien: Kolonialismus, Rassismus, Mission (seminar)

Part of the Module: Seminar in Moral Theology, Christian Social Ethics or Theology of spiritual life
Language: German
Contact Hours: 2

Assigned Courses:

"leben teilen". Gesellschaftliche Diskurse im Katholizismus (seminar)

Analyse- und Entscheidungsverfahren in der angewandten Ethik (seminar)

Bibel, Spiritualität und Kunst (Blockseminar in Kloster Weltenburg) (seminar)

Klimakrise und Apokalypse (seminar)

Lektüreseminar: Schöpfungsethik (seminar)

Queer und katholische Moral (seminar)

Theologische Tierethik (seminar)

Tiere-Mensch-Beziehungen im Blick von Wirtschaftswissenschaften und Theologie. Welchen Wa(h)ren Wert besitzen Nutztiere? (seminar)

Examination
KTH-3502 Overall Module Exam
portfolio exam

Module KTH-5601: Compulsory Module M2a: Human, Nature, Culture *Pflichtmodul M2a: Mensch, Natur, Kultur*	8 ECTS/LP
Version 3.0.0 (since SoSe22) Person responsible for module: Prof. Dr. Georg Gasser	

Contents:

Metaphysics

- Explication of concepts such as reality, nature and environment

- Clarification of the relationship between the metaphysical concepts of substance, event and process as well as the concepts of nature and history

Anthropology:

- Man as part of nature

- Culture as realm of human existence in contrast to nature

- Value and dignity of the human person

Resource Strategy:

- appropriation of nature

- Resource deposits

- use of resources

- eco-efficiency

- Fair distribution of resources

Learning Outcomes / Competences:

- Students are able to deal with basic metaphysical concepts that are crucial for a comprehensive understanding of reality.
- The position of the human being in reality is to be reflected upon, whereby particular attention is to be paid to the human being as a natural and cultural being.
- Finally, the value of the human person and the instrumental appropriation of the world by humans will also be critically discussed.

Remarks:
Regular attendance and independent preparation and follow-up of the courses are expected.

Workload:
Total: 240 h

Conditions: none		
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Man as a natural and cultural being **Language:** German **Contact Hours:** 2
Assigned Courses: **Bioethik I** (lecture) **Einführung in die Sprachphilosophie** (lecture) **Ethik der Neuzeit: Moralität und Freiheit bei Kant und Mill (Kant, Mill) (Grundtexte der abendländischen Ethik / Aktualität der Klassiker)** (lecture) **Philosophie der Gegenwart** (lecture) **Philosophiegeschichte des Mittelalters** (lecture) **Umwelt- und Technikgeschichte in Osteuropa (20 Jahrhundert)** (lecture) **Umweltgeschichte der Antike** (lecture)
Part of the Module: Resources and sustainability **Language:** German **Contact Hours:** 2
Assigned Courses: **Energiegeographie** (lecture) **Energiegeographie (Kurs 1)** (seminar) **Energiegeographie (Kurs 2)** (seminar)

Examination

KTH-5601 Overall Module Exam

module exam, See curses

Module KTH-5602: Compulsory Module M2b: Human, Nature, Culture *Pflichtmodul M2b: Mensch, Natur, Kultur*	6 ECTS/LP

Version 2.0.0 (since SoSe22)
Person responsible for module: Prof. Dr. Georg Gasser

Contents:

Metaphysics

- Explication of concepts such as reality, nature and environment

- Clarification of the relationship between the metaphysical concepts of substance, event and process as well as the concepts of nature and history

Anthropology:

- Man as part of nature

- Culture as realm of human existence in contrast to nature

- Value and dignity of the human person

Resource Strategy:

- appropriation of nature

- Resource deposits

- use of resources

- eco-efficiency

- Fair distribution of resources

Learning Outcomes / Competences:

Students will be able

- to argue and discuss with confidence using the basic terms they have learned

- to situate human environmental action in an interdisciplinary discourse

Remarks:
Regular attendance and independent preparation and follow-up of the courses are expected.

Workload:
Total: 180 h

Conditions: none		
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Subject area: human, nature, culture **Language:** German **Contact Hours:** 2
Assigned Courses: **"The Morality of Abortion"** (advanced seminar) **"Und die Moral von der Geschicht"** (seminar) **Fehlschlüsse – Analytik, Systematik, Didaktik** (advanced seminar) **HS "Disaster Without Event?" Climate Change in Literature** (advanced seminar) **HS (M.A.): Vorgestellter Verlust - die Bedrohung der natürlichen Lebensgrundlagen im dystopischen Diskurs** (advanced seminar) **HS Environmental Displacement, Citizenship and Conflict in Indigenous Literatures** (seminar) **HS/Ü: Popular Culture and the Environment** (advanced seminar) **History for future? Versuch einer anderen Landes- und Regionalgeschichte als Klimageschichte(M.A. und vertieftes Lehramt)** (advanced seminar) **KTH-5602 Themenfeld: Mensch, Natur, Kultur** **Klima- und Gesundheitseffekte urbaner Wälder** (project seminar) **Klima- und Landnutzungswandel am Beispiel Westafrikas - Climate and land use change in West Africa** (project seminar) **Kritikalitätsbewertung für strategische Rohstoffe** (seminar) **Nachhaltiges Ressourcenmanagement** (seminar) **Nachhaltigkeitsdenken in Aufklärung und Romantik** (advanced seminar) **Nachhaltigkeitsdenken in der Neuzeit (MA/LA Gym)** (advanced seminar) **Politische Ökologie - Political Ecology** (seminar) **Ressourcenspezifische Herausforderungen im Energie- und Gesundheitswesen** (seminar) **Sozialfürsorge in der antiken Welt** (seminar) **“Nature is ancient, but surprises us all” – Natur und Musik von der Gegenwart bis zur Frühen Neuzeit.** (seminar)

Examination
Overall Module Exam term paper

Module WIW-0007: Management Information Systems *Wirtschaftsinformatik*		5 ECTS/LP
Version 5.0.0 (since WS16/17) Person responsible for module: Prof. Dr. Daniel Veit		
Learning Outcomes / Competences: The module communicates the fundamentals of information systems. Upon the successful completion of this module, students can differentiate between types of information systems. They are aware of the tools or processes of IT project and business process management. Students have an understanding of the impacts of information systems on firms and society and are able to discuss their consequences for strategic decision making. They are also able to critically reflect on the associated challenges. As a result, students have the fundamental skills and abilities necessary to make informed strategic and operational IT management decisions and to understand their implications for a variety of stakeholders.		
Workload: Total: 150 h 48 h studying of course content through exercises / case studies (self-study) 30 h studying of course content using provided materials (self-study) 30 h studying of course content using literarture (self-study) 42 h lecture and exercise course (attendance)		
Conditions: keine		**Credit Requirements:** schriftliche Prüfung
Frequency: each winter semester	**Recommended Semester:** 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Management Information Systems (Wirtschaftsinformatik) (Vorlesung) **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 2
Literature: Laudon, K. C., and Laudon, J. P. 2020. Management Information Systems: Managing the Digital Firm, 16th Edition. Piccoli, G., and Pigni, F. 2019. Information Systems for Managers (With Cases), 4th Edition, Prospect Press Inc. Further readings will be given in the lecturing materials.
Part of the Module: Management Information Systems (Wirtschaftsinformatik) (Übung) **Mode of Instruction:** exercise course **Language:** German / English **Contact Hours:** 2
Examination **Wirtschaftsinformatik** written exam / length of examination: 90 minutes **Description:** jedes Semester

Module WIW-0157: Modeling and Optimization in Service Operations Management *Modeling and Optimization in Service Operations Management*		6 ECTS/LP
Version 2.2.0 (since WS16/17) Person responsible for module: Prof. Dr. Jens Brunner		
Learning Outcomes / Competences: At the end of the module, the students are able to understand the approaches to tackle deterministic planning problems in service operations. The students are able to develop mathematical programming models and to implement them using standard optimization software (e.g. OPL/CPLEX). Furthermore, the students are able to assess modeling approaches in terms of effectiveness and efficiency and to present their findings in class. Finally, they are able to make sound decisions.		
Workload: Total: 180 h 48 h studying of course content using provided materials (self-study) 10 h preparation of presentations (self-study) 90 h studying of course content through exercises / case studies (self-study) 32 h seminar (attendance)		
Conditions: Basic knowledge in mathematics and statistics is required.		**Credit Requirements:** Hausaufgaben und Präsentationen
Frequency: each winter semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Modeling and Optimization in Service Operations Management (Seminar)
Mode of Instruction: seminar
Language: English
Contact Hours: 3

Literature:

Williams HP: Model Building in Mathematical Programming, Wiley.

Hillier FS and Lieberman GJ: Introduction to Operations Research, McGraw-Hill.

Winston WL: Operations Research, Thomson.

Latest versions of the books are relevant. Other literature will be announced in the course.

Examination

Modeling and Optimization in Service Operations Management
term paper
Description:
jährlich

Module WIW-0217: Services Marketing: Research (Bachelor) *Services Marketing: Research (Bachelor)*		6 ECTS/LP
Version 2.0.0 (since SoSe17) Person responsible for module: Prof. Dr. Michael Paul		
Learning Outcomes / Competences: After the successful participation in this module, students are able to understand essential concepts, theories, and methods of services marketing research. In particular, they understand how to apply scientific methods to conduct basic research in services marketing. Students are able to gather, evaluate, and interpret research articles and other relevant information to derive scientific statements, arguments, and hypotheses. They are able to formulate research questions and to write basic research papers. Students can apply their knowledge on scientific methods to any research problem beyond this module. Overall, students are able to apply scientific methods to develop scientific statements and to defend their position towards experts and others.		
Workload: Total: 180 h 8 h studying of course content using provided materials (self-study) 40 h studying of course content using literarture (self-study) 5 h studying of course content through exercises / case studies (self-study) 15 h preparation of presentations (self-study) 80 h preparation of written term papers (self-study) 32 h seminar (attendance)		
Conditions: WIW-0005: Marketing (especially basic marketing terms and basics of the marketing mix); WIW-0119: Services Marketing: Principles.		**Credit Requirements:** Seminararbeit, Präsentation und Diskussionsbeteiligung
Frequency: each summer semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Services Marketing: Research

Mode of Instruction: seminar

Language: English

Contact Hours: 3

Literature:

To be announced in the first session.

Assigned Courses:

Services Marketing: Research (Bachelor) (seminar)

Examination

Services Marketing: Research

written/oral exam

Description:

jährlich

Hausarbeit, Präsentation und Diskussionsbeteiligung

Module WIW-0226: New Media Marketing: Research (Bachelor) *New Media Marketing: Research (Bachelor)*		6 ECTS/LP
Version 3.0.0 (since WS18/19) Person responsible for module: Prof. Dr. Michael Paul		
Learning Outcomes / Competences: After the successful participation in this module, students are able to understand essential concepts, theories, and methods of new media marketing research. In particular, they understand how to apply scientific methods to conduct basic research in new media marketing. Students are able to gather, evaluate, and interpret research articles and other relevant information to derive scientific statements, arguments, and hypotheses. They are able to formulate research questions and to write basic research papers. Students can apply their knowledge on scientific methods to any research problem beyond this module. Overall, students are able to apply scientific methods to develop scientific statements and to defend their position towards experts and others.		
Workload: Total: 180 h 15 h preparation of presentations (self-study) 5 h studying of course content through exercises / case studies (self-study) 80 h preparation of written term papers (self-study) 32 h seminar (attendance) 40 h studying of course content using literarture (self-study) 8 h studying of course content using provided materials (self-study)		
Conditions: WIW-0005: Marketing (inbesondere Grundbegriffe des Marketing und Grundlagen zum Marketing Mix); WIW-0120: New Media Marketing: Principles.		**Credit Requirements:** Hausarbeit und Präsentation und Diskussionsbeteiligung
Frequency: each winter semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: New Media Marketing: Research

Mode of Instruction: seminar
Language: English
Contact Hours: 3

Literature:

To be announced in the first session.

Examination

New Media Marketing: Research

portfolio exam

Description:

jährlich

Hausarbeit und Präsentation und Diskussionsbeteiligung

Module WIW-0230: Simulation in Service Operations Management *Simulation in Service Operations Management*		6 ECTS/LP
Version 3.2.0 (since WS16/17) Person responsible for module: Prof. Dr. Jens Brunner		
Learning Outcomes / Competences: At the end of the module, the students are able to understand the approaches to tackle stochastic planning problems in service operations. The students are able to implement such procedures by simulation software (e.g. AnyLogic), assess these approaches in terms of effectiveness and efficiency, and present their findings in class. Finally, they are able to make sound decisions.		
Workload: Total: 180 h 48 h studying of course content using provided materials (self-study) 32 h seminar (attendance) 10 h preparation of presentations (self-study) 90 h studying of course content through exercises / case studies (self-study)		
Conditions: Basic knowledge in mathematics and statistics is required.		**Credit Requirements:** Übungsblätter und Vortrag
Frequency: each summer semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Simulation in Service Operations Management

Mode of Instruction: seminar

Language: English

Contact Hours: 3

Literature:

Banks J, Carson JS, Nelson BL and Nicol DM: Discrete-Event System Simulation, Prentice Hall.

Law A: Simulation Modeling and Analysis, McGraw-Hill.

Latest versions of the books are relevant. Other literature will be announced in the course.

Assigned Courses:

Cases in Simulation (project seminar)

Examination

Simulation in Service Operations Management

term paper

Description:

jährlich

Module WIW-0235: Bachelor Seminar Innovation & International Management (English) *Bachelor Seminar Innovation & International Management (English)*		6 ECTS/LP
Version 3.3.0 (since WS18/19) Person responsible for module: Prof. Dr. Marcus Wagner		
Learning Outcomes / Competences: On successful completion of this module students should be able to analyze selected theoretical concepts according to developed criteria. Furthermore, students should be able to apply management approaches for decision making to practical examples and to use presentation techniques.		
Remarks: The course has limited capacity. Information about registration can be found on the website of the Cluster Strategy, Marketing & Management (https://www.uni-augsburg.de/en/fakultaet/wiwi/cluster-strategy-marketing-management/range-courses-bachelor-students/).		
Workload: Total: 180 h 40 h studying of course content using literarture (self-study) 40 h preparation of presentations (self-study) 68 h preparation of written term papers (self-study) 32 h seminar (attendance)		
Conditions: Prerequisites for attending the seminar are a library introduction course and the attendance at the modules "Innovation Management" and/or "International Entrepreneurship"		**Credit Requirements:** term paper and oral presentation (about 20 minutes)
Frequency: each semester	**Recommended Semester:** 5. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Bachelor Seminar Innovation & International Management (English)

Mode of Instruction: seminar

Language: English

Contact Hours: 3

Literature:

Bätsch, A. (2003). Wissenschaftliches Arbeiten. Oldenbourg (no English translation available, corresponding English texts will be suggested on request).

Assigned Courses:

Bachelor Seminar Innovation & Internationales Management (English) (seminar)

Examination

Bachelor Seminar Innovation & International Management (English)

written/oral exam

Description:

jedes Semester /every semester

term paper and oral presentation (about 20 minutes)

Module WIW-0262: Electronic Commerce *Electronic Commerce (5 LP)*		5 ECTS/LP
Version 1.0.0 (since WS16/17) Person responsible for module: Prof. Dr. Daniel Veit		
Learning Outcomes / Competences: Upon the successful completion of this module, the students are familiar with the forces driving electronic commerce. They understand the impact of technology change on the way businesses operate in electronic channels. They can assess challenges in business development for such companies and are familiar with appropriate models and theories to address these challenges. The awareness of social and ethical issues attached to technology enables them to make sound strategic decisions in the field of electronic commerce.		
Workload: Total: 150 h 60 h studying of course content using provided materials (self-study) 69 h studying of course content using literarture (self-study) 21 h lecture (attendance)		
Conditions: Working knowledge of English is necessary.		**Credit Requirements:** passing the module examination
Frequency: each winter semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Electronic Commerce (5 LP) (Vorlesung)

Mode of Instruction: lecture

Language: English

Contact Hours: 2

Literature:

Chaffey, D., Hemphill T., and Edmundson-Bird, D. Digital business and e-commerce management. Pearson 2019.

Laudon, K. C., and Traver, C.G. 2019. E-commerce 2019: business. technology. society (15th ed.). Pearson

Further readings are provided during the lecture.

Examination

Electronic Commerce

written exam / length of examination: 60 minutes

Description:

every semester

Module WIW-0268: International Accounting *International Accounting (5 LP)*		5 ECTS/LP
Version 1.0.0 (since SoSe17) Person responsible for module: Prof. Dr. Wolfgang Schultze		
Learning Outcomes / Competences: After passing this course students are aware of the international dimensions of financial and managerial accounting. They understand the reasons for the evolution of different accounting systems and resulting challenges for International Financial Reporting Standards (IFRS). The students will be able to conceptualize the key aspects of strategy formulation and its impact on accounting. They are able to apply accounting concepts for management behavioral control.		
Remarks: Restriction on participation		
Workload: Total: 150 h 21 h lecture (attendance) 44 h studying of course content using literarture (self-study) 40 h studying of course content through exercises / case studies (self-study) 45 h studying of course content using provided materials (self-study)		
Conditions: Solid knowledge of managerial and financial accounting from previous lectures.Good command of English.		**Credit Requirements:** passing the module examination
Frequency: each summer semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: International Accounting (5 LP) **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 2
Literature: Will be announced in the course.
Assigned Courses: **International Accounting** (lecture)
Examination **International Accounting** written exam / length of examination: 60 minutes **Description:** every semester

Module WIW-0269: International Entrepreneurship *International Entrepreneurship (5 LP)*		5 ECTS/LP
Version 1.2.0 (since SoSe17) Person responsible for module: Prof. Dr. Marcus Wagner		
Learning Outcomes / Competences: After successful completion of this module students should be able to understand concepts, methods and tools for realising internationally sustainable ventures and to implement these. Furthermore, students should develop their competencies which involve the recognition and evaluation of internationally sustainable entrepreneurial opportunities as well as competencies needed for founding and managing an internationally sustainable venture.		
Workload: Total: 150 h 34 h studying of course content through exercises / case studies (self-study) 15 h preparation of presentations (self-study) 30 h studying of course content using provided materials (self-study) 50 h studying of course content using literarture (self-study) 21 h lecture (attendance)		
Conditions: There are no prerequisites.		
Frequency: each summer semester	**Recommended Semester:** from 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: International Entrepreneurship (5 LP)

Mode of Instruction: lecture

Language: English

Contact Hours: 2

Literature:

Hisrich, R. D. (2016). International Entrepreneurship: Starting, Developing, and Managing a Global Venture. Sage.

Hisrich, R. D., Peters, M.P., & Shepherd, D.A. (2017). Entrepreneurship. McGraw-Hill.

Dean, T. (2014). Sustainable Venturing. Entrepreneurial Opportunity in the Transition to a Sustainable Economy. Pearson.

Assigned Courses:

International Entrepreneurship (lecture)

Examination

International Entrepreneurship

written exam / length of examination: 60 minutes

Description:

every semester

Module WIW-0270: International Finance *International Finance*		5 ECTS/LP
Version 1.0.0 (since WS21/22) Person responsible for module: Prof. Dr. Marco Wilkens Prof. Dr. Yarema Okhrin		

Learning Outcomes / Competences:

Subject-related competencies:

After successfully completing this module, students understand the challenges of international finance and how to make optimal corporate financial decisions concerning investments, financing, and hedging against risks in the international environment.

Methodological competencies:

Students are able to use Excel to analyze finance-related data using various quantitative methods. They are able to calculate and interpret statistical measures and to use the multiple linear regression model in different variants for forecasting. They will also be able to use quantitative methods, particularly in the international currency environment, and interpret the results of the methods.

Interdisciplinary competencies:

Students are able to apply the knowledge they have acquired in any area of their studies that deal with empirical questions in the field of finance and international economics. Students are able to apply quantitative approaches and models for international finance problems to other empirical and theoretical issues.

Key competencies:

Students are able to interpret relationships in the international financial environment with regard to their statements at different levels. This includes, for example, finding causal relationships in economic systems or assessing the quality of statistics. Students are able to use quantitative tools to manage international financial risks.

Workload:

Total: 150 h

20 h studying of course content through exercises / case studies (self-study)

50 h studying of course content using literarture (self-study)

42 h lecture and exercise course (attendance)

38 h studying of course content using provided materials (self-study)

Conditions: A prerequisite for successful participation is thorough mathematical and statistical knowledge, which is taught in courses during the first semesters of every degree in economics or business economics. Furthermore, an essential prerequisite is the willingness to familiarize yourself with the contents of the course and the willingness to independently study the provided resources.		**Credit Requirements:** passing the module examination
Frequency: each winter semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: International Finance (Vorlesung)

Mode of Instruction: lecture

Language: English

Contact Hours: 2

Literature:

Eun, C. / Resnick, B: International Financial Management, 8th Edition, McGraw Hill.

Selected publications

Assigned Courses:

Wiederholung: International Finance (Bachelor) (lecture + exercise)

Part of the Module: International Finance (Übung)

Mode of Instruction: exercise course

Language: English

Contact Hours: 2

Assigned Courses:

Wiederholung: International Finance (Bachelor) (lecture + exercise)

Examination

International Finance

written exam

Description:

every semester

Module WIW-0271: International Taxation *International Taxation (5 LP)*		5 ECTS/LP
Version 1.0.0 (since SoSe17) Person responsible for module: Prof. Dr. Robert Ullmann		
Learning Outcomes / Competences: After completion of this class, students will be able to recognize and discuss major principles in international taxation. This covers particularly different international tax systems, the effect of taxation on investments and the effect of taxation on international allocation of profits by multinational enterprises. Respective topics are discussed in light of current research on these matters. Finally, the class gives an extended introduction into the principles and methods of transfer pricing within multinational enterprises with a specific focus on practical implications.		
Workload: Total: 150 h 21 h lecture (attendance) 31 h studying of course content through exercises / case studies (self-study) 38 h studying of course content using literarture (self-study) 60 h studying of course content using provided materials (self-study)		
Conditions: There are no prerequisites.		**Credit Requirements:** passing the module examination
Frequency: each summer semester	**Recommended Semester:** from 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: International Taxation (5 LP) **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 2
Literature: Will be announced in class.
Assigned Courses: **International Taxation** (lecture)
Examination **International Taxation** written exam / length of examination: 60 minutes **Description:** every semester

Module WIW-0289: Service Operations *Service Operations*	5 ECTS/LP

Version 1.3.0 (since WS16/17)
Person responsible for module: Prof. Dr. Jens Brunner

Learning Outcomes / Competences:
At the end of the module service operations, the students are familiar with the standard problems and models in service operations. They are able to model service operations problems and to solve these models with appropriate mathematical methods. This enables them to analyse service operations problems and to make sound decisions in the field of service operations.

Workload:
Total: 150 h
42 h lecture and exercise course (attendance)
40 h studying of course content using literarture (self-study)
30 h studying of course content through exercises / case studies (self-study)
38 h studying of course content using provided materials (self-study)

Conditions: Basic knowledge in service management, mathematics, and statistics is required.		**Credit Requirements:** passing the module examination
Frequency: each summer semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Service Operations (Übung)
Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Part of the Module: Service Operations (Vorlesung)
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

Fitzsimmons JA and Fitzsimmons MJ: Service Management: Operations, Strategy, Information Technology, McGraw-Hill.

The most recent edition is relevant.

Additional literature will be announced in the semester.

Assigned Courses:

Service Operations (lecture + exercise)

Examination
Service Operations
written exam / length of examination: 60 minutes
Description:
every semester

Module WIW-0302: International Monetary Economics *International Monetary Economics*		5 ECTS/LP
Version 1.0.0 (since SoSe17) Person responsible for module: Prof. Dr. Burkhard Heer		
Learning Outcomes / Competences: After successful participation in the course the students are enabled to comprehend the underlying concepts of an open economy and explain the behavior of exchange rates and balances of accounts. Furthermore they will be able to utilize the models used in the course and analyze fiscal and monetary policies.		
Workload: Total: 150 h 42 h lecture and exercise course (attendance) 30 h studying of course content using provided materials (self-study) 20 h studying of course content through exercises / case studies (self-study) 58 h studying of course content using literarture (self-study)		
Conditions: Basic knowledge in macroeconomics (Makroökonomik I und II). Knowledge in Mathematics (Solution of optimization problems and systems of equations).		**Credit Requirements:** written exam
Frequency: each winter semester	**Recommended Semester:** 3. - 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: International Monetary Economics (Vorlesung)

Mode of Instruction: lecture

Language: English

Contact Hours: 2

Literature:

Blanchard, Olivier, Macroeconomics (4. Edition or higher).

Krugmann, Obstfeld, Melitz, 2011, International Economics: Theory and Policy, 9th ed.

Gärtner, Lutz, 2009, Makroökonomik flexibler and fester Wechselkurse. 4. Aufl. De Grauwe, 2009, Economics of Monetary Union, 8th ed.

Part of the Module: International Monetary Economics (Übung)

Mode of Instruction: exercise course

Language: English

Contact Hours: 2

Examination

International Monetary Economics

written exam / length of examination: 60 minutes

Description:

every semester

Module WIW-0303: Cases in Simulation *Cases in Simulation*		5 ECTS/LP
Version 3.0.0 (since WS21/22) Person responsible for module: Prof. Dr. Jens Brunner		
Learning Outcomes / Competences: Nach der erfolgreichen Teilnahme an diesem Modul sind die Studierenden in der Lage, grundlegende Simulationskenntnisse adäquat anzuwenden und die erhaltenen Ergebnisse korrekt zu interpretieren. Die in der Veranstaltung eingeführten Methoden können die Studierenden nach der Teilnahme auch in einer geeigneten Softwareumgebung umsetzen. Insgesamt soll auch ein kritisches Verständnis bezüglich der Leistungsfähigkeit und der Grenzen der verwendeten Methoden geweckt werden. After the successful completion of this module, students are able to apply simulations methods and to correctly interpret obtained results. The students are capable of implementing the introduced methods using suitable simulation software. Overall, a critical understanding of the capabilities and limitations of the utilized methods will be promoted.		
Workload: Total: 150 h 30 h studying of course content using provided materials (self-study) 30 h preparation of presentations (self-study) 10 h studying of course content using literarture (self-study) 48 h studying of course content through exercises / case studies (self-study) 32 h lecture and exercise course (attendance)		
Conditions: Grundkenntnisse in den Bereichen Operations & Information Management, Programmierung und Statistik. Basic knowledge of operations & information management, programming, and statistics.		
Frequency: each summer semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Cases in Simulation

Mode of Instruction: lecture + exercise

Language: English

Contact Hours: 3

Literature:

Die Literatur wird in der jeweiligen Veranstaltung bekannt gegeben.

The relevant literature will be announced in the respective course.

Assigned Courses:

Cases in Simulation (project seminar)

Examination

Cases in Simulation

portfolio exam

Description:

every year

Module WIW-0326: Summer School on Global Perspectives of Public and Private Sector Interaction I (5 LP) *Summer School on Global Perspectives of Public and Private Sector Interaction I (5 LP)*		5 ECTS/LP
Version 1.1.0 (since SoSe17) Person responsible for module: Prof. Dr. Erik Lehmann		
Learning Outcomes / Competences: This course is designed as a multidisciplinary course that explores theoretical and historical explanations for a range of policy issues in the international system. The concept of globalization, traditionally, is studied with respect to the manner in which countries interact in a more technologically interconnected world.		
Workload: Total: 150 h 18 h studying of course content using provided materials (self-study) 10 h preparation of presentations (self-study) 90 h preparation of written term papers (self-study) 32 h seminar (attendance)		
Conditions: keine		**Credit Requirements:** passing the module examination
Frequency: einmalig SoSe	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Summer School on Global Perspectives of Public and Private Sector Interaction I (5 LP)

Mode of Instruction: seminar

Language: English

Literature:

Audretsch, David. Everything in Its Place: Entrepreneurship and the Strategic Management of Cities, Regions, and States. New York: Oxford University Press, (2015).

Audretsch, David; Lehmann, Erik. The seven secrets of Germany. Economic Resilience in an Era of Global Turbulence. New York: Oxford University Press, (2016).

Assigned Courses:

Global Perspectives of Public and Private Sector Interaction I (Projektstudium)

Examination

Summer School on Global Perspectives of Public and Private Sector Interaction I (5 LP)

written/oral exam

Description:

unique offer in the respective term

seminar paper and presentation

Module WIW-0338: Services Marketing: Principles (5 LP) *Services Marketing: Principles (5 LP)*		5 ECTS/LP
Version 1.0.0 (since WS17/18) Person responsible for module: Prof. Dr. Michael Paul		
Learning Outcomes / Competences: After the successful participation in this module, students are able to understand essential concepts and theories of services marketing. In particular, they understand how services differ from other products; how service quality and customer satisfaction are conceptualized, measured, and managed; how to manage relationships with service customers; and how to brand services. Students are able to apply the concepts and theories to analyze simple case examples and research findings in services marketing. They can apply their knowledge on service quality and customer satisfaction to several business and research problems beyond this module. Overall, students are able to analyze and critically evaluate services marketing phenomena and to explain their ideas to experts and others.		
Workload: Total: 150 h 62 h studying of course content using provided materials (self-study) 46 h studying of course content using literarture (self-study) 42 h lecture and exercise course (attendance)		
Conditions: WIW-0005: Marketing (in particular, basic concepts of Marketing and basics of the Marketing Mix).		**Credit Requirements:** passing the module examination
Frequency: each winter semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Services Marketing: Principles (5 LP) (Vorlesung)

Mode of Instruction: lecture

Language: English

Contact Hours: 2

Literature:

Zeithaml, Valerie A., Mary Jo Bitner, and Dwayne D. Gremler (2017): Services Marketing - Integrating Customer Focus across the Firm, 7th edition, New York: McGraw-Hill.

Part of the Module: Services Marketing: Principles (5 LP) (Übung)

Mode of Instruction: exercise course

Language: English

Examination

Services Marketing: Principles (5 LP)

written exam / length of examination: 60 hours

Description:

every year; unique offer in the summer term 2022

Module WIW-0343: Industrial Services Management *Industrial Services Management (5 LP)*		5 ECTS/LP
Version 1.1.0 (since SoSe18) Person responsible for module: Prof. Dr. Michael Paul		
Learning Outcomes / Competences: After the successful participation in this module, students are able to understand essential concepts and theories of services management in an industrial market setting. In particular, they understand the scope and challenges of industrial markets; the industrial purchasing process of services; critical elements of value offerings for industrial services; and behavioral interactions among industrial service buyers and sellers. Students are able to apply the concepts and theories to analyze simple case examples and research findings in industrial services management. They can apply their knowledge on industrial markets and industrial buying behavior to several business and research problems beyond this module. Overall, students are able to analyze and critically evaluate industrial services management phenomena and to explain their ideas to experts and others.		
Workload: Total: 150 h 31 h studying of course content through exercises / case studies (self-study) 21 h lecture (attendance) 38 h studying of course content using literarture (self-study) 60 h studying of course content using provided materials (self-study)		
Conditions: None		
Frequency: einmalig SoSe	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Industrial Services Management (5 LP) **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 2

Literature:

Anderson, J. C. and J.A. Narus (1984). A Model of the Distributor's Perspective of Distributor-Manufacturer Working Relationships. Journal of Marketing, 48 (January), 62-74.

Anderson, J. C. and J.A. Narus (1990). Model of Distributor Firm and Manufacturer Firm Working Partnerships. Journal of Marketing, 54 (January), 42–58.

Bonoma, T.V. (2006). Major Sales: Who Really Does the Buying? Harvard Business Review, 84 (July-August), 172-181.

Dwyer, R.F. and J. Tanner (1999). Business Marketing. McGraw-Hill, USA.

Dwyer, R.F., P.H. Schurr, and S. Oh (1987). Developing Buyer-Seller Relationships. Journal of Marketing, 51 (April), 11–27.

El-Ansary, A. and L.W. Stern (1972). Power Measurement in the Distribution Channel. Journal of Marketing Research 9(1), 47-52.

Ford, D., L. Gadde, H. Håkansson, and I. Snehota (2006). The Business Marketing Course. West Sussex: John Wiley & Sons.

Ford, D., L. Gadde, H. Håkansson, and I. Snehota (2010). Managing Business Relationships. West Sussex: John Wiley & Sons.

Frazier, G.L. (1983). On the Measurement of Interfirm Power in Channels of Distribution. Journal of Marketing Research, 20 (May), 158–166.

Gundlach, G.T. and E.R. Cadotte, (1994). Exchange Interdependence and Interfirm Interaction: Research in a Simulated Channel Setting. Journal of Marketing Research, 31(4), 516-532.

Leonidou, L.C., D. Palihawadana and M. Theodosiou (2006). An Integrated Model of the Behavioural Dimensions of Industrial Buyer-Seller Relationships, European Journal of Marketing, 40 (1/2), 145-173.

Leonidou, L.C., S. Samiee, B. Aykol, and M. Talias (2014), Antecedents and Outcomes of Exporter-Importer Relationship Quality: Synthesis, Meta-Analysis, and Directions. Journal of International Marketing, 22 (2), 21-46.

Lovelock, C. and J. Wirtz (2011). Services Marketing. Upper Saddle River NJ: Pearson.

Rangan, V.K. and B.Isaacson (1994). Scope and Challenge of Business-to-Business Marketing, in Rangan et al. (Eds), Business Marketing Strategy: Concepts and Applications. Irwin, USA, pp. 3-13.

Shapiro, B.P. and R.S. Posner (2006). Making the Major Sale. Harvard Business Review, 84 (Jul-Aug), 140-148.

Webster, F.E. and Y. Wind (1972). A General Model for Understanding Organizational Buying Behavior. Journal of Marketing, 36 (2), 12-19.

Assigned Courses:

Industrial Services Management (lecture)

Examination

Industrial Services Management (5 LP)

written exam / length of examination: 60 minutes

Module WIW-0344: International Marketing *International Marketing*			5 ECTS/LP
Version 1.7.0 (since SoSe18) Person responsible for module: Prof. Dr. Michael Paul			
Learning Outcomes / Competences: After the successful participation in this module, students are able to understand essential concepts and theories of international marketing. In particular, they understand the influence of environmental forces (e.g., economic, social, cultural, political, legal); approaches of market research in an international setting; international marketing strategies; international marketing mix decisions; and the sources of competitive in international marketing. Students are able to apply the concepts and theories to analyze simple case examples and research findings in international marketing and to formulate international marketing strategies and marketing mix decisions. They can apply their knowledge on international marketing to several business and research problems beyond this module. Overall, students are able to analyze and critically evaluate international marketing phenomena and to explain their ideas to experts and others.			
Workload: Total: 150 h 60 h studying of course content using provided materials (self-study) 38 h studying of course content using literarture (self-study) 31 h studying of course content through exercises / case studies (self-study) 21 h lecture (attendance)			
Conditions: None			**Credit Requirements:** passing the module examination
Frequency: each summer semester	**Recommended Semester:** 4. - 6.		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: International Marketing

Mode of Instruction: lecture

Language: English

Contact Hours: 2

Literature:

Cateora, P., Graham, J., and Gilly, M. (2020). International Marketing. 18th Edition. McGraw-Hill.

Terpstra, V., Foley, J., and Sarathy, R. (2016). International Marketing. 11th Edition. Naper Press.

Keegan, W.J. and Green, M.C. (2020). Global Marketing. 10th Edition. Pearson.

Hill, C.W.L. and Hult, G.T.M. (2019). International Business: Competing in the Global Marketplace. 12th Edition. McGraw-Hill.

Assigned Courses:

International Marketing (lecture)

Examination

International Marketing

written exam / length of examination: 60 minutes

Description:

every year

Module WIW-0347: Service Management *Service Management*		5 ECTS/LP
Version 1.2.0 (since WS18/19) Person responsible for module: Prof. Dr. Jens Brunner		
Learning Outcomes / Competences: At the end of the module service management, the students are familiar with the standard problems and models in service management. They are able to model service management problems and to solve these models with appropriate mathematical methods. This enables them to analyse service management problems and to make sound decisions in the field of service management.		
Workload: Total: 150 h 30 h studying of course content through exercises / case studies (self-study) 40 h studying of course content using literarture (self-study) 38 h studying of course content using provided materials (self-study) 42 h lecture and exercise course (attendance)		
Conditions: Basic knowledge in mathematics and statistics is required.		**Credit Requirements:** passing the module examination
Frequency: each winter semester	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Service Management (Vorlesung)
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

Fitzsimmons JA and Fitzsimmons MJ: Service Management: Operations, Strategy, Information Technology, McGraw-Hill.

The most recent edition is relevant.

Additional literature will be announced in the semester.

Part of the Module: Service Management (Übung)
Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Examination
Service Management
written exam / length of examination: 60 minutes
Description:
every year; unique offer in the summer term 2022

Module WIW-0355: Cases in Business Analytics *Cases in Business Analytics*		5 ECTS/LP
Version 1.3.0 (since SoSe19) Person responsible for module: Prof. Dr. Jens Brunner		
Learning Outcomes / Competences: At the end of the module, the students are able to understand the approaches to tackle business planning problems in service operations. The students are able to analyze, optimize, and simulate business processes. Furthermore, the students are able to assess modeling approaches in terms of effectiveness and efficiency and to present their findings in class. Finally, they are able to make sound decisions.		
Workload: Total: 150 h 30 h preparation of presentations (self-study) 48 h studying of course content through exercises / case studies (self-study) 10 h studying of course content using literarture (self-study) 30 h studying of course content using provided materials (self-study) 32 h lecture and exercise course (attendance)		
Conditions: Basic knowledge in mathematics and statistics is required.		**Credit Requirements:** passing the module examination
Frequency: each semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Cases in Business Analytics

Mode of Instruction: lecture + exercise

Language: English

Contact Hours: 3

Literature:

Literature will be announced in the course

Assigned Courses:

Cases in Business Analytics (project seminar)

Examination

Cases in Business Analytics

portfolio exam

Description:

every semester

Module WIW-0363: Summer School on Strategic Management in the International Context: Public, Private and Nonprofit Organizations I *Summer School on Strategic Management in the International Context: Public, Private and Nonprofit Organizations I*		5 ECTS/LP
Version 1.1.0 (since SoSe20) Person responsible for module: Prof. Dr. Erik Lehmann		
Conditions: none		**Credit Requirements:** Passing the module examination
Frequency: each summer semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Learning Outcomes / Competences:

Upon the successful completion of this course, students will have:

- Cultivated an understanding of strategic management theory at the organizational level of all three sectors - public, private, and nonprofit
- Gained insight into the complexity of multinational organizations in all three sectors, with emphasis on managing for diversity, inclusion and cultural competence in the workplace
- Applied critical analysis to the interaction between public policy, governmental regulation and strategic management of organizations
- Studied the sustainable and ethical considerations within strategic decision-making
- Developed international project management skills by working on team-based consultation projects with students from different cultural backgrounds

Remarks:

Restriction on participation

Workload:

Total: 150 h

Parts of the Module

Part of the Module: Summer School on Strategic Management in the International Context: Public, Private and Nonprofit Organizations I

Mode of Instruction: seminar

Language: English

Contact Hours: 3

Literature:

Audretsch, David; Lehmann, Erik. The Seven Secrets of Germany: Economic Resilience in an Era of Global Turbulence. New York: Oxford University Press, (2015).

Deresky, Helen. International Management: Managing Across Borders and Cultures. 9th edition. New Jersey: Pearson, (2016).

Assigned Courses:

Strategic Management in the International Context: Public, Private and Nonprofit Organizations I (Projektstudium)

Examination

Summer School on Strategic Management in the International Context: Public, Private and Nonprofit Organizations I

written/oral exam

Description:

every year

Module WIW-0367: Systematic Creativity (Design Thinking/Lean Startup/SCRUM) *Systematic Creativity (Design Thinking/Lean Startup/SCRUM)*		5 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Daniel Veit		
Learning Outcomes / Competences: After successful participation in this module, students will be able to apply the basics of user-centered development methods. The methods range from identifying customer problems to develop evidence-based, iterative solutions to meet customer needs. Here, students will sense the benefits of these state-of-the-art methods in innovation management. Students will learn how to approach and apply the methods in a de-risked environment. Further, the learning content imparted in the course is closely coupled with examples from practice in order to convey to the students the benefits but also the risks of applying methods and instruments in a clear manner. Besides fostering method competencies, this seminar will also facilitate the improvement of English skills, as the entire seminar is held in English. Thus, after the successful completion of this module, students will have improved their writing, presentation and discussion skills in English.		
Remarks: This course is limited to a maximum of 20 participants. You can find further information on Digicampus.		
Workload: Total: 150 h 32 h seminar (attendance) 40 h preparation of presentations (self-study) 48 h preparation of written term papers (self-study) 30 h studying of course content using provided materials (self-study)		
Conditions: Working knowledge of English is necessary to understand the literature provided in this module and to prepare and present own findings.		**Credit Requirements:** Passing the module examination
Frequency: unique (winter semester)	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Systematic Creativity (Design Thinking/Lean Startup/SCRUM)
Mode of Instruction: seminar
Language: English
Contact Hours: 3

Literature:
Individual readings are assigned during the lecture.

Examination
Systematic Creativity (Design Thinking/Lean Startup/SCRUM)
written/oral exam
Description:
unique offer in the respective term

Module WIW-0370: Metropolitan Development *Metropolitan Development*	5 ECTS/LP
Version 1.0.0 (since WS20/21) Person responsible for module: Prof. Dr. Erik Lehmann	

Learning Outcomes / Competences:
The focal point of the course will be a group project resulting in a major paper/report and presentation on the strategic management of metropolitan economic development. Students will be part of a group consisting of five people, including students from both Indiana University and the University of Augsburg. They will work together to analyze the economic development of a specific city or region of their choosing. Their projects will address the following questions: 1. What are/were the main economic development problems and challenges? What evidence can be provided to document these challenges? 2. What policies did the governing bodies implement to deal with these challenges? Why was this particular set of policies pursued? 3. How successful were these policies in meeting the economic development challenge particular to that city or region? What evidence can be provided to document the policy's success or lack thereof? The student groups will work together on their project throughout the course. Each student team or group is expected to complete an in-depth paper and make a professional in-class presentation. In addition, the classrooms will be linked through Zoom and all class lectures, discussions and activities will be linked and interactive. Successful completion of the course will result in student development in the following areas: 1. Openness and ability to learn from diverse and different group members from a different cultural and national context. 2. The ability to undertake a major research collaborative project using distance technologies, i.e. Zoom and various internet platforms. 3. The ability to leverage differences in perspectives and backgrounds emanating from cultural and national difference to enhance the analysis and presentation of the group project.

Remarks:
Students have to apply with CV and STUDIS report This course will follow the schedule of the Indiana University "spring semester": Beginning of January 2021 – beginning of May 2021

Workload:
Total: 150 h
20 h studying of course content using literarture (self-study)
44 h studying of course content through exercises / case studies (self-study)
42 h lecture (attendance)
44 h preparation of written term papers (self-study)

Conditions: none		**Credit Requirements:** Unique offer in the respective term
Frequency: each winter semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Metropolitan Development
Mode of Instruction: lecture
Language: English

Literature:

Audretsch, David. Everything in Its Place: Entrepreneurship and the Strategic Management of Cities, Regions, and States. New York: Oxford University Press, (2015).

Examination

Metropolitan Development

Description:

every year

Module WIW-0372: Green Finance *Green Finance*	5 ECTS/LP

Version 1.3.0 (since WS20/21)
Person responsible for module: Prof. Dr. Marco Wilkens

Learning Outcomes / Competences:

Subject-related competencies:

After successfully completing this module, students understand the challenges of green finance and how to make private and corporate financial decisions taking into account climate targets and environmental objectives. The students are familiar with the theoretical foundations of green finance and how climate and environmental aspects fit into classic financial frameworks. Students know how climate related decisions can influence firm values. Students know which green financial products exist, critically reflect their climate effectiveness and know how to evaluate their risks and returns.

Methodological competencies:

Students are able to use Excel to analyze green finance related problems. They are able to calculate and interpret statistical measures. Students are able to discuss and critically reflect green finance related topics based on specific articles from academic and practitioner journals.

Interdisciplinary competencies:

Students are able to apply the knowledge they have acquired in any area of their studies that deal with financial economics in general as well as environmental economics, climate economics, sustainable business administration, and corporate social responsibility.

Key competencies:

Students are able to critically reflect and interpret relationships in the green and climate finance environment. They are able to evaluate how climate related financial decisions affect firm values. Students are able to use quantitative tools to manage financial risks and opportunities resulting from climate change.

Workload:
Total: 150 h
38 h studying of course content using provided materials (self-study)
20 h studying of course content through exercises / case studies (self-study)
50 h studying of course content using literarture (self-study)
42 h lecture and exercise course (attendance)

Conditions: Prerequisites for successful participation are a basic knowledge of mathematics and statistics as well as finance and banking as taught in the first semesters of any business administration or economics bachelor's degree program. In addition, participants should be prepared to work independently on selected contents of the course on the basis of the materials provided.		**Credit Requirements:** Passing the module examination
Frequency: each winter semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Green Finance (Vorlesung)
Mode of Instruction: lecture
Language: English / German
Contact Hours: 2

Literature:

Amel-Zadeh/Serafeim (2018): Why and how investors use ESG information: Evidence from a Global Survey. Financial Analyst Journal (74), 3, 87-103.

Swiss Sustainable Finance (2017) Handbook on Sustainable Investments. CFA Institute Research Foundation.

Worldbank (2019): State and Trends of Carbon Pricing 2019, https://openknowledge.worldbank.org/handle/10986/31755.

Blitz/Fabozzi (2017): Sin Stocks Revisited: Resolving the Sin Stock Anomaly. Journal of Portfolio Management 44 (1), 105-111.

Friede et al (2015): ESG and financial performance: aggregated evidence from more than 2000 empirical studies. Journal of Sustainable Finance & Investments (5), 4, 210-233

Görgen et al. (2019): Carbon Risk. WP Uni Augsburg.

Khan (2019): Corporate Governance, ESG, and Stock Returns around the World. Financial Analyst Journal (75), 4, 103-123 • EU Action Plan for sustainable finance, https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance_de.

Matos (2020): ESG and responsible institutional investing around the world. CFA Institute Research Foundation.

Zerbib (2019): The effect of pro-environmental preferences on bond prices: Evidence from green bonds. Journal of Banking and Finance, 98, pp 39-60.

IPCC (2018): Special Report: Global Warming of 1.5°C: Summary for Policymakers. • European Commission (2020): Sustainable Finance - TEG final report on the EU taxonomy.

Fama/French (1993) Common risk factors in the returns on stocks and bonds. Journal of Financial Economics, 33 (1), 3–56.

Further selected publications.

Part of the Module: Green Finance (Übung)

Mode of Instruction: exercise course

Language: English / German

Contact Hours: 2

Examination

Green Finance

written exam

Description:

every year; unique offer in the summer term 2022

Module WIW-0377: nternational Environmental Policy *International Environmental Policy*		5 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Prof. Dr. Peter Michaelis		
Learning Outcomes / Competences: After completing this module successfully - the students learn to know the difference between national and international environmental policy; - they learn to know the reasons that cause international environmental problems like climate change, loss of biodiversity or damage of the ozone layer; - they learn to know instruments that can be used to prevent international environmental problems like climate change, loss of biodiversity or damage of the ozone layer; - they learn to know why it is difficult to convince enough nations to cooperate and implement the instruments to prevent international environmental problems like climate change, loss of biodiversity or damage of the ozone layer.		
Workload: Total: 150 h 80 h studying of course content using literarture (self-study) 49 h studying of course content using provided materials (self-study) 21 h lecture (attendance)		
Conditions: none		**Credit Requirements:** Passing the module examination
Frequency: einmalig SoSe	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: International Environmental Policy **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 2

Literature:

Barrett, Scott, Environment and Statecraft, The Strategy of Environmental Treaty-making, Oxford 2003.

Boehmer-Christiansen, Sonja, International Environmental Policy: Interests and the Failure of the Kyoto Process, Cheltenham et al. 2002.

Finus, Michael, Game Theoretic Research on the Design of International Environmental Agreements: Insights, Critical Remarks and Future Challenges, Discussion paper No. 414, Hagen 2007.

Fotis, P. and M. Polenus, Sustainable development, environmental policy and renewable energy use: A dynamic panel data approach, Sustainable Development, No. 26, 2018, p. 726-740.

Fujimori, S. and Co-authors, Will international emissions trading help achieve the objectives of the Paris Agreement? Environmental Research Letter, 11, 2016.

Gillingham, K. and J.H. Stock, The cost of reducing greenhouse gas emissions, J. Econ. Perspect., 32 2018.

Glanemann, N. et al., Paris Climate Agreement passes the cost-benefit test, Nat. Commun., 11, 2020.

Heister, Johannes, Economic and Legal Aspects of International Envi¬ronmental Agreements: the Case of Enforcing and Stabilising an International CO2 Agreement, Institut für Weltwirtschaft, Working paper Nr. 711, Kiel 1995.

Marsiliani, Laura, et al., Ed., Environmental Policy in an International Perspective, Dordrecht 2003.

Perman, Roger, et al., Natural Resource and Environmental Economics, 3. Edition, Harlow et al. 2003 (Chapter 10: International environmental problems).

Rasmusen, Eric, Games and Information, An Introduction to Game Theory, Cambridge et al. 1989.

Rübbelke, Dirk T.G., International Climate Policy to Combat Global Warming, Cheltenham et al. 2002.

Schulze, Günther G., Ed., International Environmental Economics, Oxford 2001.

Siebert, Horst, Ed., The Economics of International Environmental Problems, Tübingen 2000.

Examination

International Environmental Policy

written exam

Description:

Unique offer in the respective term

Module WIW-0378: Cases in Resilient Supply Chains: A business game application *Cases in Resilient Supply Chains: A business game application*		5 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Prof. Dr. Manuel Ostermeier		
Learning Outcomes / Competences: The students will first obtain a practice-oriented overview of basics, decisions and interrelations in supply chain management. They will learn the importance of different stages in the supply chain and the interaction between these stages. The students will achieve the ability to understand influencing factors and consequences of supply chain decisions with the help of the business simulation "The Fresh Connection". In a second step, students will understand the importance of resilience in supply chains. Students will learn about risks that need to be taken into account within the supply chain and the corresponding implications and trade-offs for a company’s strategy & operations (using again the business simulation). The students will achieve the competence for autonomous academic self-study and application-oriented presentation of content. A focus of the mediation of competences is on work in cross-functional teams.		
Workload: Total: 150 h 38 h studying of course content using provided materials (self-study) 40 h studying of course content through exercises / case studies (self-study) 30 h preparation of presentations (self-study) 42 h lecture and exercise course (attendance)		
Conditions: • A basic understanding of logistics and supply chain management can be of advantage. • Willingness to work in a team and the motivation for self-reliant working.		**Credit Requirements:** Passing the module examination
Frequency: each summer semester	**Recommended Semester:** from 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Cases in Resilient Supply Chains: A business game application
Mode of Instruction: lecture + exercise
Language: English
Contact Hours: 4

Literature:
To be announced.

Assigned Courses:

Cases in Resilient Supply Chains: A business game application (lecture + exercise)

Examination
Cases in Resilient Supply Chains: A business game application
portfolio exam
Description:
every year

Module WIW-4701: Macroeconomics *Grundlagen der Makroökonomik*	5 ECTS/LP

Version 2.1.0 (since WS16/17)
Person responsible for module: Prof. Dr. Burkhard Heer

Learning Outcomes / Competences:

Fachbezogene Kompetenzen:

Die Studierenden verstehen die grundlegenden theoretischen Zusammenhänge der Makroökonomik. Insbesondere das Zusammenspiel von Güter-, Finanz- und Arbeitsmärkten. Sie kennen und verstehen die Interdependenzen zwischen diesen Märkten und deren Auswirkungen auf Produktionswachstum, Inflation, Konsum und Investitionsentscheidungen. Darüber hinaus verstehen sie die Auswirkungen technischen Fortschritts auf Wachstum und Arbeitsmarkt.

Methodische Kompetenzen:

Die Studierenden sind in der Lage Marktgleichgewichte verschiedener Märkte innerhalb einer Volkswirtschaft graphisch und analytisch zu bestimmen. Sie können Änderungen an einzelnen Modellelementen (z.B. Sparquote, Arbeitslosigkeit, Inflation) selbständig vornehmen und deren Auswirkungen mathematisch und erfahrungsgeleitet prognostizieren.

Fachübergreifende Kompetenzen:

Die Studierenden sind nicht nur in der Lage grundlegende makroökonomische Zusammenhänge zu verstehen sondern diese auf praktische Fragestellungen und wirtschaftspolitische Interventionen innerhalb eines Landes zu beziehen und diese zu analysieren.

Schlüsselkompetenzen:

Studierende sind in der Lage staatliche und institutionelle Interventionen in die o.g. Märkte unter verschiedenen modelltheoretischen Annahmen zu reflektieren und diese intererssierten Laien als auch einem Fachpublikum zu erläutern. Sie können in Diskussionen zu diesen Themen begründet Stellung beziehen und ihren Standpunkt verteidigen.

Remarks:
Veranstaltung ausschließlich für Studierende des Studiengangs GBM.

Workload:
Total: 150 h
38 h studying of course content through exercises / case studies (self-study)
30 h studying of course content using literarture (self-study)
40 h studying of course content using provided materials (self-study)
42 h lecture and exercise course (attendance)

Conditions: Als Voraussetzung für eine erfolgreiche Teilnahme sollte die Studierenden bereits Kenntnisse in Mathematik erworben haben und grundlegende wirtschaftliche Zusammenhänge kennen.		**Credit Requirements:** schriftliche Prüfung
Frequency: each summer semester	**Recommended Semester:** 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Macroeconomics (Vorlesung)
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:
Olivier Blanchard, 2017, Macroeconomics, 7. (updated) Edition, Pearson Education.

Assigned Courses:

Macroeconomics (lecture)

Part of the Module: Macroeconomics (Übung)
Mode of Instruction: exercise course
Language: English
Frequency: each semester
Contact Hours: 2

Assigned Courses:

Macroeconomics (exercise course)

Examination
Macroeconomics
written exam / length of examination: 90 minutes
Description:
jedes Semester

Module WIW-4706: Intercultural Management *Intercultural Management*	5 ECTS/LP

Version 1.0.0 (since SoSe14)
Person responsible for module: Prof. Dr. Wolfgang Schultze
Prof. Dr. Abdellatif A. Filali

Learning Outcomes / Competences:
After successful participation in this course, students are familiar with the theoretical aspects of cultural constructs and have developed an understanding of fundamental cultural national differences as well as their impacts on the international business world. They understand both the potential for conflict and the benefit of cultural diversity in international business relations and can react independently and appropriately to cultural circumstances. The students can apply the essential theoretical concepts of cultural diversity and resolve problems in this field. They are familiar with the relevant management practices for intercultural encounters. Furthermore, they are sensitized towards religious diversity within the context of this course.

Remarks:
This course is exclusively held for GBM students and students studying the IBE Track. The number of participants is limited. Further information concerning the application procedure is provided via Digicampus. Attendance is compulsory for all dates.

Workload:
Total: 150 h
60 h preparation of written term papers (self-study)
21 h lecture (attendance)
35 h studying of course content using provided materials (self-study)
34 h studying of course content using literarture (self-study)

Conditions: Participants must be fluent in English, both written and spoken.		**Credit Requirements:** Hausarbeit
Frequency: each semester	**Recommended Semester:** 2. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Intercultural Management
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

Hampden-Turner, C. (2012). Riding the Waves of Culture: Understanding Diversity in Global Business. 3rd Edition. McGraw Hill.

Hofstede, G. (2010). Cultures and Organizations, Software of the Mind: Intercultural Cooperation and its Importance for Survival. 3nd Edition. McGraw Hill USA.

Jacob, N. (2003). Intercultural Management. Kogan Page Ltd.

Luthans, F./Doh, J. (2015). International Management: Culture, Strategy, and Behavior. McGraw Hill. 9th Edition.

Assigned Courses:

Intercultural Management (lecture)

Examination

Intercultural Management

term paper

Description:

jedes Semester

Module WIW-4707: International Business and Economics *International Business and Economics*		5 ECTS/LP
Version 3.1.0 (since SoSe19) Person responsible for module: Prof. Dr. Susanne Warning Prof. Dr. Peter Welzel		
Learning Outcomes / Competences: Nach erfolgreicher Teilnahme an diesem Modul sind die Studierenden in der Lage, wirtschaftsrelevante Unterschiede zwischen Ländern zu verstehen, zu analysieren und zu bewerten. Sie kennen theoretische Modelle der Volkswirtschaft und der Betriebswirtschaft im internationalen Kontext und verstehen die zugrunde liegenden Mechanismen. Somit können die Studierenden bei Fragestellungen im internationalen Kontext betriebswirtschaftliche ebenso wie volkswirtschaftlichen Aspekte berücksichtigen.		
Workload: Total: 150 h 49 h studying of course content using provided materials (self-study) 55 h studying of course content using literarture (self-study) 25 h studying of course content through exercises / case studies (self-study) 21 h lecture (attendance)		
Conditions: Grundlegende Kenntnisse in BWL und VWL aus dem ersten Studienabschnitt Gute Englischkenntnisse (lesen, schreiben, sprechen)		**Credit Requirements:** schriftliche Prüfung
Frequency: each winter semester	**Recommended Semester:** 3. - 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: International Business and Economics (Vorlesung)

Mode of Instruction: lecture

Language: English

Contact Hours: 2

Literature:

Hill, Charles W.L. (2021): International Business: Competing in the Global Marketplace. International Student Edition. New York: McGraw-Hill Education. 13th Edition.

Examination

International Business and Economics

written exam / length of examination: 60 minutes

Description:

jedes Semester

Module WIW-4708: Project Management *Project Management (5 LP)*			5 ECTS/LP
Version 2.1.0 (since WS16/17) Person responsible for module: Prof. Dr. Jens Brunner			
Learning Outcomes / Competences: At the end of the module the students are familiar with the fundamentals and the specific tasks of project management. In particular they are able to understand how to evaluate, select, plan, and control projects. Furthermore, they will understand how to use software systems like Microsoft Project in order to accomplish these tasks.			
Workload: Total: 150 h 30 h studying of course content through exercises / case studies (self-study) 38 h studying of course content using provided materials (self-study) 40 h studying of course content using literarture (self-study) 42 h lecture and exercise course (attendance)			
Conditions: Basic knowledge in mathematics and statistics is required.			**Credit Requirements:** Passing the module examination
Frequency: each winter semester	**Recommended Semester:** 4. - 6.		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: Project Management (Vorlesung)

Mode of Instruction: lecture

Language: English

Contact Hours: 2

Literature:

Shtub, Bard and Globerson: Project Management, Pearson Prentice Hall (latest Version)

Part of the Module: Project Management (Übung)

Mode of Instruction: exercise course

Language: English

Contact Hours: 2

Examination

Project Management

written exam / length of examination: 60 minutes

Description:

every year

Module WIW-4721: New Media Marketing: Principles *New Media Marketing: Principles (5 LP)*		5 ECTS/LP
Version 3.2.0 (since SoSe17) Person responsible for module: Prof. Dr. Michael Paul		
Learning Outcomes / Competences: After the successful participation in this module, students are able to understand essential concepts and theories of new media marketing. In particular, they understand how new media differ from traditional media; by which concepts and theories new media phenomena can be explained; which challenges, opportunities, and communication formats exist in the era of new media; and how to manage multichannel companies. Students are able to apply the concepts and theories to analyze simple case examples and research findings in new media marketing. They can apply their knowledge on new media marketing to several business and research problems beyond this module. Overall, students are able to analyze and critically evaluate new media marketing phenomena and to explain their ideas to experts and others.		
Workload: Total: 150 h 42 h lecture and exercise course (attendance) 10 h studying of course content through exercises / case studies (self-study) 60 h studying of course content using provided materials (self-study) 38 h studying of course content using literarture (self-study)		
Conditions: WIW-0005: Marketing (especially basic marketing terms and basics of the marketing mix)		**Credit Requirements:** Passing the module examination
Frequency: each summer semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: New Media Marketing: Principles (5 LP) (Vorlesung)

Mode of Instruction: lecture

Language: English

Contact Hours: 2

Literature:

Lauden, Kenneth C. and Carol G. Traver (2021), E-Commerce 2020-2021: Business, Technology, Society. Pearson: Harlow.

Kotler, Philip, Hermawan Kartajaya, and Iwan Setiawan (2021), Marketing 5.0: Technology for Humanity. Wiley: Hoboken.

Assigned Courses:

New Media Marketing: Principles (lecture)

Examination

New Media Marketing: Principles

written exam / length of examination: 60 minutes

Description:

every semester

Module WIW-4723: Digital Government Management *Digital Government Management (5 LP)*		5 ECTS/LP
Version 2.1.0 (since SoSe17) Person responsible for module: Prof. Dr. Daniel Veit		
Learning Outcomes / Competences: Upon the successful completion of this module, students understand the implications of the internet for government and society. They are able to discuss the purposeful use of information and communication technology to reinvent the relationship between government and society by making governments more responsive, accessible, transparent, responsible, participatory, efficient, and effective than before. Students are aware of the technical, organizational, legal, and societal challenges of moving public services online and can describe possible strategies and countermeasures. They are also able to discuss the concept and opportunities of digital democracy and are aware of current issues such as digital participation and open data. Finally, students develop group work and presentation skills by addressing a specific problem in Digital Government Management in a group case study.		
Workload: Total: 150 h 40 h studying of course content using literarture (self-study) 24 h studying of course content through exercises / case studies (self-study) 20 h studying of course content using provided materials (self-study) 24 h preparation of presentations (self-study) 42 h lecture and exercise course (attendance)		
Conditions: Working knowledge of English is necessary.		**Credit Requirements:** Passing the module examination
Frequency: each summer semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Digital Government Management (Vorlesung)
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

Primary Literature:

Veit, D., and Huntgeburth, J. 2014. Foundations of Digital Government: Leading and Managing in the Digital Era, Berlin, Heidelberg: Springer Berlin Heidelberg.

Secondary Literature:

Bishop, P., Kane, J., and Patapan, H. 2002. "The Theory and Practice of E-Democracy: Agency, Trusteeship and Participation on The Web," International Review of Public Administration (7:2), pp. 21-31.

Norris, P. 2001. Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide, Cambridge University Press.

West, D. M. 2005. Digital Government: Technology and Public Sector Performance, Princeton University Press.

Further journal and conference papers will be referenced by the course material.

Assigned Courses:

Digital Government Management (lecture + exercise)

Part of the Module: Digital Government Management (Übung)
Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Assigned Courses:

Digital Government Management (lecture + exercise)

Examination

Digital Government Management
written exam / length of examination: 60 minutes

Description:
every semester

Module WIW-4725: International Trade *International Trade (5 LP)*			5 ECTS/LP
Version 2.2.0 (since SoSe17) Person responsible for module: Prof. Dr. Peter Welzel			
Learning Outcomes / Competences: The module introduces students to the theory and policy of international trade. Against the background of stylized facts from the world economy students get to understand why countries engage in international trade and what economic consequences they can expect. The module also develops a comprehensive understanding of instruments of trade policies, like tariffs and import quotas, and enables students to evaluate their economic effects. To sum up, this module provides students with the ability to analyze international trade and trade policy, including regional integration and supra-national trade policy.			
Workload: Total: 150 h 40 h studying of course content using provided materials (self-study) 18 h studying of course content through exercises / case studies (self-study) 50 h studying of course content using literarture (self-study) 42 h lecture and exercise course (attendance)			
Conditions: Basic knowledge in microeconomics (indifference curve, utility function, demand function, market power in monopoly/oligopoly, profit and utility maximization, social welfare)		**Credit Requirements:** written exam	
Frequency: each summer semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]	
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: International Trade (5 LP) (Vorlesung)

Mode of Instruction: lecture

Language: English

Contact Hours: 2

Literature:

Krugman, P.R., Obstfeld, M., Melitz, M. (2018), International Trade: Theory and Policy, 11th ed., Pearson.

Assigned Courses:

International Trade (lecture + exercise)

Part of the Module: International Trade (5 LP) (Übung)

Mode of Instruction: exercise course

Language: English

Contact Hours: 2

Assigned Courses:

International Trade (lecture + exercise)

Examination

International Trade

written exam / length of examination: 60 minutes

Description:

every term

Module WIW-4994: Industry Analysis *Industry Analysis*		5 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Prof. Dr. Michael Paul		
Learning Outcomes / Competences: After the successful participation in this module, students are able to understand the essential concepts, methods, and managerial tools of industry analysis. In particular, they are able to apply methods and managerial tools of industry analysis to companies in different industries and are able to create relevant managerial insights. Students are able to gather, evaluate, and interpret relevant information to derive statements and arguments. They are able to identify business problems and to write basic reports. Students can apply their knowledge on methods and managerial tools to several research and business problems beyond this module. Overall, students are able to conduct an industry analysis, to defend their position towards managers, experts, and others, and to work in teams.		
Workload: Total: 150 h 21 h seminar (attendance) 28 h preparation of written term papers (self-study) 46 h studying of course content through exercises / case studies (self-study) 24 h preparation of presentations (self-study) 15 h studying of course content using provided materials (self-study) 16 h studying of course content using literarture (self-study)		
Conditions: none		**Credit Requirements:** Hausarbeit, Präsentation und Diskussionsbeteiligung
Frequency: each summer semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Industry Analysis (Seminar)
Mode of Instruction: project seminar
Language: English
Contact Hours: 2

Contents:

- Introductory lecture on industry analysis.
- Visits of companies from different industries (e.g., Audi, Siemens, or Kuka).
- US and German students work in international teams on a presentation on their assigned companies.
- US and German students discuss the company presentations.
- German students write seminar papers which include the application of course contents to the analysis of the assigned companies.

Literature:

To be announced in the first session.

Assigned Courses:

Industry Analysis (seminar)

Examination

Industry Analysis

project work

Description:

jährlich

Hausarbeit, Präsentation, Diskussionsbeteiligung

Module WIW-9842: IT Innovation Research *IT Innovation Research (5 LP)*			5 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Daniel Veit			
Learning Outcomes / Competences: Upon the successful completion of this module, students should be able to critically discuss selected research articles pertaining to topics of IT innovation research. By analyzing research that investigates the adoption and spread of IT-based processes, products and services, students familiarize themselves with theoretical models and concepts in the area of IT adoption behavior of individuals and organizations. Students learn how to critically discuss the assigned papers in contrast to previous research and through the identification and analysis of additional academic literature they evaluate how the papers have subsequently affected the work of researchers and practitioners. By writing and presenting an individual seminar paper, in which they systematically report their approach and findings, students learn how to structure and analyze scientific problems. Thus, methodological skills acquired in this seminar are crucial for writing a bachelor thesis at the chair. Besides fostering analytical thinking, this seminar will also facilitate the improvement of English skills, as the entire seminar is held in English. Thus, after the successful completion of this module, students will have improved their writing, presentation and discussion skills in English.			
Workload: Total: 150 h 10 h studying of course content using provided materials (self-study) 32 h seminar (attendance) 78 h preparation of written term papers (self-study) 30 h preparation of presentations (self-study)			
Conditions: Working knowledge of English is necessary to understand the literature provided in this module and to prepare and present own findings.			**Credit Requirements:** Seminararbeit und Vortrag
Frequency: each semester	**Recommended Semester:** 3. - 5.		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: IT Innovation Research (5 LP)

Mode of Instruction: seminar

Language: English

Contact Hours: 3

Literature:

Individual readings are assigned during the seminar.

Assigned Courses:

IT Innovation Research Seminar (cohort summer term 2022) (seminar)

Examination

IT Innovation Research (5 LP)

seminar

Description:

jedes Semester

Seminararbeit und Vortrag

Module WIW-9854: Online User Behavior Research *Online User Behavior Research*		5 ECTS/LP
Version 1.0.0 (since SoSe17) Person responsible for module: Prof. Dr. Daniel Veit		
Learning Outcomes / Competences: Upon the successful completion of this module, students should be able to critically discuss selected research articles pertaining to customer and user behavior on the internet. By analyzing research that investigates usage and decisions in online channels, students familiarize themselves with theoretical models and concepts in this subject area. Students learn how to critically discuss the assigned papers in contrast to previous research and through the identification and analysis of additional academic literature they evaluate how the papers have subsequently affected the work of researchers and practitioners. By writing and presenting an individual seminar paper, in which they systematically report their approach and findings, students learn how to structure and analyze scientific problems. Thus, methodological skills acquired in this seminar are crucial for writing a bachelor thesis at the chair. Besides fostering analytical thinking, this seminar will also facilitate the improvement of English skills, as the entire seminar is held in English. Thus, after the successful completion of this module, students will have improved their writing, presentation and discussion skills in English.		
Remarks: As the number of places is limited, please visit our homepage to learn about the application procedure.		
Workload: Total: 150 h		
Conditions: Working knowledge of English is necessary to understand the literature provided in this module and to prepare and present own findings.		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Online User Behavior Research **Mode of Instruction:** seminar **Language:** German **Contact Hours:** 3
Contents: • Introduction to academic writing • Examination of an important piece of research in the area of online user behavior • Analysis of theoretical implications • Analysis of practical implications • Structuration, presentation and discussion of the topic Topics deal with the adoption and diffusion of IT-enabled processes, products and services, aspects of change management, individuals' and organizations' behavior, as well as implications of IT innovations for organizational capabilities.
Literature: Individual readings are assigned during the seminar.
Assigned Courses: **Online User Behavior Research (cohort summer term 2022)** (seminar)

Examination

Online User Behavior Research

written/oral exam, jährlich

Module WIW-9865: Digital Transformation Research *Digital Transformation Research (5LP)*		5 ECTS/LP
Version 1.1.0 (since WS17/18) Person responsible for module: Prof. Dr. Daniel Veit		
Learning Outcomes / Competences: Upon the successful completion of this module, students should be able to critically discuss selected research articles pertaining to topics of digital strategy research. By analyzing research that investigates IT-driven and -enabled strategies and business models of both start-ups and mature organizations, students familiarize themselves with theoretical models and concepts in this subject area. Students learn how to critically discuss the assigned papers in contrast to previous research and through the identification and analysis of additional academic literature they evaluate how the papers have subsequently affected the work of researchers and practitioners. By writing and presenting an individual seminar paper, in which they systematically report their approach and findings, students learn how to structure and analyze scientific problems. Thus, methodological skills acquired in this seminar are crucial for writing a bachelor thesis at the chair. Besides fostering analytical thinking, this seminar will also facilitate the improvement of English skills, as the entire seminar is held in English. Thus, after the successful completion of this module, students will have improved their writing, presentation and discussion skills in English.		
Remarks: This module was renamed from Digital Strategy Research. Students who have already passed Digital Strategy Research (WIW-0227 bzw. WIW-9843) cannot take this module.		
Workload: 30 h seminar (attendance) 90 h preparation of written term papers (self-study) 30 h preparation of presentations (self-study)		
Conditions: Working knowledge of English is necessary to understand the literature provided in this module and to prepare and present own findings.		**Credit Requirements:** Seminararbeit und Vortrag
Frequency: each semester	**Recommended Semester:** 3. - 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Digital Transformation Research (5LP) **Mode of Instruction:** seminar **Language:** German
Assigned Courses: **Digital Transformation Research Seminar (cohort summer term 2022)** (seminar)
Examination **Digital Transformation Research (5LP)** seminar **Description:** jährlich Seminararbeit und Vortrag

Module WIW-5016: Advanced Management Information Systems *Seminar Advanced Management Information Systems*		6 ECTS/LP
Version 2.0.0 (since WS16/17) Person responsible for module: Prof. Dr. Daniel Veit		
Learning Outcomes / Competences: Upon the successful completion of this module, students have extended their knowledge on management information systems and empirical research in the information systems field. Topics of this seminar pertain to strategic questions on innovation, adoption and continued use of management information systems. Students learn how to conduct, write and present a systematic and academic literature review on their individually assigned topic. By doing so, students gain a fundamental understanding of the principles of empirical academic work and obtain the ability to systematically and independently address a research topic. Accordingly, the knowledge and methodological skills acquired in this seminar are a necessary foundation to write a master thesis at the chair. Besides fostering analytical thinking, this seminar will also facilitate the improvement of English skills, as the entire seminar is held in English. Thus, after the successful completion of this module, students will have improved their writing, presentation and discussion skills in English.		
Workload: Total: 180 h 30 h preparation of presentations (self-study) 42 h seminar (attendance) 108 h preparation of written term papers (self-study)		
Conditions: Basic knowledge of the topics (e.g., from attending our lectures) is beneficial. Good command of English is useful for understanding the provided literature and preparing presentation and seminar paper. We furthermore recommend attending introductory courses offered by the university library.		**Credit Requirements:** Passing the module examination
Frequency: each winter semester	**Recommended Semester:** 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Seminar Advanced Management Information Systems **Mode of Instruction:** seminar **Language:** English **Contact Hours:** 4
Literature: Initial readings are provided during the seminar.
Examination **Seminar Advanced Management Information Systems** **Description:** every year

Module WIW-5020: Quantitative Methods in Finance *Quantitative Methods in Finance*		6 ECTS/LP
Version 4.6.0 (since WS16/17 to SoSe21) Person responsible for module: Prof. Dr. Yarema Okhrin		
Learning Outcomes / Competences: ***Fachbezogene Kompetenzen:*** Nach der erfolgreichen Teilnahme an diesem Modul sind Studierende vertraut mit typischen Problemen und Fragestellungen die bei der Modellierung von Finanzmarktdaten auftreten. Sie sind in der Lage erlernte Methoden einzusetzen um diese Probleme zu überwinden. Außerdem verstehen sie, wie die erlernten mit der Statistiksoftware angewendet werden können. ***Methodische Kompetenzen:*** Die Studierenden sind in der Lage die Verteilung von Finanzmarktdaten unter der Berücksichtigung spezifischer Eigenschaften solcher Daten zu modellieren. Sie können verschiedene Prognosemodelle, wie autoregressive- (AR), ARCH- und GARCH- Modelle, für lineare und nichtlineare Zeitreihen anwenden (auch in R). Darüber hinaus können sie die Konzepte der nichtparametrischen Kerndichteschätzung und der Verwendung von Copula Methoden zur Beschreibung komplexer nichtlinearer Zusammenhänge in multivariaten Verteilungen anwenden. ***Fachübergreifende Kompetenzen:*** Die Studierenden können die erlernten Methoden in Veranstaltungen mit ökonometrischem Bezug anwenden und analysieren (auch in R). Darüber hinaus ermöglicht ihnen der sichere Umgang mit R, reale Daten auf verschieden Arten zu visualisieren (Histogramme, Box-Plots, Kerndichten, etc.). ***Schlüsselkompetenzen:*** Studierende sind in der Lage komplexe Zusammenhänge in Finanzmärkten aufzudecken und zu analysieren. Die erworbenen Fähigkeiten ermöglichen es den Studierenden forschungsrelevante Aufgabenstellungen empirisch zu bearbeiten.		
Remarks: Die Veranstaltung wird ausschließlich für Studierende des Studiengangs EPP der Prüfungsordnung des Jahres 2011 angeboten. Für die Teilnahme an der Veranstaltung ist eine vorherige Anmeldung per Mail an karin.wuensch@wiwi.uni-augsburg (Sekretariat Prof. Okhrin) vor dem 01.04.2021 zwingend notwendig.		
Workload: Total: 180 h 42 h lecture and exercise course (attendance) 30 h studying of course content through exercises / case studies (self-study) 40 h studying of course content using literarture (self-study) 68 h studying of course content using provided materials (self-study)		
Conditions: Voraussetzung für eine erfolgreiche Teilnahme sind die mathematischen und statistischen Kenntnisse, welche in den Veranstaltungen Mathematik I/II und Statistik I/II vermittelt werden. Die Bereitschaft zum regelmäßigen Besuch der Vorlesung und der Übung, sowie eigene Vor- und Nachbereitung des Stoffs sind notwendig.		**Credit Requirements:** schriftliche Prüfung
Frequency: einmalig SoSe	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Quantitative Methods in Finance (Vorlesung)
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

Mills, T.; R. Markellos: The econometric modelling of financial time series, Cambridge University Press, 2008.

Schmid, T.; M. Trede: Finanzmarktstatistik, Springer, 2005.

Taylor, S.J.: Asset prices, dynamics, volatility and prediction, Princeton University Press, 2005.

Tsay, R.: Analysis of Financial Time Series, John Wiley & Sons, 2005.

Part of the Module: Quantitative Methods in Finance (Übung)
Mode of Instruction: exercise course
Language: English / German
Contact Hours: 2

Examination

Quantitative Methods in Finance

written exam / length of examination: 60 minutes

Module WIW-5040: Transfer Pricing *Transfer Pricing*			6 ECTS/LP
Version 3.1.0 (since SoSe17) Person responsible for module: Prof. Dr. Wolfgang Schultze			
Learning Outcomes / Competences: After passing this course students know the most important institutions of cross border income allocation (e.g. OECD). They are able to apply different transfer pricing methodologies and can analyze related party transactions. Students are able to conduct an arm's length analysis and are familiar with the requirement of transfer pricing documentation. Presenting selected topics by themselves helps students to improve their presentation skills.			
Workload: Total: 180 h 28 h studying of course content through exercises / case studies (self-study) 30 h studying of course content using literarture (self-study) 38 h studying of course content using provided materials (self-study) 20 h preparation of written term papers (self-study) 22 h preparation of presentations (self-study) 42 h lecture and exercise course (attendance)			
Conditions: Good command of the English language. Knowlegde of managerial accounting and international taxation from previous lectures.		**Credit Requirements:** Passing the module examination	
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]	
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Transfer Pricing (Vorlesung) **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 2
Literature: Will be announced in the course.
Assigned Courses: **Transfer Pricing** (lecture)
Examination **Transfer Pricing** written exam **Description:** every year

Module WIW-5058: Investment Funds *Investment Funds*			6 ECTS/LP
Version 2.3.0 (since SoSe17) Person responsible for module: Prof. Dr. Marco Wilkens			
Learning Outcomes / Competences: After passing this course students know the most important theoretic and practical aspects of investment funds. They are familiar with state-of-the-art methods of performance analysis of investment funds and know how to use them in order to assess different performance components separately (timing and selection). Further, students know the economic relations influencing performance. They are able to identify typical biases in performance measurement. They acquire a deep understanding of the properties and characteristics of different fund types such as mutual funds, hedge funds, private equity funds and ETFs. Moreover, students know and understand the regulatory environment in which investment funds operate. The course is therefore most important for students who want to work in the investment industry or for the related regulatory entities. It is also important for students who invest in investment funds. Because many of the theoretic basics are applicable to other areas of finance, the course is also important for all students aspiring to work in the financial industry in general.			
Workload: Total: 180 h 20 h studying of course content through exercises / case studies (self-study) 42 h lecture and exercise course (attendance) 50 h studying of course content using literarture (self-study) 68 h studying of course content using provided materials (self-study)			
Conditions: Due to the methodically demanding course content, successful prior participation in the course "Empirische Kapitalmarktforschung" (Empirical capital markets research) is obligatory. Moreover, students are recommended to take the course "Kapitalmarktorientierte Unternehmenssteuerung" (Capital market-oriented corporate management) before taking investment funds. As only a restricted number of students are admitted to the course, a timely application is also obligatory.			**Credit Requirements:** Passing the module examination
Frequency: each summer semester	**Recommended Semester:** from 2.		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: Investment Funds (Vorlesung)
Mode of Instruction: lecture
Language: German / English
Contact Hours: 2

Literature:

Grinblatt, M. and Titman, S. (1993) Performance Measurement without Benchmarks: An Examination of Mutual Fund Returns. Journal of Business 66, 47-68.

Pollet, J. M. and Wilson, M. (2008) How Does Size Affect Mutual Fund Behavior? Journal of Finance 58, 2941-2969.

Agarwal, V., Naik, N. Y. (2004) Risks and Portfolio Decisions Involving Hedge Funds. Review of Financial Studies 17, 63-98.

Unpublished Working Paper (under review).
Rohleder, M., Scholz, H., and Wilkens, M. (2011) Survivorship Bias and Mutual Fund Performance: Relevance, Significance, and Methdodical Differences. Review of Finance 15, 441-474.

Assigned Courses:

Investment Funds (Master) (lecture)

Part of the Module: Investment Funds (Übung)

Mode of Instruction: exercise course
Language: German
Contact Hours: 2

Assigned Courses:

Investment Funds (Master) (exercise course)

Examination

Investment Funds

written exam / length of examination: 60 minutes

Description:

every year

Module WIW-5089: Health Care Operations Management *Health Care Operations Management*		6 ECTS/LP
Version 2.1.0 (since SoSe17) Person responsible for module: Prof. Dr. Jens Brunner		
Learning Outcomes / Competences: At the end of the module, the students are familiar with the standard problems and models in health care operations management. They are able to model problems and to solve these models with appropriate mathematical methods. This enables them to analyze health care operations management problems and to make sound decisions in the field of health care operations management.		
Workload: Total: 180 h 60 h studying of course content using literarture (self-study) 60 h studying of course content using provided materials (self-study) 18 h studying of course content through exercises / case studies (self-study) 42 h lecture and exercise course (attendance)		
Conditions: (Advanced) knowledge in operations management, mathematics (including Linear Programming), and statistics, knowledge in optimization (e.g. OPL)/ simulation (e.g. Arena) software is an advantage.		**Credit Requirements:** Passing the module examination
Frequency: each summer semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Health Care Operations Management (Vorlesung)
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

Busse, R., J. Schreyögg und C. Gericke: Management im Gesundheitswesen. Springer.

Hall R: Handbook of Health Care System Scheduling, in International Series in Operations

Langabeer II JR: Health Care Operations Management: A Quantitative Approach to Business and Logistics, Jones & Bartlett Publishers.

Ozcan YA: Quantitative Methods in Health Care Management: Techniques and Applications, Wiley.

Vissers, J.M.H. und Beech R.: Health Operations Management: Patient Flow Logistics in Health Care, Taylor & Francis.

For all books, the most recent edition is relevant. Additional literature will be announced in the semester.

Assigned Courses:

Health Care Operations Management (lecture + exercise)

Part of the Module: Health Care Operations Management (Übung)
Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Assigned Courses:

Health Care Operations Management (lecture + exercise)

Examination

Health Care Operations Management

written exam / length of examination: 60 minutes

Description:

every semester

Module WIW-5090: Seminar Health Care Operations Management *Seminar Health Care Operations Management*		6 ECTS/LP
Version 2.1.0 (since WS16/17) Person responsible for module: Prof. Dr. Jens Brunner		
Learning Outcomes / Competences: At the end of the module, the students are able to understand the approaches to tackle several planning problems in health care. The students are able to implement such procedures, assess these approaches in terms of effectiveness and efficiency, present their findings in class. Finally, they are able to make sound decisions.		
Workload: Total: 180 h 28 h studying of course content using provided materials (self-study) 42 h seminar (attendance) 30 h preparation of presentations (self-study) 80 h preparation of written term papers (self-study)		
Conditions: (Advanced) Knowledge in operations management, mathematics (including Linear Programming), and statistics, knowlegde in optimization (e.g. OPL)/ simulation (e.g. Arena) software is an advantage.		**Credit Requirements:** Passing the module examination
Frequency: each semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Seminar Health Care Operations Management **Mode of Instruction:** seminar **Language:** English **Contact Hours:** 4
Literature: Literature will be announced in the semester.
Assigned Courses: **Seminar Health Care Operations Management (MSc)** (seminar)
Examination **Seminar Health Care Operations Management** / length of examination: 60 minutes **Description:** every semester

Module WIW-5093: Global E-Business and Electronic Markets *Global E-Business and Electronic Markets*		6 ECTS/LP
Version 2.2.0 (since SoSe17) Person responsible for module: Prof. Dr. Daniel Veit		
Learning Outcomes / Competences: This module covers the fundamentals of E-Business and Electronic Markets. Students will be able to apply this knowledge to critically analyze and evaluate the opportunities and threats of the growing digital channel. Moreover it equips them with the necessary understanding to develop strategies in the area of E-Business and Electronic Markets. The course enables students to understand, evaluate and apply the most important E-Commerce business models, their components and their success factors. Moreover, emergent issues like internet pricing for tangible goods, services and information goods are covered. The course contributes to an understanding of the importance of ethical topics like privacy, fairness and transparency. Within the second part of the course, students are applying the knowledge acquired to real life cases in today's businesses. Therefore, students are provided with an understanding of the role of information for business strategies by reviewing transaction cost theory, principal agent theory and related economic concepts. Network effects on the internet are complementing these theoretical components. Based on these theories, students are empowered to analyze the impact of information technology and the internet on industry structure. Overall, students will be made aware in what way the online channel differentiates from the offline channel. The aim is to create an understanding of the associated opportunities and threats. During the course, organizational level of analysis and the impact on economic activity stands in the foreground. This view is complemented by individual level theories. Students will also be enabled to discuss, evaluate and apply the fundamentals of E-Business strategy, business models and success factor research and to conceptualize key aspects of electronic markets. Moreover, students will be equipped with the capability to work in a group on a specific problem and to develop solutions for it.		
Workload: Total: 180 h 30 h preparation of presentations (self-study) 48 h studying of course content through exercises / case studies (self-study) 30 h studying of course content using literarture (self-study) 30 h studying of course content using provided materials (self-study) 42 h lecture and exercise course (attendance)		
Conditions: Working knowledge of English is necessary.		**Credit Requirements:** Passing the module examination
Frequency: each summer semester	**Recommended Semester:** 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Global E-Business and Electronic Markets (Vorlesung)
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

Bakos, Y.: The Emerging Role of Electronic Marketplaces on the Internet, Communications of the ACM, 41(8): 35-42, 1998

Porter, M: Strategy and the Internet, Harvard Business Review, 79(3):63-78, 2001

Shapiro, C.; Varian, H.: Information Rules: A Strategic Guide to the Network Economy, Harvard Business School Press, 1999

Additional literature will be provided in the course.

Assigned Courses:

Global E-Business and Electronic Markets (lecture + exercise)

Part of the Module: Global E-Business and Electronic Markets (Übung)

Mode of Instruction: exercise course

Language: English

Contact Hours: 2

Assigned Courses:

Global E-Business and Electronic Markets (lecture + exercise)

Examination

Global E-Business and Electronic Markets

written exam / length of examination: 60 minutes

Description:

every semester

Module WIW-5094: Information Systems Research *Information Systems Research*		6 ECTS/LP
Version 3.0.0 (since WS18/19) Person responsible for module: Prof. Dr. Daniel Veit		
Learning Outcomes / Competences: Upon the successful completion of this module, students have a basic understanding of empirical research in information systems. Topics will be chosen and assigned to students to familiarize them with the information systems research discipline. These topics include IT innovation, IT adoption and continuance, digital strategy, business models, pricing, cloud computing, information privacy, electronic healthcare and others. Students learn how to conduct, write and present a systematic and academic literature review on their individually assigned topic. By doing so, students gain a fundamental understanding of the principles of empirical academic work and obtain the ability to systematically and independently address a research topic. Accordingly, the knowledge and methodological skills acquired in this seminar are a necessary foundation to write a master thesis at the chair. Besides fostering analytical thinking, this seminar will also facilitate the improvement of English skills, as the entire seminar is held in English. Thus, after the successful completion of this module, students will have improved their writing, presentation and discussion skills in English.		
Workload: Total: 180 h 42 h seminar (attendance) 108 h preparation of written term papers (self-study) 30 h preparation of presentations (self-study)		
Conditions: Basic knowledge of the topics (e.g., from attending our lectures) is beneficial.Good command of English is useful for understanding the provided literature and preparing presentation and seminar paper.We furthermore recommend attending introductory courses offered by the university library.		**Credit Requirements:** Passing the module examination
Frequency: each semester	**Recommended Semester:** 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Information Systems Research Seminar
Mode of Instruction: seminar
Language: English
Contact Hours: 4

Literature:

Initial readings are provided during the seminar.

Assigned Courses:

Information Systems Research (cohort summer term 2022) (seminar)

Examination
Information Systems Research Seminar
Description:

every semester

Module WIW-5096: Performance Analysis of Stochastic Systems *Performance Analysis of Stochastic Systems*		6 ECTS/LP
Version 2.0.0 (since WS16/17) Person responsible for module: Prof. Dr. Jens Brunner		
Learning Outcomes / Competences: At the end of the module, the students are familiar with the standard problems and models in operations management. They are able to model problems and to solve these models with appropriate mathematical methods. This enables them to analyze operations management problems and to make sound decisions in the field of operations management.		
Workload: Total: 180 h 68 h studying of course content using provided materials (self-study) 30 h studying of course content through exercises / case studies (self-study) 40 h studying of course content using literarture (self-study) 42 h lecture and exercise course (attendance)		
Conditions: (Advanced) Knowledge in operations management, mathematics (including Linear Programming), and statistics, knowlegde in simulation (e.g. Arena) software is an advantage.		**Credit Requirements:** Passing the module examination
Frequency: each winter semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Performance Analysis of Stochastic Systems (Vorlesung)

Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

Stewart, W.J.:Probability, Markov Chains, Queues, and Simulation: The Mathematical Basis of Performance Modeling, Princeton University Press.

Hall, R.W.: Queueing Methods for Services and Manufacturing, Prentice Hall.

Gross, D. and Harris C.M.: Queueing Theory, John Wiley & Sons.

Banks, J. Carson, J.S., Nelson, B.L. und Nicol, D.M.: Discrete-Event System Simulation, Prentice Hall.

Latest versions of the books are relevant. Other literature will be announced in the course.

Part of the Module: Performance Analysis of Stochastic Systems (Übung)

Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Examination

Performance Analysis of Stochastic Systems

written exam / length of examination: 60 minutes

Description:

every semester

Module WIW-5099: Advanced Topics in Modeling and Optimization *Advanced Topics in Modeling and Optimization*		6 ECTS/LP
Version 2.6.0 (since SoSe17) Person responsible for module: Prof. Dr. Jens Brunner		
Learning Outcomes / Competences: At the end of the module, the students are familiar with optimization problems arising in many practical applications and functional areas. They are able to model these problems mathematically, to understand the problem complexity, and to implement their models in IBM ILOG in order to solve the problems and interpret the solutions. Additionally, the students will gain insight into scripting tools within ILOG such as pre-/postprocessing data, interaction with data bases, and flow control in order to tackle more advanced modeling problems. This enables them to analyze operations management problems and to make sound decisions.		
Workload: Total: 180 h 42 h seminar (attendance) 20 h studying of course content using provided materials (self-study) 78 h studying of course content through exercises / case studies (self-study) 40 h preparation of presentations (self-study)		
Conditions: (Advanced) Knowledge in operations management modeling, mathematics (including Linear Programming); knowledge in optimization software (e.g. IBM ILOG) is assumed; knowledge of a programming language (e.g. Java) is beneficial.		**Credit Requirements:** Passing the module examination
Frequency: each winter semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Advanced Topics in Modeling and Optimization
Mode of Instruction: seminar
Language: English
Frequency: each semester
Contact Hours: 4
ECTS Credits: 6.0

Literature:

Domschke, W. und A. Drexl: Einführung in Operations Research. 8. Aufl., Springer Verlag, Berlin.

Domschke, W.; A. Drexl, R. Klein, A. Scholl und S. Voß: Übungen und Fallbeispiele zum Operations Research. 7. Aufl., Springer-Verlag, Berlin.

Latest versions of the books are relevant. Other literature will be announced in the course.

Examination

Advanced Topics in Modeling and Optimization

written/oral exam

Description:

Every year

homework and presentation

Module WIW-5101: Integer Programming *Integer Programming*			6 ECTS/LP
Version 2.0.0 (since SoSe17) Person responsible for module: Prof. Dr. Jens Brunner			
Learning Outcomes / Competences: At the end of the module, the students are familiar with optimization problems arising in many practical health care applications and functional areas. They are able to model problems, to understand the problem complexity, and to apply appropriately (exact and heuristic) solution approaches to solve their complex research problems at hand. This enables them to analyze health care operations management problems and to make sound decisions.			
Workload: Total: 180 h 42 h lecture and exercise course (attendance) 60 h studying of course content using provided materials (self-study) 60 h studying of course content using literarture (self-study) 18 h studying of course content through exercises / case studies (self-study)			
Conditions: (Advanced) Knowledge in operations management, mathematics (including Linear Programming), and statistics.			**Credit Requirements:** Passing the module examination
Frequency: each summer semester	**Recommended Semester:** 1. - 3.		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: Integer Programming (Vorlesung)
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

Nemhauser GL and Wolsey LA: Integer and Combinatorial Optimization, Wiley.

Wolsey LA: Integer Programming, Wiley.

Winston WL: Operations Research, 5th ed., Thomson.

Latest versions of the books are relevant. Other literature will be announced in the course.

Assigned Courses:

Integer Programming (lecture + exercise)

Part of the Module: Integer Programming (Übung)
Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Assigned Courses:

Integer Programming (lecture + exercise)

Examination

Integer Programming

written exam

Description:

every year

Module WIW-5102: Advanced Management Support *Advanced Management Support*	6 ECTS/LP

Version 3.2.0 (since SoSe17)
Person responsible for module: Prof. Dr. Marco Meier

Learning Outcomes / Competences:
The main objective of this module is that students are familiar with current problems as well as selected theories and methods in order to gain the capability to create human-centered information systems for management support. Upon successful completion of this module, students are able to:

Subject-related skills:

- understand the challenges as well as the opportunities of management support today and in the future - explain key characteristics of management support systems - give an overview of current research topics in the field of management support

Methodical skills:

- extract and integrate essential facts from scientific as well as other sources
- foster reflection processes as well as (group) decisions

Interdisciplinary skills:

- define clear goals
- identify problems in complex systems orderly

Soft skills:

- communicate effectively in oral as well as in written form
- reflect self-critically on experiences and learning outcomes, especially from ethical and sustainability perspectives.

Remarks:
It is recommended to visit this lecture if you intend to write a master's thesis that is advised by the professorship for Business & Information Systems Engineering, in particular Management Support (Prof. Dr. Marco C. Meier).

Workload:
Total: 180 h
69 h studying of course content through exercises / case studies (self-study)
30 h studying of course content using literarture (self-study)
39 h studying of course content using provided materials (self-study)
42 h lecture and exercise course (attendance)

Conditions: Fundamental knowledge about the purpose of management support systems, current challenges in decision making, data transformation, multidimensional data modeling as well as analytics.		**Credit Requirements:** Passing the module examination
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Advanced Management Support (Vorlesung)
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:
Relevant readings will be published at the beginning of the module in the learning platform Digicampus.

Assigned Courses:

Advanced Management Support (Master) (lecture + exercise)

Part of the Module: Advanced Management Support (Übung)
Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Assigned Courses:

Advanced Management Support (Master) (lecture + exercise)

Examination
Advanced Management Support
written exam / length of examination: 60 minutes
Description:
every semester

Module WIW-5115: Corporate Governance: Research *Corporate Governance: Research*	6 ECTS/LP
Version 2.1.0 (since WS16/17) Person responsible for module: Prof. Dr. Erik Lehmann	

Learning Outcomes / Competences:
Nach erfolgreicher Teilnahme an diesem Modul sind Studierende in der Lage wissenschaftliche Artikel und enthaltene Analysen zu verstehen, zu interpretieren und zu bewerten. Sie können die gelesenen Arbeiten selbstständig in sinnvolle Literaturkategorien einordnen. Studierende sind aufgrund des erworbenen Wissens in der Lage, selbstständig bestehende Forschungslücken zu identifizieren, sinnvolle Forschungsfragen abzuleiten und den aktuellen Stand der empirischen Literatur anhand dieser Forschungsfragen schriftlich aufzuarbeiten. Insgesamt soll ein kritisches Verständnis bezüglich der bestehenden Forschung im Bereich Corporate Governance vermittelt werden. Ferner sollen die Studenten die Fähigkeit entwickeln im Bereich Corporate Governance selbstständig wissenschaftlich zu arbeiten.

Workload:
Total: 180 h
19 h studying of course content using literarture (self-study)
94 h preparation of written term papers (self-study)
25 h preparation of presentations (self-study)
42 h seminar (attendance)

Conditions: Grundkenntnisse in empirischer Wirtschaftsforschung Grundkenntnisse im Bereich Corporate Governance und Organisationstheorie		**Credit Requirements:** Kombinierte schriftlich/mündliche Prüfung/Präsentation.
Frequency: each semester	**Recommended Semester:** 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Corporate Governance: Research
Mode of Instruction: seminar
Language: German / English
Contact Hours: 4

Literature:
Wird am kick-off Termin bekannt gegeben

Assigned Courses:

Corporate Governance: Research (Seminar) (seminar)

Examination
Corporate Governance: Research
written/oral exam
Description:
jedes Semester

Module WIW-5123: Services Marketing: Case Studies *Services Marketing: Case Studies*		6 ECTS/LP
Version 2.0.0 (since WS16/17) Person responsible for module: Prof. Dr. Michael Paul		
Learning Outcomes / Competences: After the successful participation in this module, students are able to understand current theories, methods, and managerial tools of services marketing. In particular, they are able to apply research methods and managerial tools to solve case studies and are able to create novel managerial insights in a services marketing context. Students are able to integrate information and to deal with complexity and limited information. They are able to acquire knowledge, information, and skills independently and to write sound case reports. Students can apply their knowledge on methods and managerial tools to several business problems beyond this module. Overall, students are able to conduct case study projects in a largely autonomous way and to clearly defend their position towards managers, experts, and others on an academic level.		
Workload: Total: 180 h 20 h studying of course content using literarture (self-study) 46 h studying of course content through exercises / case studies (self-study) 40 h preparation of presentations (self-study) 28 h preparation of written term papers (self-study) 4 h studying of course content using provided materials (self-study) 42 h seminar (attendance)		
Conditions: Basic methodological skills and basic knowledge of marketing (e.g., descriptive and inductive statistics, regression analysis, marketing research, services marketing).		
Frequency: each winter semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Services Marketing: Case Studies
Mode of Instruction: seminar
Language: English
Contact Hours: 4

Literature:

To be announced in the first session.

Examination

Services Marketing: Case Studies

portfolio exam

Description:

jährlich

Seminararbeit, Präsentation und Diskussionsbeteiligung

Module WIW-5124: New Media Marketing: Research (Master) *New Media Marketing: Research (Master)*		6 ECTS/LP
Version 2.1.0 (since WS16/17) Person responsible for module: Prof. Dr. Michael Paul		
Learning Outcomes / Competences: After the successful participation in this module, students are able to understand current theories and methods of new media marketing research. In particular, they are able to apply scientific methods to create novel insights in new media marketing research. Students are able to integrate knowledge and to deal with complexity and limited information. They are able to acquire knowledge and skills independently and to write sound conceptual or empirical research papers. Students can apply their knowledge on scientific methods to any research problem beyond this module. Overall, students are able to conduct research projects in a largely autonomous way and to clearly defend their position towards experts and others on an academic level.		
Workload: Total: 180 h 15 h preparation of presentations (self-study) 70 h preparation of written term papers (self-study) 42 h seminar (attendance) 8 h studying of course content using provided materials (self-study) 40 h studying of course content using literarture (self-study) 5 h studying of course content through exercises / case studies (self-study)		
Conditions: Basic knowledge of marketing.		**Credit Requirements:** Passing the module examination
Frequency: each winter semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: New Media Marketing: Research **Mode of Instruction:** seminar **Language:** English **Contact Hours:** 4
Literature: To be announced in the first session.
Examination **New Media Marketing: Research** portfolio exam **Description:** every year term paper, presentation and discussion participation

Module WIW-5134: New Media Marketing: Case Studies *New Media Marketing: Case Studies*		6 ECTS/LP
Version 2.1.0 (since SoSe17) Person responsible for module: Prof. Dr. Michael Paul		
Learning Outcomes / Competences: After the successful participation in this module, students are able to understand current theories, methods, and managerial tools of new media marketing. In particular, they are able to apply research methods and managerial tools to solve case studies and are able to create novel managerial insights in a new media marketing context. Students are able to integrate information and to deal with complexity and limited information. They are able to acquire knowledge, information, and skills independently and to write sound case reports. Students can apply their knowledge on methods and managerial tools to several business problems beyond this module. Overall, students are able to conduct case study projects in a largely autonomous way and to clearly defend their position towards managers, experts, and others on an academic level.		
Workload: Total: 180 h 42 h seminar (attendance) 4 h studying of course content using provided materials (self-study) 40 h preparation of presentations (self-study) 28 h preparation of written term papers (self-study) 20 h studying of course content using literarture (self-study) 46 h studying of course content through exercises / case studies (self-study)		
Conditions: Basic knowledge of methods and fundamentals of marketing from bachelor's degree (especially descriptive and inductive statistics, regression analysis, marketing research, new media marketing if applicable)		
Frequency: each summer semester	**Recommended Semester:** 2. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: New Media Marketing: Case Studies
Mode of Instruction: seminar
Language: English
Contact Hours: 4

Literature:
To be announced in the first session.

Assigned Courses:

New Media Marketing: Case Studies (seminar)

Examination
New Media Marketing: Case Studies
portfolio exam
Description:
every year

Module WIW-5135: Advanced Value Based Marketing *Advanced Value Based Marketing*		6 ECTS/LP
Version 4.0.0 (since SoSe17) Person responsible for module: Prof. Dr. Michael Paul		
Learning Outcomes / Competences: After the successful participation in this module, students are able to understand important concepts, theories, and methods of advanced value based marketing with a focus on the brand asset. In particular, they understand brand concepts and theories, brand strategies, and methods for measuring brand performance. Students apply the concepts, theories, and methods to reflect and discuss case studies and research findings, generate ideas for research, and to develop research designs. They can apply their knowledge on performance measurement and research designs to any topic where they are applicable. Overall, students are able to critically analyze and evaluate phenomena related to the management of brands and to create solutions for business and research problems in a largely autonomous way. They are able to exchange their ideas with experts and others on an academic level.		
Workload: Total: 180 h 42 h lecture and exercise course (attendance) 8 h preparation of presentations (self-study) 30 h studying of course content using literarture (self-study) 12 h studying of course content through exercises / case studies (self-study) 88 h studying of course content using provided materials (self-study)		
Conditions: Basic knowledge of methods and fundamentals of marketing from bachelor studies (especially descriptive and inductive statistics, ANOVA, regression analysis, marketing research).		
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Advanced Value Based Marketing (Vorlesung)
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

Keller, Kevin Lane (2013), Strategic Brand Management. Building, Measuring, and Managing Brand Equity, 4th ed., Upper Saddle River, NJ: Pearson.

Sattler, Henrik and Franziska Völckner (2013), Markenpolitik, 3. Aufl., Stuttgart: Kohlhammer.

Assigned Courses:

Advanced Value Based Marketing (lecture + exercise)

Part of the Module: Advanced Value Based Marketing (Übung)
Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Assigned Courses:

Advanced Value Based Marketing (lecture + exercise)

Examination

Advanced Value Based Marketing

portfolio exam / length of examination: 60 minutes

Description:

every year

Module WIW-5136: Services Marketing: Research (Master) *Services Marketing: Research (Master)*		6 ECTS/LP
Version 2.0.0 (since SoSe17) Person responsible for module: Prof. Dr. Michael Paul		
Learning Outcomes / Competences: After the successful participation in this module, students are able to understand current theories and methods of services marketing research. In particular, they are able to apply scientific methods to create novel insights in services marketing research. Students are able to integrate knowledge and to deal with complexity and limited information. They are able to acquire knowledge and skills independently and to write sound conceptual or empirical research papers. Students can apply their knowledge on scientific methods to any research problem beyond this module. Overall, students are able to conduct research projects in a largely autonomous way and to clearly defend their position towards experts and others on an academic level.		
Workload: Total: 180 h 8 h studying of course content using provided materials (self-study) 40 h studying of course content using literarture (self-study) 70 h preparation of written term papers (self-study) 5 h studying of course content through exercises / case studies (self-study) 15 h preparation of presentations (self-study) 42 h seminar (attendance)		
Conditions: Basic knowledge of methods and fundamentals of marketing from Bachelor's degree (especially descriptive and inductive statistics, regression analysis, marketing research, if applicable services marketing)		**Credit Requirements:** Passing the module examination
Frequency: each summer semester	**Recommended Semester:** 2. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Services Marketing: Research
Mode of Instruction: seminar
Language: English
Contact Hours: 4

Literature:

To be announced in the first session.

Assigned Courses:

Services Marketing: Research (Master) (seminar)

Examination

Services Marketing: Research

portfolio exam

Description:

every year

term paper, presentation and discussion participation

Module WIW-5137: Corporate Governance: Concepts *Corporate Governance: Konzepte*		6 ECTS/LP
Version 4.2.0 (since SoSe20) Person responsible for module: Prof. Dr. Erik Lehmann		
Learning Outcomes / Competences: The aim of the course is to enable students to know, analyze and apply different concepts of corporate governance in the context of (corporate) entrepreneurship. Theoretical aspects as well as thoughts behind will be highlighted and students will learn to understand and evaluate their impact on performance. Of particular focus will be key governance theories, the role and influence of market and institutional mechanisms and future developments within the field. Overall, students should learn to use and interpret governance concepts as well as to apply them to concrete situations.		
Remarks: Open to German students as well as Erasmus/Incoming/Freemovers		
Workload: Total: 180 h 48 h studying of course content using provided materials (self-study) 42 h lecture (attendance) 90 h preparation of written term papers (self-study)		
Conditions: -		
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Corporate Governance: Konzepte
Mode of Instruction: lecture
Language: English
Contact Hours: 4

Literature:

Adams, R, Hermalin BE and MS Weisbach (2010): The Role of Boards of Directors in Corporate Governance: A Conceptual Framework and Survey, Journal of Economic Literature 48, 55-107.

Audretsch DB and EE Lehmann (2011), "Introduction", in: Audretsch/Lehmann (eds): Corporate Governance in Small and Medium-Sized Firms, Edward Elgar.

Audretsch DB and EE Lehmann (2013), "Corporate Governance in Newly Listed Firms", in: Levis/Vismara (eds): Handbook of Research on IPO, Edward Elgar (forthcoming).

Gabrielsson, J. (2017). Handbook of research on corporate governance and entrepreneurship.

Edward Elgar Publishing. Hart, O (2011): Thinking about the Firm: A Review of Daniel Spulbers "The Theory of the Firm", Journal of Economic Literature, p. 101-113. (in particular pp 101-108).

Jensen, MC and WH Meckling (1976) : Theory of the Firm: Managerial behavior, Agency Costs, and Ownership Structure, Journal of Financial economics 3, 305-360.

Morris, M. H., Kuratko, D. F., & Covin, J. G. (2010). Corporate entrepreneurship & innovation. Cengage Learning.

Shleifer A and R Vishney (1997): A Survey of Corporate Governance, Journal of Finance 52, 737-780.

Assigned Courses:

Corporate Governance: Konzepte (Vorlesung) (lecture)

Examination

Corporate Governance: Konzepte

term paper

Description:

every year

Module WIW-5138: Advanced Services Marketing *Advanced Services Marketing*		6 ECTS/LP
Version 4.1.0 (since WS16/17) Person responsible for module: Prof. Dr. Michael Paul		
Learning Outcomes / Competences: After the successful participation in this module, students are able to understand important concepts, theories, and methods of services marketing. In particular, they understand the management of people involved in service delivery (i.e., frontline employees and customers) and experimentation in services marketing. Students apply the concepts and theories to reflect and discuss case studies and research findings, generate ideas for research, and develop experimental research designs. They can apply their knowledge on research designs to any topic where experimentation is applicable. Overall, students are able to critically analyze and evaluate phenomena at the service employee-customer interface and to create solutions for business and research problems in a largely autonomous way. They are able to exchange their ideas with experts and others on an academic level.		
Workload: Total: 180 h 26 h studying of course content using literarture (self-study) 84 h studying of course content using provided materials (self-study) 42 h lecture and exercise course (attendance) 16 h preparation of presentations (self-study) 12 h studying of course content through exercises / case studies (self-study)		
Conditions: Basic methodological skills and basic knowledge of marketing (e.g., descriptive and inductive statistics, ANOVA, regression analysis, marketing research, services marketing).		**Credit Requirements:** Passing the module examination
Frequency: each winter semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Advanced Services Marketing (Vorlesung)
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

Bordoloi, Sanjeev, James A. Fitzsimmons, and Mona J. Fitzsimmons (2019), Service Management: Operations, Strategy, and Information Technology, 9th ed., NY: McGraw-Hill.

Shadish, William R., Thomas D. Cook, and Donald T. Campbell (2002), Experimental and Quasi-Experimental Designs for Generalized Causal Inference, 1st ed., Boston: Houghton Mifflin.

Zeithaml, Valerie M., Mary Jo Bitner, and Dwayne D. Gremler (2018), Services Marketing - Integrating Customer Focus across the Firm, 7th ed., NY: McGraw-Hill.

Part of the Module: Advanced Services Marketing (Übung)
Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Examination

Advanced Services Marketing

written exam

Description:

every semester

Module WIW-5147: Summer School on Global Perspectives of Public and Private Sector Interaction II *Summer School on Global Perspectives of Public and Private Sector Interaction II*		6 ECTS/LP
Version 2.0.0 (since SoSe17) Person responsible for module: Prof. Dr. Erik Lehmann		
Learning Outcomes / Competences: This course is designed as a multidisciplinary course that explores theoretical and historical explanations for a range of policy issues in the international system. The concept of globalization, traditionally, is studied with respect to the manner in which countries interact in a more technologically interconnected world.		
Remarks: Restriction on participation		
Workload: Total: 180 h 28 h studying of course content using literarture (self-study) 20 h preparation of presentations (self-study) 90 h preparation of written term papers (self-study) 42 h seminar (attendance)		
Conditions: noone		**Credit Requirements:** Passing the module examination
Frequency: each summer semester	**Recommended Semester:** 2. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Summer School on Global Perspectives of Public and Private Sector Interaction

Mode of Instruction: seminar
Language: English
Contact Hours: 4

Literature:

Audretsch, David. Everything in Its Place: Entrepreneurship and the Strategic Management of Cities, Regions, and States. New York: Oxford University Press, (2015).

Audretsch, David; Lehmann, Erik. The seven secrets of Germany. Economic Resilience in an Era of Global Turbulence. New York: Oxford University Press, (2016).

Assigned Courses:

Global Perspectives of Public and Private Sector Interaction II (Seminar) (seminar)

Examination

Summer School on Global Perspectives of Public and Private Sector Interaction

Description:

every year

Module WIW-5155: Computational Macroeconomics II *Computational Macroeconomics II*		6 ECTS/LP
Version 2.0.0 (since SoSe17) Person responsible for module: Prof. Dr. Alfred Maußner		

Learning Outcomes / Competences:
Fachbezogene Kompetenzen:

Die Studierenden

- kennen die methodischen Grundlagen der dynamischen Makroökonomik,
- kennen die Wechselwirkungen zwischen Trend und Zyklus,
- kennen die Grundlagen und Möglichkeiten der Geldpolitik,
- kennen elementare dynamische Modelle des Arbeitsmarktes,
- kennen Modelle zum Verständnis der Preisbildung von Vermögensobjekten,
- kennen elementare Modelle zur Transmission nationaler und globaler Schocks.

Methodische Kompetenzen:

Die Studierenden sind in der Lage

- mittelgroße dynamische, stochastische allgemeine Gleichgewichtsmodelle zu formulieren,
- mit Hilfe geeigneter Computersoftware zu lösen und zu simulieren
- und die so gewonnenen Ergebnisse ökonomisch zu interpretieren.

Fachübergreifende Kompetenz und Schlüsselqualifikation:

Die Studierenden lernen Werkzeuge kennen und einzusetzen, mit deren Hilfe im Sinne der Lucas Kritik konsistente Wirkunganalysen staatlicher Wirtschaftspolitik möglich sind.

Workload:
Total: 180 h
60 h studying of course content using provided materials (self-study)
42 h lecture and exercise course (attendance)
28 h studying of course content through exercises / case studies (self-study)
50 h studying of course content using literarture (self-study)

Conditions: Notwendige Voraussetzung: Erfolgreicher Besuch der Veranstaltung Computational Macroeconomics I.		**Credit Requirements:** Hausarbeit
Frequency: each summer semester	**Recommended Semester:** 2. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Computational Macroeconomics II (Vorlesung)
Mode of Instruction: lecture
Language: English / German
Contact Hours: 2

Literature:

Acemoglu, Daron, Introduction to Modern Economic Growth, Princeton University Press: Princeton and Oxford, 2009.

Aghion, Phillippe und Peter Howitt, The Economics of Growth, MIT Press: Cambridge, MA and London, 2009.

Barro, Robert J. und Xavier Sala-i-Martin, Economic Growth,McGraw-Hill: New York, Second Edition, 2004.

Galí, Jordi, Monetary Policy, Inflation, and the Business Cycle, Princeton University Press: Princeton, 2008.

Heer, Burkhard und Alfred Maußner, Dynamic General Equilibrium Modeling, 2nd edition, Springer: Berlin, 2009.

McCandless, G., The ABCs of RBCs, Harvard University Press: Cambridge, MA 2008.

Assigned Courses:

Computational Macroeconomics II (lecture)

Part of the Module: Computational Macroeconomics II (Übung)

Mode of Instruction: exercise course

Language: English / German

Contact Hours: 2

Assigned Courses:

Computational Macroeconomics II (Übung) (exercise course)

Examination

Computational Macroeconomics II

term paper

Description:

jährlich

Module WIW-5160: Health Economics *Gesundheitsökonomik - Health Economics*	6 ECTS/LP
Version 2.4.0 (since SoSe17) Person responsible for module: Prof. Dr. Robert Nuscheler	

Learning Outcomes / Competences:

Professional competences:

Students are able to analyze insurance markets and to determine the equilibrium of the insurance market under alternate information constraints and equilibrium concepts. They will be able to distinguish between important market failures in health insurance markets, namely, the free-riding problem, adverse selection, ex ante moral hazard, and ex post moral hazard. Students will be able to pin down the respective market failures and to develop public policy responses that are suited to mitigate the associated welfare losses. Moreover, students need to understand the problem of risk selection in regulated competitive health insurance markets and be aware of the prime policy responses that aim at reducing the health insurers' incentives to engage in risk selection, namely, risk adjustment and risk sharing. Students will be able to explain that imperfect risk adjustment requires a tradeoff between the inefficiencies arising from direct and indirect risk selection. Finally, students understand the principles of the political economy of health care financing and are familiar with the most important financing aspects of the German health care system.

Methodological competences:

After completing this course, students will be able to apply the concepts of welfare economics, information economics and incentives to health insurance markets and to health care financing more generally. This includes the identification of market failures and the development of suited public policy responses. The presentation of empirical research papers enables students to apply their econometric competences to assess the validity of hypotheses derived from economic theory.

Interdisciplinary skills:

A solid understanding of welfare economics and information economics is crucial for understanding the pitfalls and challenges in the field of health economics and beyond. After all, many markets of public concern are plagued by information constraints, e.g., the labor market and, rather generally, markets for goods with imperfect competition. The methods acquired in this course can easily be applied to these markets.

Key competences:

Students are able to analyze relevant markets, assess their efficiency properties, and suggest - if necessary - optimal public policy responses or regulations. As part of this, students are able to reduce research questions to their core, analyze them using modern microeconomic theory, and competently present and defend their results.

Workload:

Total: 180 h
60 h studying of course content using provided materials (self-study)
50 h studying of course content using literarture (self-study)
28 h studying of course content through exercises / case studies (self-study)
42 h lecture and exercise course (attendance)

Conditions:	**Credit Requirements:**
A solid understanding of the concepts of microeconomics and constrained optimization is an advantage. Ideally, participants should have attended the course "Mikroökonomik (Master)" (Advanced Microeconomics). While the content of the lecture is largely applied micro economic theory, the assigned research papers for presentations will have an empirical focus. Basic knowledge of econometrics is an advantage. Participation in the course "Mikroökonometrie" (Microeconometrics) is recommended.	Passing the module examination

Frequency: each summer semester	**Recommended Semester:** 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Gesundheitsökonomik - Health Economics (Vorlesung)
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

Zweifel, Breyer und Kifmann (2009): Health Economics, 2nd edition. Springer-Verlag, Heidelberg.

Supplementary material will be announced in class.

Assigned Courses:

Health Economics - Financing (lecture + exercise)

Part of the Module: Gesundheitsökonomik - Health Economics (Übung)
Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Assigned Courses:

Health Economics - Financing (lecture + exercise)

Examination

Gesundheitsökonomik

portfolio exam

Description:

every semester

Presentation, mid and end examination

Module WIW-5200: Management: Innovation and International Business *Management: Innovation and International Business*		6 ECTS/LP
Version 2.2.0 (since SoSe17) Person responsible for module: Prof. Dr. Marcus Wagner		
Learning Outcomes / Competences: On successful completion of this module students should be able to understand selected topics of strategic management related to sustainably supporting innovation and international business. Furthermore, students should be able to apply theoretical concepts to novel and complex situations provided in case studies to develop and evaluate feasible solutions to identified problems. Students should be able to apply presentation techniques to present their own work and to understand and evaluate the work of their fellows.		
Remarks: Note: We recommend visiting "Management: Innovation and international Business" BEFORE visiting "Management: Globale Nachhaltigkeit". The password for the registration and further information will be provided in the first lecture.		
Workload: Total: 180 h 40 h studying of course content through exercises / case studies (self-study) 54 h studying of course content using literarture (self-study) 16 h preparation of presentations (self-study) 42 h lecture and exercise course (attendance) 28 h studying of course content using provided materials (self-study)		
Conditions: There are no prerequisites.		**Credit Requirements:** Passing the module examination
Frequency: each summer semester	**Recommended Semester:** 2. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Management: Innovation and International Business (Vorlesung)
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H., Teece, D., & Winter, S. G. (2007). Dynamic capabilities: Understanding strategic change in organizations. John Wiley & Sons.

Case studies will be announced as approriate.

Assigned Courses:

Management: Innovation and International Business (lecture + exercise)

Part of the Module: Management: Innovation and International Business (Übung)
Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Assigned Courses:

Management: Innovation and International Business (lecture + exercise)

Examination

Management: Innovation and International Business

written exam

Description:

every year

Module WIW-5202: Management: Research (English) *Management: Research (english)*		6 ECTS/LP
Version 2.5.0 (since SoSe17) Person responsible for module: Prof. Dr. Marcus Wagner		
Learning Outcomes / Competences: On successful completion of this module students should be able to understand existing literature on selected topics. Furthermore, students should be able to apply theoretical concepts to research fields and to analyze them with their own explanatory model or through empirical evaluation. Students should be able to apply theories to abstract from secondary influence factors, think in a causal manner and to operationalize and use theoretical constructs in empirical analyses. Students should be able to apply presentation techniques to present their own work and to understand the work of their fellows.		
Remarks: Ausschlusskriterium: Studierende, welche die Veranstaltung "Master Seminar Innovation & International Management (english)" bereits abgelegt haben können die Veranstaltung "Management: Research (english)" nicht ablegen. Exclusion criterion: Students who have already passed the module "Master seminar "innovation & international management" (english)" can not take the module "Management: Research (english)".		
Workload: Total: 180 h 35 h studying of course content using literarture (self-study) 35 h preparation of presentations (self-study) 68 h preparation of written term papers (self-study) 42 h seminar (attendance)		
Conditions: Prerequisites for attending the seminar are a library introduction course and the attendance at the modules "Management: Globale Nachhaltigkeit" and "Management: Innovation and International Business"		**Credit Requirements:** Passing the module examination
Frequency: each semester	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Management: Research (english)
Mode of Instruction: seminar
Language: English
Contact Hours: 4

Literature:

Will be announced on a case-by-case basis as approriate.

Assigned Courses:

Management: Research (english) (seminar)

Examination

Management: Research (english)

Description:

every semester

Module WIW-5211: Master Seminar in Taxation II *MTax11 - Masterseminar Taxation II (Empirical Research Seminar)*		6 ECTS/LP
Version 1.2.0 (since WS16/17) Person responsible for module: Prof. Dr. Robert Ullmann		
Learning Outcomes / Competences: Nach der erfolgreichen Teilnahme an diesem Modul sind die Studierenden in der Lage, eine wissenschaftliche Ausarbeitung zu erstellen und im Rahmen einer kritischen wissenschaftlichen Diskussion zu verteidigen. Dabei wenden sie einfaches empirisches Instrumentarium (deskriptive Analysen, OLS) an oder erarbeiten eine Zusammenstellung empirischer Literatur im Rahmen eines gezielten Themenüberblicks. Zudem beherrschen sie die in diesem Zusammenhang relevanten Schlüsselkompetenzen, wobei die Kommunikations- und Rhetorikfähigkeiten der Studierenden im Vordergrund stehen. Das Seminar dient auch zur Vorbereitung auf eine empirische Masterarbeit.		
Remarks: Informationen zur Anmeldung finden Sie auf der Website des Lehrstuhls		
Workload: Total: 180 h 42 h seminar (attendance) 20 h studying of course content using literarture (self-study) 28 h studying of course content through exercises / case studies (self-study) 40 h preparation of presentations (self-study) 50 h preparation of written term papers (self-study)		
Conditions: Es sind keine Vorkenntnisse notwendig.		**Credit Requirements:** Seminararbeit und Präsentation
Frequency: each semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: MTax 11 - Masterseminar Taxation II (Empirical Research Seminar) **Mode of Instruction:** seminar **Language:** English / German
Literature: Wird in der Veranstaltung bekannt gegeben.
Assigned Courses: **MTax11 - Masterseminar Taxation II + IV (Empirical Research Seminar)** (lecture)
Examination **MTax 11 - Masterseminar Taxation II (Empirical Research Seminar)** written/oral exam **Description:** jedes Semester Seminararbeit und Präsentation

Module WIW-5243: Machine Learning in Health Care *Machine Learning in Health Care*		6 ECTS/LP
Version 1.2.0 (since SoSe19) Person responsible for module: Prof. Dr. Jens Brunner		
Learning Outcomes / Competences: At the end of the module, students understand the concepts of supervised and unsupervised learning as well as regression and classification problems. Moreover, they are familiar with the most effective machine learning techniques, underlying mathematical concepts and crucial performance indicators. In addition to the theoretical underpinnings of learning, students gain vast practical know-how and are able to apply these techniques to real-world problems. We use Python being the standard language for data science.		
Workload: Total: 180 h 42 h seminar (attendance) 78 h studying of course content through exercises / case studies (self-study) 40 h preparation of presentations (self-study) 20 h studying of course content using provided materials (self-study)		
Conditions: (Advanced) Knowledge in mathematics, particularly linear algebra and stochastics; knowledge of a programming language (e.g. Python) is beneficial; interest in health care applications and team.		**Credit Requirements:** Passing the module examination
Frequency: each summer semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Machine Learning in Health Care **Mode of Instruction:** seminar **Language:** English **Contact Hours:** 4

Literature:

Christopher M. Bishop: Pattern Recognition and Machine Learning. Springer Verlag, 2006.

Andrew Ng: Machine Learning. Stanford University. Online on Coursera: https://www.coursera.org/learn/machine-learning

Google Developers: Machine Learning Crash Course. Online: https://developers.google.com/machine-learning/crash-course

Prashant Natarajan, John C. Frenzel, Detlev H. Smaltz: Demystifying Big Data and Machine Learning for Healthcare. CRC Press, 2017.

Stephen Boyd: Introduction to Applied Linear Algebra -
Vectors, Matrices, and Least Squares. Cambridge University Press, 2017. Online: http://vmls-book.stanford.edu/vmls.pdf

Barry M. Wise, Neal B. Gallagher: An Introduction to Linear Algebra. Online: http://www.eigenvector.com/Docs/LinAlg.pdf

Eric Matthes: Python Crash Course. No Starch Press, 2016.

Official Python tutorial. Online: https://docs.python.org/3/tutorial

Interactive Python tutorial. Online: https://www.learnpython.org/

Other literature will be announced in the course.

Assigned Courses:

Machine Learning in Health Care (project seminar)

Examination

Machine Learning in Health Care

Description:

every year

Module WIW-5250: Master Seminar in Taxation IV *MTax11 - Masterseminar Taxation IV (Empirical Research Seminar)*		6 ECTS/LP
Version 1.0.0 (since WS19/20) Person responsible for module: Prof. Dr. Robert Ullmann		
Learning Outcomes / Competences: Nach der erfolgreichen Teilnahme an diesem Modul sind die Studierenden in der Lage, eine wissenschaftliche Ausarbeitung zu erstellen und im Rahmen einer kritischen wissenschaftlichen Diskussion zu verteidigen. Dabei wenden sie einfaches empirisches Instrumentarium (deskriptive Analysen, OLS) an oder erarbeiten eine Zusammenstellung empirischer Literatur im Rahmen eines gezielten Themenüberblicks. Zudem beherrschen sie die in diesem Zusammenhang relevanten Schlüsselkompetenzen, wobei die Kommunikations- und Rhetorikfähigkeiten der Studierenden im Vordergrund stehen. Das Seminar dient auch zur Vorbereitung auf eine empirische Masterarbeit.		
Remarks: Informationen zur Anmeldung finden Sie auf der Website des Lehrstuhls.		
Workload: Total: 180 h 20 h studying of course content using literarture (self-study) 28 h studying of course content through exercises / case studies (self-study) 42 h seminar (attendance) 40 h preparation of presentations (self-study) 50 h preparation of written term papers (self-study)		
Conditions: Es sind keine Vorkenntnisse notwendig.		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: MTax11 - Masterseminar Taxation IV (Empirical Research Seminar)
Mode of Instruction: seminar
Language: English / German
Contact Hours: 4

Literature:
Wird in der Veranstaltung bekannt gegeben.

Assigned Courses:

MTax11 - Masterseminar Taxation II + IV (Empirical Research Seminar) (lecture)

Examination
MTax11 - Masterseminar Taxation IV (Empirical Research Seminar)
written/oral exam
Description:
jedes Semester

Module WIW-5252: Health Economics – Financing *Health Economics – Financing*	6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Robert Nuscheler	

Learning Outcomes / Competences:

Professional competences:

Students are able to analyze insurance markets and to determine the equilibrium of the insurance market under alternate information constraints and equilibrium concepts. They will be able to distinguish between important market failures in health insurance markets, namely, the free-riding problem, adverse selection, ex ante moral hazard, and ex post moral hazard. Students will be able to pin down the respective market failures and to develop public policy responses that are suited to mitigate the associated welfare losses. Moreover, students need to understand the problem of risk selection in regulated competitive health insurance markets and be aware of the prime policy responses that aim at reducing the health insurers' incentives to engage in risk selection, namely, risk adjustment and risk sharing. Students will be able to explain that imperfect risk adjustment requires a tradeoff between the inefficiencies arising from direct and indirect risk selection. Finally, students understand the principles of the political economy of health care financing and are familiar with the most important financing aspects of the German health care system.

Methodological competences:

After completing this course, students will be able to apply the concepts of welfare economics, information economics and incentives to health insurance markets and to health care financing more generally. This includes the identification of market failures and the development of suited public policy responses. The presentation of empirical research papers enables students to apply their econometric competences to assess the validity of hypotheses derived from economic theory.

Interdisciplinary skills:

A solid understanding of welfare economics and information economics is crucial for understanding the pitfalls and challenges in the field of health economics and beyond. After all, many markets of public concern are plagued by information constraints, e.g., the labor market and, rather generally, markets for goods with imperfect competition. The methods acquired in this course can easily be applied to these markets.

Key competences:

Students are able to analyze relevant markets, assess their efficiency properties, and suggest - if necessary - optimal public policy responses or regulations. As part of this, students are able to reduce research questions to their core, analyze them using modern microeconomic theory, and competently present and defend their results.

Workload:

Total: 180 h
42 h lecture and exercise course (attendance)
50 h studying of course content using literarture (self-study)
28 h studying of course content through exercises / case studies (self-study)
60 h studying of course content using provided materials (self-study)

Conditions:	**Credit Requirements:**
A solid understanding of the concepts of microeconomics and constrained optimization is an advantage. Ideally, participants should have attended the course "Mikroökonomik (Master)" (Advanced Microeconomics). While the content of the lecture is largely applied micro economic theory, the assigned research papers for presentations will have an empirical focus. Basic knowledge of econometrics is an advantage. Participation in the course "Mikroökonometrie" (Microeconometrics) is recommended.	Bestehen der Modulprüfung

Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Health Economics – Financing

Mode of Instruction: lecture + exercise

Language: English

Literature:

Zweifel, Breyer und Kifmann (2009): Health Economics, 2nd edition. Springer-Verlag, Heidelberg.

Supplementary material will be announced in class.

Examination

Health Economics – Financing

portfolio exam

Description:

Students are evaluated on the basis of an assignment, a paper presentation, and an oral exam. The paper presentation is in English. For the assignment and the oral presentation, students can choose between English and German.

jedes Semester

Module WIW-5253: Health Economics – Topics *Health Economics – Topics*	6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Robert Nuscheler	

Learning Outcomes / Competences:

Professional competences:

Students understand what factors and individual traits shape health behaviors and how this relates to the inefficiencies that arise in the presence of health externalities. This includes smoking and the over-use of antibiotics as examples for negative health externalities and vaccinations as an example for positive health externalities. In the context of the latter, students understand the economic epidemiology of infectious diseases and how preventive measures affect the spread of diseases taking Sars-Cov-2 as an example. Students are able to assess the incentive effects of alternative payment schemes for healthcare providers and competently discuss their pros and cons. Students are aware of the most important concepts of the economic evaluation of healthcare services, namely, cost-effectiveness analysis, cost-utility analysis, and cost-benefit analysis. Students can competently discuss the pros and cons of deceases versus living organ donation. The students can identify the differences between different regulations on organ donation (e.g. consent and opt-out) and assess the incentives resulting from these regulations for willingness to donate. Finally, students are aware of the peculiarities of the market for long-term care.

Methodological competences:

After completing this course, students will be able to apply the concepts of welfare economics, information economics and incentives to various areas in the field of health economics, including individual health production, health externalities, economic epidemiology, provider payment, economic evaluation, organ donation, and long-term care. This includes the identification of market failures and the development of suited public policy responses. The presentation of empirical research papers enables students to apply their econometric competences to assess the validity of hypotheses derived from economic theory.

Interdisciplinary skills:

A solid understanding of welfare economics and information economics is crucial for understanding the pitfalls and challenges in the field of health economics and beyond. After all, many markets of public concern are plagued by information constraints, e.g., the labor market and, rather generally, markets for goods with imperfect competition. The methods acquired in this course can easily be applied to these markets.

Key competences:

Students are able to analyze relevant markets, assess their efficiency properties, and suggest - if necessary - optimal public policy responses or regulations. As part of this, students are able to reduce research questions to their core, analyze them using modern microeconomic theory, and competently present and defend their results.

Workload:

Total: 180 h
50 h studying of course content using literarture (self-study)
60 h studying of course content using provided materials (self-study)
28 h studying of course content through exercises / case studies (self-study)
42 h lecture and exercise course (attendance)

Conditions:	**Credit Requirements:**
A solid understanding of the concepts of microeconomics and constrained optimization is an advantage. Ideally, participants should have attended the course "Mikroökonomik (Master)" (Advanced Microeconomics). While the content of the lecture is largely applied micro economic theory, the assigned research papers for presentations will have an empirical focus. Basic knowledge of econometrics is an advantage. Participation in the course "Mikroökonometrie" (Microeconometrics) is recommended.	Passing the module examination

Frequency: each winter semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Health Economics – Topics
Mode of Instruction: lecture + exercise
Language: English
Contact Hours: 4

Literature:
will be announced in class

Examination

Health Economics – Topics
portfolio exam

Description:
every semester

Students are evaluated on the basis of an assignment, a paper presentation, and an oral exam. The paper presentation is in English. For the assignment and the oral presentation, students can choose between English and German.

Module WIW-5257: Summer School on Strategic Management in the International Context: Public, Private and Nonprofit Organizations II *Summer School on Strategic Management in the International Context: Public, Private and Nonprofit Organizations II*	6 ECTS/LP

Version 1.0.0 (since SoSe20)
Person responsible for module: Prof. Dr. Erik Lehmann

Learning Outcomes / Competences:
Upon the successful completion of this course, students will have:

- Cultivated an understanding of strategic management theory at the organizational level of all three sectors ? public, private, and nonprofit.
- Gained insight into the complexity of multinational organizations in all three sectors, with emphasis on managing for diversity, inclusion and cultural competence in the workplace.
- Applied critical analysis to the interaction between public policy, governmental regulation and strategic management of organizations.
- Studied the sustainable and ethical considerations within strategic decision-making.
- Developed international project management skills by working on team-based consultation projects with students from different cultural backgrounds.

Remarks:
The number of participants is limited.

Workload:
Total: 180 h
42 h seminar (attendance)
90 h preparation of written term papers (self-study)
28 h studying of course content using literarture (self-study)
20 h preparation of presentations (self-study)

Conditions: none		**Credit Requirements:** Passing the module examination
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Summer School on Strategic Management in the International Context: Public, Private and Nonprofit Organizations II
Mode of Instruction: seminar
Language: English
Contact Hours: 4

Literature:

Audretsch, David; Lehmann, Erik. The Seven Secrets of Germany: Economic Resilience in an Era of Global Turbulence. New York: Oxford University Press, (2015).

Deresky, Helen. International Management: Managing Across Borders and Cultures. 9th edition. New Jersey: Pearson, (2016).

Assigned Courses:

Strategic Management in the International Context: Public, Private and Nonprofit Organizations II (Seminar)
(seminar)

Examination

on Strategic Management in the International Context: Public, Private and Nonprofit Organizations II
written/oral exam

Description:
every year

Module WIW-5262: Advanced Topics in Service Operations Management *Advanced Topics in Service Operations Management*		6 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Jens Brunner		
Learning Outcomes / Competences: At the end of the module, the students are familiar with optimization problems arising in many practical applications and functional areas. They are able to model these problems mathematically, to understand the problem complexity, and to implement their models in order to solve the problems and interpret the solutions. This enables them to analyze service operations management problems and to make sound decisions in term of effectiveness and efficiency.		
Workload: Total: 180 h 28 h studying of course content using provided materials (self-study) 80 h preparation of written term papers (self-study) 30 h preparation of presentations (self-study) 42 h seminar (attendance)		
Conditions: (Advanced) Knowledge in service operations management, operations research, modeling, and mathematics (including Linear Programming); knowledge in optimization (e.g. IBM ILOG) software is assumed; knowledge of a programming language (e.g. Java) is beneficial.		**Credit Requirements:** Passing the module examination
Frequency: each semester	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Advanced Topics in Service Operations Management **Mode of Instruction:** seminar **Language:** English **Contact Hours:** 4
Literature: The literature depends on the specific topic of the course.
Assigned Courses: **Advanced Topics in Service Operations Management** (seminar)
Examination **Advanced Topics in Service Operations Management** written/oral exam **Description:** every semester

Module WIW-5263: Machine Learning *Machine Learning*			6 ECTS/LP
Version 1.0.0 (since WS20/21) Person responsible for module: Prof. Dr. Yarema Okhrin			

Learning Outcomes / Competences:

Subject-related competencies:

After the successful participation in this module, students have a good understanding of the objectives, tools and potential applications of supervised and unsupervised Machine Learning. The students understand the mathematical and statistical background of the models, can apply the discussed techniques in R and interpret the results correctly. Furthermore, the students understand the key steps of a modelling/learning process, its reasoning and requirements.

Methodological competencies:

The students learn the key approaches to performance measurement of supervised learning techniques with a focus on the separation between explanatory and predictive modelling. The feature engineering for large data sets is discussed on the example of lasso and elasticnet regressions. The students understand and can apply tree-based models such as regression trees, bagging and random forests as well as models stemming from neural networks, such as MLP, recurrent NN and basics of deep learning. The students can solve classification problems using support vector machines and Bayes' classifiers. Furthermore, ensample models and super learners will be discussed based on the previously learned techniques. Finally, the students become familiar with the most popular ideas and tools of interpretable machine learning, (LIME and Shapley measures). Relying on the methods discussed in the second part of the course the students will be able to apply methods of unsupervised learning for pattern recognition using advanced clustering techniques. The participants can apply and interpret correctly the PCA for the purpose of dimension reduction. From the last part of the module, the students will be familiar with such advanced areas of machine learning for unstructured data as text mining and image processing.

Interdisciplinary competencies:

For practical applications, we use the statistical software R. The students can apply the ML methods to solve practical questions of modelling, forecasting or classification for large data with a focus on applications in business and economics. The students can draw economic conclusions from complex ML models and learn the potential of these methods in practice.

Key competencies:

The students are able to correctly assess data structures, select appropriate modelling methods and apply them using the software R. Furthermore, they are able to present and interpret the results in a conclusive manner.

Workload:
Total: 180 h
42 h lecture and exercise course (attendance)
70 h studying of course content using provided materials (self-study)
34 h studying of course content using literarture (self-study)
34 h studying of course content through exercises / case studies (self-study)

Conditions: The key prerequisite for a successful participation in the course is a good background in mathematical and statistical methods and a basic experience with software R. This is covered by the modules Mathematics I/II and Statistics I/II. A successfully passed Data Mining course (Bachelor) and Econometrics (Master) are of advantage. The willingness to attend the lecture regularly, as well as independent preparation and follow-up of the lectures are necessary.		**Credit Requirements:** Passing the module examination
Frequency: each winter semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]

Contact Hours: 4	Repeat Exams Permitted: according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Machine Learning (Übung)
Mode of Instruction: exercise course
Language: English / German
Contact Hours: 2

Part of the Module: Machine Learning (Vorlesung)
Mode of Instruction: lecture
Language: English / German
Contact Hours: 2

Literature:

James, Witten, Hastie, Tibshirani (2013): An Introduction to Statistical Learning - with Applications in R, Springer.

Hastie, Tibshirani, Friedman (2009): The Elements of Statistical Learning – Data Mining, Inference and Prediction, Springer.

Hothorn, Everitt (2014) A Handbook of Statistical Analyses using R, Chapman and Hall/CRC; 3 edition-

Efron and Hastie (2016), Computer Age Statistical Inference: Algorithms, Evidence and Data Science.

Bishop (2007) Pattern Recognition and Machine Learning.

Goodfellow, Bengio, Courville (2017) Deep Learning.

Molnar (2020) Interpretable Machine Learning: A Guide for Making Black Box Models Explainable.

Examination

Machine Learning
written exam

Description:
every year; unique offer in the summer term 2022

Module WIW-5264: Artificial Intelligence in Business *Artificial Intelligence in Business*		6 ECTS/LP
Version 1.0.0 (since WS20/21) Person responsible for module: Prof. Dr. Daniel Veit		
Learning Outcomes / Competences: Artificial intelligence (AI) is rapidly emerging as the most important and transformative digital technology of our time. Recent advances have led to a rapid proliferation of new approaches that are changing the competitive landscape for companies in almost all industries. Therefore an understanding of this technology is indispensable for future managers Upon completion of this module students therefore possess basic knowledge of the conceptual and technological foundations of AI and its strategic implications for companies. They can distinguish different types of machine learning as core enablers of AI (e.g., deep learning, neural networks). They are able to formulate strategies for using AI to create value in companies and to apply the appropriate tools and techniques. Students are familiar with the limitations, pitfalls and possible countermeasures when using AI. They are capable of discussing the societal, ethical and legal implications of the use of AI in business. During the course, the students are divided into heterogeneous teams of 3-6 students. Within these teams they will learn to develop their own strategy to use AI to solve a real business problem. Finally, the teams will compete with their solution against the solutions of the other teams in a pitch towards the company's stakeholders.		
Remarks: This course is limited to a maximum of 20 participants. You can find further information on Digicampus.		
Workload: Total: 180 h 30 h preparation of presentations (self-study) 108 h preparation of written term papers (self-study) 42 h seminar (attendance)		
Conditions: A basic understanding of organizational processes and information systems in firms. Fundamental knowledge of statistics.		**Credit Requirements:** Passing the module examination
Frequency: einmalig SoSe	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Artificial Intelligence in Business **Mode of Instruction:** seminar **Language:** English **Contact Hours:** 4
Literature: Initial readings are provided during the course.
Assigned Courses: **Artificial Intelligence in Business** (seminar)
Examination **Artificial Intelligence in Business** **Description:** Unique offer in the respective term

Module WIW-5268: Topics in Behavioural Controlling *Topics in Behavioural Controlling*		6 ECTS/LP
Version 1.0.0 (since WS21/22) Person responsible for module: Prof. Dr. Jennifer Kunz		
Learning Outcomes / Competences: After successfully completing this module, students will be able to critically evaluate scientific texts and understand the use of different methodological approaches. Furthermore, they deeply understand behavioral approaches in the context of the design of management control systems. The analytical skills imparted in the course are of great relevance both to scientific work and responsible work in an operational context.		
Remarks: There is an introduction date and a presentation date. The number of participants is limited.		
Workload: Total: 180 h 90 h preparation of written term papers (self-study) 30 h studying of course content using literarture (self-study) 18 h preparation of presentations (self-study) 42 h seminar (attendance)		
Conditions: Knowledge of controlling or accounting is recommended.		**Credit Requirements:** Passing the module examination
Frequency: each winter semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Topics in Behavioural Controlling **Mode of Instruction:** seminar **Language:** English **Contact Hours:** 4
Literature: Articles will be announced depending on the topic.
Examination **Topics in Behavioural Controlling** **Description:** every year

Module WIW-5275: Empirical Research in Innovation and Entrepreneurship *Empirical Research in Innovation and Entrepreneurship*		6 ECTS/LP
Version 1.0.0 (since WS21/22) Person responsible for module: Prof. Dr. Erik Lehmann		
Learning Outcomes / Competences: In small groups, participants plan and execute an empirical study in the topic area of innovation and entrepreneurship using the statistics software R. They write a term paper and present their statistical analysis in class. The lectures provide guidance throughout all stages of the research process, including programming in R.		
Workload: Total: 180 h 42 h lecture and exercise course (attendance) 94 h preparation of written term papers (self-study) 25 h preparation of presentations (self-study) 19 h studying of course content using provided materials (self-study)		
Conditions: This course provides an introduction to academic research in the fields of innovation and entrepreneurship, with an emphasis on empirical work. In small groups, participants propose, plan, and carry out focused empirical research projects, employing the statistics software R. No previous knowledge in R is required. Basic knowledge in statistics in helpful but no prerequisite.		**Credit Requirements:** Passing the module examination
Frequency: unique (winter semester)	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Empirical Research in Innovation and Entrepreneurship

Mode of Instruction: lecture + exercise

Language: German

Contact Hours: 4

Literature:

Auer, B., & Rottmann, H. 2020. Statistik und Ökonometrie für Wirtschaftswissenschaftler. Eine anwendungsorientierte Einführung. 4., aktualisierte und überarbeitete Auflage. Wiesbaden: Gabler.

Auer, L. von 2016. Ökonometrie. Eine Einführung. 7., durchgesehene und aktualisierte Auflage. Berlin, Heidelberg: Springer Gabler.

Backhaus, K., Erichson, B., Gensler, S., Weiber, R. & Weiber, T. 2021. Multivariate Analysemethoden. Eine anwendungsorientierte Einführung. 16., vollständig überarbeitete und erweiterte Auflage. Berlin, Heidelberg: Springer.

Fahrmeir, L., Kneib, T., Lang, S., & Marx, B. 2013. Regression. Models, Methods and Applications. Dordrecht: Springer.

Studenmund, A. H. 2017. Using Econometrics. A Practical Guide. 7th edition. Boston: Pearson.

Verbeek, M. 2017. A Guide to Modern Econometrics. 5th edition. Hoboken: Wiley & Sons.

Wooldridge, J. M. 2013. Introductury Econometrics. A Modern Approach. 5th edition. Mason Ohio: South-Western Cengage Learning.

Examination

Empirical Research in Innovation and Entrepreneurship

Description:

Unique offer in the respective term

Module JUR-8301: Introduction to Common Law *Introduction to Common Law*		6 ECTS/LP
Version 1.0.0 Person responsible for module: Dr. Stefan Lorenzmeier Elizabeth O'Leary		
Contents: • The Common Law – History, Development Courts & Legal Methodology • Contract Law • Criminal Law • Tort Law		
Learning Outcomes / Competences: Students will be introduced to the principles, concepts and workings of a common law legal system. Students will extract legal principles from landmark court decisions, analyzing the court's legal reasoning and the role history and policy plays in such decisions. Students will apply the court developed legal principles to fact situation. Students will examine how the substantive law in a case law system evolves. Students will be able to compare, contrast and critically evaluate different legal systems. Students' networking, negotiation and persuasion skills will be trained on an individual and a team basis.		
Remarks: Only available to law students from Erasmus partner universities of the Faculty of Law or law students from university-wide partner universities.		
Conditions: none		**Credit Requirements:** Passing the module exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: Introduction to Common Law **Mode of Instruction:** lecture **Lecturers:** Elizabeth O'Leary **Language:** English
Lehr-/Lernmethoden: Socratic method, lecture, experiential learning
Literature: • Court reports • Legal Journals • Computer based legal research
Assigned Courses: **Introduction to Common Law** (lecture)
Examination **Introduction to Common Law** written exam / length of examination: 60 minutes

Module JUR-8302: Introduction to Anglo-American Legal Systems *Introduction to Anglo-American Legal Systems*	6 ECTS/LP

Version 1.0.0
Person responsible for module: Dr. Stefan Lorenzmeier
Trudi Klein

Contents:

- Organisational aspects of the English and American Legal Systems - how each legal system operates under the Constitutional Doctrines of Rule of Law; Separation of Powers and Supremacy of laws – including differences between civil and common law; the application of case precedent; court structure; standards of proof; roles of lawyers and judges; and important constitutional cases;
- An Overview of English Contract Law – elements of a contract and what happens when a breach or frustration occurs.
- An Overview of Tort Law – elements of negligence and risk assessment; defences; and vicarious liability - including also a selection of statutory duties/strict liability and how these are applied in caselaw and in practice;
- An Overview of Criminal Law and Procedure – types of offences; actus reus and mens rea and their application in specific crimes; analysing recent examples of murder and manslaughter; considering the application of the presumption of innocence in pre-trial as well as trial context – including role of jury trials; police powers and aims of sentencing.

Learning Outcomes / Competences:
To introduce students to the English and American Legal Systems and the operation of common law therein. Students will gain an insight into the application of the case precedent system in the areas of contract, tort and criminal law. Students will actively participate in group discussion and practical application of legal principles in case analysis; role-play and fact specific problem solving.

Remarks:
Only available to law students from Erasmus partner universities of the Faculty of Law or law students from university-wide partner universities.

Conditions:		**Credit Requirements:**
Students must first take the Oxford Online Placement Test, offered by the faculty during the first week of classes of the respective semester, and achieve a score that is at least equivalent to level C1 in order to participate in this course. Registration is done via Digicampus with the event name "Einstufungstest für Introduction to Anglo-American Legal Systems (Oxford Online Placement Test)". There you will also find all further information about the test.		Passing the module exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none	

Parts of the Module

Part of the Module: Introduction to Anglo-American Legal Systems
Mode of Instruction: lecture
Language: English

Lehr-/Lernmethoden:
Mixed - Lectures including activities to promote learning or online correspondence course

Literature:

No specific literature required due to broad nature of subject.

If students wish to know more on a specific subject at this level the Law Express series (subject specific) published by Pearson may be helpful. Not required for course.

Assigned Courses:

Introduction to Anglo-American Legal Systems, Group A (lecture)

Introduction to Anglo-American Legal Systems, Group B (lecture)

Examination

Introduction to Anglo-American Legal Systems

written exam / length of examination: 90 minutes

Description:

Mix of general questions aimed at examining general legal principles and lexis/and problem solving essay questions.

Module JUR-8310: Contract Law *Contract Law*			6 ECTS/LP
Version 1.0.0 Person responsible for module: Dr. Stefan Lorenzmeier Abigail Rekas			
Contents: Sale of Goods, The Law of Contracts, The Common Law			
Learning Outcomes / Competences: Contract law is the law of promises and obligations. It governs private law between two parties. This course will focus primarily on United States law as it relates to contracts and sale of goods. Students will study contract formation, enforcement, interpretation, performance, breach, sales and the statute of frauds, battle of the forms, and remedies. Students will be introduced to the Uniform Commercial Code and the Restatement of Contracts. Students will read leading cases and draw principles from the court's application of the law. Students will be expected to critically examine contract doctrine and apply it to new facts.			
Remarks: Only available to law students from Erasmus partner universities of the Faculty of Law or law students from university-wide partner universities.			
Conditions: Students must first take the Oxford Online Placement Test, offered by the faculty during the first week of classes of the respective semester, and achieve a score that is at least equivalent to level C1 in order to participate in this course. Registration is done via Digicampus with the event name "Einstufungstest für Introduction to Anglo-American Legal Systems (Oxford Online Placement Test)". There you will also find all further information about the test.			**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none		

Parts of the Module

Part of the Module: Contract Law

Mode of Instruction: lecture

Language: English

Literature:

- Randall Kennedy’s Contracts: Happiness and Heartbreak 2nd Ed - Available as .pdf
- Uniform Commercial Code

Assigned Courses:

Contract Law, Group A (lecture)

Contract Law, Group B (lecture)

Examination

Contract Law

written exam / length of examination: 2 hours

Module JUR-8311: Tort Law *Tort Law*			6 ECTS/LP
Version 1.0.0 Person responsible for module: Dr. Stefan Lorenzmeier Abigail Rekas			
Contents: • Common Law • US Law • Tort Law • Restitution & Damages			
Learning Outcomes / Competences: Tort is the law of civil harms and civil remedies. The primary concern of tort law is whether one whose actions harm another should be required to pay compensation for the harm done. This course will focus primarily on the doctrines of Negligence and Recklessness in the United States. This will cover a broad range of situations, including personal injury, industrial harms, medical mishaps, and perhaps, consumer products liability. Towards the end of the semester, it will look at intentional torts. It will also look at "strict liability" torts and the difference between strict liability and general liability. In both intentional and unintentional tort, theories of vicarious liability will be covered. This class will be weighted towards an American understanding of torts, but students should expect to see some UK tort law as well. Students should be able to identify tort scenarios and assess the likelihood of recovery. Students will read leading cases and identify relevant rulings.			
Remarks: Only available to law students from Erasmus partner universities of the Faculty of Law or law students from university-wide partner universities.			
Conditions: Students must first take the Oxford Online Placement Test, offered by the faculty during the first week of classes of the respective semester, and achieve a score that is at least equivalent to level C1 in order to participate in this course. Registration is done via Digicampus with the event name "Einstufungstest für Introduction to Anglo-American Legal Systems (Oxford Online Placement Test)". There you will also find all further information about the test.			**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none		

Parts of the Module
Part of the Module: Tort Law **Mode of Instruction:** lecture **Language:** English
Literature: Tort Law and Alternatives: Cases and Materials (University Casebook Series), 10th Edition by Marc Franklin, Robert Rabin, Michael Green, Mark Geistfeld
Assigned Courses: **Tort Law, Group A** (lecture) **Tort Law, Group B** (lecture)

Examination

Tort Law

written exam / length of examination: 2 hours

Module JUR-8312: Intellectual Property Law (FRA) *Intellectual Property Law (FRA)*		6 ECTS/LP
Version 1.0.0 Person responsible for module: Dr. Stefan Lorenzmeier Abigail Rekas		
Contents: • Common Law • US Law • Copyright Law • Patent Law • Trademark Law • Trade Secret Law		
Learning Outcomes / Competences: Intellectual property is the study of the economic rights attached to intangible "property." This course will discuss the nature of Intellectual Property, including whether it should be considered property at all. It will also discuss the different approaches to Intellectual Property, and why the justifications underpinning the system matter. It will then turn to the various branches of IP in the United States, namely patent, trademark, and copyright and the related rights. Time permitting trade secret law will be discussed. Students will read leading cases and commentary. Students will understand the broad stroke outlines of the doctrines of patent, trademark, copyright and trade secret. Students will learn how to conduct a fair use analysis in Trademark and Copyright. Students will be able to explain the justification and extent of patent protection.		
Remarks: Only available to law students from Erasmus partner universities of the Faculty of Law or law students from university-wide partner universities.		
Conditions: Students must first take the Oxford Online Placement Test, offered by the faculty during the first week of classes of the respective semester, and achieve a score that is at least equivalent to level C1 in order to participate in this course. Registration is done via Digicampus with the event name "Einstufungstest für Introduction to Anglo-American Legal Systems (Oxford Online Placement Test)". There you will also find all further information about the test.		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: Intellectual Property Law **Mode of Instruction:** lecture **Language:** English
Literature: 1. INTELLECTUAL PROPERTY: LAW & THE INFORMATION SOCIETY Cases & Materials 4th Ed. James Boyle & Jennifer Jenkins 2. INTELLECTUAL PROPERTY: LAW & THE INFORMATION SOCIETY Supplement for 4th Edition, August 2019. James Boyle & Jennifer Jenkins
Assigned Courses:

Intellectual Property Law, Group A (lecture)

Intellectual Property Law, Group B (lecture)

Examination

Intellectual Property Law

written exam / length of examination: 2 hours

Module JUR-8313: Independent Legal Studies *Independent Legal Studies*		6 ECTS/LP
Version 1.0.0 Person responsible for module: Dr. Stefan Lorenzmeier Abigail Rekas		
Contents: • Common Law • Legal Research • Legal Writing		
Learning Outcomes / Competences: This course is an independent, self-lead, research-focused class. Students are expected to identify an area of law in which they would like to conduct in-depth research. Students must then create a brief research proposal, articulating what they intend to research, and why it is important. Over the course of the semester students will research, outline and write an in-depth research paper of approximately 3500 words (excluding footnotes). Students will have regular one-on-one meetings with the instructor for guidance and support. Students will produce a piece of rigorous academic writing in English.		
Remarks: Only available to law students from Erasmus partner universities of the Faculty of Law or law students from university-wide partner universities.		
Conditions: Students must first take the Oxford Online Placement Test, offered by the faculty during the first week of classes of the respective semester, and achieve a score that is at least equivalent to level C1 in order to participate in this course. Registration is done via Digicampus with the event name "Einstufungstest für Introduction to Anglo-American Legal Systems (Oxford Online Placement Test)". There you will also find all further information about the test.		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: Independent Legal Studies **Mode of Instruction:** lecture + exercise **Language:** English
Lehr-/Lernmethoden: Independent study
Assigned Courses: **Independent Legal Studies Group A** (lecture) **Independent Legal Studies Group B** (lecture) **Independent Legal Studies Group C** (lecture)

Examination

Independent Legal Studies

portfolio exam

Description:

Graded based on materials produced

Module JUR-8315: Case Analysis *Case Analysis*		6 ECTS/LP
Version 1.0.0 Person responsible for module: Elizabeth O'Leary		
Learning Outcomes / Competences: Students should be able to analyze a common law court judgment and extract the rule or law which governs the pertinent legal issue. Students should be able to explain case relevant legal and business concepts. Students should be able to distinguish between the ratio decidendi and obiter dicta in a court opinion. Participants will learn to use legal reasoning to support their legal position using analogy, judicial tests, balancing of factors and public policy arguments. Students will independently research cases and apply the legal principles extracted to cases at hand. Students will perfect their legal writing and legal oratory skills through participation in moot court exercises.		
Remarks: Only available to law students from Erasmus partner universities of the Faculty of Law or law students from university-wide partner universities.		
Workload: Total: 180 h 21 h lecture and exercise course (attendance) 40 h preparation of presentations (self-study) 40 h preparation of written term papers (self-study) 40 h studying of course content using provided materials (self-study) 39 h studying of course content using literarture (self-study)		
Conditions: Students should have an excellent command of business and legal English (C1). Certificate required. Students may have to take the Oxford Online Placement Test, offered by the faculty during the first week of classes each semester, and achieve a score that is at least equivalent to the required language level if they can't already provide official test results i.e. TOEFL or are native Speakers. Registration is done via Digicampus with the event name "Einstufungstest für Business Law Topics (Oxford Online Test)". There you will also find all further information about the test. Prior to commencing the course, students should keep themselves well informed of leading cases in common law jurisdictions.		**Credit Requirements:** written exam, Presentation and written assignment
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: Case analysis **Mode of Instruction:** lecture + exercise **Language:** English

Contents:

- Common Law terminology in practice
- Preparing case briefs
- Reading and applying court opinions
- Developing legal arguments
- Interpreting statutes and court rules
- Articulating legal arguments in writing
- Perfecting oratory skills

Literature:

- Commercial Law: Text, Cases and Materials Clarke, Hooley , Munday & Others (OUP 2017)
- https://www.supremecourt.uk/
- https://beta.courts.ie/judgments
- https://www.supremecourt.gov/default.aspx
- https://curia.europa.eu/jcms/jcms/j_6/en/

Assigned Courses:

Case analysis (lecture)

Examination

Asignment (Case brief)

term paper

Examination

Klausur Case analysis

written exam / length of examination: 90 minutes

Examination

Presentation

/ length of examination: 30 minutes

Module JUR-8316: Business Law Topics 2 *Business Law Topics 2*		6 ECTS/LP
Version 1.0.0 Person responsible for module: Elizabeth O'Leary		
Contents: • Labour relations • Accounting Frauds • Innovation and start ups • Intercultural traits and competence • Financing and Environmental Sustainability • White-collar crime		
Learning Outcomes / Competences: Students will be introduced to the legal and business terminology and concepts with specific focus on current affairs and events. Students will examine the interplay and overlap between legal and business topics and analyse the influence and restriction they have on each other. Students will analyse and evaluate business and legal topics on an individual country basis and from an international basis. Students will evaluate the influence societal and political norms have on business and law. Students will recommend need for reform on business and law from a domestic and global standpoint. Students' networking, negotiation and persuasion skills will be trained on an individual and a team basis. Intercultural competence will be developed.		
Remarks: Only available to law students from Erasmus partner universities of the Faculty of Law or law students from university-wide partner universities.		
Conditions: Students should have good language skills (minimum B2/C1) and should be familiar with basic business and legal English terminology. Students may have to take the Oxford Online Placement Test, offered by the faculty during the first week of classes each semester, and achieve a score that is at least equivalent to the required language level if they can't already provide official test results i.e. TOEFL or are native Speakers. Registration is done via Digicampus with the event name "Einstufungstest für Business Law Topics (Oxford Online Test)". There you will also find all further information about the test.		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: Business Law Topics 2 **Mode of Instruction:** lecture **Language:** English
Lehr-/Lernmethoden: Socratic method, lecture, experiential learning
Literature: Legal and Business reports and journals
Assigned Courses: **Business Law Topics** (lecture)

Examination

Business Law Topics 2

written exam / length of examination: 90 minutes

Module JUR-8317: Concepts of Law and Business II *Concepts of Law and Business II*		12 ECTS/LP
Version 1.0.0 Person responsible for module: Elizabeth O'Leary		
Learning Outcomes / Competences: Students will gain an insight into the Anglo-American legal system. Students will be able to analyse common law cases and extract legal principles from them and assess the relationship between legal reasoning, interpretation and policy. Students will complete legal research and apply their findings to fact-based business situations. Students will be able to compare, contrast and critically evaluate different legal systems. Students will be made aware of intercultural differences and of their effect on business and how to successfully incorporate these differences in networking, discussion and argumentation, negotiation and in preparing and presenting business plans.		
Remarks: Students must register on www.digicampus.de. The number of participants ist limited. Only available to law students from Erasmus partner universities of the Faculty of Law or law students from university-wide partner universities.		
Conditions: Students should have good language skills (minimum B2/C1) and should be familiar with basic legal English terminology. Students may have to take the Oxford Online Placement Test, offered by the faculty during the first week of classes each semester, and achieve a score that is at least equivalent to the required language level if they can't already provide official test results i.e. TOEFL or are native Speakers. Registration is done via Digicampus with the event name "Einstufungstest für Business Law Topics (Oxford Online Test)". There you will also find all further information about the test.		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: Business and Legal Communication **Mode of Instruction:** lecture **Language:** English
Contents: • Tort Law • Business Organizations • Financing and Bankruptcy • Employment Law • Accounting and Auditing • Tax • Intercultural Training • Legal Research and Writing • Negotiation, Presentation and Advocacy

Literature:

- Legal Writing Coach - Chris Jensen (2nd Edition)
- Intercultural Business Communication - Robert Gibson
- Modern Legal Drafting - Peter Butt (3rd Edition)

Examination

Business and Legal Communication

portfolio exam, Special examination for incoming students

Description:

written assignment and 90 minute exam

Module JUR-8319: Practical Law: Case Preparation and Presentation *Practical Law: Case Preparation and Presentation*		6 ECTS/LP
Version 1.0.0 Person responsible for module: Dr. Stefan Lorenzmeier Trudi Klein		
Contents: • Practical application of communication skills, primarily through legal writing and presentation in the context of a common law legal case • Overview of the operation of the English Legal System and difference between civil and common law • The importance of good writing – practical exercises in the context of procedural steps and advising in a civil claim • Application of relevant law – identifying relevant law in set contexts; including the application of the case precedent system • Presenting the evidence - types and rules of evidence and analysing a criminal trial • Opening and closing speeches - how to make a persuasive argument • Presenting a mock trial – considering case strategy, students practice being witnesses and lawyers in the context of a short mock trial		
Learning Outcomes / Competences: Students will gain an understanding of the stages leading up to and including the presentation of a common law trial, including an insight into the application of the case precedent system. The aim of the course is to practice soft skills required to present a legal case in a common law English speaking country, including writing skills in legal English, and presentation of evidence and legal argumentation in a mock court setting. Students will be examined on their ability to present a clearly understandable and persuasive opening or closing argument by way of oral examination.		
Remarks: Only available to law students from Erasmus partner universities of the Faculty of Law or law students from university-wide partner universities.		
Conditions: Students must achieve required level in English		**Credit Requirements:** Passing the module exam
Frequency: irregular (usu. summer semester)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: Practical Law: Case Preparation and Presentation **Mode of Instruction:** lecture + exercise **Language:** English
Lehr-/Lernmethoden: Lectures including practical activities to promote learning such as role play; group discussion; practical application of legal principles and fact specific problem solving
Literature: No specific literature required due to broad nature of subject. Further reading (not necessary for course): • Legal Writing in Plain English 2nd Edition Bryan A. Garner • Legal English (4th Edition) - Rupert Haigh
Assigned Courses:

Practical Law: Case preparation and presentation - only for incoming students (lecture)

Examination

Practical Law: Case Preparation and Presentation

oral exam

Description:

Students will be assessed on their ability to present a clearly understandable and persuasive opening or closing argument (to be specified) from mock trial evidence previously presented.

Module JUR-8320: United Nations Convention on Contracts for the International Sale of Goods (CISG) *CISG (UN-Kaufrecht)*		3 ECTS/LP
Version 1.0.0 Person responsible for module: Prof. Dr. Raphael Koch		

Learning Outcomes / Competences:

The lecture is on the United Nations Convention on Contracts for the International Sale of Goods (CISG). The CISG is a sales law treaty with acceptance on a worldwide scale. Globalisation of markets demands international unification of the law of sales contracts. Disparities in national laws governing international trade create obstacles to the flow of trade. The CISG can provide legal certainty for contract parties and predictability of legal decisions.

The aim of this lecture is to acquaint the students with the CISG and learn how it regulates the international sale of goods between parties which have their place of business in different states.

The content of this lecture will be amongst others the scope of application of the Convention, the formation of the contract, the obligations of the seller and the buyer and consequences of breach of contract.

Remarks:

The course will be held as part of the "Augsburg Summer Program" in the second half of the summer semester.

Disability Services: The course will comply with the requirements of the Americans with Disabilities Act and any law school or university rules to accommodate students with disabilities. Students with disabilities may ask the Dean of Students office to arrange note taking for the class and may request **additional** time to complete the exam.

Workload:

Total: 90 h

11 h lecture (attendance)

Conditions: Students should have basic knowledge in contract law and should be interested in transnational sales law.		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** none	

Parts of the Module

Part of the Module: CISG (UN-Kaufrecht)

Mode of Instruction: lecture

Lecturers: Prof. Dr. Raphael Koch, Prof. Dr. Phillip Hellwege

Language: English / German

Learning Outcome:

ABA Statement of Learning Outcomes: A student who completes this course should have knowledge and understanding of the challenges of the CISG and of sales law in general. Students should be able to see similarities and differences to their national law.

Contents:

§ 1 Introduction

I. Overview on the CISG II. When does the CISG apply (Overview)?

III. History and background

IV. Structure of the CISG

§ 2 Scope of application of the Convention

I. Contract of sale of goods

II. Internationality

III. Connection to a contracting state

IV. Temporal scope of application

V. Party autonomy

§ 3 General provisions

I. Interpretation of the Convention

II. Gap filling

III. Interpretation of declarations of parties

IV. Interpretation of the contract

V. Usages and trade practices

VI. Form requirements

§ 4 Formation of the contract

I. Offer

II. Acceptance

III. Specific issues

IV. Modification of the contract

§ 5 Obligations of the parties

I. General provisions

II. Obligations of the seller

III. Obligations of the buyer

§ 6 Breach of contract

I. Rights of the buyer

II. Rights of the seller

III. Passing of risk

IV. Provisions common to the obligations of the seller and of the buyer

§ 7 Final provisions

Lehr-/Lernmethoden:

Readings: Readings and case studies will be sent by e-mail or will be available as a download.

Class participation: All students must be prepared to participate actively in discussions. Case studies have to be prepared in group work and be presented in class.

Literature:

In the respective current editions:

- Güllemann, Internationales Vertragsrecht – Internationales Privatrecht, UN-Kaufrecht und Internationales Zivilverfahrensrecht;
- Huber/Mullis, The CISG – A new textbook for students and practitioners;
- Schlechtriem/Schroeter, Internationales UN-Kaufrecht, Ein Studien- und Erläuterungsbuch zum Übereinkommen der Vereinten Nationen über Verträge über den internationalen Warenkauf (CISG);
- Schwenzer/Fountoulakis/Dimsey, International Sales Law. A Guide to the CISG.

Assigned Courses:

CISG (UN-Kaufrecht), SP I (lecture)

Examination

Klausur CISG (UN-Kaufrecht)

written exam / length of examination: 60 minutes

Description:

The grade will be based on a 60-minute written exam that will test students’ ability to understand and address the legal challenges that parties applying the CISG face.

Module JUR-8321: Comparative Venture Capital Law *Comparative Venture Capital Law*	3 ECTS/LP

Version 1.0.0
Person responsible for module: Prof. Dr. Thomas Möllers
Prof. Manns

Contents:
This class is designed to provide an overview of the legal issues facing start-up companies at each stage of their development. First, we will go over the basics of agency law. Agency law is important at every stage of a company's development in creating defaults for employer-employee relationships, but it is particularly important at the formative phase of a business. Second, we will then discuss the choice of business entity, the challenges companies face during the incorporation process, and the need to create incentive structures to retain and attract talent. Third, we will go over the legal and financial issues facing venture capitalists and the formation of venture capital funds. We will focus primarily on the US start-up company context because it is a leading center for entrepreneurship and capital markets, although start-ups in Europe and every part of the globe face similar issues and choices.

Remarks:
The course will be held as part of the "Augsburg Summer Program" in the second half of the summer semester.

Disability Services: The course will comply with the requirements of the Americans with Disabilities Act and any law school or university rules to accommodate students with disabilities. Students with disabilities may ask the Dean of Students office to arrange note taking for the class and may request additional time to complete the exam.

Conditions: none		**Credit Requirements:** Passing the module exam
Frequency: irregular (usu. summer semester)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** none	

Parts of the Module

Part of the Module: Comparative Venture Capital Law
Mode of Instruction: lecture
Language: English

Learning Outcome:
ABA Statement of Learning Outcomes: A student who completes this course should have knowledge and understanding of the challenges in going down an entrepreneurial path and navigating the distinctive regulatory obligations and uncertainties that early stage companies face.

Contents:

Part I: Overview of Business Planning and Venture Capital Law

Introduction / Agency Law / Choice of Business Entity

- Class 1, Wednesday, July 13, 2022 - Entrepreneurship and Agency Law Part I
  Reading: Entrepreneurship and Agency Part I
- Class 2 Thursday, July 14, 2022 - Entrepreneurship and Agency Law Part II
  Reading: Entrepreneurship and Agency Part II
- Class 3 Wednesday, July 20, 2022 - Choice of Business Entity
  Reading: Organizational Choices

Part II: Incorporation Issues / Corporate Finance / Venture Capital Law

- Class 4 Thursday, July 21, 2022 - Incorporation Issues
  Reading: Incorporation Issues
- Class 5 Wednesday, July 27, 2022 - Corporate Finance and Venture Capital Law Part I
  Reading: Venture Capital Part I
- Class 6 Thursday, July 28, 2022 - Corporate Finance and Venture Capital Law Part II
  Reading: Venture Capital Part II

Take-home Exam – 1 hour TBD

Lehr-/Lernmethoden:

Readings: Readings will be sent by e-mail in advance of each class. To save you money, I will use pdfs or links to all of the class materials.

Class participation: All students must be prepared to participate actively in discussions

Assigned Courses:

Comparative Venture Capital Law (lecture)

Examination

Comparative Venture Capital Law

/ work period for assignment: 150 minutes

Description:

The grade will be based on a 2.5-hour take-home exam that will test students' ability to understand and address the legal challenges that start-up companies face.

Module JUR-8322: European and WTO Law *Europäisches und Internationales Wirtschaftsrecht*		6 ECTS/LP
Version 1.0.0 Person responsible for module: Prof. Dr. Thomas Möllers		
Contents: The course will give you an overview about the most important institutions, principles and the enforcement of European and WTO law. The class will focus the area of European Intellectual Property Law. The first part of the lecture concerns the basics or foundations of European law, that is the law of the European Union and the law of the European Communities. We will talk about the history, the institutions, the fundamental principles, and the enforcement of EC Law. Then we will come to the law of the common market. It covers the economic policy and the four basic freedoms, that is, the free movement of goods and for workers and the freedom of services and establishment. The law of harmonisation examines the advantages and disadvantages of legal harmonization. The enforcement of law shows how European Law can be enforced as a supranational source of law. The second part examines the International Economic law, especially the WTO agreement. Here again, we will speak about institutions, principles of the GATT, and the Enforcement of the GATT. The lecture will end with an epilogue about Europe and the WTO in the 21st century.		
Remarks: The course will be held as part of the "Augsburg Summer Program" in the second half of the summer semester.		
Workload: Total: 180 h 21 h lecture (attendance) 79 h studying of course content using literarture (self-study) 80 h studying of course content using provided materials (self-study)		
Conditions: The course will be held partly in English, therefore English language skills, both spoken and written, are a prerequisite. Basic knowledge of European law is also an advantage.		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: European and WTO Law **Mode of Instruction:** lecture **Language:** English / German

Contents:

Part 1: Foundations of the European Union Law

§ 1 History of European Integration
§ 2 Institutional System of the European Union
§ 3 European Law: Supremacy, Direct Applicability
§ 4 The Relation between the EU and the Member States (Competences, Subsidiarity)
§ 5 European Fundamental Rights
§ 6 Enforcement of European Law
Part 2: The Internal Market
§ 7 The Internal Market and Relevant Principles (Non-Discrimination, Proportionality)
§ 8 Free Movement of Goods
§ 9 The other Basic Freedoms
§ 10 Further Restrictions of Competition
§ 11 Law of Harmonization, e.g. Intellectual Property
Part 3: Outlook

Literature:

each in the current editions:

- Steiner/Woods, EU Law;
- Chalmers/Davies/Monti, European Union Law: Cases and Materials;
- Craig/de Búrca, EU Law: Text Cases and Materials.

also:

- Möllers, The Role of Law in European Integration, 48 American Journal of Comparative Law (Am.J.CompL), 679 - 711 (2000);
- Möllers, European Directives on Civil Law - Shaping a new German Civil Code, 18 Tulane European & Civil Law Forum, 1 - 37 (2003).

Assigned Courses:

Europäisches und Internationales Wirtschaftsrecht (European and WTO Law) (lecture)

Examination

Europäisches und Internationales Wirtschaftsrecht

written exam / length of examination: 120 minutes

Description:

The exam will be held in English.

Module JUR-8323: European Contract Law *European Contract Law*		3 ECTS/LP
Version 1.0.0 Person responsible for module: Prof. Dr. Thomas Möllers Prof. Enrico Camilleri		
Contents: The implementation of some specific sectors of contract law in the framework of EU legislation has become an important issue for many subjects. In the most of cases the legislative body of the European community has followed the so-called soft harmonization approach, by adopting directives on contractual matters. One of the objectives of this course is to present an overall picture of contracts in European law, but it is also dedicated to enhancing critical analysis of some European contract law institutions, focusing in particular on the functioning of the common market. A special attention will be devoted to the European competition law and its interference with the law of contracts and the party autonomy in general. By the attendancy of the course, the students will receive professional training in this area of law, in accordance with the labor market.		
Learning Outcomes / Competences: This course is intended for the student to gain training and skills necessary to: 1. analyze the basic principles ruling contracts at European level 2. analyze the differences and compatibility of national contracts with European law of contracts 3. analyze the compatibility of single contractual clauses with antitrust law.		
Remarks: The course will be held as part of the "Augsburg Summer Program" in the second half of the summer semester. **Disability Services:** The course will comply with the requirements of the Americans with Disabilities Act and any law school or university rules to accommodate students with disabilities. Students with disabilities may ask the Dean of Students office to arrange note taking for the class and may request additional time to complete the exam.		
Conditions: none		**Credit Requirements:** Passing the module exam
Frequency: irregular (usu. summer semester)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: European Contract Law **Mode of Instruction:** lecture **Language:** English
Learning Outcome: **ABA Statement of Learning Outcomes:** A student who completes this course will be able to analyze the basic principles ruling contracts at European level, know the differences and compatibility of national contracts with European law of contracts and analyze the compatibility of single contractual clauses with antitrust law.

Contents:

Class 1 Wednesday, June 22, 2022, 12:00-2:00 pm

EU: Institutional Framework and field of Competencies-

European Contract Law as a project and a set of rules

Reading: *Collins*, Why Europe needs a civil code?, *European Review of Private Law*, 4-2013, [907–922]

Class 2 Wednesday, June 22, 2022, 4:00-6:00 pm

The cornerstones of European contract Law

Reading: *Hesselink*, Towards a Sharp Distinction between b2b and b2c?

On Consumer, Commercial and General Contract Law after the Consumer Rights Directive, *European Review of Private Law*, 1-2010, [57–102]

Class 3 Wednesday, June 29, 2022, 12:00-2:00 pm

Rights and Remedies in European Contract Law: The New Deal for Consumers

Reading:

Dougan, Primacy and the remedy of disapplication, *Common Market Law Review* 56: 1459–1508, 2019

Tommasi, The 'New Deal' for Consumers: Towards More Effective Protection?, *European Review of Private Law*, 2-2020 [311–332]

Farina, Unfair Terms and Supplementation of the Contract, *European Review of Private Law*, 3-2021 [441–462]

Class 4 Wednesday, June 29, 2022, 4:00-6:00 pm

Rights and remedies: The New Deal for Consumers

Reading:

Cafaggi-Iamiceli, The Principles of Effectiveness, Proportionality and Dissuasiveness in the Enforcement of EU Consumer Law: The Impact of a Triad on the Choice of Civil Remedies and Administrative Sanctions, *European Review of Private Law*, 03-2017, [575–618]

Durovic-Lech, A Consumer Law Perspective on the Commercialization of Data, *European Review of Private Law*, 5-2021 [701–732]

Scott, Consumer Law, Enforcement and the New Deal for Consumers, *European Review of Private Law*, 6-2019 [1279–1296]

Class 5 Wednesday, July 6, 2022, 12:00-2:00 pm

European Contract Law and European Competition Law

Reading:

Nowag-Tarkkila, How Much Effectiveness for The Eu Damages Directive? Contractual Clauses and Antitrust Damages Actions, *Common Market Law Review* 57: 433–474, 2020

Staudenmayer, The Directives on Digital Contracts: First Steps Towards the Private Law of the Digital Economy, *European Review of Private Law*, 2-2020 [219–250]

Andenas-Della Negra, Between Contract Law and Financial Regulation: Towards the Europeanisation of General Contract Law, *European Business Law Review*, 2017 [499-521]

Class 6 Wednesday, July 6, 2022, 4:00-6:00 pm

European Contract Law and European Competition Law: Digital Market Act and Digital Services Act

Reading:

Eifert-Metzger-Schweitzer-Wagner, Taming the Giants: the Dma/Dsa Package, *Common Market Law Review* 58: 987–1028, 2021

Tommasi, The Liability of Internet Service Providers in the Proposed Digital Services Act, *European Review of*

Lehr-/Lernmethoden:

Readings: Readings will be available for download on the homepage for each class.

Class participation: All students must be prepared to participate actively in discussions

Literature:

Readings will be available for download on the homepage for each class. In addition, the following reading assignments are recommended:

- *Dougan,* PRIMACY AND THE REMEDY OF DISAPPLICATION *Common Market Law Review* 56: 1459–1508, 2019;
- *Hesselink*, Towards a Sharp Distinction between b2b and b2c?
  On Consumer, Commercial and General Contract Law after the Consumer Rights Directive, European Review of Private Law 1-2010[57–102]
- *Collins*, Why Europe needs a civil code?, European Review of Private Law 4-2013 [907–922]
- *Cafaggi-Iamiceli*, The Principles of Effectiveness, Proportionality and Dissuasiveness in the Enforcement of EU Consumer Law: The Impact of a Triad on the Choice of Civil Remedies and Administrative Sanctions European Review of Private Law 03-2017 [575–618]

Assigned Courses:

European Contract Law (lecture)

Examination

European Contract Law

/ work period for assignment: 1 hours

Description:

Grading: The grade will be based on a 1-hour take-home exam that will test students' ability to understand and address the legal challenges raised by a multilevel system of norms and principles. The students should also be able to understand the interplay between the Principles of Effectiveness, Proportionality and Dissuasiveness in the Enforcement of EU Consumer

Law.

Module JUR-8324: German and European Company Law *Deutsches und Europäisches Kapitalgesellschaftsrecht*		6 ECTS/LP
Version 1.0.0 Person responsible for module: Prof. Dr. Thomas Möllers		
Contents: In the last twenty years company law has been developed on a European level. This development has lead to many directives on harmonizing company law. Harmonization is necessary because legal systems in the member states are based on different points of view. In Europe, on the one hand, the one-tier-board system and, on the other hand, the two-tier-board system exists for a company's management. Furthermore, some member states require strong worker participation. Harmonization within the European Union has made rapid progress during the last few years. The major impulses for these recent changes were discussions about corporate governance and some leading cases by the European Court of Justice.		
Learning Outcomes / Competences: The aim of the course is to provide students with an in-depth understanding of German and European corporate law. The students understand the relevant European directives and their implementation in national law. In addition, the students learn the terminology and the structural basics of the different corporations. After successful completion of the module, students will have a comprehensive overview of how to deal with the main national standards, European regulations and the underlying economic policy aspects.		
Remarks: The course will be held as part of the "Augsburg Summer Program" in the second half of the summer semester.		
Workload: Total: 180 h		
Conditions: The course will be held in English, therefore English language skills in spoken and written are a prerequisite . Basic knowledge of corporate law is an advantage.		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: Europäisches Kapitalgesellschaftsrecht (Grundlagen und Vertiefung) **Mode of Instruction:** lecture **Language:** English / German

Contents:

A. BASICS

§ 1 Basics of German Company Law

§ 2 History and Overview of European Company Law

§ 3. Overview and Structure of European Company Law

B. LEGAL HARMONISATION OF EUROPEAN COMPANY LAW

§ 4. Formation, Capital Protection

§ 5.Accounting

§ 6. Corporate Governance

§ 7. Public Disclosure – Companies listed on a stock exchange

§ 8. Delisting

§ 9. Takeover Law and the Free Movement of Capital

§ 10. Group of Companies

§ 11. Crossborder Mergers, Transferring the Seat

C. SUPRANATIONAL EUROPEAN COMPANIES

§ 12. Supranational European Companies: EEIG, SE, EPC, SUP etc

D. CONCLUSIONS FOR EUROPEAN COMPANY LAW

§ 13 Final Remarks

Literature:

Textbooks in the current editions, e.g.:

- Möllers,Thomas M.J.,Gesellschafts- und Unternehmensrecht, kleinere und mittlere Unternehmen, in: Schulze, Reiner/Zuleeg, Manfred/Kadelbach, Stefan(Hrsg.), Europarecht. Handbuch für die deutsche Rechtspraxis;
- Wirth, Gerhard/Arnold, Michael/Morshäuser, Ralf/Greene, Mark, Corporate Law in Germany;
- Hirte,Heribert,Kapitalgesellschaftsrecht;
- Lutter, Marcus/Bayer, Walter/Schmidt, Jessica, Europäisches Unternehmens- und Kapitalmarktrecht;
- Raiser/Veil, Recht der Kapitalgesellschaften;
- Grundmann, Stefan, Europäisches Gesellschaftsrecht, Eine systematische Darstellung unter Einbeziehung des Europäischen Kapitalmarktrechts.

also:

- Berichte von Hirte, Die Entwicklung des Unternehmens – und Gesellschaftsrechts in Deutschland jeweils in der NJW

Assigned Courses:

Europäisches Kapitalgesellschaftsrecht, SP III (German and European Company Law) (lecture)

Examination

Europäisches Kapitalgesellschaftsrecht

written exam / length of examination: 120 minutes

Description:

The exam will be held in English.

Module JUR-8325: Intellectual Property Law (SP) *Intellectual Property Law (SP)*		3 ECTS/LP
Version 1.0.0 Person responsible for module: Prof. Dr. Michael Kort		
Contents: The first part deals with the characteristics shared by all types of intellectual property as well as with the distinctions, inter alia with their distinct subject-matter, namely inventions, literary and artistic works and associated products and names for good-will attaching to marketing symbols. The course focuses then on the U.S. law and its special characteristics, inter alia the first-to-invent system and on the European law, in particular with EC law, for example the directives regarding intellectual property issues. Moreover the last part of the course deals with international law, in particular with TRIPS, and questions of Technology Challenge and "Cultural Rights"		
Remarks: The course will be held as part of the "Augsburg Summer Program" in the second half of the summer semester.		
Conditions: none		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: Intellectual Property Law **Mode of Instruction:** lecture **Language:** English
Assigned Courses: **International, US and European Intellectual Property Law** (lecture)
Examination **Intellectual Property Law** written exam

Module JUR-8326: International Arbitration *International Arbitration*		3 ECTS/LP
Version 1.0.0 Person responsible for module: Prof. Dr. Thomas Möllers Dr. Daniel Engel		
Contents: In international business transactions, the dispute resolution clause usually provides for international arbitration. The course "International Arbitration" will discuss international arbitration from a practitioner's point of view. It will focus on the advantages and disadvantages of international arbitration and address the conduct of international arbitration proceedings, such as the establishment of the arbitral tribunal, the taking of evidence, oral hearings and rendering the arbitral award.		
Learning Outcomes / Competences: The students will learn to draft tailor-made arbitration clauses. In addition, the course will deal with procedures to set aside and enforce arbitral awards internationally. Further, the course will focus on the interaction between national law and international arbitration. The students will also learn about the specifics of the most commonly applied rules of arbitral institutions such as the ICC, the LCIA, the VIAC and the German DIS.		
Remarks: The course will be held as part of the "Augsburg Summer Program" in the second half of the summer semester.		
Conditions: none		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: International Arbitration **Mode of Instruction:** lecture **Language:** English
Assigned Courses: **International Arbitration** (lecture)
Examination **International Arbitration** oral exam

Module JUR-8327: International Investment Law *International Investment Law*	3 ECTS/LP
Version 1.0.0 Person responsible for module: Prof. Dr. Thilo Rensmann	

Contents:

The lecture course on International Investment Law focusses on the protection afforded to foreign investors under bi- and multilateral investment treaties. A special emphasis will be put on the substantive standards of protection, such as the protection against expropriation and the "fair and equitable treatment" clause. The course will also cover the highly disputed system of "Investor-State Dispute Settlement" as well as current initiatives to establish a Multilateral Investment Court. The legal topics will be placed into the broader context of current policy issues. Particular attention will be given to the democratic legitimacy of investment tribunals and the tension between the protection of foreign investment on the one hand, and conflicting public policy goals, such as the protection of human rights, labour standards, and the environment on the other.

Remarks:

The course will be held as part of the "Augsburg Summer Program" in the second half of the summer semester.

Conditions: none		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** none	

Parts of the Module

Part of the Module: International Investment Law

Mode of Instruction: lecture

Language: English

Assigned Courses:

International Investment Law (lecture)

Examination

International Investment Law

written exam

Module JUR-8328: Law and Economics *Law and Economics*			3 ECTS/LP
Version 1.0.0 Person responsible for module: Prof. Dr. Thomas Möllers Prof. Peter Wendel			
Contents: The course introduces students to the economic analysis of law. It explores what it means for the law to be efficient; the extent to which a quest for economic efficiency explains the development of the law (with a focus on property and torts due to the limited time); and the extent to which efficiency should affect the development of the law. The course includes a brief introduction to the tools of microeconomics and to the different 'schools' of economic thought.			
Remarks: The course will be held as part of the "Augsburg Summer Program" in the second half of the summer semester.			
Conditions: none			**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** none		

Parts of the Module
Part of the Module: Law and Economics **Mode of Instruction:** lecture **Language:** English
Assigned Courses: **Law and Economics** (lecture)
Examination **Law and Economics** written exam

Module JUR-8329: Performance and Financial Guarantees as Encountered in International Commercial Contracts *Performance and Financial Guarantees as Encountered in International Commercial Contracts*	3 ECTS/LP

Version 1.0.0
Person responsible for module: Prof. Dr. Thomas Möllers
Prof. Charl Hugo

Contents:

The main focus of the course falls on attempts by principal debtors attempting to block payment of a guarantee and/or by guarantors attempting to evade payment of a guarantee - that is on the main issues that lead to litigation or arbitration in this field. It is, for example, well-established law in most jurisdictions that fraud by the beneficiary of an independent guarantee will provide a valid defence for the guarantor. Less clear, however, are questions such as whether an unconscionable demand for payment of a guarantee may also provide a defence for a guarantor (or the basis for the principal debtor to block payment of the guarantee), or whether the illegality of the principal debt may provide a defence to the guarantor. Moreover, a beneficiary wishing to avail itself of a guarantee needs to demand payment in accordance with the guarantee. Such a demand must conform with the terms of the guarantee. Disputes as to whether a particular demand is indeed conforming or not are often before the courts. Interesting and demanding case law on these and similar issues from England, Germany, South Africa, the United States of America, Singapore and Australia will be considered critically against the background also of the URDG and ISP98. In this respect the law of guarantees and letters of credit overlap largely - a further aspect that will be explored briefly.

Any obligation can be guaranteed. The guarantee can take the form of an accessory guarantee (suretyship) or of an independent guarantee (demand guarantee, performance bond, standby letter of credit). The latter is especially important and receives and forms the focal point of the course. Such guarantees can secure a performance other than the payment of money (for example the construction of a building) or can secure the performance of having to pay money. On this basis a distinction is sometimes drawn between performance guarantees and financial guarantees. The legal principles governing them, however, are very much the same.

Independent guarantees are common in large commercial contracts. They are often (but not necessarily) also governed by rules emanating from (or endorsed by) the International Chamber of Commerce namely the Uniform Rules of Demand Guarantees (URDG) or the International Standby Practice 1998 (ISP98). The historical development of these Rules and their main provisions will be considered.

Learning Outcomes / Competences:

Students completing the course will acquire a working knowledge of the roll, purposes and operation of guarantees in large (often international) commercial contracts.

Remarks:

The course will be held as part of the "Augsburg Summer Program" in the second half of the summer semester.

Conditions: none		**Credit Requirements:** Passing the module exam
Frequency: irregular (usu. summer semester)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** none	

Parts of the Module

Part of the Module: Performance and Financial Guarantees as Encountered in International Commercial Contracts

Mode of Instruction: lecture
Language: English

Assigned Courses:

Performance and Financial Guarantees as Encountered in International Commercial Contracts (lecture)
Examination **Performance and Financial Guarantees as Encountered in International Commercial Contracts** written exam

Module JUR-8330: Transnational Litigation: The Practice of International Dispute Resolution *Transnational Litigation: The Practice of International Dispute Resolution*		3 ECTS/LP
Version 1.0.0 Person responsible for module: Prof. Dr. Thomas Möllers Prof. Kotuby		
Contents: This course is designed for students to develop an understanding of the international aspects of certain areas of civil procedure such as choice of law, subject matter and personal jurisdiction, forum selection devices, and the enforcement of judgments; and develop an appreciation for the overlap of public and private international law arising in civil litigation such as foreign sovereign immunity and investment protection; and understand how issues relating commercial arbitration are handled in municipal courts. The course is designed to be both theoretical and intensely practical, and provide students with an appreciation of proactive risk mitigation strategies when managing multijurisdictional commercial disputes.		
Remarks: The course will be held as part of the "Augsburg Summer Program" in the second half of the summer semester. **Disability Services:** The course will comply with the requirements of the Americans with Disabilities Act and any law school or university rules to accommodate students with disabilities. Students with disabilities may ask the Dean of Students office to arrange note taking for the class and may request additional time to complete the exam.		
Conditions: none		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: Transnational Litigation: The Practice of International Dispute Resolution **Mode of Instruction:** lecture **Language:** English
Learning Outcome: **ABA Statement of Learning Outcomes:** A student who completes this course should have an understanding of the issues and challenges that arise in international and cross-border disputes, and how those disputes can be settled through resort to judicial processes in one or more jurisdictions.

Contents:

Part I: Introduction to International and Cross-Border Litigation

Class 1: Wednesday, June 22, 2022
Determining the Proper Court: Jurisdiction and Choice of Court

Class 2: Thursday, June 23, 2022
Determining the Proper Law: Extraterritoriality and Choice of Law

Part II: Litigation Strategies for International and Cross-Border Cases

Class 3: Wednesday, June 29, 2022
Ancillary Support for Litigated Cases: Transnational Discovery and the Enforcement of Foreign Judgments

Class 4: Thursday, June 30, 2022
Proactive Strategies to Mitigate Litigation Risk: Combatting International Tort Tourism

Part III: Litigation Regarding Arbitration: Arbitrability, Judicial Support and Award Enforcement

Class 5: Wednesday, July 6, 2022
Litigation Issues at the Abitral Seat

Class 6: Thursday, July 7, 2022
Litigation Issues Outside the Arbitral Seat

Lehr-/Lernmethoden:

Readings: Readings will be sent by e-mail in advance of each class. To save you money, I will use pdfs or links to all of the class materials.

Class participation: All students must be prepared to participate actively in discussions

Assigned Courses:

Transnational Litigation: The Practice of International Dispute Resolution (lecture)

Examination

Transnational Litigation: The Practice of International Dispute Resolution

written exam / length of examination: 60 minutes

Description:

Grading: The grade will be based on a 60-minute written exam that will test students' ability to understand and address the legal challenges that start-up companies face.

Module JUR-8331: US/EU Antitrust Law *US/EU Antitrust Law*		3 ECTS/LP
Version 1.0.0 Person responsible for module: Prof. Dr. Michael Kort		
Contents: The first part of the course deals with two main aspects of Antitrust Economics, namely with the Price Theory and with the Industrial Organization, as a basic knowledge of Antitrust Economics is necessary to understand Antitrust Law. After focusing on the U.S. Antitrust Law and the U.S. Merger Control Law, the course deals with EU Competition Law and with EU merger Control Law. Additionally, recent developments of U. S. and E.U. Antitrust Law are discussed. Also some cases on important topics of U.S. and EU Antitrust Law and Merger Control Law will be discussed in order to give the students the opportunity to find differences and similarities between the U.S. Law and the EU Law.		
Remarks: The course will be held as part of the "Augsburg Summer Program" in the second half of the summer semester. **Disability Services:** The course will comply with the requirements of the Americans with Disabilities Act and any law school or university rules to accommodate students with disabilities. Students with disabilities may ask the Dean of Students office to arrange note taking for the class and may request **additional** time to complete the exam.		
Conditions: none		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: US/EU Antitrust Law **Mode of Instruction:** lecture **Language:** English
Learning Outcome: **ABA Statement of Learning Outcomes:** Students should be able to deal both with antitrust cases and with merger control law cases which may have an international dimension in a way that the students take economic considerations like efficiencies and market structure considerations into account. Further, they should be familiar with the content of the statutory provisions like the Sherman Act, the Clayton Act, the TFEU and the EU Merger Regulation as well as with the main case law of the US and the EU. They should be able to see the similarities and the differences between US and EU Antitrust Law. Further, they should know the difference between the application of the rule of reason and the application of the per se rule. In addition, they should be able to decide which law may be applicable in the case of a conflict of laws.

Contents:

Introduction

Part I: Antitrust Economies

Part II: US Antitrust Law

- Applicable Law
- Agreements in Restraints of Trade
- Monopolization and attempted Monopolization
- Mergers, Acquisitions and Joint Ventures
- Price discrimination
- Antitrust Enforcement
- Jurisdictional, public policy and regulatory Limitations on the Domain of Antitrust

Part III: European Antitrust Law

- Art. 101 Treaty on the Functioning of the European Union (TFEU)
- Art. 102 Treaty on the Functioning of the European Union (TFEU)
- EU Merger Control Regulation

Introduction

Part I: Antitrust Economies

Part II: US Antitrust Law

Applicable Law

Agreements in Restraints of Trade

Monopolization and attempted Monopolization

Mergers, Acquisitions and Joint Ventures

Price discrimination

Antitrust Enforcement

Jurisdictional, public policy and regulatory Limitations on the Domain of Antitrust

Part III: European Antitrust Law

Art. 101 Treaty on the Functioning of the European Union (TFEU)

Art. 102 Treaty on the Functioning of the European Union (TFEU)

EU Merger Control Regulation

Lehr-/Lernmethoden:

Readings: The syllabus with appendix will be sent to the students via e-mail before the course will start. Additional material will be available via email or by links during the time the course will take place.

Class participation: All students must be prepared to participate actively in discussions

Literature:

Books that may be helpful with (but no “reading requirements”):

- Douglas Broder, U.S. Antitrust Law and Enforcement, 3rd ed., 2016
- Herbert Hovenkamp, Antitrust, 7th ed., 2021
- Herbert Hovenkamp, Principles of Antitrust, 2nd ed. 2021
- Howard Langer, Competition Law in the United States, 4th ed., 2019
- Sullivan/Harrison, Understanding Antitrust and Its Economic Implications, 7th ed., 2019
- Alison Jones/Brenda Sufrin, EC Competition Law, 7th ed., 2019
- Ariel Ezrachi, EU Competition Law, 7th ed., 2021

Books that may be helpful with (but no “reading requirements”):

- *Douglas Broder, U.S. Antitrust Law and Enforcement, 3rd ed., 2016*
- *Herbert Hovenkamp, Antitrust, 7th ed., 2021*
- *Herbert Hovenkamp, Principles of Antitrust, 2nd ed. 2021*
- *Howard Langer, Competition Law in the United States, 4th ed., 2019*
- *Sullivan/Harrison, Understanding Antitrust and Its Economic Implications, 7th ed., 2019*
- *Alison Jones/Brenda Sufrin, EC Competition Law, 7th ed., 2019*
- *Ariel Ezrachi, EU Competition Law, 7th ed., 2021*

Assigned Courses:

US and European Antitrust Law (lecture)

Examination

US/EU Antitrust Law

written exam / length of examination: 60 minutes

Description:

Grading: The grade will be based on a 60 (or 90)-minute written exam in order to test students’ ability to understand and address the legal challenges that companies face concerning Antitrust Law and Merger Control Law in the U.S. and in the European Union.

Disability Services: The course will comply with the requirements of the Americans with Disabilities Act and any law school or university rules to accommodate students with disabilities. Students with disabilities may ask the Dean of Students office to arrange note taking for the class and may request **additional** time to complete the exam.

Module JUR-8401: Introduction au droit français *Introduction au droit français*		6 ECTS/LP
Version 1.0.0 Person responsible for module: Dr. Stefan Lorenzmeier Julia Leymonie		
Conditions: Students must first take a placement test offered by the faculty during the first week of classes of the respective semester and achieve a result that is at least equivalent to level B2 in order to participate in this course. Registration is done via Digicampus with the event name "Einstufungstest für Introduction au droit français". There you will also find all further information about the test.		**Credit Requirements:** Passing the module exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: Introduction au droit français **Mode of Instruction:** lecture **Language:** French / German
Assigned Courses: **Introduction au droit français** (lecture)
Examination **Introduction au droit français** written exam

Module JUR-8406: Drot des contracts *Droit des contracts*	6 ECTS/LP
Version 1.0.0 Person responsible for module: Dr. Stefan Lorenzmeier Julia Leymonie	

Conditions: Students should have good language skills (minimum B2) and should be familiar with basic legal French terminology. Students may take a placement test offered by the faculty during the first week of classes of the respective semester and achieve a result that is at least equivalent to level B2 in order to participate in this course. Registration is done via Digicampus with the event name "Einstufungstest für Introduction au droit français". There you will also find all further information about the test.		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: Droit des contracts **Mode of Instruction:** lecture **Language:** French
Assigned Courses: **Droit des contrats** (lecture)
Examination **Droit des contracts** written exam

Module JUR-8407: Droit de la responsabilité extracontractuelle *Droit de la responsabilité extracontractuelle*		6 ECTS/LP
Version 1.0.0 Person responsible for module: Dr. Stefan Lorenzmeier Francois Amice, Julia Leymonie		
Conditions: Students should have good language skills (minimum B2) and should be familiar with basic legal French terminology. Students may take a placement test offered by the faculty during the first week of classes of the respective semester and achieve a result that is at least equivalent to level B2 in order to participate in this course. Registration is done via Digicampus with the event name "Einstufungstest für Introduction au droit français". There you will also find all further information about the test.		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: Droit de la responsabilité extracontractuelle **Mode of Instruction:** lecture **Language:** French
Assigned Courses: **Droit de la responsabilité extracontractuelle** (lecture)
Examination **Droit de la responsabilité extracontractuelle** written exam

Module JUR-8408: Droit du travail *Droit du travail*			6 ECTS/LP
Version 1.0.0 Person responsible for module: Dr. Stefan Lorenzmeier Julia Leymonie			
Conditions: Students should have good language skills (minimum B2) and should be familiar with basic legal French terminology. Students may take a placement test offered by the faculty during the first week of classes of the respective semester and achieve a result that is at least equivalent to level B2 in order to participate in this course. Registration is done via Digicampus with the event name "Einstufungstest für Introduction au droit français". There you will also find all further information about the test.			**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none		

Parts of the Module
Part of the Module: Droit du travail **Mode of Instruction:** lecture **Language:** French
Assigned Courses: **Droit du travail** (lecture)
Examination **Droit du travail** written exam

Module JUR-8409: Pratique du droit des affaires *Pratique du droit des affaires*		6 ECTS/LP
Version 1.0.0 Person responsible for module: Dr. Stefan Lorenzmeier Francois Amice		
Conditions: Students should have good language skills (minimum B2) and should be familiar with basic legal French terminology. Students may take a placement test offered by the faculty during the first week of classes of the respective semester and achieve a result that is at least equivalent to level B2 in order to participate in this course. Registration is done via Digicampus with the event name "Einstufungstest für Introduction au droit français". There you will also find all further information about the test.		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** none	

Parts of the Module
Part of the Module: Pratique du droit des affaires **Mode of Instruction:** lecture **Language:** French
Examination **Pratique du droit des affaires** written exam

Module ASW-1201: Intermediate Module Applied Linguistics (Media Linguistics/ Technical and Research Communication/ Lexicography) *Aufbaustufe Angewandte Sprachwissenschaft (5 LP; Medienlinguistik/Fach- u. Wissenschaftskommunikation/Lexikographie)*		5 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Joachim Steffen		
Contents: Exemplary discussion of one of the following topic areas of Applied Linguistics: Media Linguistics, Technical and Scientific Communication, or Lexicography		
Learning Outcomes / Competences: *Subject-specific:* Students are able to deal with the acquired linguistic analysis methods and description procedures and apply them to topics from English and/or Romance Linguistics, namely from the area of Applied or Intercultural Linguistics. They are able to harness their theoretical knowledge for questions from the areas of Media Linguistics, Technical and Scientific Communication and/or Lexicography. *Methodical:* Students are able to independently research current secondary literature on a specific topic and thereby acquire in-depth knowledge of this very topic. They are able to adequately summarise the results of their theoretical and empirical analyses in oral and written form. *Social/personal:* Students are able to discursively assess specific topics and questions in the learning group and, if necessary, modify their views, showing appropriate communicative behaviour with regard to topic and situation.		
Remarks: This module may be offered by the chairs of Romance or English (Applied) Linguistics.		
Workload: Total: 150 h 30 h (attendance) 120 h (self-study)		
Conditions: Successful completion of the basic module linguistics (French, Italian or Spanish) OR basic module (English)		**Credit Requirements:** Passing the overall module examination
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Proseminar aus einem der Bereiche Medienlinguistik, Fach- und Wissenschaftskommunikation oder Lexikographie **Mode of Instruction:** intermediate seminar **Language:** German / English **Contact Hours:** 2
Assigned Courses: **Proseminar: Digitale Wörterbücher in der Romania (Französisch, Italienisch, Spanisch)** (intermediate seminar) **Proseminar: Fachsprachen in der Romania** (intermediate seminar)

Examination

Aufbaustufe Angewandte Sprachwissenschaft (5 LP; Medienlinguistik/Fach- u. Wissenschaftskommunikation/ Lexikographie) Anglistik bzw. Romanistik

module exam, overall module examination: term paper or written examination (depending on the respective course)

Module ASW-1202: Intermediate Module Applied Linguistics (Second and Third Language Acquisition/ Multilingualism/ Language Contact/ Translation) *Aufbaustufe Angewandte Sprachwissenschaft (5 LP; Zweit- u. Drittsprachenerwerb/Mehrsprachigkeit/Sprachkontakt/Translation)*		5 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Joachim Steffen		
Contents: Exemplary discussion of one of the following topic areas of Applied Linguistics: Second and Third Language Acquisition, Multilingualism/Language Contact, or Translation		
Learning Outcomes / Competences: *Subject-specific:* Students are able to deal with the acquired linguistic analysis methods and description procedures and apply them to topics from English and/or Romance Linguistics, namely from the area of Applied Linguistics. They are able to harness their theoretical knowledge for questions from the areas of Second and Third Language Acquisition, Multilingualism/ Language Contact, and/or Translation. *Methodical:* Students are able to independently research current secondary literature on a specific topic and thereby acquire in-depth knowledge of this very topic. They are able to adequately summarise the results of their theoretical and empirical analyses in oral and written form. *Social/personal:* Students are able to discursively assess specific topics and questions in the learning group and, if necessary, modify their views, showing appropriate communicative behaviour with regard to topic and situation.		
Remarks: This module may be offered by the chairs of Romance or English (Applied) Linguistics.		
Workload: Total: 150 h 30 h (attendance) 120 h (self-study)		
Conditions: Successful completion of the basic module linguistics (French, Italian or Spanish) OR basic module (English)		**Credit Requirements:** Passing the overall module examination
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Proseminar aus einem der Bereiche Zweit- und Drittsprachenerwerb, Mehrsprachigkeit/ Sprachkontakt oder Translation **Mode of Instruction:** intermediate seminar **Language:** German / English **Contact Hours:** 2
Assigned Courses: **Cross-Cultural Pragmatics** (seminar)

Proseminar: Phraseologismen und andere Übersetzungsschwierigkeiten (Französisch, Italienisch, Spanisch) (intermediate seminar)

Psycholinguistic Aspects of Second Language Acquisition (seminar)

Examination

Aufbaustufe Angewandte Sprachwissenschaft (5 LP; Zweit- u. Drittsprachenerwerb/Mehrsprachigkeit/ Sprachkontakt/Translation) Anglistik oder Romanistik

module exam, overall module examination: term paper

Module ASW-1301: Advanced Module Applied Linguistics (Second and Third Language Learning and Teaching/ Translation Studies/ Lexicography/ Terminology) *Vertiefungsstufe Angewandte Sprachwissenschaft (8 LP; Sprachlern-/ Sprachlehrforschung/Translationswissenschaft/Wörterbuchforschung/ Terminologiearbeit)*	8 ECTS/LP

Version 1.0.0 (since WS15/16)
Person responsible for module: Prof. Dr. Joachim Steffen

Contents:
In-depth discussion of one of the following central topics of Applied Linguistics: Language Learning Research/ Language Teaching Research, Translation Studies, or Dictionary Research/Terminology Work

Learning Outcomes / Competences:
Subject-specific:
Students are able to confidently deal with the acquired linguistic analysis methods and description procedures and independently apply them to challenging linguistic problems from the area of Applied or Intercultural Linguistics of the English or/and a Romance language. They are able to use their sound theoretical knowledge for complex questions from the areas of Language Learning Research/Language Teaching Research, Translation Studies, or Dictionary Research/Terminology Work.

Methodical:
Students are able to independently research current, extensive secondary literature on a specific topic and thereby acquire in-depth knowledge of this very topic. They are able to adequately present the results of their in-depth theoretical and empirical analyses in oral and written form.

Social/personal:
Students are able to independently work on research questions and to structure their self-study appropriately over a longer period of time. Students are able to defend their own positions in academic discourse in oral and written form.

Remarks:
This module may be offered by the chairs of Romance or English (Applied) Linguistics.

Workload:
Total: 240 h
30 h (attendance)
210 h (self-study)

Conditions: Successful completion of both intermediate level modules in Applied Linguistics		**Credit Requirements:** Passing the overall module examination
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Hauptsemianar aus einem der Bereiche Sprachlern-/Sprachlehrforschung, Translationswissenschaft oder Wörterbuchforschung/Terminologiearbeit
Mode of Instruction: advanced seminar
Language: German / English
Contact Hours: 2

Assigned Courses:

Hauptseminar: Romanische Pidgins und Kreolsprachen (advanced seminar)

Mündlichkeit und Schriftlichkeit (Französisch, Italienisch, Spanisch) (advanced seminar)

Mündlichkeit und Schriftlichkeit [1301, 1501] (advanced seminar)

Examination

Vertiefungsstufe Angewandte Sprachwissenschaft (8 LP; Sprachlern-/Sprachlehrforschung/Translationswissenschaft/Wörterbuchforschung/Terminologiearbeit) Anglistik

term paper, Modulgesamtprüfung: Seminararbeit (15-25 Seiten)

Examination

Vertiefungsstufe Angewandte Sprachwissenschaft (8 LP; Sprachlern-/Sprachlehrforschung/Translationswissenschaft/Wörterbuchforschung/Terminologiearbeit) Romanistik

term paper, overall module examination

Module EAS-1011: Literary Studies: Introduction (6 ECTS/LP, compulsory) *Literary Studies: Introduction (Vorlesung + Übung, 6 LP)*		6 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Martin Middeke PD Dr. David Kerler		
Contents: Introduction to the study of anglophone literatures		
Learning Outcomes / Competences: Students learn the basic terminology and methods for analyzing and interpreting anglophone literatures Students learn to apply these concepts on selected examples of anglophone literatures		
Remarks: This module must be taken at one of the indicated chairs (ALW or ELW). The examination is assigned to the selected chair. This must be considered when signing up for the exam.		
Workload: Total: 180 h 45 h (attendance) 135 h (self-study)		
Conditions: none		**Credit Requirements:** Passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: V Introduction to Literary Studies **Mode of Instruction:** lecture **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Introduction to Literary Studies**
Examination **Literary Studies: Introduction (V+Ü, 6 LP)** written exam

Parts of the Module
Part of the Module: Ü Supplementary Course **Mode of Instruction:** exercise course **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Supplementary Course English Literary Studies A** **Supplementary Course English Literary Studies B**

Supplementary Course English Literary Studies C
Supplementary Course English Literary Studies D
Supplementary Course English Literary Studies E
Supplementary Course English Literary Studies F

Module EAS-1210: Literary Studies Backgrounds: Periods *Literary Studies Backgrounds: Periods (V, Ü, Ex; 4 LP)*		4 ECTS/LP
Version 1.0.0 (since SoSe18) Person responsible for module: Prof. Dr. Martin Middeke PD Dr. David Kerler		
Contents: Critical analysis and description of exemplary anglophone literatures from different historical periods.		
Learning Outcomes / Competences: Students acquire basic knowledge of paradigmatic works, authors and periods of anglophone literatures Students learn to critically engage with literary periods together with their paradigmatic authors and works Students learn to apply various methods of literary analysis and literary/cultural theories		
Remarks: This module must be taken at one of the indicated chairs (ALW or ELW or NELK). The examination is assigned to the selected chair. This must be considered when signing up for the exam.		
Workload: Total: 120 h 30 h (attendance) 90 h (self-study)		
Conditions: none		**Credit Requirements:** Passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Vorlesung Literary Studies Backgrounds: Periods **Language:** German
Assigned Courses: **Canadian Minority Fiction** (exercise course) **Contemporary Irish Fiction** (exercise course) **English Literature: An Overview** (lecture) **Narrative Analysis** (exercise course) **Narrative Analysis** (exercise course) **Narrative Analysis - Postcolonial Short Fiction** (exercise course) **Narrative Analysis: Victorian Fiction** (exercise course) **Poetry Analysis** (exercise course) **Second Wave Feminist Print Culture in America** (exercise course) **Televisual Analysis and/as Cultural Criticism** (exercise course) **The Body in Postcolonial Contexts** (exercise course) **Video Game Analysis: Metagames** (exercise course)

Part of the Module: Übung Literary Studies Backgrounds: Periods
Language: German

Part of the Module: Exkursion Literary Studies Backgrounds: Periods
Language: German

Examination

Literary Studies Backgrounds: Periods (V, Ü, Ex; 4 LP)
module exam, portfolio, written exam

Module EAS-1411: Literary Studies Intermediate : Genres (6 ECTS/LP, compulsory) *Literary Studies Intermediate : Genres (Seminar + Übung 6 LP)*		6 ECTS/LP
Version 2.0.0 (since WS17/18) Person responsible for module: Prof. Dr. Katja Sarkowsky		
Contents: Critical analysis and description of various genres together with paradigmatic texts of anglophone literatures Beyond classical genres such as poetry, drama and prose fiction, these genres also comprise film, tv and digital media.		
Learning Outcomes / Competences: Students learn to critically engage with / differentiate various genres by analyzing paradigmatic examples Students learn to critically engage with primary and secondary literature Students learn to present and discuss their ideas and work results in an academic register (orally and written)		
Remarks: This module must be taken at one of the indicated chairs (ALW or ELW or NELK). The examination is assigned to the selected chair. This must be considered when signing up for the exam.		
Workload: Total: 180 h 30 h (attendance) 150 h (self-study)		
Conditions: None		**Credit Requirements:** Passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: S Literary Studies Intermediate: Genres **Mode of Instruction:** seminar, intermediate seminar **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Literature from the Margins** (intermediate seminar) **Narrative Analysis - Postcolonial Short Fiction** (exercise course) **PS: Feminist Poetry** (intermediate seminar) **PS: Modernism** (intermediate seminar) **PS: Time and Narrative** (intermediate seminar) **The Victorian Social Novel** (intermediate seminar)
Examination **Literary Studies Intermediate : Genres (Seminar + Übung 6 LP)** term paper

Parts of the Module
Part of the Module: Ü Literary Studies: Genres **Mode of Instruction:** exercise course **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Narrative Analysis** (exercise course) **Narrative Analysis** (exercise course) **Narrative Analysis - Postcolonial Short Fiction** (exercise course) **Narrative Analysis: Victorian Fiction** (exercise course) **Poetry Analysis** (exercise course)

Module EAS-1412: Literary Studies: Intermediate 2 *Literary Studies Intermediate 2 (Seminar, 6 LP)*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Annika McPherson Prof. Dr. Martin Middeke		
Contents: Exemplary analyses of paradigmatic works, genres and periods of anglophone literatures		
Learning Outcomes / Competences: Students acquire advanced knowledge of paradigmatic works, genres and periods of anglophone literatures Students learn to scrutinize specific issues of literary studies and to critically approach them with the help of specific methods and (literary) theories Students learn to present and discuss their ideas and work results in an academic register (orally and written)		
Remarks: This module must be taken at one of the indicated chairs (ALW or ELW or NELK). The examination is assigned to the selected chair. This must be considered when signing up for the exam.		
Workload: Total: 180 h 30 h (attendance) 150 h (self-study)		
Conditions: None		**Credit Requirements:** Passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: S Literary Studies Intermediate 2 **Mode of Instruction:** intermediate seminar **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Literature from the Margins** (intermediate seminar) **PS: Feminist Poetry** (intermediate seminar) **PS: Modernism** (intermediate seminar) **PS: Time and Narrative** (intermediate seminar) **The Victorian Social Novel** (intermediate seminar)
Examination **Literary Studies: Intermediate 2 (S, 6 LP)** module exam, seminar paper, portfolio

Module EAS-1731: Literary Studies Advanced: Literary Analysis (8 ECTS/LP, compulsory) *Literary Studies Advanced: Literary Analysis (Seminar, 8 LP)*		8 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Martin Middeke		
Contents: Advanced literary analysis of anglophone literatures		
Learning Outcomes / Competences: Students acquire advanced knowledge of specific topics in anglophone literatures Students learn to engage with complex questions in literary studies and to critically reflect them with the help of specific methods and (literary) theories Students learn to present and discuss their ideas and work results in an academic register (orally and written)		
Remarks: This module must be taken at one of the indicated chairs (ALW or ELW or NELK). The examination is assigned to the selected chair. This must be considered when signing up for the exam.		
Workload: Total: 240 h 210 h (self-study) 30 h (attendance)		
Conditions: None		**Credit Requirements:** Passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: S Literary Studies Advanced: Literary Analysis **Mode of Instruction:** advanced seminar **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Aktuelle Fragen der Literaturtheorie** **HS "The Drama of a Broken Tea Cup? American Realism and its Critics"** (advanced seminar) **HS: Flight and Refuge in North American Fiction** (advanced seminar) **HS: Literary Ethics** (advanced seminar)
Examination **Literary Studies: Advanced BA (HS, 8 LP)** module exam, seminar paper

Module EAS-2211: Linguistics Background: Linguistics and Language in Use (4 ECTS/LP, compulsory) *Linguistics Background: Linguistics and Language in Use (V, 4 LP)*		4 ECTS/LP
Version 2.0.0 (since WS17/18) Person responsible for module: Prof. Dr. Claudia Claridge Prof. Dr. Anita Fetzer		
Contents: Description, analysis and discussion of the English language system, its patterns, norms, and contextual use, with a focus on the investigation of semantic, pragmatic, and discursive phenomena as well as their manifestation in selected contexts of spoken and written language use. Advanced methodologies for language description based on scientific criteria as well as use of subject- and mode-specific digital and non-digital tools.		
Learning Outcomes / Competences: Students expand their knowledge of terminology and research paradigm-specific definitions with a focus on semantics and the related structural and cognitive representation of meaning, on pragmatics with pragma-linguistic analyses as well as on discourse analysis with discourse- and text-analytical applications. Students apply digital and non-digital tools to quantitative and qualitative analyses and learn to critically reflect and interpret methodologies and their outcomes. Student acquire competences in context-independent and context-dependent language description and analysis. They use linguistic methods for illuminating perception and processing on the cognitive level. Students improve their strategies for acquiring information from scientific research literature, adopt strategies for the development of their own research projects. In doing so, students critically analyse and evaluate research literature as well as their own performance. They improve their ability to work in a team, to use academic communication strategies, and to present academic content adequately. They improve their time management skills.		
Remarks: This module is assigned to one of the English linguistics chairs (ASWA or ESW), which is responsible for the exam. Exam registration is attached to the respective chair.		
Workload: Total: 120 h 30 h (attendance) 90 h (self-study)		
Conditions: none		**Credit Requirements:** Passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: V Linguistics Background: Linguistics and Language in Use **Mode of Instruction:** lecture **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Key Topics in Pragmatics** (lecture)

Examination

Linguistics Background: Linguistics and Language in Use

module exam, (portfolio)

Module EAS-2410: Linguistics Intermediate: Grammar in Context *Linguistics Intermediate: Grammar in Context (S; 6 LP)*	6 ECTS/LP

Version 1.0.0 (since WS17/18)
Person responsible for module: Prof. Dr. Claudia Claridge
Prof. Dr. Anita Fetzer

Contents:
Analysis and discussion of scientific grammars / grammatical modesl of English and their application to selected language data, with a focus on the investigation of syntactic, morphological and phonological-phonetic phenomena and their manifestation in various contexts. Application of advanced working techniques of speech analysis as well as their appropriate oral and written presentation.

Learning Outcomes / Competences:
Students acquire advanced knowledge of the terminology and ordering principles of modern English grammars and their core areas (syntax and syntactic analysis, morphology and word formation as well as related analysis, phonology and phonetics as well as phonological representations and regular phonetic realisation).

Students acquire the ability for context-sensitive grammatical analysis and its critical reflection.

Students acquire competence in structural and functional grammar description, in using linguistic methods for the identification of regularities and patterns.

Students improve their strategies for acquiring information from scientific research literature, adopt strategies for the development of their own research projects. In doing so, students critically analyse and evaluate research literature as well as their own performance. Students develop skills in team working, time management, and in adequately presenting linguistic content.

Remarks:
This module is assigned to one of the English linguistics chairs (ASWA or ESW), which is responsible for the exam. Exam registration is attached to the respective chair.

Workload:
Total: 180 h
30 h (attendance)
150 h (self-study)

Conditions: None		**Credit Requirements:** Passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: S Linguistics Intermediate: Grammar in Context
Language: English / German
Contact Hours: 2

Assigned Courses:

Construction Grammar in Context (seminar)

Lexicology (seminar)

Negation across Englishes (seminar)

Topics in Semantics (seminar)

Examination

Linguistics Intermediate: Grammar in Context

module exam, portfolio

Module EAS-2731: Linguistics Advanced: System and Variation (8 ECTS/LP, compulsory) *Linguistics Advanced: System and Variation (S, 8 LP)*		8 ECTS/LP
Version 2.2.0 (since WS17/18) Person responsible for module: Prof. Dr. Claudia Claridge Prof. Dr. Anita Fetzer		
Contents: Analysis of the rule-based inherent variation of the English language and its use in regional, social, national and international varieties, taking account of all relevant linguistic levels (including phonetics / phonology, syntax, morphosyntax, morphology, lexicology, pragmatics and discourse), sociolinguistic levels (including forms of address, politeness and gender) and diachronic levels (including sound developments, changes in the lexicon, grammaticalization, pragmaticalization).		
Learning Outcomes / Competences: Students acquire in-depth knowledge of linguistic tools and their application to linguistic and sociolinguistic issues. They understand the relationships and competitions between linguistic realisations such as standard vs. non-standard, standardisation processes, spoken vs. written, monolingual vs. multilingual, creolisation as well as linguistic variables. Students extend their competences in dealing with competing, functionally equivalent manifestations of English and its varieties as well as with different conceptualisations of native language use. They can use advanced and variety-specific methods for recognising and differentiating regularities, patterns and functional equivalence, using qualitative and quantitative approaches. Students improve their strategies for acquiring information from scientific research literature. Students learn to plan and implement independent research projects regarding aims, data and presentation as well as to critically evaluate others' projects. Students develop intercultural and transcultural skills. Students' skills regarding team work, time management, and academic communication are further improved.		
Remarks: This module is assigned to one of the English linguistics chairs (ASWA or ESW), which is responsible for the exam. Exam registration is attached to the respective chair.		
Workload: Total: 240 h 210 h (self-study) 30 h (attendance)		
Conditions: None		**Credit Requirements:** Passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: S Linguistics Advanced: System and Variation **Mode of Instruction:** seminar **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Cross-Cultural Pragmatics** (seminar)

Early Modern English (seminar)

Excessive Language (seminar)

Psycholinguistic Aspects of Second Language Acquisition (seminar)

Stylistic Approaches to Pop(ular) Culture (seminar)

Examination

Linguistics Advanced: System and Variation

module exam, (portfolio)

Module EAS-3060: Didactics: Introduction *Didactics: Introduction (6 LP)*		6 ECTS/LP
Version 2.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Engelbert Thaler		
Contents: Introduction to basic theories, key concepts, approaches, and foreign language teaching methodology; introduction to key aspects in TEFL and foreign language research; introduction to learning objectives, key issues of second language acquisition, foreign language learning and teaching against the backdrop of profession-oriented contexts and teaching practices.		
Learning Outcomes / Competences: module part I: Lecture Students acquire a basic knowledge of the teaching and learning of English as a foreign language. They are able to understand and theoretically explain domain-specific teaching and learning processes. In doing so, they are able to differentiate between foreign language skills and competences, methodological and didactic approaches to English language teaching and their implementation in classroom contexts. Students understand teaching/learning processes as a complex interaction of subject-specific, individual, institutional factors and educational policy. module part 2: Supplementary Course In this supplementary course students acquire basic knowledge and skills in dealing with academic key concepts and techniques from a TEFL perspective, which they will later on need, apply and further deepen in the context of their study program. For example, students will acquire knowledge of how to prepare, conduct and evaluate classroom observations in a criterion-guided manner. They will explore the aspects that need to be taken into account when developing their own teaching and learning materials and understand which didactic principles of TEFL are used to design modern textbooks. Another focus is the acquisition of basic knowledge and skills with regard to the writing of term papers in TEFL.		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: for incoming students: none (but sound knowledge of TEFL issues desirable)		**Credit Requirements:** 6
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Introduction to the Teaching of English **Mode of Instruction:** lecture **Lecturers:** Prof. Dr. Engelbert Thaler **Language:** English / German **Contact Hours:** 2

Contents:

This introductory lecture will give you an overview of TEFL (Teaching English as a Foreign Language). We will cover basics (e.g. objectives, teacher, learner, media, lesson planning), methodology (e.g. Balanced Teaching, cooperative learning, practising, playing, CLIL), competences (e.g. listening-viewing, speaking, reading, writing, mediating, vocabulary, grammar, intercultural communicative competence) as well as assessment (e.g. class tests).

Lehr-/Lernmethoden:

It is highly recommended to also attend the (non-compulsory) tutorial in which student tutors revisit the topics dealt with in the lecture and provide assistance with open questions.

Literature:

Thaler, Engelbert. *Englisch unterrichten*. Berlin: Cornelsen, 2014. (Die in der Vorlesung behandelten Kapitel sollten wöchentlich vorbereitend gelesen werden.)

Assigned Courses:

Introduction to the Teaching of English - Nicht für Erstsemester geeignet (ausgenommen Master)! (lecture)

Part of the Module: Übung

Mode of Instruction: exercise course
Language: English / German
Contact Hours: 2

Contents:

In this supplementary course students acquire basic knowledge and skills in dealing with academic key concepts and techniques from a TEFL perspective, which they will later on need, apply and further deepen in the context of their study program. For example, students will acquire knowledge of how to prepare, conduct and evaluate classroom observations in a criterion-guided manner. They will explore the aspects that need to be taken into account when developing their own teaching and learning materials and understand which didactic principles of TEFL are used to design modern textbooks. Another focus is the acquisition of basic knowledge and skills with regard to the writing of term papers in TEFL.

Lehr-/Lernmethoden:

exercise course

Assigned Courses:

Begleitübung zur Vorlesung "Introduction to the Teaching of English"

Begleitübung zur Vorlesung "Introduction to the Teaching of English"

Examination

Didactics: Introduction (V+Ü, 6 LP)

module exam, module exam (written final exam)

Module EAS-3200: Didactics: Intermediate *Didactics: Intermediate (PS, 3 LP)*		3 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Engelbert Thaler		
Contents: Introduction to key aspects in TEFL and foreign language research; introduction to learning objectives, key issues of second language acquisition, foreign language learning and teaching against the backdrop of profession-oriented contexts and teaching practices.		
Learning Outcomes / Competences: Delving into a specific topic of a core area in TEFL (influencing factors in foreign language learning, foreign language skills and competences, foreign language teaching methodology, assessment), students expand their knowledge of English language teaching and learning. They recognize connections between TEFL-related issues and develop a deeper understanding of these.		
Workload: Total: 90 h 60 h (self-study) 30 h (attendance)		
Conditions: for incoming students: none (but basic knowledge of key issues in TEFL desirable)		**Credit Requirements:** 3
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Proseminar, siehe Titel der jeweiligen Lehrveranstaltung

Mode of Instruction: intermediate seminar

Language: English / German

Contact Hours: 2

Lehr-/Lernmethoden:

intermediate seminar

Assigned Courses:

A Practical Approach to Teaching English at Gymnasium (intermediate seminar)

Aspects of Teaching English in Primary School (intermediate seminar)

Dealing with Heterogeneity in Foreign Language Classrooms (intermediate seminar)

Methods of Teaching English in Elementary School (intermediate seminar)

Practices of Teaching English in Multilingual Classrooms (intermediate seminar)

Research Methods and Techniques in Foreign Language Teaching (intermediate seminar)

Teaching Cultural Studies: USA (intermediate seminar)

Teaching Texts (intermediate seminar)

Examination

Didactics: Intermediate (PS, 3 LP)

module exam, written term paper or written exam (depending on individual course requirements)

Module EAS-4441: Cultural Studies: Key Concepts (4 ECTS/LP, compulsory) *Cultural Studies: Key Concepts (Vorlesung, 4 LP)*		4 ECTS/LP
Version 2.2.0 (since WS17/18) Person responsible for module: Prof. Dr. Annika McPherson		
Contents: Introduction to cultural studies		
Learning Outcomes / Competences: Students learn the basic terminology, concepts and methods of cultural studies Students learn to apply these concepts on selected examples of anglophone culture(s)		
Remarks: This module must be taken at one of the indicated chairs (ALW or ELW or NELK). The examination is assigned to the selected chair. This must be considered when signing up for the exam.		
Workload: Total: 120 h 90 h (self-study) 30 h (attendance)		
Conditions: none		**Credit Requirements:** Passing the exam
Frequency: usu. at least once per acad. year	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Modulteiltitel neu: V Cultural Studies: Key Concepts **Mode of Instruction:** lecture **Language:** German **Contact Hours:** 2
Assigned Courses: **Cultural Studies: Key Concepts (VL)** (lecture)
Examination **Cultural Studies: Key Concepts** portfolio exam

Module EAS-4442: Cultural Studies: Cultural Analysis (4 ECTS/LP, compulsory) *Cultural Studies: Cultural Analysis (Übung 4 LP)*		4 ECTS/LP
Version 2.0.0 (since WS17/18) Person responsible for module: Prof. Dr. Annika McPherson Prof. Dr. Martin Middeke		
Contents: Advanced cultural analysis Advanced discussion and systematization of culture-theoretical texts		
Learning Outcomes / Competences: Students learn to independently engage with theoretical texts Students can contextualize these theories/approaches historically and reproduce their specific methods of analysis Students learn to present and discuss their ideas and work results in an academic register (orally and written)		
Remarks: This module must be taken at one of the indicated chairs (ALW or ELW or NELK). The examination is assigned to the selected chair. This must be considered when signing up for the exam.		
Workload: Total: 120 h 30 h (attendance) 90 h (self-study)		
Conditions: None		**Credit Requirements:** Passing the exam
Frequency: usu. at least once per acad. year	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Ü Cultural Studies: Cultural Analysis **Mode of Instruction:** exercise course **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Cultural Studies: Ecocriticism** (exercise course) **Televisual Analysis and/as Cultural Criticism** (exercise course) **The Body in Postcolonial Contexts** (exercise course)
Examination **Cultural Studies: Cultural Analysis (Übung 4 LP)** module exam, portfolio

Module FRA-2101: Basic Module Literary and Cultural Studies French (Methods + Introductory Course) *Grundstufe Literatur- und Kulturwissenschaft Französisch (8 LP; Methoden + Grundkurs)*		8 ECTS/LP
Version 1.3.1 (since WS15/16) Person responsible for module: Dr. Maximilian Gröne		
Contents: Introduction to theories and methods of French Literary Studies; tutorial.		
Learning Outcomes / Competences: Students learn the methods of text analysis and different theories of literary studies.		
Workload: Total: 240 h 60 h (attendance) 180 h (self-study)		
Conditions: none		**Credit Requirements:** Sucessful passing of the module exam.
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Methoden der Romanischen Literaturwissenschaft
Mode of Instruction: lecture
Language: German / French
Contact Hours: 2

Assigned Courses:

Vl Methoden der Romanischen Literatur- und Kulturwissenschaft (lecture)

Parts of the Module

Part of the Module: Grundkurs Literaturwissenschaft Französisch
Mode of Instruction: basic course
Language: German / French
Contact Hours: 2

Assigned Courses:

Grundkurs Literatur- und Kulturwissenschaft Französisch, Gruppe A (basic course)

Grundkurs Literatur- und Kulturwissenschaft Französisch, Gruppe B (basic course)

Examination

Grundstufe Literaturwissenschaft Französisch (8 LP; Methoden + Grundkurs)
written exam, Modulgesamtprüfung: Klausur (15-180 Minuten) / length of examination: 90 minutes

Description:
written examination

Module FRA-2203: Intermediate Module Literary and Cultural Studies French (Lecture) *Aufbaustufe Literatur- und Kulturwissenschaft Französisch (5 LP; Vorlesung)*		5 ECTS/LP
Version 1.3.0 (since WS15/16) Person responsible for module: Dr. Maximilian Gröne		
Contents: Advanced knowledge in French Literary Studies and French Literary History.		
Learning Outcomes / Competences: Students will acquire extensive knowledge in the methods and theories of French Literary Studies and French Literary History.		
Workload: Total: 150 h 120 h (self-study) 30 h (attendance)		
Conditions: FRA-2101 or FRA-2102		**Credit Requirements:** Sucessful passing of the module exam.
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Vorlesung Französische Literatur

Mode of Instruction: lecture

Language: German / French

Contact Hours: 2

Assigned Courses:

Vl Aufklärung (lecture)

Examination

Aufbaustufe Literaturwissenschaft Französisch (5 LP; Vorlesung)

written exam, Modulgesamtprüfung: Klausur (15-180 Minuten)

Description:

Written examination.

<table>
<tr><td colspan="2">Module FRA-2302: Advanced Module Literary and Cultural Studies French (Core Seminar)
Vertiefungsstufe B Literatur- und Kulturwissenschaft Französisch (8 LP; Hauptseminar)</td><td>8 ECTS/LP</td></tr>
<tr><td colspan="3">Version 1.3.0 (since WS15/16)
Person responsible for module: Dr. Maximilian Gröne</td></tr>
<tr><td colspan="3">Contents:
Advanced skills in independent text and media analysis.</td></tr>
<tr><td colspan="3">Learning Outcomes / Competences:
Students will be able to analyze literary texts and other media genres in terms of their central literary and cultural characteristics and to interpret them methodically, taking into account the research literature.</td></tr>
<tr><td colspan="3">Workload:
Total: 240 h
30 h (attendance)
210 h (self-study)</td></tr>
<tr><td colspan="2">Conditions:
none</td><td>Credit Requirements:
Sucessful passing of the module exam.</td></tr>
<tr><td>Frequency: each semester</td><td>Recommended Semester:</td><td>Minimal Duration of the Module:
1 semester[s]</td></tr>
<tr><td>Contact Hours:
2</td><td>Repeat Exams Permitted:
according to the examination regulations of the study program</td><td></td></tr>
</table>

Parts of the Module

Part of the Module: Hauptseminar Französische Literatur

Mode of Instruction: advanced seminar
Language: German / French
Contact Hours: 2

Assigned Courses:

HS Auteures du 18e siècle (advanced seminar)

Examination

Vertiefungsstufe Literaturwissenschaft Französisch Bachelor (8 LP; Hauptseminar)
term paper, Modulgesamtprüfung: Seminararbeit (15-25 Seiten)

Module FRA-3301: Advanced Module Didactics French (seminar + colloquium) *Vertiefungsstufe Fachdidaktik Französisch (9 LP; Hauptseminar + Examenskolloquium)*		9 ECTS/LP
Version 1.3.0 (since WS15/16) Person responsible for module: Prof. Dr. Christiane Fäcke		
Contents: Designing – analysing – researching foreign language teaching		
Learning Outcomes / Competences: *Subject-specific:* Students enhance their knowledge of one key aspect of subject-specific didactics as well as their ability to reflect in-depth on foreign language theories and concepts taking into account major contents, goals and methods. *Methodical:* Students acquire the skill to develop theories on foreign language didactics and become familiar with empirical research methods. They improve their methodological skills by working independently with the research literature. They present their own results and defend them in the academic discourse. *Social/personal:* Students deepen their skills in the academic discourse with due regard to the subject and the addressees. They strengthen their own positions and show interest in and open-mindedness for the positions and achievements of others. They learn how to cope with a heavy workload, thereby improving their ability to concentrate and their time-management.		
Workload: Total: 270 h 60 h (attendance) 210 h (self-study)		
Conditions: Successful completion of the intermediate module on subject-specific didactics		**Credit Requirements:** Passing the overall module examination
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Hauptseminar Fachdidaktik Französisch
Mode of Instruction: advanced seminar
Language: German / French
Contact Hours: 2

Assigned Courses:

Evaluation im Französisch- und Italienischunterricht (Französisch/Italienisch) (advanced seminar)

Mehrsprachigkeit im Unterricht (Französisch/Spanisch/Italienisch) (advanced seminar)

Part of the Module: Examenskolloquium Fachdidaktik Französisch
Mode of Instruction: colloquium
Language: German / French
Contact Hours: 2

Assigned Courses: **Examenskolloquium Fachdidaktik (Französisch)** (colloquium)
Examination **Vertiefungsstufe Fachdidaktik Französisch (9 LP; Hauptseminar + Examenskolloquium)** term paper, overall module examination

Module GER-1001: Modern German Literature: basic module *NDL Basis*		10 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Mathias Mayer		
Contents: basic knowledge of literary theory and genres		
Learning Outcomes / Competences: - ability to analyse and to interpret works of modern german literature - fundamental philological skills		
Workload: Total: 300 h 225 h studying of course content (self-study) 75 h (attendance)		
Conditions: none		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 5	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Grundkurs zur Einführung in die Neuere Deutsche Literaturwissenschaft

Language: German

Assigned Courses:

Grundkurs NDL (A) (basic course)

Grundkurs NDL (B) (basic course)

Grundkurs NDL (C) (basic course)

Grundkurs NDL (D) (basic course)

Grundkurs NDL (E) (basic course)

Examination

GK-NDL-Prüfung

portfolio exam

Parts of the Module

Part of the Module: Vorlesung zur Einführung in die Neuere Deutsche Literaturwissenschaft

Language: German

Assigned Courses:

V: Warten auf die Katastrophe? Literarische Endzeit(en) (lecture)

Module GER-1002: Modern German Literature: basic module (subsidiary subject) *NDL NF-Basis*		7 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Mathias Mayer		
Contents: basic knowlegde of literary theory and genres		
Learning Outcomes / Competences: - ability to analyse and to interpret works of modern german literature - fundamental philological skills		
Workload: Total: 210 h 165 h studying of course content (self-study) 45 h (attendance)		
Conditions: none		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Grundkurs zur Einführung in die Neuere Deutsche Literaturwissenschaft (Nebenfach)
Language: German

Assigned Courses:

Grundkurs NDL (A) (basic course)

Grundkurs NDL (B) (basic course)

Grundkurs NDL (C) (basic course)

Grundkurs NDL (D) (basic course)

Grundkurs NDL (E) (basic course)

Examination

GK-NDL-Prüfung (Nebenfach)
portfolio exam

Module GER-1003: Modem German Literature: intermediate module *NDL Aufbau*		10 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Mathias Mayer		
Contents: exemplary practice in analysing and interpreting literary works		
Learning Outcomes / Competences: improved ability to research, discuss, and present topics of modern german literature		
Workload: Total: 300 h 240 h studying of course content (self-study) 60 h (attendance)		
Conditions: completion of the basic module		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Proseminar in Neuerer Deutscher Literaturwissenschaft
Language: German

Assigned Courses:

PS 'Beschwertes Schreiben' – deutschsprachig-jüdische Literatur der Gegenwart

PS (B.A., LA.): LeHet: Mehrdeutigkeit - Betrachtung aus Perspektive der Literaturwissenschaften und der Mehrsprachigkeitsdidaktik (Kooperation mit DaZ/DaF) (intermediate seminar)

PS Basiswissen literarische Epochen (intermediate seminar)

PS Erinnerung und Migration in der deutschsprachigen Gegenwartsliteratur: Annäherungen an die erinnerungskulturelle Funktion von Literatur (intermediate seminar)

PS Kindersachbücher (intermediate seminar)

PS Klassiker der Kinderliteratur (intermediate seminar)

PS Was ist deutsch? Eine Spurensuche (intermediate seminar)

PS/HS (BA/LA): Große Schweizer Schriftsteller des 20. Jahrhunderts: Friedrich Dürrenmatt und Max Frisch (seminar)

PS/Ü Literatur aus Czernowitz - Rose Ausländer, Paul Celan u.a. (seminar)

PS/Ü: Autorinnen unterwegs. Literarische Reiseberichte um 1800 (intermediate seminar)

PS/Ü: Cat People (intermediate seminar)

PS: "Denn Bleiben ist nirgends". Rilkes lyrisches Jahrhundertwerk. 100 Jahre "Duineser Elegien" und "Sonette an Orpheus" (intermediate seminar)

PS: Deutschsprachige Gegenwartsdramatik. Tendenzen seit 1990 (intermediate seminar)

PS: Geschichte(n) in Raum und Zeit erzählen - Zu einer Theorie des Romans mit Michail Bachtin (intermediate seminar)

PS: Kunstmärchen (intermediate seminar)

PS: Lyrikanalyse (Schwerpunkt Klassik, Romantik) (intermediate seminar)

Ü: Schreibwerkstatt (exercise course)

Part of the Module: Vorlesung in Neuerer Deutscher Literaturwissenschaft

Language: German

Assigned Courses:

V: Epochen der europäischen Literatur (lecture)

V: Warten auf die Katastrophe? Literarische Endzeit(en) (lecture)

Examination

Proseminar-Arbeit

term paper

Description:

Ausnahmefall WS 2020/21: Portfolio

Module GER-1005: Modern German Literature: intermediate module (elective area : theory of literature) *NDL Aufbau (Wahlbereich Literaturtheorie)*		5 ECTS/LP
Version 2.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Mathias Mayer		
Contents: literary theory		
Learning Outcomes / Competences: ability to discuss problems of literary theory		
Workload: Total: 150 h 120 h studying of course content (self-study) 30 h (attendance)		
Conditions: completion of the basic module		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Wahlbereich NDL Aufbau

Language: German

Assigned Courses:

HS (B.A., LA) Einführung in die Literatursoziologie (advanced seminar)

HS (BA/LA): Auf Fortunatus Spuren. Topographie und Literatur in der Frühen Neuzeit (advanced seminar)

HS (BA/LA): Strahlende Held*innen - tragische Figuren? Frühe Neuzeit und ihre Bühnen-Geschichte (advanced seminar)

HS - BA/LA Ghettogeschichten – Realismus in der deutschsprachig-jüdischen Literatur des 19. Jahrhunderts (advanced seminar)

HS: Hans Keilson: Dichter, Widerstandskämpfer, Traumaforscher (advanced seminar)

Ko Abschlussarbeiten (colloquium)

PS 'Beschwertes Schreiben' – deutschsprachig-jüdische Literatur der Gegenwart

PS/HS (BA/LA): Große Schweizer Schriftsteller des 20. Jahrhunderts: Friedrich Dürrenmatt und Max Frisch (seminar)

PS/Ü Literatur aus Czernowitz - Rose Ausländer, Paul Celan u.a. (seminar)

schauinsblau - Onlinemagazin für Literatur, Kunst und Wissenschaft (exercise course)

Ü (B.A./LA/M.A.): "Fiktion und Fantasie" (exercise course)

Ü (B.A./LA/M.A.): Sprachliche Heterogenität (exercise course)

Ü/Ko: Gesprächskreis Abschlussarbeiten (exercise course)

Ü: Literarische Neuerscheinungen (exercise course)

Ü: Schreibwerkstatt (exercise course)

Part of the Module: Seminar, Übung, Projekt
Language: German

Assigned Courses:

HS (B.A., LA) Einführung in die Literatursoziologie (advanced seminar)

HS (BA/LA): Auf Fortunatus Spuren. Topographie und Literatur in der Frühen Neuzeit (advanced seminar)

HS (BA/LA): Strahlende Held*innen - tragische Figuren? Frühe Neuzeit und ihre Bühnen-Geschichte (advanced seminar)

HS - BA/LA Ghettogeschichten – Realismus in der deutschsprachig-jüdischen Literatur des 19. Jahrhunderts (advanced seminar)

HS: Hans Keilson: Dichter, Widerstandskämpfer, Traumaforscher (advanced seminar)

Ko Abschlussarbeiten (colloquium)

PS 'Beschwertes Schreiben' – deutschsprachig-jüdische Literatur der Gegenwart

PS/HS (BA/LA): Große Schweizer Schriftsteller des 20. Jahrhunderts: Friedrich Dürrenmatt und Max Frisch (seminar)

PS/Ü Literatur aus Czernowitz - Rose Ausländer, Paul Celan u.a. (seminar)

schauinsblau - Onlinemagazin für Literatur, Kunst und Wissenschaft (exercise course)

Ü (B.A./LA/M.A.): "Fiktion und Fantasie" (exercise course)

Ü (B.A./LA/M.A.): Sprachliche Heterogenität (exercise course)

Ü/Ko: Gesprächskreis Abschlussarbeiten (exercise course)

Ü: Literarische Neuerscheinungen (exercise course)

Ü: Schreibwerkstatt (exercise course)

Examination

Wahlbereichs-Prüfung
module exam

Module GER-1006: Modern German Literature: advanced module (bachelor) *NDL BA-Vertiefung*		8 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Mathias Mayer		
Contents: historical and current state of research about an exemplary topic		
Learning Outcomes / Competences: ability to develope own research questions		
Workload: Total: 240 h 210 h studying of course content (self-study) 30 h (attendance)		
Conditions: completion of the basic module		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Hauptseminar in Neuerer deutscher Literaturwissenschaft
Language: German

Assigned Courses:

HS (B.A., LA) Einführung in die Literatursoziologie (advanced seminar)

HS (BA/LA): Auf Fortunatus Spuren. Topographie und Literatur in der Frühen Neuzeit (advanced seminar)

HS (BA/LA): Strahlende Held*innen - tragische Figuren? Frühe Neuzeit und ihre Bühnen-Geschichte (advanced seminar)

HS - BA/LA Ghettogeschichten – Realismus in der deutschsprachig-jüdischen Literatur des 19. Jahrhunderts (advanced seminar)

HS: Hans Keilson: Dichter, Widerstandskämpfer, Traumaforscher (advanced seminar)

PS/HS (BA/LA): Große Schweizer Schriftsteller des 20. Jahrhunderts: Friedrich Dürrenmatt und Max Frisch (seminar)

PS/Ü Literatur aus Czernowitz - Rose Ausländer, Paul Celan u.a. (seminar)

Examination
Hauptseminar-Arbeit
term paper

Module GER-1010: Modern German Literature: advanced module (elective area) *NDL WB-Vertiefung*		5 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Mathias Mayer		
Contents: exemplary specialisation		
Learning Outcomes / Competences: improved presentation of research results		
Workload: Total: 150 h 30 h (attendance) 120 h studying of course content (self-study)		
Conditions: none		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar, Übung, Projekt

Language: German

Assigned Courses:

HS (B.A., LA) Einführung in die Literatursoziologie (advanced seminar)

HS (BA/LA): Auf Fortunatus Spuren. Topographie und Literatur in der Frühen Neuzeit (advanced seminar)

HS (BA/LA): Strahlende Held*innen - tragische Figuren? Frühe Neuzeit und ihre Bühnen-Geschichte (advanced seminar)

HS - BA/LA Ghettogeschichten – Realismus in der deutschsprachig-jüdischen Literatur des 19. Jahrhunderts (advanced seminar)

HS: Hans Keilson: Dichter, Widerstandskämpfer, Traumaforscher (advanced seminar)

Ko Abschlussarbeiten (colloquium)

PS 'Beschwertes Schreiben' – deutschsprachig-jüdische Literatur der Gegenwart

PS (B.A., LA.): LeHet: Mehrdeutigkeit - Betrachtung aus Perspektive der Literaturwissenschaften und der Mehrsprachigkeitsdidaktik (Kooperation mit DaZ/DaF) (intermediate seminar)

PS Basiswissen literarische Epochen (intermediate seminar)

PS Erinnerung und Migration in der deutschsprachigen Gegenwartsliteratur: Annäherungen an die erinnerungskulturelle Funktion von Literatur (intermediate seminar)

PS Kindersachbücher (intermediate seminar)

PS Klassiker der Kinderliteratur (intermediate seminar)

PS Was ist deutsch? Eine Spurensuche (intermediate seminar)

PS/HS (BA/LA): Große Schweizer Schriftsteller des 20. Jahrhunderts: Friedrich Dürrenmatt und Max Frisch (seminar)

PS/Ü Literatur aus Czernowitz - Rose Ausländer, Paul Celan u.a. (seminar)

PS: "Denn Bleiben ist nirgends". Rilkes lyrisches Jahrhundertwerk. 100 Jahre "Duineser Elegien" und "Sonette an Orpheus" (intermediate seminar)

PS: Deutschsprachige Gegenwartsdramatik. Tendenzen seit 1990 (intermediate seminar)

PS: Geschichte(n) in Raum und Zeit erzählen - Zu einer Theorie des Romans mit Michail Bachtin (intermediate seminar)

PS: Kunstmärchen (intermediate seminar)

PS: Lyrikanalyse (Schwerpunkt Klassik, Romantik) (intermediate seminar)

schauinsblau - Onlinemagazin für Literatur, Kunst und Wissenschaft (exercise course)

Ü (B.A./LA/M.A.): "Fiktion und Fantasie" (exercise course)

Ü (B.A./LA/M.A.): Sprachliche Heterogenität (exercise course)

Ü/Ko: Gesprächskreis Abschlussarbeiten (exercise course)

Ü: Literarische Neuerscheinungen (exercise course)

Ü: Schreibwerkstatt (exercise course)

Examination

NDL Wahlbereich-Vertiefungs-Prüfung

module exam

Module GER-1013: Academic specialisation: Modern German Literature (bachelor) *NDL Profilierung (Bachelor)*		4 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Mathias Mayer		
Contents: academic specialisation		
Learning Outcomes / Competences: - acquiring an individual academic profile - orientation of possible professional application		
Remarks: Germanistik NF (PO 2012): Entweder GER-1013 **oder** GER-2009		
Workload: Total: 120 h 30 h studying of course content (attendance) 90 h (self-study)		
Conditions: none		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Projekt

Language: German

Assigned Courses:

AG/ÜB Benefizveranstaltung: Lesung von Literatur aus Czernowitz (Ukraine) in der Kresslesmühle (exercise course)

Ko Abschlussarbeiten (colloquium)

PS 'Beschwertes Schreiben' – deutschsprachig-jüdische Literatur der Gegenwart

PS/Ü Literatur aus Czernowitz - Rose Ausländer, Paul Celan u.a. (seminar)

Ringvorlesung Ethik - Text - Kultur (lecture)

V: Warten auf die Katastrophe? Literarische Endzeit(en) (lecture)

schauinsblau - Onlinemagazin für Literatur, Kunst und Wissenschaft (exercise course)

Ü (B.A./LA/M.A.): "Fiktion und Fantasie" (exercise course)

Ü (B.A./LA/M.A.): Sprachliche Heterogenität (exercise course)

Ü/Ko: Gesprächskreis Abschlussarbeiten (exercise course)

Ü: Literarische Neuerscheinungen (exercise course)

Ü: Schreibwerkstatt (exercise course)

Examination

Projekt-Prüfung

module exam

Module GER-1026: Modern German Literature: intermediate module (elective area : scientific and creative writing) *NDL Aufbau (Wahlbereich Schreibpraxis)*		5 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Mathias Mayer		
Contents: scientific and creative writing		
Learning Outcomes / Competences: improved application of philological skills		
Workload: Total: 150 h 30 h (attendance) 120 h studying of course content (self-study)		
Conditions: completion of the basic module		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Wahlbereich NDL Aufbau

Language: German

Assigned Courses:

AG/ÜB Benefizveranstaltung: Lesung von Literatur aus Czernowitz (Ukraine) in der Kresslesmühle (exercise course)

HS (B.A., LA) Einführung in die Literatursoziologie (advanced seminar)

HS (BA/LA): Auf Fortunatus Spuren. Topographie und Literatur in der Frühen Neuzeit (advanced seminar)

HS (BA/LA): Strahlende Held*innen - tragische Figuren? Frühe Neuzeit und ihre Bühnen-Geschichte (advanced seminar)

HS - BA/LA Ghettogeschichten – Realismus in der deutschsprachig-jüdischen Literatur des 19. Jahrhunderts (advanced seminar)

HS: Hans Keilson: Dichter, Widerstandskämpfer, Traumaforscher (advanced seminar)

PS/HS (BA/LA): Große Schweizer Schriftsteller des 20. Jahrhunderts: Friedrich Dürrenmatt und Max Frisch (seminar)

schauinsblau - Onlinemagazin für Literatur, Kunst und Wissenschaft (exercise course)

Ü (B.A./LA/M.A.): "Fiktion und Fantasie" (exercise course)

Ü (B.A./LA/M.A.): Sprachliche Heterogenität (exercise course)

Ü/Ko: Gesprächskreis Abschlussarbeiten (exercise course)

Ü: Literarische Neuerscheinungen (exercise course)

Ü: Schreibwerkstatt (exercise course)

Part of the Module: Seminar, Übung, Projekt
Language: German

Assigned Courses:

AG/ÜB Benefizveranstaltung: Lesung von Literatur aus Czernowitz (Ukraine) in der Kresslesmühle (exercise course)

HS (B.A., LA) Einführung in die Literatursoziologie (advanced seminar)

HS (BA/LA): Auf Fortunatus Spuren. Topographie und Literatur in der Frühen Neuzeit (advanced seminar)

HS (BA/LA): Strahlende Held*innen - tragische Figuren? Frühe Neuzeit und ihre Bühnen-Geschichte (advanced seminar)

HS - BA/LA Ghettogeschichten – Realismus in der deutschsprachig-jüdischen Literatur des 19. Jahrhunderts (advanced seminar)

HS: Hans Keilson: Dichter, Widerstandskämpfer, Traumaforscher (advanced seminar)

PS/HS (BA/LA): Große Schweizer Schriftsteller des 20. Jahrhunderts: Friedrich Dürrenmatt und Max Frisch (seminar)

schauinsblau - Onlinemagazin für Literatur, Kunst und Wissenschaft (exercise course)

Ü (B.A./LA/M.A.): "Fiktion und Fantasie" (exercise course)

Ü (B.A./LA/M.A.): Sprachliche Heterogenität (exercise course)

Ü/Ko: Gesprächskreis Abschlussarbeiten (exercise course)

Ü: Literarische Neuerscheinungen (exercise course)

Ü: Schreibwerkstatt (exercise course)

Examination

Wahlbereichs-Prüfung
module exam

Module GER-1027: Modern German Literature: intermediate module (elective area: contemporary literature) *NDL Aufbau (Wahlbereich Gegenwartsliteratur)*		5 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Mathias Mayer		
Contents: contemporary german literature		
Learning Outcomes / Competences: improved application of philological skills		
Workload: Total: 150 h 30 h (attendance) 120 h studying of course content (self-study)		
Conditions: completion of the basic module		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Wahlbereich NDL Aufbau

Language: German

Assigned Courses:

AG/ÜB Benefizveranstaltung: Lesung von Literatur aus Czernowitz (Ukraine) in der Kresslesmühle (exercise course)

HS (B.A., LA) Einführung in die Literatursoziologie (advanced seminar)

HS (BA/LA): Auf Fortunatus Spuren. Topographie und Literatur in der Frühen Neuzeit (advanced seminar)

HS (BA/LA): Strahlende Held*innen - tragische Figuren? Frühe Neuzeit und ihre Bühnen-Geschichte (advanced seminar)

HS - BA/LA Ghettogeschichten – Realismus in der deutschsprachig-jüdischen Literatur des 19. Jahrhunderts (advanced seminar)

HS: Hans Keilson: Dichter, Widerstandskämpfer, Traumaforscher (advanced seminar)

Ko Abschlussarbeiten (colloquium)

PS/HS (BA/LA): Große Schweizer Schriftsteller des 20. Jahrhunderts: Friedrich Dürrenmatt und Max Frisch (seminar)

schauinsblau - Onlinemagazin für Literatur, Kunst und Wissenschaft (exercise course)

Ü (B.A./LA/M.A.): "Fiktion und Fantasie" (exercise course)

Ü (B.A./LA/M.A.): Sprachliche Heterogenität (exercise course)

Ü/Ko: Gesprächskreis Abschlussarbeiten (exercise course)

Ü: Literarische Neuerscheinungen (exercise course)

Ü: Schreibwerkstatt (exercise course)

Part of the Module: Seminar, Übung, Projekt
Language: German

Assigned Courses:

AG/ÜB Benefizveranstaltung: Lesung von Literatur aus Czernowitz (Ukraine) in der Kresslesmühle (exercise course)

HS (B.A., LA) Einführung in die Literatursoziologie (advanced seminar)

HS (BA/LA): Auf Fortunatus Spuren. Topographie und Literatur in der Frühen Neuzeit (advanced seminar)

HS (BA/LA): Strahlende Held*innen - tragische Figuren? Frühe Neuzeit und ihre Bühnen-Geschichte (advanced seminar)

HS - BA/LA Ghettogeschichten – Realismus in der deutschsprachig-jüdischen Literatur des 19. Jahrhunderts (advanced seminar)

HS: Hans Keilson: Dichter, Widerstandskämpfer, Traumaforscher (advanced seminar)

Ko Abschlussarbeiten (colloquium)

PS/HS (BA/LA): Große Schweizer Schriftsteller des 20. Jahrhunderts: Friedrich Dürrenmatt und Max Frisch (seminar)

schauinsblau - Onlinemagazin für Literatur, Kunst und Wissenschaft (exercise course)

Ü (B.A./LA/M.A.): "Fiktion und Fantasie" (exercise course)

Ü (B.A./LA/M.A.): Sprachliche Heterogenität (exercise course)

Ü/Ko: Gesprächskreis Abschlussarbeiten (exercise course)

Ü: Literarische Neuerscheinungen (exercise course)

Ü: Schreibwerkstatt (exercise course)

Examination
Wahlbereichs-Prüfung
module exam

Module GES-1019: Ancient History: Lecture Elective Area BA *Alte Geschichte: Vorlesung Wahlbereich BA*		2 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Dr. Andreas Hartmann		
Contents: Display of the current state of research on a broader thematic or epochal topic.		
Learning Outcomes / Competences: Comprehension of fundamental problems and tendencies in current research		
Workload: Total: 60 h		
Conditions: none		**Credit Requirements:** Passing the overall module examination.
Frequency: each semester Every Semester	**Recommended Semester:** 1. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Vorlesung **Language:** German
Assigned Courses: **Umweltgeschichte der Antike** (lecture)
Examination **AG: Modulgesamtprüfung in VL** confirmed participation, Leistungserbringung entsprechend der Veranstaltungsbeschreibung im Digicampus

Module GES-1020: Ancient History: Fundamental Course Elective Area BA *Alte Geschichte: Grundkurs Freier Bereich/ Wahlbereich BA*		6 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Dr. Andreas Hartmann		
Contents: Overview of the overall context of Greek History.		
Learning Outcomes / Competences: The students possess basic knowledge about Greek History, which enables them to integrate more specific topics and problems in chronological and factual order. They gain an inside into the subject-specific problems of criticising the sources and the research debates. The students hierarchise and select relevant contents from handbooks. They assess their own level of learning, organise broader processes of learning and motivate themselves for further examinations.		
Workload: Total: 180 h 150 h (self-study) 30 h (attendance)		
Conditions: According to the description of the Fundamental Course in Digicampus.		**Credit Requirements:** Passing the overall module examination.
Frequency:	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Grundkurs **Language:** German
Assigned Courses: **Griechische Geschichte** (basic course)
Examination **AG: Modulgesamtprüfung im GK** written exam, Leistungserbringung (z. B. Portfolio, Klausur etc.) entsprechend der Beschreibung im Digicampus **Description:** Ausnahmefall WS 2020/21: Hausaufgabe

Module GES-1021: Ancient History: Fundamental Course Elective Area BA *Alte Geschichte: Grundkurs Wahlbereich BA*		6 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Dr. Andreas Hartmann		
Contents: Overview of the broader context of Roman History.		
Learning Outcomes / Competences: The students possess basic knowledge about Roman History, which enables them to integrate more specific topics and problems in chronological and factual order. They gain an inside view in the subject-specific problems of criticising the sources and the research debates. The students hierarchise and select relevant contents from handbooks. They assess their own level of learning, organise broader processes of learning and motivate themselves for further examinations.		
Workload: Total: 180 h 150 h (self-study) 30 h (attendance)		
Conditions: According to the description of the Fundamental Course in Digicampus.		**Credit Requirements:** Passing the overall module examination.
Frequency: each semester	**Recommended Semester:** 1. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Grundkurs **Language:** German
Examination **AG: Modulgesamtprüfung im GK** written exam, Leistungserbringung (z. B. Portfolio, Klausur etc.) entsprechend der Beschreibung im Digicampus **Description:** Ausnahmefall WS 2020/21: Hausaufgabe

Module GES-2019: Medieval History: Lecture Elective Area BA *Mittelalterliche Geschichte: Vorlesung Wahlbereich BA*		2 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: PD Dr. Thomas Krüger		
Contents: Introduction to the epoch and topics of Medieval History; overviews and consolidations.		
Learning Outcomes / Competences: The students possess basic knowledge about the current state of research for a broader and interrelated field of topics.		
Workload: Total: 60 h 30 h (attendance) 30 h studying of course content using provided materials (self-study)		
Conditions: none		**Credit Requirements:** Passing the overall module examination.
Frequency: each semester Every Semester	**Recommended Semester:** 1. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Vorlesung **Language:** German
Assigned Courses: **Das hohe Mittelalter (VL-Mittelalter)** (lecture)
Examination **MG: Modulgesamtprüfung in VL** module exam, Leistungserbringung entsprechend der Veranstaltungsbeschreibung im Digicampus

Module GES-2020: Medieval History: Fundamental Course Elective Area BA *Mittelalterliche Geschichte: Grundkurs Freier Bereich/ Wahlbereich BA*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: PD Dr. Thomas Krüger		
Contents: Introductions and overview about the central topics of Medieval History.		
Learning Outcomes / Competences: The students possess basic knowledge about Medieval History, which enables them to integrate more specific topics and problems in chronological and factual order. They gain an inside view in the subject-specific problems of criticising the sources and the research debates. The students hierarchise and select relevant contents from handbooks. They assess their own level of learning, organise broader processes of learning and motivate themselves for further examinations.		
Workload: Total: 180 h 30 h (attendance) 150 h (self-study)		
Conditions: none		**Credit Requirements:** Passing the overall module examination.
Frequency:	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Grundkurs **Language:** German
Examination **MG: Modulgesamtprüfung in GK** module exam, Written exam. For the exact examination-demands see the description of the course in Digicampus.

Module GES-3019: Early Modern History: Lecture Elective Area BA *Geschichte der Frühen Neuzeit: Vorlesung Wahlbereich BA*		2 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: PD Dr. Regina Dauser		
Contents: Introductions to central topics of Early Modern History. Display of the current state of research on a broader thematic- or epoch-related topic.		
Learning Outcomes / Competences: The students analyse central problems and tendencies in the current state of research in Early Modern History and gain knowledge of a broader, interrelated field of topics, which enables them to integrate these topics in the basic structures and processes of Early Modern History.		
Workload: Total: 60 h 30 h (attendance) 30 h (self-study)		
Conditions: none		**Credit Requirements:** Passing the overall module examination.
Frequency: each semester Every Semester	**Recommended Semester:** 1. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Vorlesung
Language: German

Assigned Courses:

Der Dreißigjährige Krieg (lecture)

VL:Migration in der Frühen Neuzeit (lecture)

Examination
FNZ: Modulgesamtprüfung in VL
module exam, Modul exam. For examination-demands see the description of the lecture in Digicampus.

Module GES-3020: Early Modern History: Fundamental Course Elective Area BA *Geschichte der Frühen Neuzeit: Grundkurs Freier Bereich/ Wahlbereich BA*		6 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: PD Dr. Regina Dauser		
Contents: Introductions to the central problems in Early Modern History and the history of the subject. Overview about the general contexts of Early Modern History. Display of the current state of research for selected, central topics in the research of Early Modern History.		
Learning Outcomes / Competences: The students possess basic knowledge about Early Modern History, which enables them to integrate more specific topics and problems in chronological and factual order. They gain an inside view into the subject-specific problems of criticising the sources and the research debates. The students hierarchise and select relevant contents out of handbooks. They assess their own level of learning, organise broader processes of learning and motivate themselves for further examinations.		
Workload: Total: 180 h 150 h (self-study) 30 h (attendance)		
Conditions: none		**Credit Requirements:** Passing the overall module examination.
Frequency: each semester Every Semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Grundkurs
Language: German

Assigned Courses:

Grundkurs Frühe Neuzeit (seminar)

Examination
FNZ: Modulgesamtprüfung im GK
module exam, Module exam. For the exact examination-demands see the description of the course in Digicampus.
Description:
Ausnahmefall WS 2020/21: Klausur

Module GES-4019: Modern and Contemporary History: Lecture Elective Area BA *Neuere und Neueste Geschichte: Vorlesung Wahlbereich BA*		2 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Dr. Stefan Paulus		
Contents: Introduction to the Epoch and topics of Modern and Contemporary history; overviews and consolidations.		
Learning Outcomes / Competences: The students possess knowledge about the current state of research to a broader, interrelated field of topics.		
Workload: Total: 60 h 30 h (self-study) 30 h (attendance)		
Conditions: none		**Credit Requirements:** Passing the overall module examination.
Frequency: each semester Every Semester	**Recommended Semester:** 1. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Vorlesung **Language:** German
Assigned Courses: **E Pluribus Unum: A History of the American People, Part 1 (1492-1865)** (lecture)
Examination **NNG: Modulgesamtprüfung in VL** module exam, Modul exam. For examination-demands see the description of the lecture in Digicampus.

Module GES-4020: Modern and Contemporary History: Fundamental Course Elective Area BA *Neuere und Neueste Geschichte: Grundkurs Freier Bereich/ Wahlbereich BA*		6 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Dr. Stefan Paulus		
Contents: Overview about the interrelations in Modern and Contemporary History in the 19th and 20th century, especially in Contemporary History. Coherence of historical events, structural characteristics of different topics.		
Learning Outcomes / Competences: Die Studierenden verfügen über Grundlagenkenntnisse zur Geschichte der Frühen The students possess basic knowledge about Modern and Contemporary History, which enables them to integrate more specific topics and problems in chronological and factual order. They gain an inside view into the subject-specific problems of criticising the sources and the research debates. The students hierarchise and select relevant contents out of handbooks. They assess their own level of learning, organise broader processes of learning and motivate themselves for further examinations.		
Workload: Total: 180 h 150 h (self-study) 30 h (attendance)		
Conditions: Entsprechend der Beschreibung des Grundkurses im Digicampus.		**Credit Requirements:** Passing the overall module examination.
Frequency: each semester Every Semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Grundkurs **Language:** German
Assigned Courses: **Einführung in die Zeitgeschichte II (1945-1990)** (basic course)
Examination **NNG: Modulgesamtprüfung im GK** module exam, Module exam. For the exact examination-demands see the description of the course in Digicampus. **Description:** Ausnahmefall WS 2020/21: Hausaufgabe

Module GES-5021: Bavarian and Swabian Regional History: Lecture Elective Area BA *Bayerische und Schwäbische Landesgeschichte: Vorlesung Wahlbereich BA*		2 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Dr. Stefan Lindl		
Contents: Introduction to the Epoch and topics of Bavarian and Swabian Regional History; overviews and consolidations.		
Learning Outcomes / Competences: The students possess knowledge about the current state of research to a broader, interrelated field of topics.		
Workload: Total: 60 h 30 h (self-study) 30 h (attendance)		
Conditions: none		**Credit Requirements:** Passing the overall module examination.
Frequency: each semester Every Semester	**Recommended Semester:** 1. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Vorlesung

Language: German

Assigned Courses:

Biografie und Geschichte (lecture)

Umwelt- und Technikgeschichte in Osteuropa (20 Jahrhundert) (lecture)

Examination

LG: Modulgesamtprüfung in VL

module exam, Modul exam. For examination-demands see the description of the lecture in Digicampus.

Module GES-5022: Bavarian and Swabian Regional History: Fundamental Course Elective Area BA *Bayerische und Schwäbische Landesgeschichte: Grundkurs Freier Bereich/ Wahlbereich BA*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Dr. Stefan Lindl		
Contents: Overview about the interrelations in broader fields of topics in Bavarian and Swabian Regional History. Coherence of historical events, structural characteristics of different topics.		
Learning Outcomes / Competences: The students possess basic knowledge about Bavarian and Swabian Regional History, which enables them to integrate more specific topics and problems in chronological and factual order. They gain an inside view into the subject-specific problems of criticising the sources and the research debates. The students hierarchise and select relevant contents out of handbooks. They assess their own level of learning, organise broader processes of learning and motivate themselves for further examinations.		
Workload: Total: 180 h 150 h (self-study) 30 h (attendance)		
Conditions: Entsprechend der Beschreibung des Grundkurses im Digicampus.		**Credit Requirements:** Passing the overall module examination.
Frequency: each semester Every Semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Grundkurs **Language:** German
Assigned Courses: **Das Neue Bayern. Historische Strukturen und der Wandel im 19. Jahrhundert** (basic course)
Examination **LG: Modulgesamtprüfung im GK** module exam, Module exam. For the exact examination-demands see the description of the course in Digicampus.

Module GES-6001: Introduction to European Cultural History *Einführung in die Europäische Kulturgeschichte*		7 ECTS/LP
Version 2.0.0 (since WS19/20) Person responsible for module: Prof. Dr. Silvia Serena Tschopp Matthias Lehmann, M.A.		
Contents: Central guiding concepts, theories, methods and research fields of European Cultural History are introduced.		
Learning Outcomes / Competences: The students have basic knowledge of European cultural history as a historical subject and its basic concepts. They deal with sources and research literature in a problem-oriented and critical manner under guidance. They have the ability to read handbooks and first scientific texts and to select topic-specific information. They know the basic tools and working methods of the subject (especially citation methods), can apply them and are sensitised to the importance of correct citation of sources and research literature as well as scientific honesty. They can analyse contexts under guidance and present resulting positions in an addressee-oriented manner, especially in written form. They can assess their own learning status, organise extensive learning processes and motivate themselves for these. They have basic knowledge of central subject areas of European cultural history and initial insights into theoretical positions, methodological problems and content-related questions of cultural history. They are aware of the complexity and ambiguity of scientific positions and concepts and are practised with regard to the elaboration of scientific questions and the presentation of their reflections.		
Workload: Total: 210 h 60 h (attendance) 150 h (self-study)		
Conditions: The course is designed as an introduction to the subject European Cultural History. Therefore, no subject-specific prerequisites are necessary.		**Credit Requirements:** Passing of the module exam: minor homework, presentation (10 min.) + written exam (150 min.)
Frequency: each winter semester	**Recommended Semester:** 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Grundlagen kulturhistorischen Arbeitens
Language: German

Part of the Module: Einführung in Themenfelder der Europäischen Kuturgeschichte
Language: German

Examination
EKG: Modulgesamtprüfung Einführungskurs
module exam, Written exam / length of examination: 150 minutes

Module GES-6002: Cultural History and Cultural Theory *Kulturgeschichte und Kulturtheorie*		7 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Silvia Serena Tschopp Matthias Lehmann, M.A.		
Contents: The historical development of the subject European Cultural History is presented and the central theoretical and methodological subject discussions are explained.		
Learning Outcomes / Competences: The students are sensitised with regard to the importance of interdisciplinary, cultural-theoretical and historiographical and historical questions for European cultural history. They are able to reflect on specific theoretical positions from the history of historiography against the background of the acquired methodological tools, critically relate them to the acquired historical knowledge in terms of content and are practised with regard to source criticism in relation to historiographical-historical material.		
Remarks: The lecture and the accompanying seminar are primarily held in German		
Workload: Total: 210 h 60 h (attendance) 150 h (self-study)		
Conditions: The accompanying seminar to the basic lecture can only be attended by students who also participate in the lecture.		**Credit Requirements:** Passing the module examination; presentation (10 min.) in the accompanying seminar and oral examination (20-30 min.) on the material of the lecture and the accompanying seminar.
Frequency: every 3rd semester Every third semester, alternating with the lectures "Europe as a cultural space" and "Media History and Media Theory"	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Grundlagenvorlesung: Einführung in die Kulturgeschichte und Kulturtheorie
Language: German

Parts of the Module

Part of the Module: Begleitseminar
Language: German

Examination
EKG: Modulgesamtprüfung Grundlagen-VL/Begleitseminar
module exam, Oral examination / length of examination: 20 minutes

Module GES-6003: Europe as a Cultural Space *Kulturraum Europa*			7 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Silvia Serena Tschopp Matthias Lehmann, M.A.			
Contents: An overview of the academic discussions and in-depth specialist knowledge on the cultural area of Europe is presented.			
Learning Outcomes / Competences: The students are sensitised to the significance of the concept of "European cultural space" for European cultural history. They are able to reflect on specific theoretical positions on European history against the background of the acquired methodological tools, critically relate the content to the acquired historical knowledge and practise source criticism with regard to European historical material.			
Remarks: The lecture and the accompanying seminar will be held primarily in German.			
Workload: Total: 210 h 150 h (self-study) 60 h (attendance)			
Conditions: The accompanying seminar to the basic lecture can only be attended by students who also participate in the lecture.		**Credit Requirements:** Passing the module examination; presentation (10 min.) in the accompanying seminar and oral examination (20-30 min.) on the material of the lecture and the accompanying seminar.	
Frequency: every 3rd semester Every third semester, alternating with the lectures "Cultural History and Theory" and "Media History and Theory"	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]	
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: Grundlagenvorlesung: Europa: Idee und Geschichte eines Kulturraums
Language: German

Parts of the Module

Part of the Module: Begleitseminar
Language: German

Examination
EKG: Modulgesamtprüfung Grundlagen-VL/BS
module exam, Oral examination / length of examination: 20 minutes

Module GES-6004: History and Theory of Media *Mediengeschichte und Medientheorie*		7 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Silvia Serena Tschopp Matthias Lehmann, M.A.		
Contents: The thematic focus and the discussion of media-historical and media-theoretical questions within the framework of cultural history will be intensified.		
Learning Outcomes / Competences: The students are sensitised to the importance of media theoretical and media historical questions for European cultural history. They are able to reflect on specific media theoretical positions against the background of the acquired methodological tools, critically relate their content to the acquired historical knowledge and are practised with regard to source criticism in relation to media historical material.		
Remarks: The lecture and the accompanying seminar are primarily held in German		
Workload: Total: 210 h 150 h (self-study) 60 h (attendance)		
Conditions: The accompanying seminar to the basic lecture can only be attended by students who also participate in the lecture.		**Credit Requirements:** Passing the module examination; presentation (10 min.) in the accompanying seminar and oral examination (20-30 min.) on the material of the lecture and the accompanying seminar.
Frequency: every 3rd semester Every third semester, alternating with the lectures "Cultural History and Theory" and "Europe as a Cultural Space".	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Grundlagenvorlesung: Mediengeschichte und -theorie **Language:** German

Parts of the Module
Part of the Module: Begleitseminar **Language:** German
Examination **EKG: Modulgesamtprüfung in Grundlagen-VL/BS** module exam, Oral examination / length of examination: 20 minutes

Module GES-7113: Didactics of History: Fundamental Course Elective Area BA *Didaktik der Geschichte: Grundkurs Wahlbereich BA*		3 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Susanne Popp Wobring, Michael, Dr.		
Contents: Einführung und Überblick zu zentralen Themen der Didaktik der Geschichte. Exemplarische Behandlung von Quellen und Darstellungen aus der Perspektive der Geschichtsdidaktik. Die genaue Erläuterung der Inhalte finden Sie in der Veranstaltungsbeschreibung.		
Learning Outcomes / Competences: Die Studierenden verfügen über Grundlagenkenntnisse zur Didaktik der Geschichte, die sie in die Lage versetzen, spezifischere Themen und Problemstellungen chronologisch und sachlich adäquat einzuordnen. Sie haben einen Einblick in teilfachspezifische Probleme der Quellenkritik und Forschungsdebatten. Die Studierenden hierarchisieren und selektieren aus Handbüchern relevante Inhalte. Sie schätzen ihren eigenen Lernstand ein, organisieren umfangreiche Lernprozesse und motivieren sich für diese.		
Workload: Total: 90 h 60 h (self-study) 30 h (attendance)		
Conditions: Entsprechend der Beschreibung des Grundkurses im Digicampus.		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: irregular	**Recommended Semester:** 1. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Grundkurs **Language:** German **Contact Hours:** 2 **ECTS Credits:** 3.0
Learning Outcome: Siehe unter Modul.
Contents: Einführung und Überblick zu zentralen Themen der Didaktik der Geschichte. Exemplarische Behandlung von Quellen und Darstellungen aus der Perspektive der Geschichtsdidaktik. Die genaue Erläuterung der Inhalte finden Sie in der Veranstaltungsbeschreibung.
Literature: Literaturhinweise erfolgen in der Lehrverstaltung.

Examination

DG: Modulgesamtprüfung im GK

module exam, Leistungserbringung (z. B. Portfolio, Klausur etc.) entsprechend der Beschreibung im Digicampus

Examination Prerequisites:

Teilnahme an der Lehrveranstaltung, Vor- und Nachbereitung der Sitzungen, Eigenstudium

Description:

Bachelor of Arts (B.A.), Wahlbereich-Studium mit insgesamt 25 LP

Module GES-7115: Didactics of History: Lecture Elective Area BA *Didaktik der Geschichte: Vorlesung Wahlbereich BA*		3 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Susanne Popp Wobring, Michael, Dr.		
Contents: Einführung in Epochen und Themen der Geschichte; Überblicke und Vertiefungen. Die genaue Erläuterung der Inhalte finden Sie in der Veranstaltungsbeschreibung.		
Learning Outcomes / Competences: Die Studierenden verfügen über Kenntnisse zum aktuellen Forschungsstand zu einem größeren zusammenhängenden Themengebiet.		
Workload: Total: 90 h 45 h (self-study) 45 h (attendance)		
Conditions: Keine		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: irregular	**Recommended Semester:** 1. - 6.	**Minimal Duration of the Module:** 2 semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Vorlesung

Language: German

Contact Hours: 2

ECTS Credits: 3.0

Learning Outcome:

Siehe unter Modul.

Contents:

Einführung in Epochen und Themen der Geschichte; Überblicke und Vertiefungen. Die genaue Erläuterung der Inhalte finden Sie in der Veranstaltungsbeschreibung.

Literature:

Literaturhinweise erfolgen in der Lehrverstaltung.

Examination

DG: Modulgesamtprüfung in VL

module exam, Leistungserbringung entsprechend der Veranstaltungsbeschreibung im Digicampus

Examination Prerequisites:

Teilnahme an der Lehrveranstaltung, Vor- und Nachbereitung der Sitzungen, Eigenstudium

Description:

Bachelor of Arts (B.A.), Wahlbereich-Studium mit insgesamt 25 LP

Module ITA-2101: Basic Module Literary and Cultural Studies Italian (Methods + Introductory Course) *Grundstufe Literatur- und Kulturwissenschaft Italienisch (8 LP; Methoden + Grundkurs)*		8 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Dr. Maximilian Gröne		
Contents: Introduction to theories and methods of Italian Literary Studies; tutorial.		
Learning Outcomes / Competences: Students learn the methods of text analysis and different theories of literary studies.		
Workload: Total: 240 h 60 h (attendance) 180 h (self-study)		
Conditions: none		**Credit Requirements:** Sucessful passing of the module exam.
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Methoden der Romanischen Literaturwissenschaft

Mode of Instruction: lecture

Language: German

Contact Hours: 2

Assigned Courses:

Vl Methoden der Romanischen Literatur- und Kulturwissenschaft (lecture)

Parts of the Module

Part of the Module: Grundkurs Literaturwissenschaft Italienisch

Mode of Instruction: basic course

Language: German

Contact Hours: 2

Assigned Courses:

Grundkurs Literatur- und Kulturwissenschaft Italienisch (basic course)

Examination

Grundstufe Literaturwissenschaft Italienisch (8 LP; Methoden + Grundkurs)

written exam, Modulgesamtprüfung: Klausur (15-180 Minuten) / length of examination: 90 minutes

Description:

written examination

Module ITA-2203: Intermediate Module Literary and Cultural Studies Italian (Lecture) *Aufbaustufe Literatur- und Kulturwissenschaft Italienisch (5 LP; Vorlesung)*		5 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Dr. Maximilian Gröne		
Contents: Advanced knowledge in Italian Literary Studies and Italian Literary History.		
Learning Outcomes / Competences: Students will acquire extensive knowledge in the methods and theories of Italian Literary Studies and Italian Literary History.		
Workload: Total: 150 h 30 h (attendance) 120 h (self-study)		
Conditions: ITA-2101 or ITA-2102		**Credit Requirements:** Sucessful passing of the module exam.
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Vorlesung Italienische Literatur
Mode of Instruction: lecture
Language: German / Italian
Contact Hours: 2

Assigned Courses:

VI Aufklärung (lecture)

Examination
Aufbaustufe Literaturwissenschaft Italienisch (5 LP; Vorlesung)
written exam, Modulgesamtprüfung: Klausur (15-180 Minuten)
Description:
Written examination.

Module ITA-2302: Advanced Module Literary and Cultural Studies Italian (Core Seminar) *Vertiefungsstufe B Literatur- und Kulturwissenschaft Italienisch (8 LP; Hauptseminar)*		8 ECTS/LP
Version 1.3.0 (since WS15/16) Person responsible for module: Dr. Maximilian Gröne		
Contents: Advanced skills in independent text and media analysis.		
Learning Outcomes / Competences: Students will be able to analyze literary texts and other media genres in terms of their central literary and cultural characteristics and to interpret them methodically, taking into account the research literature.		
Workload: Total: 240 h 30 h (attendance) 210 h (self-study)		
Conditions: Intermediate module in Literary and Cultural Studies.		**Credit Requirements:** Sucessful passing of the module exam.
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Haupseminar Italienische Literatur **Mode of Instruction:** advanced seminar **Language:** German / Italian **Contact Hours:** 2
Assigned Courses: **HS Natalia Ginzburg** (advanced seminar)
Examination **Vertiefungsstufe Literaturwissenschaft Italienisch Bachelor (8 LP; Hauptseminar)** term paper, Modulgesamtprüfung: Seminararbeit (15-25 Seiten)

Module ITA-3301: Advanced Module Didactics Italian (seminar + colloquium) *Vertiefungsstufe Fachdidaktik Italienisch (9 LP; Hauptseminar + Examenskolloquium)*		9 ECTS/LP
Version 1.5.0 (since WS15/16) Person responsible for module: Prof. Dr. Christiane Fäcke		
Contents: Designing – analysing – researching foreign language teaching		
Learning Outcomes / Competences: *Subject-specific:* Students enhance their knowledge of one key aspect of subject-specific didactics as well as their ability to reflect in-depth on foreign language theories and concepts taking into account major contents, goals and methods. *Methodical:* Students acquire the skill to develop theories on foreign language didactics and become familiar with empirical research methods. They improve their methodological skills by working independently with the research literature. They present their own results and defend them in the academic discourse. *Social/personal:* Students deepen their skills in the academic discourse with due regard to the subject and the addressees. They strengthen their own positions and show interest in and open-mindedness for the positions and achievements of others. They learn how to cope with a heavy workload, thereby improving their ability to concentrate and their time-management.		
Workload: Total: 270 h 210 h (self-study) 60 h (attendance)		
Conditions: Successful completion of the intermediate module on subject-specific didactics		**Credit Requirements:** Passing the overall module examination
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Hauptseminar Fachdidaktik Italienisch
Mode of Instruction: advanced seminar
Language: German / Italian
Contact Hours: 2

Assigned Courses:

Evaluation im Französisch- und Italienischunterricht (Französisch/Italienisch) (advanced seminar)

Mehrsprachigkeit im Unterricht (Französisch/Spanisch/Italienisch) (advanced seminar)

Part of the Module: Examenskolloquium Fachdidaktik Italienisch
Mode of Instruction: colloquium
Language: German / Italian
Contact Hours: 2

Assigned Courses:

Examenskolloquium Fachdidaktik (Italienisch/Spanisch) (colloquium)

Examination

Vertiefungsstufe Fachdidaktik Italienisch (9 LP; Hauptseminar + Examenskolloquium)

term paper, overall module examination

Module KAR-0001: Introduction to Classical Archaeology *Einführung in die Klassische Archäologie*		10 ECTS/LP
Version 2.1.0 (since SoSe18) Person responsible for module: Prof. Dr. Natascha Sojc		
Contents: Basics of the subject and study of Classical Archaeology Including 1 lecture, 1 introductory seminar and 1 guided self-study		
Learning Outcomes / Competences: **Subject-related:** The students will gain basic knowledge of the subjects and working techniques of the discipline and apply these to given case studies. They will learn selected methodological and historical approaches to the subjects of the discipline. **Methodological:** The students will learn basic forms of academic communication as well as techniques of scientific work and can allocate these to the subject of the discipline. **Social/personal:** Students are to have basic skills of academic self-organization. Students are to have basic skills of academic self-organization.		
Remarks: Wählen Sie aus dem Modulteil jeweils nur 1 Vorlesung, 1 Proseminar und 1 Angeleitetes Selbststudium aus. Select only 1 lecture, 1 introductory seminar and 1 guided self-study from the module section.		
Workload: Total: 300 h 90 h (attendance) 210 h (self-study)		
Conditions: none		
Frequency: each winter semester	**Recommended Semester:** 1. - 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Einführung in die Klassische Archäologie **Language:** German
Examination **Einführung AR Einführung in die Klassische Archäologie** written exam / length of examination: 90 minutes **Description:** Ausnahmefall WS 21/22: Bericht

Module KEE-0001: Introduction to European Ethnology *Einführung in die Europäische Ethnologie/Volkskunde*		10 ECTS/LP
Version 2.3.0 (since SoSe18) Person responsible for module: Prof. Dr. Günther Kronenbitter		
Contents: Basics of the subject and study of European Ethnology Including 1 lecture, 1 introductory seminar and 1 guided self-study		
Learning Outcomes / Competences: **Subject-related:** The students will gain basic knowledge of the subjects and working techniques of the discipline and apply these to given case studies. They will learn selected methodological and historical approaches to the subjects of the discipline. **Methodological:** The students will learn basic forms of academic communication as well as techniques of scientific work and can allocate these to the subject of the discipline. **Social/personal:** Students are to have basic skills of academic self-organization.		
Remarks: Wählen Sie aus dem Modulteil jeweils nur 1 Vorlesung, 1 Proseminar und 1 Angeleitetes Selbststudium aus. Select only 1 lecture, 1 introductory seminar and 1 guided self-study from the module section.		
Workload: Total: 300 h 90 h (attendance) 210 h (self-study)		
Conditions: none		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each winter semester	**Recommended Semester:** 1. - 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Einführung in die Europäische Ethnologie/Volkskunde **Language:** German
Examination **Einführung EE Einführung in die Europäische Ethnologie/Volkskunde** written exam / length of examination: 90 minutes **Description:** Ausnahmefall WS 21/22: Bericht

Module KKG-0001: Introduction to Art History *Einführung in die Kunstgeschichte/Bildwissenschaft*			10 ECTS/LP

Version 2.1.0 (since SoSe18)
Person responsible for module: Prof. Dr. Andrea Gottdang

Contents:
Basics of the subject and study of Art History

Including 1 lecture, 1 introductory seminar and 1 guided self-study

Learning Outcomes / Competences:
Subject-related:

The students will gain basic knowledge of the subjects and working techniques of the discipline and apply these to given case studies. They will learn selected methodological and historical approaches to the subjects of the discipline.

Methodological:

The students will learn basic forms of academic communication as well as techniques of scientific work and can allocate these to the subject of the discipline.

Social/personal:

Students are to have basic skills of academic self-organization.

Remarks:
Wählen Sie aus dem Modulteil jeweils nur 1 Vorlesung, 1 Proseminar und 1 Angeleitetes Selbststudium aus.

Select only 1 lecture, 1 introductory seminar and 1 guided self-study from the module section.

Workload:
Total: 300 h
90 h (attendance)
210 h (self-study)

Conditions: none		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each winter semester	**Recommended Semester:** 1. - 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Einführung in die Kunstgeschichte/Bildwissenschaft
Language: German

Examination
Einführung KG Einführung in die Kunstgeschichte/Bildwissenschaft
written exam / length of examination: 90 minutes
Description:
Ausnahmefall WS 21/22: Bericht

Module KLG-0001: Introduction to European Regional History and Bavarian and Swabian Regional History *Einführung in die Europäische Regionalgeschichte sowie Bayerische und Schwäbische Landesgeschichte*		10 ECTS/LP
Version 2.1.0 (since SoSe18) Person responsible for module: Prof. Dr. Marita Krauss		
Contents: Basics of the subject and study of European Regional History and Bavarian and Swabian Regional History Including 1 lecture, 1 introductory seminar and 1 guided self-study		
Learning Outcomes / Competences: **Subject-related:** The students will gain basic knowledge of the subjects and working techniques of the discipline and apply these to given case studies. They will learn selected methodological and historical approaches to the subjects of the discipline. **Methodological:** The students will learn basic forms of academic communication as well as techniques of scientific work and can allocate these to the subject of the discipline. **Social/personal:** Students are to have basic skills of academic self-organization.		
Remarks: Wählen Sie aus dem Modulteil jeweils nur 1 Vorlesung, 1 Proseminar und 1 Angeleitetes Selbststudium aus. Select only 1 lecture, 1 introductory seminar and 1 guided self-study from the module section.		
Workload: Total: 300 h 210 h (self-study) 90 h (attendance)		
Conditions: none		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each winter semester	**Recommended Semester:** 1. - 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Einführung in die Europäische Regionalgeschichte sowie Bayerische und Schwäbische Landesgeschichte
Language: German

Examination
Einführung LG Einführung in die Europäische Regionalgeschichte sowie Bayerische und Schwäbische Landesgeschichte
written exam / length of examination: 90 minutes
Description:
Ausnahmefall WS 21/22: Bericht

Module KUK-0001: Interdisciplinary Perspectives – Methods and Contexts *Interdisziplinäre Perspektiven – Methoden und Kontexte*	10 ECTS/LP

Version 2.5.0 (since SoSe18)
Person responsible for module: Prof. Dr. Günther Kronenbitter

Contents:
Introduction to main methods of History of the Arts and Cultural History and their application

Including 1 lecture, 1 introductory seminar and 1 guided self-study

Learning Outcomes / Competences:
Subject-related:

Students will become familiar with main interdisciplinary subject areas of History of the Arts and Cultural History and will gain an initial understanding of the capacity of interdisciplinary approaches to given phenomena in History of the Arts and Cultural History.

Methodological:

Students will learn to distinguish between subject-specific and interdisciplinary approaches to objects and have an initial understanding of the mutual complementarity of interdisciplinary approaches to objects in History of the Arts and Cultural History. They will become familiar with basic patterns of thought and methods of argumentation regarding the interdisciplinary discourse on History of the Arts and Cultural History and can assign them historically.

Social/personal:

Students will be able to reason from multiple perspectives. They will have a basic understanding of networked thinking.

Remarks:
Wählen Sie aus einem der Modulteile jeweils nur 1 Vorlesung, 1 Proseminar und 1 Angeleitetes Selbststudium aus.

Select only 1 lecture, 1 introductory seminar and 1 guided self-study from the module section.

Workload:
Total: 300 h
90 h (attendance)
210 h (self-study)

Conditions: none		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each summer semester	**Recommended Semester:** 2. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Interdisziplinäre Perspektiven - Methoden und Kontexte Europäische Ethnologie/ Volkskunde
Language: German

Assigned Courses:

Angeleitetes Selbststudium zum Proseminar "Prädikat 'Heritage'? Der Umgang mit kulturellem Erbe aus Sicht der Europäischen Ethnologie" (Gruppe 1) ()

Angeleitetes Selbststudium zum Proseminar "Prädikat 'Heritage'? Der Umgang mit kulturellem Erbe aus Sicht der Europäischen Ethnologie" (Gruppe 2) ()

PS (B.A.): Prädikat ‚Heritage'?: Der Umgang mit kulturellem Erbe aus Sicht der Europäischen Ethnologie (Gruppe A) (intermediate seminar)

PS (B.A.): Prädikat ‚Heritage'?: Der Umgang mit kulturellem Erbe aus Sicht der Europäischen Ethnologie (Gruppe B) (intermediate seminar)

VL: Interdisziplinäre Perspektiven: Kulturerbe - Weltkulturerbe (14-täglich) (lecture)

Part of the Module: Interdisziplinäre Perspektiven - Methoden und Kontexte Kunstgeschichte/ Bildwissenschaft
Language: German

Assigned Courses:

AS (B.A.): Angeleitetes Selbststudium zum Proseminar "Kunstgeschichte, Kulturerbe und Denkmalpflege" (Gruppe 1) ()

AS (B.A.): Angeleitetes Selbststudium zum Proseminar "Kunstgeschichte, Kulturerbe und Denkmalpflege" (Gruppe 2) ()

AS (B.A.): Angeleitetes Selbststudium zum Proseminar "Kunstgeschichte, Kulturerbe und Denkmalpflege" (Gruppe 3) ()

PS (B.A.): Kunstgeschichte, Kulturerbe und Denkmalpflege (Gruppe A) (intermediate seminar)

PS (B.A.): Kunstgeschichte, Kulturerbe und Denkmalpflege (Gruppe B) (intermediate seminar)

PS (B.A.): Kunstgeschichte, Kulturerbe und Denkmalpflege (Gruppe C) (intermediate seminar)

VL: Interdisziplinäre Perspektiven: Kulturerbe - Weltkulturerbe (14-täglich) (lecture)

Part of the Module: Interdisziplinäre Perspektiven - Methoden und Kontexte Klassische Archäologie
Language: German

Assigned Courses:

Angeleitetes Selbststudium zum Proseminar Archäologie und kulturelles Erbe ()

Archäologie und kulturelles Erbe (intermediate seminar)

VL: Interdisziplinäre Perspektiven: Kulturerbe - Weltkulturerbe (14-täglich) (lecture)

Part of the Module: Interdisziplinäre Perspektiven - Methoden und Kontexte Musikwissenschaft
Language: German

Assigned Courses:

Musik und Musikinstrumente als Welterbe (lecture)

Musikalisches Kulturerbe: Quellen und Notationen (intermediate seminar)

Tutorium zum Proseminar #2204 Musikalische Quellen und Notationen ()

VL: Interdisziplinäre Perspektiven: Kulturerbe - Weltkulturerbe (14-täglich) (lecture)

Part of the Module: Interdisziplinäre Perspektiven - Methoden und Kontexte Europäische Regionalgeschichte sowie Bayerische und Schwäbische Landesgeschichte
Language: German

Examination
Interdisz. Persp. Interdisziplinäre Perspektiven - Methoden und Kontexte
written exam / length of examination: 90 minutes
Description:
Ausnahmefall SoSe 2022: Bericht

Module SPA-1101: Basic Module Linguistics Spanish (Introduction A + B) *Grundstufe Sprachwissenschaft Spanisch (6 LP; Einführung A + B)*		6 ECTS/LP
Version 1.1.0 (since WS15/16) Person responsible for module: Prof. Dr. Joachim Steffen		
Contents: Fundamentals of General, Romance, and Spanish Linguistics		
Learning Outcomes / Competences: *Subject-specific:* Students are familiar with basic terms, theories, and methods of linguistics and are able to apply the acquired knowledge to the Spanish language. Central questions, terms, and approaches of linguistics form the basis for the ability to deal academically with topics within the field of (Spanish) Linguistics. *Methodical:* Students in the learning group work on the fundamentals of Spanish Linguistics using the materials provided. In addition, they are able to independently access literature from fundamental areas of (Spanish) Linguistics. *Social/personal:* Students are able to express themselves appropriately with regard to the subject and the addressees and are able to adequately present their own views and modify them if necessary.		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: None		**Credit Requirements:** Passing the overall module examination
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Einführung in die Sprachwissenschaft für Romanisten A: Sprache in Raum und Zeit **Mode of Instruction:** lecture **Language:** German **Contact Hours:** 2
Assigned Courses: **Einführung in die Sprachwissenschaft für Romanisten A (Französisch, Italienisch, Spanisch): Sprache in Raum und Zeit** (lecture)
Part of the Module: Einführung in die Sprachwissenschaft für Romanisten B (Spanisch): Sprachliche Strukturen **Mode of Instruction:** exercise course **Language:** German / Spanish **Contact Hours:** 2
Assigned Courses: **Einführung in die Sprachwissenschaft für Romanisten B (Spanisch): Sprachliche Strukturen** (exercise course)

Examination

Grundstufe Sprachwissenschaft Spanisch (6 LP; Einführung A + B)

written exam, overall module examination

Module SPA-1201: Intermediate Module Linguistics Spanish (Text Linguistics or History of the Spanish Language + Varieties) *Aufbaustufe Sprachwissenschaft Spanisch (7 LP; Textlinguistik/Interne Sprachgeschichte + Varietäten)*		7 ECTS/LP
Version 1.1.0 (since WS15/16) Person responsible for module: Prof. Dr. Joachim Steffen		
Contents: Central topics of Spanish Linguistics		
Learning Outcomes / Competences: *Subject-specific:* Students are able to analyse complex structures of the Spanish language as well as interrelations between intralinguistic and historical or present-day social factors. They are able to describe Spanish texts according to principles of text linguistics or to analyse a text of an older language stage phonologically and morpho-syntactically and to explain structures from contemporary Spanish against the background of their historically relative nature. They have an overview of the heterogeneity of the Spanish language and variables that determine language usage and are able to categorise utterances within a diasystemic framework. *Methodical:* Students are able to independently access linguistic literature and deal with it discursively in the learning group. Students are able to take an argumentative stance within the framework of controversially assessed facts. *Social/personal:* Students are able to deal with ambiguous positions in the academic discourse and thereby acquire flexibility of thought.		
Workload: Total: 210 h 150 h (self-study) 60 h (attendance)		
Conditions: Successful completion of the following module: „Basic Module Linguistics Spanish“		**Credit Requirements:** Passing the overall module examination
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Textlinguistik (Spanisch) / Interne Sprachgeschichte (Spanisch) **Mode of Instruction:** exercise course **Language:** German / Spanish **Contact Hours:** 2
Assigned Courses: **Interne Sprachgeschichte (Spanisch)** (exercise course) **Textlinguistik (Spanisch)** (exercise course)

Part of the Module: Sprachvarietäten in der Iberoromania

Mode of Instruction: exercise course

Language: Spanish / German

Contact Hours: 2

Assigned Courses:

Sprachvarietäten in der Iberoromania (exercise course)

Examination

Aufbaustufe Sprachwissenschaft Spanisch (7 LP; Textlinguistik/Interne Sprachgeschichte + Varietäten)

written exam, overall module examination

Module SPA-1202: Intermediate Module Linguistics Spanish (Introductory Seminar)

6 ECTS/LP

Aufbaustufe Sprachwissenschaft Spanisch (6 LP; Proseminar)

Version 1.2.0 (since WS15/16)
Person responsible for module: Prof. Dr. Joachim Steffen

Contents:
Exemplary discussion of a selected subject area of Spanish Linguistics

Learning Outcomes / Competences:

Subject-specific:
Students are able to deal with newly acquired linguistic analysis methods and description procedures and apply them to specific topics from the area of Spanish Linguistics.

Methodical:
Students are able to independently research current secondary literature on a specific topic and thereby acquire in-depth knowledge of the given topic. They are able to adequately summarise their work results in oral and written form.

Social/personal:
Students are able to discursively assess specific topics and questions in the learning group and, if necessary, modify their views, showing appropriate communicative behaviour with regard to the topic and the situation.

Workload:
Total: 180 h
30 h (attendance)
150 h (self-study)

Conditions: Successful completion of the following module: „Basic Module Linguistics Spanish“		**Credit Requirements:** Passing the overall module examination
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Proseminar zur synchronischen Sprachwissenschaft Spanisch
Mode of Instruction: intermediate seminar
Language: German / Spanish
Contact Hours: 2

Assigned Courses:

Proseminar: Syntax und Informationsstruktur (Spanisch) (intermediate seminar)

Proseminar: Variación Morfosintáctica del Español (intermediate seminar)

Examination
Aufbaustufe Sprachwissenschaft Spanisch (6 LP; Proseminar)
term paper, overall module examination

Module SPA-1204: Intermediate Module Linguistics Spanish (Text Linguistics or History of the Spanish Language) *Aufbaustufe Sprachwissenschaft Spanisch (5 LP; Textlinguistik/Interne Sprachgeschichte)*	5 ECTS/LP

Version 1.1.0 (since WS15/16)
Person responsible for module: Prof. Dr. Joachim Steffen

Contents:
Central topics of Spanish Linguistics

Learning Outcomes / Competences:

Subject-specific:

Students are able to analyse complex structures of the Spanish language as well as interrelations between intralinguistic and historical or present-day social factors. They are able to describe Spanish texts according to principles of text linguistics or to analyse a text of an older language stage phonologically and morpho-syntactically and to explain structures from contemporary Spanish against the background of their historically relative nature.

Methodical:

Students are able to independently access linguistic literature and deal with it discursively in the learning group.

Social/personal:

Students are able to deal with ambiguous positions in the academic discourse and thereby acquire flexibility of thought.

Workload:
Total: 150 h
120 h (self-study)
30 h (attendance)

Conditions: Successful completion of the following module: „Basic Module Linguistics Spanish“		**Credit Requirements:** Passing the overall module examination
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Textlinguistik (Spanisch) / Interne Sprachgeschichte (Spanisch)
Mode of Instruction: exercise course
Language: German / Spanish
Contact Hours: 2

Assigned Courses:

Interne Sprachgeschichte (Spanisch) (exercise course)

Textlinguistik (Spanisch) (exercise course)

Examination

Aufbaustufe Sprachwissenschaft Spanisch (5 LP; Textlinguistik/Interne Sprachgeschichte)
written exam, overall module examination

Module SPA-1302: Advanced Module Linguistics Spanish (Core Seminar) *Vertiefungsstufe B Sprachwissenschaft Spanisch (8 LP; Hauptseminar)*		8 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Joachim Steffen		
Contents: Discussion of specific linguistic topics from the area of Spanish Language and Literature		
Learning Outcomes / Competences: *Subject-specific:* Students are able to competently handle the acquired linguistic analysis methods and description procedures and independently apply them to challenging linguistic problems from the area of Spanish Linguistics. *Methodical:* Students are able to independently research comprehensive secondary literature on a specific topic and thereby acquire in-depth knowledge of the given topic. They are able to present various – and, if necessary, also controversial – linguistic positions and weigh them against each other. In so doing, they develop their own positions on academic topics and are able to apply them to central questions. *Social/personal:* Students are able to independently work on research questions and to structure their self-study appropriately over a longer period of time. Students are able to defend their own positions in acedemic discourse in oral and written form.		
Workload: Total: 240 h 30 h (attendance) 210 h (self-study)		
Conditions: Successful completion of the following module: "Intermediate Module Linguistics Spanish (Introductory Seminar)"		**Credit Requirements:** Passing the overall module examination
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Hauptseminar Sprachwissenschaft Spanisch
Mode of Instruction: advanced seminar
Language: Spanish / German
Contact Hours: 2

Assigned Courses:

Hauptseminar: Perspectivas de investigacio´n del cambio lingu¨i´stico en espan~ol (advanced seminar)

Examination

Vertiefungsstufe Sprachwissenschaft Spanisch Bachelor (8 LP; Hauptseminar)
term paper, overall module examination

Module SPA-1402: Specialisation module linguistics: Old Spanish *Spezialisierung Sprachwissenschaft Altspanisch (5 LP; Examenskurs)*		5 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Joachim Steffen		
Contents: Text-based tasks on Old Spanish		
Learning Outcomes / Competences: *Subject-specific:* Students are able to adequately translate Old Spanish texts into German and to analyse them against the background of complex tasks from the area of Diachronic Linguistics. *Methodical:* Students are able to expand on different linguistic stages diachronically and to adequately describe in writing their development up to the present-day language. *Social/personal:* Students are able to structure their self-study appropriately over a longer period of time and to present their work results in the learning group or in written form in a manner appropriate to the situation and addressees.		
Workload: Total: 150 h 120 h (self-study) 30 h (attendance)		
Conditions: Successful completion of both intermediate level modules in linguistics (Spanish)		**Credit Requirements:** Passing the overall module examination
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Textaufgaben zum Altspanischen **Mode of Instruction:** exercise course **Language:** German / Spanish **Contact Hours:** 2
Examination **Spezialisierung Sprachwissenschaft Altspanisch (5 LP; Examenskurs)** written exam, overall module examination

Module SPA-3301: Advanced Module Didactics Spanish (seminar + colloquium) *Vertiefungsstufe Fachdidaktik Spanisch (9 LP; Hauptseminar + Examenskolloquium)*		9 ECTS/LP
Version 1.3.0 (since WS15/16) Person responsible for module: Prof. Dr. Christiane Fäcke		
Contents: Designing – analysing – researching foreign language teaching		
Learning Outcomes / Competences: *Subject-specific:* Students enhance their knowledge of one key aspect of subject-specific didactics as well as their ability to reflect in-depth on foreign language theories and concepts taking into account major contents, goals and methods. *Methodical:* Students acquire the skill to develop theories on foreign language didactics and become familiar with empirical research methods. They improve their methodological skills by working independently with the research literature. They present their own results and defend them in the academic discourse. *Social/personal:* Students deepen their skills in the academic discourse with due regard to the subject and the addressees. They strengthen their own positions and show interest in and open-mindedness for the positions and achievements of others. They learn how to cope with a heavy workload, thereby improving their ability to concentrate and their time-management.		
Workload: Total: 270 h 60 h (attendance) 210 h (self-study)		
Conditions: Successful completion of the intermediate module on subject-specific didactics		**Credit Requirements:** Passing the overall module examination
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Hauptseminar Fachdidaktik Spanisch **Mode of Instruction:** advanced seminar **Language:** German / Spanish **Contact Hours:** 2
Assigned Courses: **Literaturdidaktik (Spanisch)** (advanced seminar) **Mehrsprachigkeit im Unterricht (Französisch/Spanisch/Italienisch)** (advanced seminar)

Part of the Module: Examenskolloquium Fachdidaktik Spanisch **Mode of Instruction:** colloquium **Language:** German / Spanish **Contact Hours:** 2

Assigned Courses:

Examenskolloquium Fachdidaktik (Italienisch/Spanisch) (colloquium)

Examination

Vertiefungsstufe Fachdidaktik Spanisch (9 LP; Hauptseminar + Examenskolloquium)

term paper, overall module examination

Module EAS-1711: Literary Studies: Advanced *Literary Studies: Advanced (HS, 8 LP)*		8 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Annika McPherson Prof. Dr. Martin Middeke		
Contents: Advanced literary analysis of specific topics, themes and authors of anglophone literatures		
Learning Outcomes / Competences: Students acquire advanced knowledge of specific topics, themes and authors of anglophone literatures Students learn to critically engage with primary and secondary literature Students learn to answer complex questions in literary studies and to critically reflect them with the help of specific methods and (literary) theories Students learn to present and discuss their ideas and work results in an academic register (orally and written)		
Remarks: This module must be taken at one of the indicated chairs (ALW or ELW or NELK). The examination is assigned to the selected chair. This must be considered when signing up for the exam.		
Workload: Total: 240 h 210 h (self-study) 30 h (attendance)		
Conditions: None		**Credit Requirements:** Passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Literary Studies: Advanced (HS, 8 LP) **Mode of Instruction:** advanced seminar **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Aktuelle Fragen der Literaturtheorie** **Baldwin in Context** (advanced seminar) **HS "Disaster Without Event?" Climate Change in Literature** (advanced seminar) **HS Environmental Displacement, Citizenship and Conflict in Indigenous Literatures** (seminar) **HS: Intermediality in Contemporary British Fiction** (advanced seminar) **HS: The Poetry and Poetics of Affect** (advanced seminar) **HS: Theatre Ecologies** (advanced seminar) **OS/KOL NELK Global Dynamics in Popular Cultures** **The Art of the Essay: Postcolonial Interventions and Transcultural Perspectives** (advanced seminar)

Examination

Literary Studies: Advanced (HS, 8 LP)

module exam, (term paper or portfolio exam, depending on the respective course)

Module EAS-1834: Cultural and Theoretical Approaches to Literature *Cultural and Theoretical Approaches to Literature (HS, 8 LP)*		8 ECTS/LP
Version 1.1.0 (since WS15/16) Person responsible for module: Prof. Dr. Annika McPherson Prof. Dr. Martin Middeke		
Contents: Cultural studies methods and theories in Anglophone literary studies		
Learning Outcomes / Competences: students improve their knowledge of cultural studies methods and theories in the context of anglophone literatures, students learn how to apply these methods and theories in their own argumentation and analysis. students are able to work independently with academic research texts and to reflect critically on various cultural contexts (including their own).		
Remarks: This module must be taken at one of the indicated chairs (ALW or ELW or NELK). The examination is assigned to the selected chair. This must be considered when signing up for the exam.		
Workload: Total: 240 h 30 h (attendance) 210 h (self-study)		
Conditions: none		**Credit Requirements:** Passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: HS Cultural and Theoretical Approaches to Literature
Mode of Instruction: advanced seminar
Language: English / German
Contact Hours: 2

Assigned Courses:

Aktuelle Fragen der Literaturtheorie

HS Environmental Displacement, Citizenship and Conflict in Indigenous Literatures (seminar)

HS: The Poetry and Poetics of Affect (advanced seminar)

Examination
Cultural and Theoretical Approaches to Literature (HS, 8 LP)
module exam, (seminar paper)

Module EAS-1844: Backgrounds in Literary Studies: Literary Texts and Cultural Contexts (10 ECTS/LP, compulsory) *Backgrounds in Literary Studies: Literary Texts and Cultural Contexts (Vorlesung + Übung, 10 LP)*		10 ECTS/LP
Version 2.0.0 (since WS17/18) Person responsible for module: Prof. Dr. Annika McPherson Prof. Dr. Martin Middeke		
Contents: In-depth study of cultural studies methods and research questions		
Learning Outcomes / Competences: students learn to trace and comprehend complex connections literary and cultural history students improve their competences of working through complex research questions in the field of cultural studies students improve their abilities to use methods, terms, and modes of analysis competently		
Workload: Total: 300 h 180 h (self-study) 120 h (attendance)		
Conditions: none		**Credit Requirements:** Passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: V Literary Texts and Cultural Contexts **Mode of Instruction:** lecture **Language:** English / German **Contact Hours:** 2
Assigned Courses: **20th and 21st Century Drama and Theatre** (lecture)
Examination **Backgrounds in Literary Studies: Literary Texts and Cultural Contexts (Vorlesung + Übung, 10 LP)** module exam, portfolio, not graded

Parts of the Module
Part of the Module: Ü Literary Texts and Cultural Contexts **Mode of Instruction:** exercise course **Language:** German **Contact Hours:** 2
Assigned Courses: **Literary Reviews** (exercise course) **The American Short Story and Concepts of Citizenship** (exercise course) **Ü Contemporary Drama and the Political** (exercise course)

Module EAS-1854: Advanced Literary Studies (10 ECTS/LP, compulsory) *Advanced Literary Studies (Hauptseminar + Übung, 10 LP)*		10 ECTS/LP
Version 2.0.0 (since WS17/18) Person responsible for module: Prof. Dr. Katja Sarkowsky Prof. Dr. Martin Middeke		
Contents: Current research in Anglophone literary and cultural studies		
Learning Outcomes / Competences: Students are able to comprehend complex literary research texts and to apply a variety of methods and analytical approaches competently. Students deepen their knowledge of works, themes, and contexts in Anglophone literary studies.		
Remarks: This module must be taken at one of the indicated chairs (ALW or ELW or NELK). The examination is assigned to the selected chair. This must be considered when signing up for the exam.		
Workload: Total: 300 h 30 h (attendance) 270 h (self-study)		
Conditions: none		**Credit Requirements:** Passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: HS Advanced Literary Studies
Mode of Instruction: seminar, advanced seminar
Language: English / German
Contact Hours: 2

Assigned Courses:

Literary Reviews (exercise course)

OS/KOL NELK Global Dynamics in Popular Cultures

The Art of the Essay: Postcolonial Interventions and Transcultural Perspectives (advanced seminar)

Examination
Advanced Literary Studies (Hauptseminar + Übung, 10 LP)
module exam, seminar paper, portfolio

Parts of the Module

Part of the Module: Ü Advanced Literary Studies
Mode of Instruction: exercise course
Language: English / German
Contact Hours: 2

Assigned Courses:

Literary Reviews (exercise course)

Module EAS-2511: Linguistics: Backgrounds 2 (4 ECTS/LP, compulsory) *Linguistics: Backgrounds 2 (Ü, 4 LP)*		4 ECTS/LP
Version 2.0.0 (since WS17/18) Person responsible for module: Prof. Dr. Claudia Claridge Prof. Dr. Anita Fetzer		
Contents: Theories and methodologies from selected areas of theoretical and applied linguistics, and their critical application on the levels of phonology, morphology, syntax, pragmatics, text linguistics (including (multimodal) discourse analysis) and media linguistics. Contextual analyses, e.g. in media communication, spoken and written language, variational linguistics, sociolinguistics.		
Learning Outcomes / Competences: Students acquire more specialised knowledge of selected theories and methodologies and their application to natural language data. They improve their skills in the classification and analysis of different text genres, including the interpretation of semantic-pragmatic and media-specific aspects. Students acquire the ability to analyse relevant linguistic units, patterns and their variability as well as their application to selected discourse contexts (e.g. technical language, media communication). Students acquire presentation and discussion skills, ability to work in a team, transfer skills, and intercultural competence.		
Remarks: This module is assigned to one of the English linguistics chairs (ASWA or ESW), which is responsible for the exam. Exam registration is attached to the respective chair.		
Workload: Total: 120 h 90 h (self-study) 30 h (attendance)		
Conditions: none		**Credit Requirements:** Passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Ü Linguistics: Backgrounds 2 **Mode of Instruction:** exercise course **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Approaches to Language Acquisition** (exercise course) **English Historical Linguistics** (exercise course) **Research Methods**
Examination **Linguistics: Backgrounds 2** module exam, (portfolio)

Module EAS-2934: Linguistics: Form and Meaning (8 ECTS/LP, compulsory) *Linguistics: Form and Meaning (S, 8 LP)*		8 ECTS/LP
Version 2.0.0 (since WS17/18) Person responsible for module: Prof. Dr. Claudia Claridge Prof. Dr. Anita Fetzer		
Contents: Analysis of the relationship between formal realisations and (different) meanings on the levels of word, construction, sentence and text. Analysis of the contributions of lexical (denotative, connotative, cognitive), functional-grammatical, propositional, and context-dependent and context-independent meanings, including the consideration of compositionality. Analysis of 'competing' variants, e.g. -s vs. of-genitive. Analysis of the information structure of texts and the forms used, e.g. passive, cleft sentences.		
Learning Outcomes / Competences: Students acquire in-depth knowledge of important semantic and discourse(-analytic) models, of the possibilities of formal realisations and their functional differences in context, and of relevant models for constructing meaning. Students acquire the ability to analyse semantic-formal relationships, to apply models and theories to data and to critically discuss the analysis results. They advance their competence in the use and production of scientific discourse. Students improve their abilities for oral academic discourse using the appropriate register and goal-oriented argumentation strategies. Students acquire context-dependent intercultural competence.		
Remarks: This module is assigned to one of the English linguistics chairs (ASWA or ESW), which is responsible for the exam. Exam registration is attached to the respective chair.		
Workload: Total: 240 h 30 h (attendance) 210 h (self-study)		
Conditions: none		**Credit Requirements:** Passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: S Linguistics: Form and Meaning **Mode of Instruction:** seminar **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Speech Acts across Cultures** (seminar)
Examination **Linguistics: Form and Meaning** module exam, (seminar paper)

Module EAS-2954: Linguistics: Text and Discourse (8 ECTS/LP, compulsory) *Linguistics: Text and Discourse (S, 8 LP)*		8 ECTS/LP
Version 2.0.0 (since WS17/18) Person responsible for module: Prof. Dr. Claudia Claridge Prof. Dr. Anita Fetzer		
Contents: Analysis of the structural characteristics of oral and written forms of expression as well as their differences. Analysis of the regularity of oral forms of interaction (inter alia turn-taking system). Differentiation of texts according to stylistic and functional aspects (e.g. register, genre) as well as critical reflection of relevant concepts. Investigations of selected discourse contexts, e.g. media, politics, and their special contextual characteristics as well as their communicative goals and forms of interaction. Presentation of cognitive and psycholinguistic models and approaches to speech and text comprehension.		
Learning Outcomes / Competences: Students acquire in-depth knowledge of text and discourse theories (including text linguistics, (critical) discourse analysis, discourse grammar) and their constitutive components (including coherence, cohesion, discourse relations) and of form- and function-based discourse analysis, as well as their application in different contexts. They acquire in-depth knowledge of linguistic structures and their meanings in local and global contexts. Students improve their ability to (critically) analyse discourse models as well as local and global structures and sequences. They are familiar with models for validating discourse theories (e.g. questionnaires, interviews, experiments, discourse completion tasks). Students gain in-depth knowledge of the strategies of scientific/academic discourse with regard to appropriate use and production, and are able to engage constructively with criticism.		
Remarks: This module is assigned to one of the English linguistics chairs (ASWA or ESW), which is responsible for the exam. Exam registration is attached to the respective chair.		
Workload: Total: 240 h 210 h (self-study) 30 h (attendance)		
Conditions: none		**Credit Requirements:** Passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: S Linguistics: Text and Discourse **Mode of Instruction:** seminar **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Language and Law** (advanced seminar)

Examination

Linguistics: Text and Discourse

module exam, (seminar paper)

Module EAS-3000: Didactics: Introduction *Didactics: Introduction (V+Ü, 5 LP)*		5 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Engelbert Thaler		
Contents: Introduction to basic theories, key concepts, approaches, and foreign language teaching methodology; introduction tokey aspects in TEFL and foreign language research; introduction to learning objectives, key issues of second language acquisition, foreign language learning and teaching against the backdrop of profession-oriented contexts and teaching practices.		
Learning Outcomes / Competences: module part I: Lecture Students acquire a basic knowledge of the teaching and learning of English as a foreign language. They are able to understand and theoretically explain domain-specific teaching and learning processes. In doing so, they are able to differentiate between foreign language skills and competences, methodological and didactic approaches to English language teaching and their implementation in classroom contexts. Students understand teaching/learning processes as a complex interaction of subject-specific, individual, institutional factors and educational policy. module part 2: Supplementary Course In this supplementary course students acquire basic knowledge and skills in dealing with academic key concepts and techniques from a TEFL perspective, which they will later on need, apply and further deepen in the context of their study program. For example, students will acquire knowledge of how to prepare, conduct and evaluate classroom observations in a criterion-guided manner. They will explore the aspects that need to be taken into account when developing their own teaching and learning materials and understand which didactic principles of TEFL are used to design modern textbooks. Another focus is the acquisition of basic knowledge and skills with regard to the writing of term papers in TEFL.		
Workload: Total: 150 h 60 h (attendance) 90 h (self-study)		
Conditions: none		**Credit Requirements:** 5
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Introduction to the Teaching of English **Mode of Instruction:** lecture **Lecturers:** Prof. Dr. Engelbert Thaler **Language:** English / German **Contact Hours:** 2
Learning Outcome: Students acquire a basic knowledge of the teaching and learning of English as a foreign language. They are able to understand and theoretically explain domain-specific teaching and learning processes. In doing so, they are able to differentiate between foreign language skills and competences, methodological and didactic approaches to English language teaching and their implementation in classroom contexts. Students understand teaching/learning processes as a complex interaction of subject-specific, individual, institutional factors and educational policy.

Contents:

This introductory lecture will give you an overview of TEFL (Teaching English as a Foreign Language). We will cover basics (e.g. objectives, teacher, learner, media, lesson planning), methodology (e.g. Balanced Teaching, cooperative learning, practising, playing, CLIL), competences (e.g. listening-viewing, speaking, reading, writing, mediating, vocabulary, grammar, intercultural communicative competence) as well as assessment (e.g. class tests).

Lehr-/Lernmethoden:

lecture

Literature:

Thaler, Engelbert. *Englisch unterrichten*. Berlin: Cornelsen, 2014. (Die in der Vorlesung behandelten Kapitel sollten wöchentlich vorbereitend gelesen werden.)

Assigned Courses:

Introduction to the Teaching of English - Nicht für Erstsemester geeignet (ausgenommen Master)! (lecture)

Part of the Module: Begleitübung zur Vorlesung "Introduction to the Teaching of English"

Mode of Instruction: exercise course

Language: English / German

Contact Hours: 2

Learning Outcome:

In this supplementary course students acquire basic knowledge and skills in dealing with academic key concepts and techniques from a TEFL perspective, which they will later on need, apply and further deepen in the context of their study program. For example, students will acquire knowledge of how to prepare, conduct and evaluate classroom observations in a criterion-guided manner. They will explore the aspects that need to be taken into account when developing their own teaching and learning materials and understand which didactic principles of TEFL are used to design modern textbooks. Another focus is the acquisition of basic knowledge and skills with regard to the writing of term papers in TEFL.

Contents:

This supplementary course to the main lecture "Introduction to the Teaching of English" aims to outline important skills and key concepts in English language teaching. It will particularly cover sessions about academic writing skills in which you will gain a preliminary insight into writing term papers and preparing handouts. These sessions will be embedded into meaningful contexts by analyzing some practical examples, e.g. selected articles about contemporary issues in foreign language teaching, excerpts from formerly submitted term papers. Furthermore, students will have ample opportunities to discuss some key concepts, such as the impact of globalization on modern language teaching, guidelines for selecting and designing effective language teaching materials. Finally, your questions about our chair (Teaching English as a Foreign Language), exams (final exam, state examination) and course selection will be answered.

Depending on the requirements of your study program, this supplementary course (*Begleitübung)* is an obligatory one and needs to be taken in the same semester with the introductory lecture (*Einführungsvorlesung*). The final exam will cover both the introductory lecture and the supplementary course.

Lehr-/Lernmethoden:

exercise course

Literature:

Thaler, Engelbert. *Englisch unterrichten*. Berlin: Cornelsen, 2014.

Assigned Courses:

Begleitübung zur Vorlesung "Introduction to the Teaching of English"

Begleitübung zur Vorlesung "Introduction to the Teaching of English"

Examination

Didactics: Introduction (V+Ü, 5 LP)

module exam, written final exam

Module EAS-3270: Mediation practice I (E) *Vermittlungspraxis I (E)*		5 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Engelbert Thaler		
Contents: Introduction to key aspects in TEFL and foreign language research; introduction to learning objectives, key issues of second language acquisition, foreign language learning and teaching against the backdrop of profession-oriented contexts and teaching practices.		
Learning Outcomes / Competences: Delving into a specific topic of a core area in TEFL (influencing factors in foreign language learning, foreign language skills and competences, foreign language teaching methodology, assessment), students expand their knowledge of English language teaching and learning. They recognize connections between TEFL-related issues and develop a deeper understanding of these.		
Workload: Total: 150 h 120 h (self-study) 30 h (attendance)		
Conditions: for incoming students: none (but sound knowledge of TEFL issues desirable)		**Credit Requirements:** 5
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Proseminar, siehe Titel der jeweiligen Lehrveranstaltung **Mode of Instruction:** intermediate seminar **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Journalistische Textsorten im Kultursektor (DID)** (seminar) **Research Methods and Techniques in Foreign Language Teaching** (intermediate seminar) **Sprechen, Referieren, Präsentieren (Übung)** (exercise course)
Examination **Vermittlungspraxis I (E)** module exam, Modulgesamtprüfung: Referat (3-5 Seiten, Handout) ODER Mündliche Prüfung (30 Minuten) ODER Seminararbeit (10-12 Seiten) ODER Portfolio (zum Prüfungsumfang vgl. Veranstaltungsbeschreibung in Digicampus) (vgl. § 9 M-22-2-000 MAPOPhilHist)

Module EAS-3600: Didactics: Advanced *Didactics: Advanced (HS, 7 LP)*		7 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Engelbert Thaler		
Contents: Students deepen their knowledge of a specific subject area and topic of TEFL; in-depth reflection on theories and key concepts in TEFL, taking into account the main objectives and contents in English language teaching; theorization in foreign language education and research, empirical classroom research and teaching practices.		
Learning Outcomes / Competences: Students have in-depth knowledge in a domain-specific field of TEFL. They apply their knowledge by relating it to other sub-areas of TEFL as well as academic disciplines.		
Workload: Total: 210 h 30 h (attendance) 180 h (self-study)		
Conditions: for incoming students: none (but sound knowledge of TEFL issues desirable)		**Credit Requirements:** 7
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Hauptseminar, siehe Titel der jeweiligen Lehrveranstaltung
Mode of Instruction: advanced seminar
Language: English / German
Contact Hours: 2

Lehr-/Lernmethoden:
advanced seminar

Assigned Courses:

Distance Learning & Digital Media in TEFL (advanced seminar)

Intercultural Service Learning (advanced seminar)

Investigating Foreign Language Teaching Profession (advanced seminar)

Teaching Communicative Competences in Primary School (advanced seminar)

The Influence of Individual Learner Differences on Foreign Language Learning and Teaching (advanced seminar)

Examination
Didactics: Advanced (HS, 7 LP)
module exam, module exam (written term paper or written exam, depending on individual course requirements)

Module EAS-3650: Didactics: Subjects and Methods (8 ECTS/LP, compulsory) *Didactics: Subjects and Methods (HS, 8 LP)*		8 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Engelbert Thaler		
Contents: Students deepen their knowledge of a specific subject area and topic of TEFL; in-depth reflection on theories and key concepts in TEFL, taking into account the main objectives and contents in English language teaching; theorization in foreign language education and research, empirical classroom research and teaching practices.		
Learning Outcomes / Competences: Students have in-depth knowledge in a domain-specific field of TEFL. They apply their knowledge by relating it to other sub-areas of TEFL as well as academic disciplines.		
Workload: Total: 240 h 30 h (attendance) 210 h (self-study)		
Conditions: for incoming students: none (but sound knowledge of TEFL issues desirable)		**Credit Requirements:** passing the written term paper or written exam, depending on individual course requirements
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Hauptseminar, siehe Titel der jeweiligen Lehrveranstaltung
Mode of Instruction: advanced seminar
Language: English / German
Contact Hours: 2

Assigned Courses:

Distance Learning & Digital Media in TEFL (advanced seminar)

Intercultural Service Learning (advanced seminar)

Investigating Foreign Language Teaching Profession (advanced seminar)

Teaching Communicative Competences in Primary School (advanced seminar)

The Influence of Individual Learner Differences on Foreign Language Learning and Teaching (advanced seminar)

Examination
Didactics: Subjects and Methods (HS, 8 LP)
module exam, (written exam or term paper, depending on the respective course)

Module EAS-4445: Topics in Cultural Studies I: Cultural Analysis (8 ECTS/LP, compulsory) *Topics in Cultural Studies I: Cultural Analysis (Hauptseminar, 8 LP)*		8 ECTS/LP
Version 1.1.0 (since WS15/16) Person responsible for module: Prof. Dr. Annika McPherson		
Contents: Methods and research topics in Anglophone Cultural Studies		
Learning Outcomes / Competences: Students deepen their academic knowledge of Anglophone cultures. Students can competently approach complex research questions, and apply different methods, theories and termini Students learn to work independently through specialized thematic research literature, to develop their own research questions, and to present their own findings		
Remarks: This module must be taken at one of the indicated chairs (ALW or ELW or NELK). The examination is assigned to the selected chair. This must be considered when signing up for the exam.		
Workload: Total: 240 h 30 h (attendance) 210 h (self-study)		
Conditions: none		**Credit Requirements:** Passing the exam
Frequency: usu. at least once per acad. year	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: HS Topics in Cultural Studies I: Cultural Analysis **Mode of Instruction:** advanced seminar **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Aktuelle Fragen der Literaturtheorie** **HS Environmental Displacement, Citizenship and Conflict in Indigenous Literatures** (seminar) **HS: The Poetry and Poetics of Affect** (advanced seminar) **OS/KOL NELK Global Dynamics in Popular Cultures** **The Art of the Essay: Postcolonial Interventions and Transcultural Perspectives** (advanced seminar)
Examination **Topics in Cultural Studies I (HS, 8 LP)** module exam, seminar paper

Module EAS-4446: Topics in Cultural Studies II: Cultural Theory (8 ECTS/LP, compulsory) *Topics in Cultural Studies II: Cultural Theory (Hauptseminar, 8 LP)*		8 ECTS/LP
Version 1.1.0 (since WS15/16) Person responsible for module: Prof. Dr. Annika McPherson		
Contents: Methods and research topics in Anglophone Cultural Studies		
Learning Outcomes / Competences: Students deepen their academic knowledge of Anglophone cultures. Students can competently approach complex research questions, and apply different methods, theories and termini Students learn to work independently through specialized thematic research literature, to develop their own research questions, and to present their own findings		
Remarks: This module must be taken at one of the indicated chairs (ALW or ELW or NELK). The examination is assigned to the selected chair. This must be considered when signing up for the exam.		
Workload: Total: 240 h 30 h (attendance) 210 h (self-study)		
Conditions: none		**Credit Requirements:** Passing the exam
Frequency: usu. at least once per acad. year	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: HS Topics in Cultural Studies II: Cultural Theory **Mode of Instruction:** advanced seminar **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Aktuelle Fragen der Literaturtheorie** **HS Environmental Displacement, Citizenship and Conflict in Indigenous Literatures** (seminar) **HS: The Poetry and Poetics of Affect** (advanced seminar) **OS/KOL NELK Global Dynamics in Popular Cultures** **The Art of the Essay: Postcolonial Interventions and Transcultural Perspectives** (advanced seminar)
Examination **Topics in Cultural Studies II (HS, 8 LP)** module exam, seminar paper

Module EAS-4447: Cultural Studies: Backgrounds (4 ECTS/LP, compulsory) *Cultural Studies: Backgrounds (Übung 4 LP)*		4 ECTS/LP
Version 1.3.0 (since WS15/16) Person responsible for module: Prof. Dr. Annika McPherson		
Contents: Methods and research topics in Anglophone Cultural Studies		
Learning Outcomes / Competences: Students deepen their academic knowledge of Anglophone cultures. Students can competently approach complex research questions, and apply different methods, theories and termini Students learn to work independently through specialized thematic research literature, to develop their own research questions, and to present their own findings		
Remarks: This module must be taken at one of the indicated chairs (ALW or ELW or NELK). The examination is assigned to the selected chair. This must be considered when signing up for the exam.		
Workload: Total: 120 h 90 h (self-study) 30 h (attendance)		
Conditions: none		**Credit Requirements:** Passing the exam
Frequency: usu. at least once per acad. year	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Ü Cultural Studies: Backgrounds **Mode of Instruction:** exercise course **Language:** English / German **Contact Hours:** 2
Assigned Courses: **Literary Reviews** (exercise course)
Examination **Cultural Studies: Backgrounds (benotet)** module exam, portfolio **Description:** /
Examination **Cultural Studies: Backgrounds (unbenotet)** module exam, (written exam or portfolio exam, depending on the respective course), not graded **Description:** /

Module FRA-4514: Specialisation Module: Cultural Dimensions of Enlightenment *Spezialisierung Kulturelle Dimensionen der Aufklärung (10 LP; Hauptseminar + Ergänzung)*			10 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Dr. Maximilian Gröne			
Contents: Knowledge of and reflection on the European Enlightenment as a culture of communication (culture understood as the totality of a society's symbolic forms and media of communication. Among other things, the module aims at reflecting on cultural transfer processes between France and Germany as well as Europe as a whole, taking into account current communication phenomena and intercultural perception processes such as forms of interaction, discourse traditions and their historical roots (in the French or European Enlightenment). In doing so, the focus is on the specifics of the cultural area, especially France in the overall European context and in relation to the Francophone cultural area.			
Learning Outcomes / Competences: Students have in-depth knowledge of French Enlightenment culture and are able to analyze and reflect on the possible effects of Enlightenment cultures of thought and communication on modernity and into the present. In addition, students are able to identify French specifics in relation to the pan-European cultural transfer processes of the European Enlightenment. They develop a deeper understanding of the cultural area of France, from which in turn their own culture is also derived and which enables a differentiated historicizing and intercultural view of pan-European developments. They are able to understand the specific relationship of France to different francophone cultural areas (Québec, Maghreb, etc.).			
Workload: Total: 300 h 240 h (self-study) 60 h (attendance)			
Conditions: none		**Credit Requirements:** Sucessful passing of the module exam.	
Frequency: irregular (usu. winter semester) irregular (usually in the winter semester)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]	
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Projektseminar/Hauptseminar Kulturelle Dimensionen der Aufklärung **Mode of Instruction:** advanced seminar **Language:** German / French **Contact Hours:** 2
Examination **Spezialisierung Kulturelle Dimensionen der Aufklärung (10 LP; Hauptseminar + Vorlesung/Übung)** term paper, written assignment

Parts of the Module
Part of the Module: Vorlesung/Übung Kulturelle Dimensionen der Aufklärung **Mode of Instruction:** lecture, exercise course **Language:** German / French **Contact Hours:** 2

Module GER-1008: Modern German Literature: advanced module (master) *NDL MA-Vertiefung*		8 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Mathias Mayer		
Contents: exemplary topics of modern german literature		
Learning Outcomes / Competences: acquisition of advanced knowledge and competence (literary history, literary theory, research)		
Workload: Total: 240 h 210 h studying of course content (attendance) 30 h (attendance)		
Conditions: none		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Hauptseminar in Neuerer Deutscher Literaturwissenschaft
Language: German

Assigned Courses:

HS (M.A.) Körpertexturen: Literatur, Theater, Performance (advanced seminar)

HS (M.A.) Zusammenhalt als Thema in der Literatur (Augsburger Gespräche zu Literatur und Engagement) (advanced seminar)

HS (M.A.): Im Fokus der Kamera: Die Fotografie und die Jüdischen Kultur(en) (advanced seminar)

HS (MA): Der nackte Mensch. Ästhetik, Un/Moral und Ethik von Gesicht und Körper (advanced seminar)

HS (MA): Literatur und Spiel (advanced seminar)

HS MA Sexuelle Gewalt in der Literatur (advanced seminar)

HS: Hans Keilson: Dichter, Widerstandskämpfer, Traumaforscher (advanced seminar)

PS/Ü Literatur aus Czernowitz - Rose Ausländer, Paul Celan u.a. (seminar)

Examination
HS-Arbeit
term paper

Module GER-1009: Modern German Literature: advanced module plus (master) *NDL MA-Vertiefung Plus*		8 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Mathias Mayer		
Contents: exemplary topics of modern german literature		
Learning Outcomes / Competences: acquisition of advanced knowledge and competence (literay history, literary theory, research)		
Workload: Total: 240 h 210 h studying of course content (self-study) 30 h (attendance)		
Conditions: none		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Hauptseminar in Neuerer Deutscher Literaturwissenschaft
Language: German

Assigned Courses:

HS (M.A.) Körpertexturen: Literatur, Theater, Performance (advanced seminar)

HS (M.A.) Zusammenhalt als Thema in der Literatur (Augsburger Gespräche zu Literatur und Engagement) (advanced seminar)

HS (M.A.): Im Fokus der Kamera: Die Fotografie und die Jüdischen Kultur(en) (advanced seminar)

HS (MA): Der nackte Mensch. Ästhetik, Un/Moral und Ethik von Gesicht und Körper (advanced seminar)

HS (MA): Literatur und Spiel (advanced seminar)

HS MA Sexuelle Gewalt in der Literatur (advanced seminar)

HS: Hans Keilson: Dichter, Widerstandskämpfer, Traumaforscher (advanced seminar)

PS/Ü Literatur aus Czernowitz - Rose Ausländer, Paul Celan u.a. (seminar)

Examination

HS-Arbeit
term paper

Module GER-1018: Modern German Literature: developing a personal profile (master) *NDL Profilierung (Master)*		5 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Mathias Mayer		
Contents: exemplary problem areas of modern german literature		
Learning Outcomes / Competences: acquiring an individual academic profile		
Remarks: Die Lehrveranstaltung kann auch drei SWS umfassen.		
Workload: Total: 150 h 30 h (attendance) 120 h studying of course content (self-study)		
Conditions: none		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Vorlesung, Übung, Seminar, Projektarbeit
Language: German

Assigned Courses:

AG/ÜB Benefizveranstaltung: Lesung von Literatur aus Czernowitz (Ukraine) in der Kresslesmühle (exercise course)

HS (M.A.) Körpertexturen: Literatur, Theater, Performance (advanced seminar)

HS (M.A.) Zusammenhalt als Thema in der Literatur (Augsburger Gespräche zu Literatur und Engagement) (advanced seminar)

HS (M.A.): Im Fokus der Kamera: Die Fotografie und die Jüdischen Kultur(en) (advanced seminar)

HS (MA): Der nackte Mensch. Ästhetik, Un/Moral und Ethik von Gesicht und Körper (advanced seminar)

HS (MA): Literatur und Spiel (advanced seminar)

HS MA Sexuelle Gewalt in der Literatur (advanced seminar)

HS: Hans Keilson: Dichter, Widerstandskämpfer, Traumaforscher (advanced seminar)

Ko Abschlussarbeiten (colloquium)

PS/Ü Literatur aus Czernowitz - Rose Ausländer, Paul Celan u.a. (seminar)

Ringvorlesung Ethik - Text - Kultur (lecture)

V: Warten auf die Katastrophe? Literarische Endzeit(en) (lecture)

schauinsblau - Onlinemagazin für Literatur, Kunst und Wissenschaft (exercise course)

Ü (B.A./LA/M.A.): "Fiktion und Fantasie" (exercise course)

Ü (B.A./LA/M.A.): Sprachliche Heterogenität (exercise course)

Ü/Ko: Gesprächskreis Abschlussarbeiten (exercise course)

Ü: Literarische Neuerscheinungen (exercise course)

Ü: Schreibwerkstatt (exercise course)

Examination

NDL Profilierung (Master)

module exam

Module GER-1019: Modern German Literature: developing a personal profile plus (master) *NDL Profilierung Plus (Master)*		5 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Mathias Mayer		
Contents: exemplary problem areas of modern german literature		
Learning Outcomes / Competences: acquiring an individual academic profile		
Remarks: Eine Veranstaltung in diesem Modul kann auch drei SWS umfassen.		
Workload: Total: 150 h 30 h (attendance) 120 h studying of course content (self-study)		
Conditions: none		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Vorlesung, Übung, Seminar, Projektarbeit

Language: German

Assigned Courses:

AG/ÜB Benefizveranstaltung: Lesung von Literatur aus Czernowitz (Ukraine) in der Kresslesmühle (exercise course)

HS (M.A.) Körpertexturen: Literatur, Theater, Performance (advanced seminar)

HS (M.A.) Zusammenhalt als Thema in der Literatur (Augsburger Gespräche zu Literatur und Engagement) (advanced seminar)

HS (M.A.): Im Fokus der Kamera: Die Fotografie und die Jüdischen Kultur(en) (advanced seminar)

HS (MA): Der nackte Mensch. Ästhetik, Un/Moral und Ethik von Gesicht und Körper (advanced seminar)

HS (MA): Literatur und Spiel (advanced seminar)

HS MA Sexuelle Gewalt in der Literatur (advanced seminar)

HS: Hans Keilson: Dichter, Widerstandskämpfer, Traumaforscher (advanced seminar)

Ko Abschlussarbeiten (colloquium)

Ko Staatsexamens-Kolloquium (Schwerpunkt Gattungen) (colloquium)

PS/Ü Literatur aus Czernowitz - Rose Ausländer, Paul Celan u.a. (seminar)

Ringvorlesung Ethik - Text - Kultur (lecture)

V: Warten auf die Katastrophe? Literarische Endzeit(en) (lecture)

schauinsblau - Onlinemagazin für Literatur, Kunst und Wissenschaft (exercise course)

Ü (B.A./LA/M.A.): "Fiktion und Fantasie" (exercise course)

Ü (B.A./LA/M.A.): Sprachliche Heterogenität (exercise course)

Ü/Ko: Gesprächskreis Abschlussarbeiten (exercise course)

Ü: Literarische Neuerscheinungen (exercise course)

Ü: Schreibwerkstatt (exercise course)

Examination

NDL Profilierung Plus (Master)

module exam

Module GER-1020: Modern German Literature: developing a personal profile plus plus (master) *NDL Proflierung Plus Plus (Master)*		5 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Mathias Mayer		
Contents: exemplary problem areas of modern german literature		
Learning Outcomes / Competences: acquiring an individual academic profile		
Remarks: Eine Veranstaltung in diesem Modul kann auch drei SWS umfassen.		
Workload: Total: 150 h 30 h (attendance) 120 h studying of course content (self-study)		
Conditions: none		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Vorlesung, Übung, Seminar, Projektarbeit
Language: German

Assigned Courses:

AG/ÜB Benefizveranstaltung: Lesung von Literatur aus Czernowitz (Ukraine) in der Kresslesmühle (exercise course)

HS (M.A.) Körpertexturen: Literatur, Theater, Performance (advanced seminar)

HS (M.A.) Zusammenhalt als Thema in der Literatur (Augsburger Gespräche zu Literatur und Engagement) (advanced seminar)

HS (M.A.): Im Fokus der Kamera: Die Fotografie und die Jüdischen Kultur(en) (advanced seminar)

HS (MA): Der nackte Mensch. Ästhetik, Un/Moral und Ethik von Gesicht und Körper (advanced seminar)

HS (MA): Literatur und Spiel (advanced seminar)

HS MA Sexuelle Gewalt in der Literatur (advanced seminar)

HS: Hans Keilson: Dichter, Widerstandskämpfer, Traumaforscher (advanced seminar)

Ko Abschlussarbeiten (colloquium)

PS/Ü Literatur aus Czernowitz - Rose Ausländer, Paul Celan u.a. (seminar)

Ringvorlesung Ethik - Text - Kultur (lecture)

V: Warten auf die Katastrophe? Literarische Endzeit(en) (lecture)

schauinsblau - Onlinemagazin für Literatur, Kunst und Wissenschaft (exercise course)

Ü (B.A./LA/M.A.): "Fiktion und Fantasie" (exercise course)

Ü (B.A./LA/M.A.): Sprachliche Heterogenität (exercise course)

Ü/Ko: Gesprächskreis Abschlussarbeiten (exercise course)

Ü: Literarische Neuerscheinungen (exercise course)

Ü: Schreibwerkstatt (exercise course)

Examination

NDL Proflierung Plus Plus (Master)

module exam

Module GER-1021: Modern German Literature: professional orientation (master) *NDL Berufsfeldorientierung (Master)*	5 ECTS/LP

Version 1.2.0 (since WS15/16)
Person responsible for module: Prof. Dr. Mathias Mayer

Contents:
related to professional application

Learning Outcomes / Competences:
correlating academic competence to professional fields (media, publishing, education)

Remarks:
Eine präzise SWS-Angabe ist bei Projekten im Rahmen der Berufsfeldorientierung nicht immer möglich.

Workload:
Total: 150 h
120 h studying of course content (self-study)
30 h (attendance)

Conditions: none		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Beruflich orientierende Veranstaltung
Language: German

Assigned Courses:

AG/ÜB Benefizveranstaltung: Lesung von Literatur aus Czernowitz (Ukraine) in der Kresslesmühle (exercise course)

HS (M.A.) Körpertexturen: Literatur, Theater, Performance (advanced seminar)

HS (M.A.) Zusammenhalt als Thema in der Literatur (Augsburger Gespräche zu Literatur und Engagement) (advanced seminar)

HS (M.A.): Im Fokus der Kamera: Die Fotografie und die Jüdischen Kultur(en) (advanced seminar)

HS (MA): Der nackte Mensch. Ästhetik, Un/Moral und Ethik von Gesicht und Körper (advanced seminar)

HS (MA): Literatur und Spiel (advanced seminar)

HS MA Sexuelle Gewalt in der Literatur (advanced seminar)

HS: Hans Keilson: Dichter, Widerstandskämpfer, Traumaforscher (advanced seminar)

Ko Abschlussarbeiten (colloquium)

PS/Ü Literatur aus Czernowitz - Rose Ausländer, Paul Celan u.a. (seminar)

schauinsblau - Onlinemagazin für Literatur, Kunst und Wissenschaft (exercise course)

Ü (B.A./LA/M.A.): "Fiktion und Fantasie" (exercise course)

Ü (B.A./LA/M.A.): Sprachliche Heterogenität (exercise course)

Ü/Ko: Gesprächskreis Abschlussarbeiten (exercise course)

Ü: Literarische Neuerscheinungen (exercise course)

Ü: Schreibwerkstatt (exercise course)

Examination

Beruflich orientierende Prüfung

module exam

Module GER-1022: Modern German Literature: professional orientation (master) plus *NDL Berufsfeldorientierung (Master) Plus*		5 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Prof. Dr. Mathias Mayer		
Contents: related to professional application		
Learning Outcomes / Competences: correlating academic competence to professional fields (media, publishing, education)		
Remarks: Eine präzise SWS-Angabe ist bei Projekten im Rahmen der Berufsfeldorientierung nicht immer möglich.		
Workload: Total: 150 h 120 h studying of course content (self-study) 30 h (attendance)		
Conditions: none		**Credit Requirements:** passing the exam
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Beruflich orientierende Veranstaltung

Language: German

Assigned Courses:

AG/ÜB Benefizveranstaltung: Lesung von Literatur aus Czernowitz (Ukraine) in der Kresslesmühle (exercise course)

HS (M.A.) Körpertexturen: Literatur, Theater, Performance (advanced seminar)

HS (M.A.) Zusammenhalt als Thema in der Literatur (Augsburger Gespräche zu Literatur und Engagement) (advanced seminar)

HS (M.A.): Im Fokus der Kamera: Die Fotografie und die Jüdischen Kultur(en) (advanced seminar)

HS (MA): Der nackte Mensch. Ästhetik, Un/Moral und Ethik von Gesicht und Körper (advanced seminar)

HS (MA): Literatur und Spiel (advanced seminar)

HS MA Sexuelle Gewalt in der Literatur (advanced seminar)

HS: Hans Keilson: Dichter, Widerstandskämpfer, Traumaforscher (advanced seminar)

Ko Abschlussarbeiten (colloquium)

PS/Ü Literatur aus Czernowitz - Rose Ausländer, Paul Celan u.a. (seminar)

schauinsblau - Onlinemagazin für Literatur, Kunst und Wissenschaft (exercise course)

Ü (B.A./LA/M.A.): "Fiktion und Fantasie" (exercise course)

Ü (B.A./LA/M.A.): Sprachliche Heterogenität (exercise course)

Ü/Ko: Gesprächskreis Abschlussarbeiten (exercise course)

Ü: Literarische Neuerscheinungen (exercise course)

Ü: Schreibwerkstatt (exercise course)

Examination

Beruflich orientierende Prüfung

module exam

Module GES-1032: Ancient History: Tutorial or Mentoring *Alte Geschichte: Übung oder Mentorat*	6 ECTS/LP

Version 1.0.0 (since WS15/16)
Person responsible for module: Dr. Andreas Hartmann

Contents:
Expounding the problems of the objects and methods of research in ancient history on the basis of suitable examples and sources.

Learning Outcomes / Competences:
Through the intense examination of sources and research-opinions on exemplary cases, the students gain a problem-oriented understanding of historical structures and processes. They confidently apply research-methods and question the range of theoretical models and methodical approaches. The students are familiar with the complex, often divergent, traditional findings and can handle them adequately in the context of the subject. They reflect on the effects of specific conceptions of history.

Remarks:
Students have to participate in

EITHER

a mentoring

OR

a Tutorial.

Workload:
Total: 180 h
150 h (self-study)
30 h (attendance)

Conditions: A consultation with the advisory service for the subject is needed, bevor choosing the key area of focus. Accompanied by a discussion about the necessary knowledge of languages for the key subject.		**Credit Requirements:** Passing the overall module examination.
Frequency: each semester Every Semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Übung
Language: German

Assigned Courses:

Das Monster und die Kritiker. Quellen zu Alexander dem Großen (exercise course)

Die Vindolanda Tablets und das Alltagsleben in einer römischen Garnison (mit Einführung in die Ältere römische Kursivschrift) (exercise course)

Die römische Handelsstadt Augsburg (exercise course)

Geschichte der Geschichtswissenschaft – Theorie und Methode (exercise course)

„How (not) to be a tyrant“: Das Bild des schlechten Herrschers und die Delegitimierung der hellenistischen Könige (exercise course)

Part of the Module: Mentorat

Language: German

Examination

AG: Modulgesamtprüfung in Ü(Master/LA Gym)/Mentorat

module exam, Für die Prüfungsmodalitäten im Einzelnen sind die Veranstaltungsankündigungen maßgeblich.
Mögliche Prüfungsformen sind: Portfolio, Hausaufgabe, Klausur, Mündliche Prüfung

Module GES-2031: Medieval History: Tutorial or Mentoring *Mittelalterliche Geschichte: Übung oder Mentorat*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: PD Dr. Thomas Krüger		
Contents: Exemplary topics out of the chosen denomination subject.		
Learning Outcomes / Competences: Through the intense examination of sources and research-opinions to exemplary cases, the students gain a problem orientated understanding of historical structures and processes. They confidently operate with research-methods and question the range of theoretical models and methodical approaches. The students know the complex, often divergent, traditional findings und can handle them adequate in the context of the subject. They reflect the effects of specific views on history.		
Remarks: Students have to participate in EITHER • a mentoring OR • a Tutorial.		
Workload: Total: 180 h 150 h (self-study) 30 h (attendance)		
Conditions: A consultation with the advisory service for the subject is needed, bevor choosing the key area of focus. Accompanied by a discussion about the necessary knowledge of languages for the key subject.		**Credit Requirements:** Passing the overall module examination.
Frequency: each semester Every Semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Übung
Language: German

Assigned Courses:

Alternative Währungen (exercise course)

Anfertigung von Urkundenregesten für Anfänger (exercise course)

Das Benediktinerkloster Lambach (gegründet 1056) und seine Bibliothek (Praktikum+Übung) (internship)

Geschichte in Vitrinen - schriftliche Zeugnisse in der musealen Praxis (exercise course)

Lektürekurs: Lat. Quellen zu Augsburg in der ottonischen Zeit (exercise course)

Mittelalter-Exkursion: Kultur und Herrschaft in Hochburgund (Transjuranien) während der Früh- und Hochmittelalters (excursion)

Schwerpunktbildung in Mittelalterlicher Geschichte: Methoden - Motive - Zugänge (Ü/Mentorat-Mittelalter) (exercise course)

Urkunden im Staatsarchiv Augsburg. Übung für Fortgeschrittene mit Vorkenntnissen in Paläographie
(exercise course)

Part of the Module: Mentorat

Language: German

Assigned Courses:

Schwerpunktbildung in Mittelalterlicher Geschichte: Methoden - Motive - Zugänge (Ü/Mentorat-Mittelalter)
(exercise course)

Examination

MG: Modulgesamtprüfung in Ü(Master/LA Gym)/Mentorat

module exam, Module exam. For the exact examination-demands see the description of the course in Digicampus. Possible forms of examinations are: Portfolio, Homework, written exam, oral examination.

Module GES-3031: Early Modern History: Tutorial or Mentoring *Geschichte der Frühen Neuzeit: Übung oder Mentorat*	6 ECTS/LP

Version 1.0.0 (since WS15/16)
Person responsible for module: PD Dr. Regina Dauser

Contents:
Analysis of complex sources and their traditions. Testing and problematisation of methods and theories of the research in Early Modern History on the basis of suitable case examples.

Learning Outcomes / Competences:
Through the intense examination of sources and research-opinions to exemplary cases, the students gain a problem orientated understanding of historical structures and processes. They confidently operate with research-methods and question the range of theoretical models and methodical approaches. The students know the complex, often divergent, traditional findings und can handle them adequate in the context of the subject. They reflect the effects of specific views on history.

Remarks:
Students have to participate in EITHER

- a mentoring

OR

- a Tutorial.

Workload:
Total: 180 h
30 h (attendance)
150 h (self-study)

Conditions: A consultation with the advisory service for the subject is needed, bevor choosing the key area of focus. Accompanied by a discussion about the necessary knowledge of languages for the key subject.		**Credit Requirements:** Passing the overall module examination.
Frequency: each semester Every Semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Übung
Language: German

Assigned Courses:

Symbolische Kommunikation im Europa der Frühen Neuzeit (Ü MA / LA Gym) (exercise course)

Part of the Module: Mentorat
Language: German

Assigned Courses:

Mentorat

Mentorat Geschichte der Frühen Neuzeit (Master)

Examination

FNZ: Modulgesamtprüfung in Ü(Master/LA Gym)/Mentorat

module exam, Module exam. For the exact examination-demands see the description of the course in Digicampus. Possible forms of examinations are: Portfolio, Homework, written exam, oral examination.

Module GES-4031: Modern and Contemporary History: Tutorial or Mentoring *Neuere und Neueste Geschichte: Übung oder Mentorat*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Dr. Stefan Paulus		
Contents: Tutorial: Exemplary examination of sources and representations of Modern and Contemporary History. **or** Mentoring: Individual supervision for a specific topic of Modern and Contemporary History.		
Learning Outcomes / Competences: Through the intense examination of sources and research-opinions to exemplary cases, the students gain a problem orientated understanding of historical structures and processes. They confidently operate with research-methods and question the range of theoretical models and methodical approaches. The students know the complex, often divergent, traditional findings und can handle them adequate in the context of the subject. They reflect the effects of specific views on history.		
Remarks: Students have to participate in EITHER • a mentoring OR • a Tutorial.		
Workload: Total: 180 h 150 h (self-study) 30 h (attendance)		
Conditions: A consultation with the advisory service for the subject is needed, bevor choosing the key area of focus. Accompanied by a discussion about the necessary knowledge of languages for the key subject.		**Credit Requirements:** Passing the overall module examination.
Frequency: each semester Every Semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Übung
Language: German

Assigned Courses:

Deutsche Gesellschaftsgeschichte im langen 19. Jahrhundert (exercise course)

Examensübung Neueste Geschichte. Vorbereitungskurs für Absolventinnen und Absolventen der Ersten Staatsprüfung für das Lehramt

Geschichte studieren: Eine Einführung in das geschichtswissenschaftliche Arbeiten (exercise course)

History of Racism (exercise course)

The American Presidents, Part 1: From George Washington to Franklin D. Roosevelt (exercise course)

The November Pogrom 1938 in History and Memory (exercise course)

Von „Die Sünderin“ bis zur Barschel-Pfeiffer-Affäre - Skandale in der Bonner Republik (exercise course)

Zeitung, Kino, Fernsehen: Medien und Öffentlichkeit in Deutschland im 20. Jahrhundert (exercise course)

Zwischen Reeducation und kulturellem Kalten Krieg: Die amerikanische Präsenz in Deutschland zwischen 1945 und 1955 (exercise course)

Übung/Exkursion: NS-Überlebende als erinnerungspolitische Akteure. Die KZ-Gedenkstätten Buchenwald und Dachau im Vergleich (exercise course)

Part of the Module: Mentorat

Language: German

Assigned Courses:

Mentorat

Mentorat: Neuere und Neueste Geschichte

Examination

NNG: Modulgesamtprüfung in Ü(Master/LA Gym)/Mentorat

module exam, Module exam. For the exact examination-demands see the description of the course in Digicampus. Possible forms of examinations are: Portfolio, Homework, written exam, oral examination.

Module GES-5033: Bavarian and Swabian Regional History: Tutorial or Mentoring *Bayerische und Schwäbische Landesgeschichte: Übung oder Mentorat*	6 ECTS/LP

Version 1.0.0 (since WS15/16)
Person responsible for module: Dr. Stefan Lindl

Contents:
Tutorial: Exemplary examination of sources and representations of Bavarian and Swabian Regional History, respectively methods and theories of Regional History.

or

Mentoring: Individual supervision for a specific topic of Bavarian and Swabian Regional History.

oder

Mentorat: Persönliche Bedtreuung zu einem speziellen Thema aus dem Bereich der Regionalgeschichte sowie Bayerischen und Schwäbischen Landesgeschichte

Learning Outcomes / Competences:
Through the intense examination of sources and research-opinions to exemplary cases, the students gain a problem orientated understanding of historical structures and processes. They confidently operate with research-methods and question the range of theoretical models and methodical approaches. The students know the complex, often divergent, traditional findings und can handle them adequate in the context of the subject. They reflect the effects of specific views on history.

Remarks:
Students have to participate in EITHER

- a mentoring

OR

- a Tutorial.

Workload:
Total: 180 h
30 h (attendance)
150 h (self-study)

Conditions: A consultation with the advisory service for the subject is needed, bevor choosing the key area of focus. This is Accompanied by a discussion about the necessary knowledge of languages for the key subject.		**Credit Requirements:** Passing the overall module examination.
Frequency: each semester Every Semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Übung
Language: German

Assigned Courses:

AG/ÜB Benefizveranstaltung: Lesung von Literatur aus Czernowitz (Ukraine) in der Kresslesmühle (exercise course)

Einführung in die Wissenschaftstheorie der Historischen Wissenschaften (exercise course)

Einführung in die deutsche Paläographie des 19. und frühen 20. Jahrhunderts (exercise course)

GES-0041 Interdisziplinäres Kolloquium und Übung/Mentorat

Generationsübergaben, Generationskonflikte, Generationserwartungen an Beispielen aus Bayern im 19. und 20. Jahrhundert (exercise course)

Inszenierte Vergangenheit – Geschichtsvermittlung oder Erinnerungskitsch: Der Nationalsozialismus und sein Ende in Film und Fernsehen (exercise course)

Oral History und Erinnerungskultur, eine praktische und theoretische Einführung (in Zusammenarbeit mit dem Bukowina-Institut) (exercise course)

Tod und Raum. Räumliche Repräsentationen der Toten am Beispiel von Augsburger Friedhöfen (exercise course)

Urbane Identitäten. O-Italien / Schwaben (exercise course)

Vorbereitungskurs für Examenskandidat.innen: Bayern im 19. und 20. Jahrhundert

Part of the Module: Mentorat

Language: German

Assigned Courses:

GES-0041 Interdisziplinäres Kolloquium und Übung/Mentorat

Kolloquium Europäische Regionalgeschichte sowie Bayerische und Schwäbische Landesgeschichte

Mentorat: h-forum klimaresilienz

Examination

LG: Modulgesamtprüfung in Ü(Master/LA Gym)/Mentorat

module exam, Module exam. For the exact examination-demands see the description of the course in Digicampus. Possible forms of examinations are: Portfolio, Homework, written exam, oral examination.

Module GES-6002: Cultural History and Cultural Theory *Kulturgeschichte und Kulturtheorie*		7 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Silvia Serena Tschopp Matthias Lehmann, M.A.		
Contents: The historical development of the subject European Cultural History is presented and the central theoretical and methodological subject discussions are explained.		
Learning Outcomes / Competences: The students are sensitised with regard to the importance of interdisciplinary, cultural-theoretical and historiographical and historical questions for European cultural history. They are able to reflect on specific theoretical positions from the history of historiography against the background of the acquired methodological tools, critically relate them to the acquired historical knowledge in terms of content and are practised with regard to source criticism in relation to historiographical-historical material.		
Remarks: The lecture and the accompanying seminar are primarily held in German		
Workload: Total: 210 h 60 h (attendance) 150 h (self-study)		
Conditions: The accompanying seminar to the basic lecture can only be attended by students who also participate in the lecture.		**Credit Requirements:** Passing the module examination; presentation (10 min.) in the accompanying seminar and oral examination (20-30 min.) on the material of the lecture and the accompanying seminar.
Frequency: every 3rd semester Every third semester, alternating with the lectures "Europe as a cultural space" and "Media History and Media Theory"	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Grundlagenvorlesung: Einführung in die Kulturgeschichte und Kulturtheorie
Language: German

Parts of the Module

Part of the Module: Begleitseminar
Language: German

Examination
EKG: Modulgesamtprüfung Grundlagen-VL/Begleitseminar
module exam, Oral examination / length of examination: 20 minutes

Module GES-6003: Europe as a Cultural Space *Kulturraum Europa*		7 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Silvia Serena Tschopp Matthias Lehmann, M.A.		
Contents: An overview of the academic discussions and in-depth specialist knowledge on the cultural area of Europe is presented.		
Learning Outcomes / Competences: The students are sensitised to the significance of the concept of "European cultural space" for European cultural history. They are able to reflect on specific theoretical positions on European history against the background of the acquired methodological tools, critically relate the content to the acquired historical knowledge and practise source criticism with regard to European historical material.		
Remarks: The lecture and the accompanying seminar will be held primarily in German.		
Workload: Total: 210 h 150 h (self-study) 60 h (attendance)		
Conditions: The accompanying seminar to the basic lecture can only be attended by students who also participate in the lecture.		**Credit Requirements:** Passing the module examination; presentation (10 min.) in the accompanying seminar and oral examination (20-30 min.) on the material of the lecture and the accompanying seminar.
Frequency: every 3rd semester Every third semester, alternating with the lectures "Cultural History and Theory" and "Media History and Theory"	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Grundlagenvorlesung: Europa: Idee und Geschichte eines Kulturraums **Language:** German

Parts of the Module
Part of the Module: Begleitseminar **Language:** German
Examination **EKG: Modulgesamtprüfung Grundlagen-VL/BS** module exam, Oral examination / length of examination: 20 minutes

Module GES-6004: History and Theory of Media *Mediengeschichte und Medientheorie*		7 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Silvia Serena Tschopp Matthias Lehmann, M.A.		
Contents: The thematic focus and the discussion of media-historical and media-theoretical questions within the framework of cultural history will be intensified.		
Learning Outcomes / Competences: The students are sensitised to the importance of media theoretical and media historical questions for European cultural history. They are able to reflect on specific media theoretical positions against the background of the acquired methodological tools, critically relate their content to the acquired historical knowledge and are practised with regard to source criticism in relation to media historical material.		
Remarks: The lecture and the accompanying seminar are primarily held in German		
Workload: Total: 210 h 150 h (self-study) 60 h (attendance)		
Conditions: The accompanying seminar to the basic lecture can only be attended by students who also participate in the lecture.		**Credit Requirements:** Passing the module examination; presentation (10 min.) in the accompanying seminar and oral examination (20-30 min.) on the material of the lecture and the accompanying seminar.
Frequency: every 3rd semester Every third semester, alternating with the lectures "Cultural History and Theory" and "Europe as a Cultural Space".	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Grundlagenvorlesung: Mediengeschichte und -theorie
Language: German

Parts of the Module

Part of the Module: Begleitseminar
Language: German

Examination
EKG: Modulgesamtprüfung in Grundlagen-VL/BS
module exam, Oral examination / length of examination: 20 minutes

Module GES-6135: European Cultural History: Tutorial or Mentoring *Europäische Kulturgeschichte: Übung oder Mentorat*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Silvia Serena Tschopp Matthias Lehmann, M.A.		
Contents: Exemplary sources from the field of the denomination subject European cultural history		
Learning Outcomes / Competences: Through the intensive examination of sources and the state of research on exemplary cases, students have a problem-oriented understanding of historical structures and processes. They confidently apply already acquired methodological competences and at the same time question the scope of theoretical models and methodological approaches. The students are familiar with complex, often divergent traditional findings and can deal with them adequately. They reflect on the effects of specific historical images.		
Remarks: EITHER a mentorship OR an exercise.		
Workload: Total: 180 h 30 h (attendance) 150 h (self-study)		
Conditions: Vor der Festlegung des Schwerpunktbereichs ist eine Fachstudienberatung wahrzunehmen. Hierbei werden auch die für das Schwerpunktfach erforderlichen Sprachkenntnisse erörtert.		**Credit Requirements:** Passing the module examination
Frequency: each semester Each term	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Übung

Language: German

Part of the Module: Mentorat

Language: German / English

Examination

EKG: Modulgesamtprüfung in Ü/Mentorat

module exam, The course announcements are decisive for the examination modalities in detail. Possible forms of examination are: Portfolio, homework, written exam, oral exam

Module GES-7135: Didactics of History: Tutorial or Mentoring *Didaktik der Geschichte: Übung oder Mentorat*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Susanne Popp Wobring, Michael, Dr.		
Contents: Formation of a denomination subject in Didactics of History. Exemplary examination and testing based on problems in the didactics and culture of history.		
Learning Outcomes / Competences: Through the intense examination of sources and research-opinions to exemplary cases, the students gain a problem orientated understanding of historical structures and processes. They confidently operate with research-methods and question the range of theoretical models and methodical approaches. The students know the complex, often divergent, traditional findings und can handle them adequate in the context of the subject. They reflect the effects of specific views on history.		
Workload: Total: 180 h 150 h (self-study) 30 h (attendance)		
Conditions: A consultation with the advisory service for the subject is needed, bevor choosing the key area of focus. This is Accompanied by a discussion about the necessary knowledge of languages for the key subject.		**Credit Requirements:** Passing the overall module examination.
Frequency: irregular Every Semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Übung **Language:** German **Contact Hours:** 2 **ECTS Credits:** 6.0
Learning Outcome: Siehe unter Modul.
Contents: Bildung eines Schwerpunktbereichs (Denominationsfach) im Teilfach Didaktik der Geschichte. Exemplarische Auseinandersetzung sowie Erprobungen am Beispiel von Problemstellungen der Geschichtsvermittlung und der Geschichtskultur. Die genaue Erläuterung der Inhalte finden Sie in der Veranstaltungsbeschreibung.
Literature: References to literature occur during the course.
Part of the Module: Mentorat **Language:** German **Contact Hours:** 2 **ECTS Credits:** 6.0

Learning Outcome:

Siehe unter Modul.

Contents:

Diskurs und Reflexion über Fachpublikationen sowie individuelle Schwerpunktsetzungen und Forschungsvorhaben. Die genaue Erläuterung der Inhalte finden Sie in der Veranstaltungsbeschreibung.

Literature:

References to literature occur during the course.

Assigned Courses:

Mentorat Didaktik der Geschichte (DID) (exercise course)

Examination

DG: Modulgesamtprüfung in Ü Master/Mentorat

module exam, Participation, preparation and wrap-up of the lectures, Self-studying

Examination Prerequisites:

Teilnahme an den Lehrveranstaltungen, Vor- und Nachbereitung der Sitzungen, Eigenstudium

Description:

Master of Arts (M.A.) Historische Wissenschaften

Module GES-7137: Didactics of History: Tutorial or Mentoring *Didaktik der Geschichte: Übung oder Mentorat*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Susanne Popp Wobring, Michael, Dr.		
Contents: Formation of a denomination subject in Didactics of History. Exemplary examination and testing based on problems in the didactics and culture of history.		
Learning Outcomes / Competences: Through the intense examination of sources and research-opinions to exemplary cases, the students gain a problem orientated understanding of historical structures and processes. They confidently operate with research-methods and question the range of theoretical models and methodical approaches. The students know the complex, often divergent, traditional findings und can handle them adequate in the context of the subject. They reflect the effects of specific views on history.		
Workload: Total: 180 h 30 h (attendance) 150 h (self-study)		
Conditions: A consultation with the advisory service for the subject is needed, bevor choosing the key area of focus. This is Accompanied by a discussion about the necessary knowledge of languages for the key subject.		**Credit Requirements:** Passing the overall module examination.
Frequency: irregular Every Semester	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Übung **Language:** German **Contact Hours:** 2 **ECTS Credits:** 6.0
Learning Outcome: Siehe unter Modul.
Contents: Vertiefte Auseinandersetzung mit Quellen im Teilfach Didaktik der Geschichte. Exemplarische Auseinandersetzung sowie Erprobungen am Beispiel von Problemstellungen der Geschichtsvermittlung und der Geschichtskultur. Die genaue Erläuterung der Inhalte finden Sie in der Veranstaltungsbeschreibung.
Literature: References to literature occur during the course.
Part of the Module: Mentorat **Language:** German **Contact Hours:** 2 **ECTS Credits:** 6.0

Learning Outcome:

Siehe unter Modul.

Contents:

Diskurs und Reflexion über Fachpublikationen sowie individuelle Schwerpunktsetzungen und Forschungsvorhaben. Die genaue Erläuterung der Inhalte finden Sie in der Veranstaltungsbeschreibung.

Literature:

Literaturhinweise erfolgen in der Lehrveranstaltung.

Assigned Courses:

Mentorat Didaktik der Geschichte (DID) (exercise course)

Examination

DG: Modulgesamtprüfung in Ü Master/Mentorat

module exam, Module exam. For the exact examination-demands see the description of the course in Digicampus. Possible forms of examinations are: Portfolio, Homework, written exam, oral examination.

Examination Prerequisites:

Participation, preparation and wrap-up of the lectures, Self-studying

Description:

Master of Arts (M.A.) Historische Wissenschaften

Module KUK-0016: Methods and Theories 1 *Methoden und Theorien 1*		8 ECTS/LP
Version 3.0.0 (since SoSe18) Person responsible for module: Prof. Dr. Günther Kronenbitter		
Contents: Methods and theories of History of the Arts and Cultural History Modulelemente: Hauptseminar (Lektürekurs) + Vorlesung + interdisziplinäres Kolloquium		
Learning Outcomes / Competences: **Subject-related:** Students will gain an in-depth knowledge of theoretical and methodological contents, and will know the historical genesis and the basic features of the subject’s methodologies. **Methodological:** Students will apply an extended range of methods to different objects and relate them to broader historical contexts. **Social/personal:** Students have an extended capacity for abstraction. They master forms of communication for their own theses and the ability for collegial criticism.		
Remarks: Wählen Sie aus den folgenden, fest vorgegebenen Modulteilen nur einen Modulteil mit 1 Lektürekurs, 1 Vorlesung und 1 interdisziplinärem Kolloquium aus.		
Workload: Total: 240 h 90 h (attendance) 150 h (self-study)		
Conditions: none		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each semester	**Recommended Semester:** 2. - 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Methoden und Theorien 1 Europäische Ethnologie/Volkskunde 1 **Language:** German
Assigned Courses: **HS (M.A.): Lektürekurs „Kulturelles Gedächtnis – Einführung in die Erinnerungsforschung“** (advanced seminar) **Koll M.A.: KuK Kolloquium** (colloquium) **VL: Interdisziplinäre Perspektiven: Kulturerbe - Weltkulturerbe (14-täglich)** (lecture)
Part of the Module: Methoden und Theorien 1 Europäische Ethnologie/Volkskunde 2 **Language:** German
Part of the Module: Methoden und Theorien 1 Kunstgeschichte/Bildwissenschaft 1 **Language:** German

Assigned Courses:

HS LK (M.A./MAIES): Politische Ikonographie (advanced seminar)

Koll M.A.: KuK Kolloquium (colloquium)

VL: Interdisziplinäre Perspektiven: Kulturerbe - Weltkulturerbe (14-täglich) (lecture)

Part of the Module: Methoden und Theorien 1 Kunstgeschichte/Bildwissenschaft 2
Language: German

Part of the Module: Methoden und Theorien 1 Klassische Archäologie 1
Language: German

Assigned Courses:

Altertumswissenschaftliches Kolloquium (colloquium)

Koll M.A.: KuK Kolloquium (colloquium)

Römische Gräber (advanced seminar)

VL: Interdisziplinäre Perspektiven: Kulturerbe - Weltkulturerbe (14-täglich) (lecture)

Part of the Module: Methoden und Theorien 1 Klassische Archäologie 2
Language: German

Part of the Module: Methoden und Theorien 1 Musikwissenschaft 1
Language: German

Part of the Module: Methoden und Theorien 1 Musikwissenschaft 2
Language: German

Part of the Module: Methoden und Theorien 1 Europäische Regionalgeschichte sowie Bayerische und Schwäbische Landesgeschichte 1
Language: German

Part of the Module: Methoden und Theorien 1 Europäische Regionalgeschichte sowie Bayerische und Schwäbische Landesgeschichte 2
Language: German

Examination
MT1 Methoden und Theorien 1
report, Prüfungsumfang format- und projektbezogen (siehe Digicampus)

Module KUK-0019: Methods and Theories 2 *Methoden und Theorien 2*		10 ECTS/LP
Version 3.0.0 (since SoSe18) Person responsible for module: Prof. Dr. Günther Kronenbitter		
Contents: Detailed focus on methods and theories of History of the Arts and Cultural History Modulelemente: Hauptseminar (Lektürekurs) + Übung + interdisziplinäres Kolloquium		
Learning Outcomes / Competences: **Subject-related:** Students will develop a profound knowledge of theoretical and methodological contents, and will be able to derive their historical genesis in the interdisciplinary context of the discussion of methods. They will be aware of current research positions and projects on higher-level subject-specific and interdisciplinary topics. **Methodological:** Students will be able to apply a broad spectrum of methods to complex objects. They will classify research achievements in changing methodological and theoretical horizons and will evaluate them independently. **Social/personal:** Students will have a deepened capacity for abstraction. They have mastered extended forms of communication in the discussion of their own theses and research questions as well as the ability to engage in collegial criticism.		
Remarks: Wählen Sie aus den folgenden, fest vorgegebenen Modulteilen nur einen Modulteil mit 1 Lektürekurs, 1 Übung und 1 interdisziplinärem Kolloquium aus. Die Prüfungsanmeldung erfolgt über den Lektürekurs.		
Workload: Total: 300 h 90 h (attendance) 210 h (self-study)		
Conditions: none		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each semester	**Recommended Semester:** 3. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Methoden und Theorien 2 Europäische Ethnologie/Volkskunde 1 **Language:** German
Assigned Courses: **HS (MA): (Lektürekurs): Vom ‚traditionellen' Brauch zum rauschhaften Fest? Texte zur Ritual- und Brauchforschung** (advanced seminar) **Koll M.A.: KuK Kolloquium** (colloquium) **Ü (M.A): Ab ins Feld! Feste und Rituale erforschen** (exercise course)
Part of the Module: Methoden und Theorien 2 Europäische Ethnologie/Volkskunde 2 **Language:** German

Part of the Module: Methoden und Theorien 2 Kunstgeschichte/Bildwissenschaft 1
Language: German

Assigned Courses:

HS LK (M.A./MAIES): Politische Ikonographie (advanced seminar)

Koll M.A.: KuK Kolloquium (colloquium)

Ü (M.A.): Druckgraphik von den Anfängen bis zur Mitte des 19. Jahrhunderts, Ikonographie, Stil und Technik. Übung an Originalen der Staats- und Stadtbibliothek Augsburg (exercise course)

Part of the Module: Methoden und Theorien 2 Kunstgeschichte/Bildwissenschaft 2
Language: German

Part of the Module: Methoden und Theorien 2 Klassische Archäologie 1
Language: German

Assigned Courses:

Altertumswissenschaftliches Kolloquium (colloquium)

Koll M.A.: KuK Kolloquium (colloquium)

Römische Gräber (advanced seminar)

Ü (M.A): Ab ins Feld! Feste und Rituale erforschen (exercise course)

Part of the Module: Methoden und Theorien 2 Klassische Archäologie 2
Language: German

Part of the Module: Methoden und Theorien 2 Musikwissenschaft 1
Language: German

Part of the Module: Methoden und Theorien 2 Musikwissenschaft 2
Language: German

Part of the Module: Methoden und Theorien 2 Europäische Regionalgeschichte sowie Bayerische und Schwäbische Landesgeschichte 1
Language: German

Part of the Module: Methoden und Theorien 2 Europäische Regionalgeschichte sowie Bayerische und Schwäbische Landesgeschichte 2
Language: German

Examination
MT2 Methoden und Theorien 2
report, Prüfungsumfang format- und projektbezogen (siehe Digicampus)

Module MRM-0086: Sustainable Chemistry of Materials and Resources - Modelling *Nachhaltige Chemie der Materialien und Ressourcen - Modellierung*		6 ECTS/LP
Version 1.2.0 (since SoSe16) Person responsible for module: Prof. Dr. Richard Weihrich		
Contents: • Basics of materials' modelling from structures of molecules and crystals • Aspects of computational modelling of materials and sustainability • Application of computer codes using density functional theory • Prediction of chemical structures, energy landscapes, and polymorphism • Electronic structures • Advanced properties: magnetism, EOS, dynamics • Bonding in direct space: ELF, AIM		
Learning Outcomes / Competences: • The students know the basic terms and concepts of modelling of molecular and crystal structures and properties • The students have the competence to explain input and output data from computational modelling and to apply them for their specific use. • The students are able to apply the knowledge on modelling different molecular and crystal structures and properties by themselves on common computer codes like CRYSTAL17 • The students are able to process input and output data from computational modelling • The students acquire scientific skills to search for scientific literature and to evaluate scientific content.		
Workload: Total: 180 h		
Conditions: none		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: as needed	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** any	

Parts of the Module
Part of the Module: Nachhaltige Chemie der Materialien und Ressourcen - Modellierung **Mode of Instruction:** lecture **Language:** English / German **Contact Hours:** 2
Contents: • Grundlagen der Modellierung von Molekül- und Festkörper-Strukturen • Aspekte von Modellierung und Nachhaltigkeit • Anwendung von Computercodes auf Basis von DFT (Dichtefunktionaltheorie) • Vorhersage zu chemischen Strukturen, Energielandschaften und Polymorphie • Berechnung elektronischer Strukturen • Eigenschaftsvorhersage: Magnetismus, Dynamik, Zustandsgleichungen • Bindung im Realraum: DFT und AIM

Literature:

- A. R. West, Solid State Chemistry and its Applications, 2nd Ed., Stud. Ed., 2014, ISBN: 978-1-119-94294-8
- R. Dronskowski, Computational Chemistry of Solid State Materials: A Guide for Materials Scientists, Chemists, Physicists and others: A Guide for Material Scientists, Chemists, Physicists and Others, Wiley-VCH, 2005
- L. Smart, E. A. Moore, Solid State Chemistry: An Introduction, Taylor & Francis Inc., ISBN: 978-1439847909
- U. Müller, Anorganische Strukturchemie, 6. Auflage, Verlag Teubner, ISBN: 978-3834806260
- R. A. Evarestov, Quantum Chemistry of Solids: LCAO Treatment of Crytals and Nanostructures, Springer, 2013, 978-3642303555
- T. E. Warner, Synthesis, Properties and Mineralogy of Important Inorganic Materials, Wiley, 2011, 978-0470746110
- C. Pisani: Lecture notes in Chemistry: Quantum-Mechanical Ab-initio Calculation of the Properties of Crystalline Materials, Springer, 2013, 978-3540616450

Assigned Courses:

Nachhaltige Chemie der Materialien und Ressourcen - Modellierung (lecture)

Examination

Nachhaltige Chemie der Materialien und Ressourcen - Modellierung

written exam / length of examination: 90 minutes

Parts of the Module

Part of the Module: Übung zu Nachhaltige Chemie der Materialien und Ressourcen - Modellierung

Mode of Instruction: exercise course

Language: English / German

Contact Hours: 1

Learning Outcome:

Kenntnisse:

Die Studierenden verstehen die Prinzipien der Modellierung von Materialien auf atomarer Basis

Fertigkeiten:

Die Studierenden können den Input für Computer-Modellierungen erstellen, Berechnungen mit modernen Programmen (hier: CRYSTAL17) durchführen und den Output interpretieren.

Kompetenzen:

Die Studierenden beherrschen die Bedienung und den Umgang mit Ein- und Ausgabedaten von modernen DFT-Modellierungsprogrammen (hier: CRYSTAL17) und können ihre Kenntnisse auf eigene oder neue Fragestellungen anwenden.

Assigned Courses:

Nachhaltige Chemie der Materialien und Ressourcen - Modellierung (lecture)

Module MRM-0118: Engineering mechanics *Technische Mechanik*			6 ECTS/LP
Version 1.3.0 (since WS18/19) Person responsible for module: Prof. Dr.-Ing. Christian Weißenfels			
Contents: 1. Classification of mechanical systems 2. Support loads and stress resultants of statically determinate systems 3. Calculation of displacements 4. Support loads and stress resultants of statically indeterminate systems 5. Calculation of stresses 6. Static and kinetic friction 7. Kinematics and kinetics of rigid bodies			
Learning Outcomes / Competences: • The students know the most important basic concepts and methods of engineering mechanics • The Students understand the relationship between load and response in static structures • The students are able to describe movements due to forces • The students are able to apply their knowledge to formulate engineering problems using mechanics and solve them independently • The students can evaluate engineering systems • Acquisition of key qualifications: logical thinking; independent and structured working			
Workload: Total: 180 h			
Conditions: Experimentalphysik I Ingenieurwissenschaften I			**Credit Requirements:** schriftliche Prüfung
Frequency: each winter semester	**Recommended Semester:** from 4.		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** any		

Parts of the Module

Part of the Module: Technische Mechanik
Mode of Instruction: lecture
Language: German
Contact Hours: 3

Literature:
- Gross/Hauger/Schröder/Wall: Technische Mechanik 1-3 . 11.-13.Aufl. Springer, Berlin 2011-2015.
- Wriggers/Nackenhorst/Beuermann/Spiess/Löhnert: Technische Mechanik kompakt. 2. Auflage, Teubner-Verlag, Stuttgart, 2006.

Examination
Technische Mechanik
written exam

Parts of the Module
Part of the Module: Übung zu Technische Mechanik **Mode of Instruction:** exercise course **Language:** German **Contact Hours:** 1

Module MRM-1000: Mathematics I *Mathematik I*	5 ECTS/LP
Version 1.0.0 Person responsible for module: Prof. Dr. Andreas Rathgeber	

Contents:

1. Basic principles: Brief repetition of the basic mathematical knowledge from the mathematics preliminary course
2. Sequences, series and continuity: in particular Cauchy sequences, Taylor series
3. Differentiation and functions: in particular exponential, logarithmic and trigonometric functions, Differentiation in R^n, vector fields and differential operators
4. Integration: special integration in R^n, integration on curves and surfaces, integer sets and vector fields
5. Differential equations: basics and introductory examples
6. Coordinate systems: in particular Euclidean spaces, fundamental transformations, complex numbers with associated ones coordinate system

Learning Outcomes / Competences:
In this accompanying course, students in the first semester are to acquire the necessary mathematical knowledge. The basics for engineering training are taught as part of your studies: Learning basic arithmetic operations for students of engineering courses, for the future professional career are indispensable. In particular, the school knowledge of analysis is here to images of R^n extended to R^n (esp. R^3 to R^3). Among other things, differentiation and integration in R^n are considered.

Workload:
Total: 150 h

Conditions: none		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Mathematik I
Mode of Instruction: lecture
Lecturers: Prof. Dr. Andreas Rathgeber
Language: German
Contact Hours: 2

Lehr-/Lernmethoden:
Blackboard lecture and beamer presentation.

Literature:
Announced in lecture.

Examination
Mathematik I
/ length of examination: 60 minutes

Parts of the Module
Part of the Module: Übung Mathematik I **Mode of Instruction:** exercise course **Language:** German **Contact Hours:** 2

Module MRM-1001: Mathematics II *Mathematik II*	8 ECTS/LP
Version 1.2.0 Person responsible for module: Prof. Dr. Andreas Rathgeber Prof. Klein	

Contents:

Part Prof. Rathgeber: Stochastics

1. Descriptive statistics

a. Introduction

b. Evaluation methods for one- and multidimensional data material

2. Theory of Probability

a. Combinatorial basics

b. Random processes, events and probabilities

c. Random variables, distributions and distribution parameters, i.e. Law of large numbers and central limit theorem

3. Inductive statistics

a. Basics of inductive statistics

b. Significance tests

Part Prof. Klein: Linear Algebra and Optimization

1. Basics

a. Complex numbers

b. Sets and their operations

c. Binary relations

2. Linear Algebra

a. Matrices and vectors

b. Point sets

c. Vector spaces, i.e. systems of linear equations

e. Linear mappings

f. Determinants

G. Eigenvalue problems

3. Optimization

a. Linear optimization

b. Nonlinear optimization

Learning Outcomes / Competences:

In many economic problems, the evaluation of data and their further useof the evaluation results is essential. As part of the event, the students should on the one hand learn the theoretical basics as well as the application requirements of the statistical methods. on the other handThe focus should also be on the application of these procedures in order to enable the students to enter the facilitate empirical work and enable them to carry out their own data evaluations. Through this they are also able to interpret the results obtained and the limitations of the methods usedto recognize.In addition, areas of mathematics are dealt with that are not already the subject of the technical courses are. In particular, the students should be able to answer questions and problems such as they occur at the interface of economics and material sciences, to describe them mathematically and toanalyze.

Workload: Total: 240 h		
Conditions: Basic knowledge in Mathematics.		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 8	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Mathematik II
Mode of Instruction: lecture
Lecturers: Prof. Dr. Robert Klein, Prof. Dr. Andreas Rathgeber
Language: German
Contact Hours: 4
ECTS Credits: 8.0

Literature:

- Bamberg et al.: Statistik, Oldenbourg-Verlag, 15. Auflage 2009
- Bamberg et al.: Arbeitsbuch Statistik, Oldenbourg-Verlag, 8. Auflage 2008
- Opitz, O.; S. Etschberger, W.R. Burkart und R. Klein: Mathematik - Lehrbuch für das Studium der Wirtschaftswissenschaften. 12. Aufl., De Gruyter Oldenbourg, München, 2017.
- Opitz, O.; Klein, R.; Burkart, W. R.: Mathematik - Übungsbuch für das Studium der Wirtschaftswissenschaften. 8. Aufl., De Gruyter Oldenbourg, München, 2014

Assigned Courses:

Mathematik II (WING, Vorlesung), Teil 2: Lineare Algebra und Optimierung (lecture)

Mathematik II - Stochastik für WING - Stochastik für MSE (lecture + exercise)

Examination
Mathematik II
written exam / length of examination: 90 minutes

Parts of the Module

Part of the Module: Übung Mathematik II
Mode of Instruction: exercise course
Language: German
Contact Hours: 4

Contents:
Wiederholung und Vertiefung der Lehrinhalte mithilfe von Übungen. Übungsblätter werden regelmäßig angeboten.

Assigned Courses:

Mathematik II (WING, Übung), Teil 2: Lineare Algebra und Optimierung (exercise course)

Module MRM-1002: Technical Physics I *Technische Physik I*	6 ECTS/LP

Version 1.0.0
Person responsible for module: Prof. Dr. Markus Sause

Contents:
1. mechanics of mass points and systems of mass points
2. mechanics and dynamics of extended rigid bodies
3. continuum mechanics
4. mechanical oscillations and waves
5. mechanics and dynamics of gases and liquids
6. thermodynamics

Learning Outcomes / Competences:
The students

- know the basic terms, concepts and phenomena of classical mechanics, oscillations and waves in mechanical systems and thermodynamics (thermodynamics and statistical interpretation) and their application in engineering
- have skills in simple model building, the formulation of mathematical-physical approaches and can apply these to tasks in the areas mentioned, especially for technical problems, and
- have skills in the independent processing of problems from the above-mentioned subject areas. They are able to assess the accuracy of observation and analysis.

Remarks:
Mathematical tools such as differentiation and integration, simple differential equations and complex numbers are integrated into the module depending on their occurrence.

Workload:
Total: 180 h

Conditions: none		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 5	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Technische Physik I
Mode of Instruction: lecture
Lecturers: Prof. Dr. Markus Sause
Language: German
Contact Hours: 4

Lehr-/Lernmethoden:
Tafelvortrag, Beamerpräsentation, Demonstration von Experimenten

Literature:

- U. Hahn; Physik für Ingenieure, Oldenburg Wissenschaftsverlag, ISBN: 978-3-486-27520-9
- W. Demtröder: Experimentalphysik Band 1-2, Springer Verlag
- D. Halliday, R. Resnick & J. Walker: Physik, Wiley-VCH, ISBN: 978-3527405992
- P. Tipler: Physik, Spektrum, ISBN: 978-3860251225
- D. Meschede: Gerthsen Physik, Springer, ISBN: 978-3540254218
- R.C. Hibbeler: Kurzlehrbuch Technische Mechanik 1, Pearson Studium, ISBN: 978-3-8273-7101-0

Examination

Technische Physik I

written exam / length of examination: 90 minutes

Parts of the Module

Part of the Module: Übung Technische Physik I

Mode of Instruction: exercise course

Language: German

Contact Hours: 1

Module MTH-1000: Linear Algebra I *Lineare Algebra I*	8 ECTS/LP

Version 1.0.0 (since WS15/16)
Person responsible for module: Prof. Dr. Tatjana Stykel

Contents:

Basic calculation methods and most important tools of linear algebra, such as solution methods for linear systems of equations or the principal axis transformation of symmetric matrices, the notion of dimension of a (sub)vector space and the use of the determinant, important approaches for proof techniques:
- sets
- relations and mappings
- rational, real and complex numbers
- vector spaces and linear mappings
- linear systems of equations
- linear and affine subspaces
- dimension of subspaces
- similarity of matrices
- determinants
- eigenvalues and eigenvectors
- principal axis transformation

Learning Outcomes / Competences:

The students learn the mathematical structure of vector spaces and linear mappings in an abstract way and in explicit description. They possess the skills to work independently on tasks from these areas and to recognize and use linear structures in problems. They learn common calculation methods for solving linear systems and their possible applications. They understand the importance of the problem of eigenvectors and eigenvalues.
Integrated acquisition of key skills: competence of logical reasoning, mathematical expression, scientific thinking, developing solution strategies for given problems, scientific communication skills.

Workload:

Total: 240 h
4 h lecture (attendance)
2 h exercise course (attendance)

Conditions: none		
Frequency: each winter semester	**Recommended Semester:** 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Lineare Algebra I

Language: German

Workload:

4 Std. Vorlesung (Präsenzstudium)
2 Std. Übung (Präsenzstudium)

Contact Hours: 6

ECTS Credits: 8.0

Learning Outcome:

The students learn the mathematical structure of vector spaces and linear mappings in an abstract way and in explicit description. They possess the skills to work independently on tasks from these areas and to recognize and use linear structures in problems. They learn common calculation methods for solving linear systems and their possible applications. They understand the importance of the problem of eigenvectors and eigenvalues.
Integrated acquisition of key skills: competence of logical reasoning, mathematical expression, scientific thinking, developing solution strategies for given problems, scientific communication skills.

Contents:

Basic calculation methods and most important tools of linear algebra, such as solution methods for linear systems of equations or the principal axis transformation of symmetric matrices, the notion of dimension of a (sub)vector space and the use of the determinant, important approaches for proof techniques:
- sets
- relations and mappings
- rational, real and complex numbers
- vector spaces and linear mappings
- linear systems of equations
- linear and affine subspaces
- dimension of subspaces
- similarity of matrices
- determinants
- eigenvalues and eigenvectors
- principal axis transformation

Prerequisites: none

Literature:

Th. Bröcker: Lineare Algebra und Analytische Geometrie (Birkhäuser)
H.J. Kowalsky: Lineare Algebra (de Gruyter)
S. Bosch: Lineare Algebra (Springer)

Assigned Courses:

Lineare Algebra I (lecture + exercise)

Examination

Linear Algebra I

module exam, Portfolio

Module MTH-1010: Linear Algebra II *Lineare Algebra II*		10 ECTS/LP
Version 1.1.0 (since WS15/16) Person responsible for module: Prof. Dr. Marco Hien		
Contents: • Classification of endomorphisms of finite dimensional vector spaces (Jordan's normal form). • Norms and bilinear forms on vector spaces. • Tensor product and wedge product of vector spaces. • Basic algebraic structures (groups, rings) - in particular the ring of polynomials over a field		
Learning Outcomes / Competences: Students will understand the classification of endomorphisms of a finite dimensional vector space (quadratic matrices) - Jordan's normal form. They learn how to use additional structures on vector spaces (such as norms or bilinear forms, eucilidian scalar products) for deeper investigations. Students will understand the concept of the tensor product and universal properties - an important notion in differential geometry, algebraic geometry, ... They will encounter and study basic algebraic structures (groups, rings) and in particular develop a deeper understanding and computational skills with respect to the ring of polynomials in one variable over a field. Additionally, students will improve their general skills with respect to handling mathematical problems.		
Workload: Total: 300 h 2 h exercise course (attendance) 4 h lecture (attendance)		
Conditions: Lineare Algebra I		
Frequency: each summer semester	**Recommended Semester:** 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module
Part of the Module: Lineare Algebra II **Language:** German **Workload:** 2 Std. Übung (Präsenzstudium) 4 Std. Vorlesung (Präsenzstudium) **Contact Hours:** 6 **ECTS Credits:** 10.0

Contents:

Dieses Modul führt das Modul Lineare Algebra I fort, indem der Schwerpunkt mehr auf abstrakte Strukturen gelegt wird. So werden Matrizen je nach Situation als lineare Abbildungen oder Endomorphismen betrachtet, und es werden Konstruktionsmöglichkeiten für abstrakte Vektorräume. Die Klassifikation von Endomorphismen endlich-dimensionaler Vektorräume durch Normalformen wird diskutiert, insbesondere wird die Jordansche Normalform besprochen.

Linearformen und Bilinearformen

Euklidische und unitäre Vektorräume

Normierte Vektorräume

Normalformen von Endomorphismen, insbesondere Jordansche Normalform

Orthoginale und unitäre Endomorphismen

Selbstadjungierte Endomorphismen

Normale Endomorphismen

Singulärwertzerlegung

Literature:

Th. Bröcker: Lineare Algebra und Analytische Geometrie (Birkhäuser)

H.J. Kowalsky: Lineare Algebra (de Gruyter)

S. Bosch: Lineare Algebra (Springer)

Assigned Courses:

Lineare Algebra II (lecture)

Examination

Lineare Algebra II

oral exam / length of examination: 30 minutes

Module MTH-1020: Analysis I		8 ECTS/LP
Version 1.0.0 (since WS18/19) Person responsible for module: Prof. Dr. Bernd Schmidt		
Learning Outcomes / Competences: Die Student(inn)en sind vertraut mit den Grundlagen der Analysis einer reellen Unabhängigen, insbesondere mit Grenzwertprozessen bei Folgen und Reihen sowie Stetigkeit und Differenzierbarkeit von Funktionen. Sie haben wichtige Anwendungen und Beispiele verstanden und kennen die wesentlichen Eigenschaften und Konsequenzen dieser Begriffe. Integrierter Erwerb von Schlüsselqualifikationen: Anhand des vermittelten Stoffes haben die Student(inn)en außerdem die Fähigkeit erworben, abstrakten mathematischen Schlüssen zu folgen und selbst rigorose Beweise zu führen.		
Workload: Total: 240 h 4 h lecture (attendance) 2 h exercise course (attendance)		
Conditions: Keine inhaltlichen Voraussetzungen.		
Frequency: each semester	**Recommended Semester:** 1. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Analysis I

Mode of Instruction: lecture, exercise course

Language: German

Workload:

4 Std. Vorlesung (Präsenzstudium)

2 Std. Übung (Präsenzstudium)

Contact Hours: 6

ECTS Credits: 8.0

Contents:

Dieses Vorlesung behandelt unter anderem die reelle Analysis einer Unabhängigen:

Reelle Zahlen und Vollständigkeit

Komplexe Zahlen

Konvergenz und Divergenz bei Folgen und Reihen

Potenz- und Taylor-Reihen

Stetigkeitsbegriffe

Differential- und Integralrechnung einer Veränderlichen

(Teile des Stoffes können in die Analysis II ausgelagert werden und Stoffteile der Analysis II vorgezogen werden.)

Lehr-/Lernmethoden:

Vorlesung und Übungen

Literature:

Forster. O.: Analysis 1: Differential- und Integralrechnung einer Veränderlichen. Vieweg+Teubner.

Hildebrandt, S.: Analysis 1. Springer Verlag, 2005.

Königsberger, K.: Analysis 1. Springer Verlag, 2003.

Dieudonné, J.: Grundzüge der modernen Analysis. Vieweg Verlagsgesellschaft.

Lang, S.: Undergraduate Analysis

Lang, S.: Real and Functional Analysis

Rudin, W.: Analysis, De Gruyter Oldenbourg Verlag, 2008.

Assigned Courses:

Analysis 1 (lecture + exercise)

Examination

Analysis I

module exam, Klausur oder Portfolio (semesterweise Angabe siehe LV im Digicampus)

Module MTH-1030: Analysis II *Analysis II*		10 ECTS/LP
Version 2.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Bernd Schmidt		
Learning Outcomes / Competences: Die Student(inn)en haben ihre gundlegenden Analysiskenntnisse vertieft und wesentlich erweitert. Insbesondere sind sie vertraut mit den Grundlagen der Differentialrechnung mehrerer Veränderlicher sowie grundlegenden toplogischen Begriffen. Integrierter Erwerb von Schlüsselqualifikationen: Die Student(inn)en sind in der Lage, eigenständig und problemorientiert an mathematischen Aufgabenstellungen zu arbeiten.		
Workload: Total: 300 h 2 h exercise course (attendance) 4 h lecture (attendance)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** 2. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Analysis II

Mode of Instruction: lecture, exercise course
Language: German
Contact Hours: 6
ECTS Credits: 10.0

Contents:

Dieses Modul behandelt die reelle Analysis mehrerer Unabhängiger:
Differentialrechnung mehrerer Veränderlicher
Metrische Räume und grundlegende topologische Begriffe
Normierte (vollständige) Vektorräume
Voraussetzungen: Grundlagen der reellen eindimensionalen Analysis

Literature:

Otto Forster: Analysis 2: Differential- und Integralrechnung mehrerer Veränderlichen. Vieweg+Teubner.
J. Dieudonné: Grundzüge der modernen Analysis. Vieweg Verlagsgesellschaft.
Hildebrandt, S.: Analysis 1. Springer Verlag, 2005.
Hildebrandt, S.: Analysis 2. Springer Verlag, 2003.
Königsberger, K.: Analysis 1. Springer Verlag, 2003.
Königsberger, K.: Analysis 2. Springer Verlag, 2009.

Assigned Courses:

Analysis II (lecture)

Examination

Analysis II

oral exam / length of examination: 20 minutes

Module MTH-1040: Analysis III		9 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Bernd Schmidt		
Learning Outcomes / Competences: Die Student(inn)en haben sich ein solides Grundwissen der Analysis erarbeitet. Sie kennen das Lebesgue-Integration, grundlegende Eigenschaften von Mannigfaltigkeiten und die Integralsätze. Sie haben ihre Abstraktionsfähigkeit und ihre geometrische Anschauung für analytische Sachverhalte geschult.		
Workload: Total: 270 h 2 h exercise course (attendance) 4 h lecture (attendance)		
Conditions: none		
Frequency: each winter semester	**Recommended Semester:** 3. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Analysis III

Mode of Instruction: lecture, exercise course

Language: German

Workload:

2 Std. Übung (Präsenzstudium)

4 Std. Vorlesung (Präsenzstudium)

Contact Hours: 6

ECTS Credits: 9.0

Contents:

Dieses Modul vertieft und setzt die Differential- und Integralgrechnung mehrerer Veränderlicher mit globalen Anwendungen auf Mannigfaltigkeiten fort:

Maßtheorie

Lebesque-Integration

Mannigfaltigkeiten

Differentialformen und Integralsätze

Voraussetzungen: Grundlagen der reellen eindimensionalen und mehrdimensionalen Analysis

Literature:

Forster, O.: Analysis III, Springer, 2012.

Königsberger, K.: Analysis II. Springer-Verlag, 2009.

H. Bauer: Maß- und Integrationstheorie (de Gruyter, 1990)

K. Jänich: Vektoranalysis (Springer, 2005)

Examination

Analysis III

portfolio exam, Klausur

Module MTH-1050: Introduction to algebra *Einführung in die Algebra*	9 ECTS/LP
Version 1.0.0 (since WS19/20) Person responsible for module: Prof. Dr. Marc Nieper-Wißkirchen	
Learning Outcomes / Competences: Die Studenten verstehen Fragen über prinzipielle Lösbarkeit von Polynomgleichungen und ihre Anwendungen und können diese beantworten. Die Studenten haben Kenntnisse der Geschichte und Entwicklung der Mathematik im Rahmen der Galoisschen Theorie erlangt.	
Workload: Total: 270 h 4 h lecture (attendance) 2 h exercise course (attendance)	
Conditions: Keine inhaltlichen Voraussetzungen abgesehen vom Abitur-Wissen.	

Frequency: each winter semester	**Recommended Semester:** 1. - 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Einführung in die Algebra

Mode of Instruction: lecture, exercise course

Language: German

Workload:

4 Std. Vorlesung (Präsenzstudium)

Contact Hours: 6

ECTS Credits: 9.0

Contents:

Die Einführung in die Algebra beginnt mit einer leicht verständlichen Einführung in die Galoissche Theorie der Symmetrien der Lösungen einer Polynomgleichung. Anhand dieses konkreten Zuganges werden Begriffe aus der Gruppen-, Ring- und Körpertheorie motiviert und eingeführt. Am Ende werden Ausblicke auf den moderneren abstrakten Zugang und Verallgemeinerungen gegeben. Themen sind:

Zahlbereiche

Polynome

Symmetrien

Galoissche Theorie

Konstruktionen mit Zirkel und Lineal

Auflösbarkeit von Gleichungen

Es werden die Grundlagen für alle weiterführenden Module in Algebra, Zahlentheorie und Arithmetischer und Algebraischer Geometrie gelegt. Außerdem ist die Algebra eine sinnvolle Grundlage für Module in Komplexer Geometrie und Algebraischer Topologie.

Voraussetzungen: Keine inhaltlichen Voraussetzungen abgesehen vom Abitur-Wissen.

Literature:

Serge Lang: Algebra. Springer-Verlag.

H. Edwards: Galois Theory. Springer-Verlag.

I. Stewart: Galois Theory. Chapman Hall/CRC.

Marc Nieper-Wißkirchen: Galoissche Theorie.

Examination

Einführung in die Algebra

oral exam / length of examination: 20 minutes

Module MTH-1070: Introduction to Geometry *Einführung in die Geometrie*		9 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Bernhard Hanke		
Learning Outcomes / Competences: Verständnis der grundlegenden Konzepte und Methoden in der modernen Geometrie. Befähigung zum weiterführenden Studium geometrischer und topologischer Themen im Rahmen der Bachelor- und Masterausbildung.		
Workload: Total: 270 h 2 h exercise course (attendance) 4 h lecture (attendance)		
Conditions: none		
Frequency: each winter semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Einführung in die Geometrie

Language: German

Workload:

2 Std. Übung (Präsenzstudium)

4 Std. Vorlesung (Präsenzstudium)

Contact Hours: 6

ECTS Credits: 9.0

Contents:

Aspekte der Geometrie, insbesondere Differentialgeometrie, etwa:

Krümmungsbegriffe

Riemannsche Metriken

Geodäten

Parallelverschiebung

innere und äußere Geometrie

Gruppen in der Geometrie

Voraussetzungen: Solide Grundkenntnisse in Analysis und Linearer Algebra

Examination

Einführung in die Geometrie

written exam / length of examination: 180 minutes

Module MTH-1080: Complex Analysis *Funktionentheorie*		9 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Dr. Peter Quast		
Learning Outcomes / Competences: Die Studenten sollen ein Verständnis für die grundlegenden Konzepte und Methoden der komplexen Analysis entwickeln. Sie sollen die Befähigung zu selbständiger wissenschaftlicher Arbeit im Bereich der Funktionentheorie lernen.		
Workload: Total: 270 h 4 h lecture (attendance) 2 h exercise course (attendance)		
Conditions: none		
Frequency: each summer semester	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Funktionentheorie

Language: German

Workload:

4 Std. Vorlesung (Präsenzstudium)

2 Std. Übung (Präsenzstudium)

Contact Hours: 6

ECTS Credits: 9.0

Contents:

Funktionentheorie ist der traditionelle Name für die Theorie der komplexwertigen analytischen oder holomorphen Funktionen einer komplexen Veränderlichen. Diese Funktionen sind einerseits sehr gewöhnlich, in dem Sinne nämlich, daß man ihnen in vielen mathematischen Gebieten begegnet. Polynome sind zum Beispiel holomorph, ebenso Sinus und Kosinus, der Exponentialfunktionen, der Logarithmus usw., wenn sie als von einer komplexen Variablen abhängig aufgefaßt werden.

Andererseits haben die holomorphen Funktionen erstaunliche Eigenschaften und gehorchen merkwürdigen strikten Gesetzen, die sich nicht erahnen lassen, wenn diese Funktionen nur so im reellen Gewande der Analysis daherkommen gesehen werden.

Holomorphe Funktionen

Der Cauchysche Integralsatz

Erste Folgerungen aus dem Cauchyschen Integralsatz

Isolierte Singularitäten

Analytische Fortsetzung

Die Umlaufszahlversion des Cauchyschen Integralsatzes

Der Residuenkalkül

Folgen holomorpher Funktionen

Satz von Mittag-Leffler und Weierstraßscher Produktsatz

Der Riemannsche Abbildungssatz

Ausblicke

Voraussetzungen: Solide Grundkenntnisse in Linearer Algebra. Kenntnisse der reellen Analysis in einer Variablen. Kenntnisse der reellen Analysis in mehreren Variablen sind hilfreich.

Literature:

Jähnich, K.: Funktionentheorie.

Assigned Courses:

Funktionentheorie (lecture)

Examination

Funktionentheorie

module exam, schriftliche Prüfung oder mündliche Prüfung oder Portfolioprüfung

Module MTH-1100: Funktionalanalysis		9 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Bernd Schmidt		
Learning Outcomes / Competences: Die Student(inn)en haben sich die funktionalanalytischen Grundlagen für viele vertiefte Analysismodule erarbeitet. Sie sind in der Lage, in abstrakten Problemen allgemeine Strukturen zu erkennen und zu analysieren.		
Workload: Total: 270 h 4 h lecture (attendance) 2 h exercise course (attendance)		
Conditions: none		
Frequency: each summer semester	**Recommended Semester:** 3. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Funktionalanalysis

Mode of Instruction: lecture, exercise course

Language: German

Workload:

4 Std. Vorlesung (Präsenzstudium)

2 Std. Übung (Präsenzstudium)

Contact Hours: 6

ECTS Credits: 9.0

Contents:

Normierte Vektorräume und Banachräume

Funktionale

lineare Operatoren und Grundprinzipien der Funktionalanalysis

Voraussetzungen: Solide Grundkenntnisse in Analysis und Linearer Algebra

Assigned Courses:

Funktionalanalysis (lecture)

Examination

Funktionalanalysis

portfolio exam

Module MTH-1110: Ordinary differential equations

Gewöhnliche Differentialgleichungen

9 ECTS/LP

Version 1.0.0 (since WS15/16)
Person responsible for module: Prof. Dr. Tatjana Stykel

Contents:
* Solution methods for special classes of ordinary differential equations
* Existence and uniqueness of solutions
* Continuous dependence of solutions
* Basic principles of qualitative theory, stability theory
* Boundary value problems

Learning Outcomes / Competences:
Understanding of the basic problems of ordinary differential equations including existence and uniqueness of the solutions as well as qualitative analysis of the solution behavior and elementary solution techniques; acquisition of key qualifications: the students learn to formulate motion processes as differential equations, to develop suitable solution strategies and to implement them.

Workload:
Total: 270 h
2 h exercise course (attendance)
4 h lecture (attendance)

Conditions:
Linear Algebra and Calculus

Frequency: each winter semester	**Recommended Semester:** 3. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Gewöhnliche Differentialgleichungen
Language: German / English
Workload:
2 Std. Übung (Präsenzstudium)
4 Std. Vorlesung (Präsenzstudium)
Contact Hours: 6
ECTS Credits: 9.0

Learning Outcome:
Understanding of the basic problems of ordinary differential equations including existence and uniqueness of the solutions as well as qualitative analysis of the solution behavior and elementary solution techniques; acquisition of key qualifications: the students learn to formulate motion processes as differential equations, to develop suitable solution strategies and to implement them.

Contents:
* Solution methods for special classes of ordinary differential equations
* Existence and uniqueness of solutions
* Continuous dependence of solutions
* Basic principles of qualitative theory, stability theory
* Boundary value problems

Literature:

Aulbach: Gewöhnliche Differentialgleichungen. Spektrum, 2004.

Walter: Gewöhnliche Differentialgleichungen. Springer, 2000.

Heuser:Gewöhnliche Differentialgleichungen (Vieweg+Teubner, 2009)

Examination

Ordinary Differential Equations

module exam, Portfolio

Module MTH-1130: Introduction to Numerical Analysis *Einführung in die Numerik*	9 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Tatjana Stykel	
Contents: Error analysis, solution of linear systems, linear least squares problems, nonlinear equations, interpolation and eigenvalue problems	
Learning Outcomes / Competences: Understanding of the fundamental problems of numerics including conditioning, stability theory, algorithms and convergence analysis; knowledge of the simplest procedures for solving linear and nonlinear systems of equations, least squares problems, interpolation as well as eigenvalue problems; integrated acquisition of key qualifications: students learn in small groups to define problems precisely, to develop numerical methods and strategies and to assess their suitability; in the process, the social competence to work together in a team is developed.	
Workload: Total: 270 h 4 h lecture (attendance) 2 h exercise course (attendance)	
Conditions: Linear Algebra and Calculus	

Frequency: each winter semester	**Recommended Semester:** 3. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Einführung in die Numerik

Language: German

Workload:

4 Std. Vorlesung (Präsenzstudium)

2 Std. Übung (Präsenzstudium)

Contact Hours: 6

ECTS Credits: 9.0

Learning Outcome:

Understanding of the fundamental problems of numerics including conditioning, stability theory, algorithms and convergence analysis; knowledge of the simplest procedures for solving linear and nonlinear systems of equations, least squares problems, interpolation as well as eigenvalue problems; integrated acquisition of key qualifications: students learn in small groups to define problems precisely, to develop numerical methods and strategies and to assess their suitability; in the process, the social competence to work together in a team is developed.

Contents:

Error analysis, solution of linear systems, linear least squares problems, nonlinear equations, interpolation and eigenvalue problems

Literature:

Freund, R.W., Hoppe, R.H.W.: Stoer/Bulirsch: Numerische Mathematik I. Springer.

Deuflhard, P., Hohmann, A.: Numerische Mathematik I. deGruyter.

Schwarz, H.R., Köckler, N.: Numerische Mathematik. Teubner.

Examination

Introduction to Numerical Analysis

module exam, Portfolio

Module MTH-1140: Introduction to Optimization *Einführung in die Optimierung (Optimierung I)*		9 ECTS/LP
Version 1.1.0 (since WS15/16) Person responsible for module: Prof. Dr. Mirjam Dür		
Contents: This course gives a general introduction to optimization. Specifically, the following fundamental topics are treated: * Separation Theorems * Simplex Algorithm * Theory of polyhedra * Duality Theory * Parametric Optimization * Ellipsoid method		
Learning Outcomes / Competences: Students learn how to model real world problems as mathematical optimization problems. They also acquire knowledge about polyhedra which appear as feasible sets in linear optimization.		
Workload: Total: 270 h 2 h exercise course (attendance) 4 h lecture (attendance)		
Conditions: Grundvorlesungen zur Analysis und Lineare Algebra		**Credit Requirements:** Die Module MTH-1140 und MTH-1148 unterscheiden sich bei den ECTS/LP-Punkten, sind aber inhaltlich nahezu identisch. Daher dürfen Studiernede nur eines dieser beiden Module einbringen.
Frequency: each summer semester	**Recommended Semester:** 3. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module
Part of the Module: Einführung in die Optimierung (Optimierung I) **Mode of Instruction:** lecture **Language:** German **Workload:** 4 Std. Vorlesung (Präsenzstudium) **Contact Hours:** 4 **ECTS Credits:** 9.0
Assigned Courses: **Einführung in die Optimierung - Optimierung I** (lecture + exercise)
Examination **Einführung in die Optimierung (Optimierung I)** written exam / length of examination: 180 minutes

Parts of the Module
Part of the Module: Einführung in die Optimierung (Optimierung I) (Übung) **Mode of Instruction:** exercise course **Language:** German **Contact Hours:** 2
Contents: Übungen vertiefen und ergänzen den Vorlesungsstoff; die Teilnahme wird unbedingt empfohlen.

Module MTH-1150: Probability I

Einführung in die Stochastik (Stochastik I)

9 ECTS/LP

Version 2.0.0 (since WS17/18)
Person responsible for module: Prof. Dr. Vitali Wachtel

Contents:

- Ereignissysteme,
- Sigma-Algebren,
- Aufbau der Maß- und Integrationstheorie,
- Zufallsvariablen,
- Zufallsvektoren,
- Wahrscheinlichkeitsverteilungen,
- Numerische Charakteristika von Zufallsgrößen,
- Konvergenzarten von Zufallsgrößen,
- Grenzwertsätze der Wahrscheinlichkeitsrechnung

Learning Outcomes / Competences:

Fähigkeiten zur Übersetzung von stochastischen Problemstellungen in eine mathematische Sprache, Fähigkeiten zur Lösung von stochastischen Anwendungsproblemen in Naturwissenschaft, Technik und Wirtschaft, Kennenlernen der wichtigsten Verteilungen und deren Kenngrößen.

Workload:

Total: 270 h
4 h lecture (attendance)
2 h exercise course (attendance)

Conditions:

Grundlagen der reellen eindimensionalen und mehrdimensionalen Analysis, Eigenschaften linearer Abbildungen zwischen endlichdimensionalen Vektorräumen, Matrizenkalkül inkl. Spektraleigenschaften.

Module Linear Algebra I (MTH-1000)
Module Linear Algebra II (MTH-1010)
Module Analysis I (MTH-1020)
Module Analysis II (MTH-1030)

Frequency: each winter semester	**Recommended Semester:** 3. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Einführung in die Stochastik (Stochastik I)

Mode of Instruction: lecture + exercise
Lecturers: Prof. Dr. Lothar Heinrich
Language: German
Contact Hours: 6
ECTS Credits: 9.0

Learning Outcome:

Fähigkeiten zur Übersetzung von stochastischen Problemstellungen in eine mathematische Sprache, Fähigkeiten zur Lösung von stochastischen Anwendungsproblemen in Naturwissenschaft, Technik und Wirtschaft, Kennenlernen der wichtigsten Verteilungen und deren Kenngrößen.

Contents:

- Ereignissysteme,
- Sigma-Algebren,
- Aufbau der Maß- und Integrationstheorie,
- Zufallsvariablen,
- Zufallsvektoren,
- Wahrscheinlichkeitsverteilungen,
- Numerische Charakteristika von Zufallsgrößen,
- Konvergenzarten von Zufallsgrößen,
- Grenzwertsätze der Wahrscheinlichkeitsrechnung

Literature:

Wird in der Vorlesung bekannt gegeben

Examination

Einführung in die Stochastik (Stochastik I)

written exam

Module MTH-1160: Probability II *Statistik (Stochastik II)*		9 ECTS/LP
Version 2.0.0 (since SoSe17) Person responsible for module: Prof. Dr. Lothar Heinrich		
Learning Outcomes / Competences: Beherrschung der grundlegenden Methoden des statistischen Schätzens und Testens, Erlernen aus Beobachtungen, Kenntnisse über eine unbekannte Verteilung zu erhalten, Erlernen statistische Tests auszuwählen, durchzuführen und zu interpretieren.		
Workload: Total: 270 h 2 h exercise course (attendance) 4 h lecture (attendance)		
Conditions: Analysis I Analysis II Lineare Algebra I Lineare Algebra II Einführung in die Stochastik (Stochastik I)		
Frequency: each summer semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Einführung in die mathematische Statistik (Stochastik II)
Language: German
Contact Hours: 6
ECTS Credits: 9.0

Contents:

Bedingte Erwartungen,
Grenzwertsätze der Wahrscheinlichkeitsrechnung,
Beschreibende Statistik,
Empirische Verteilungsfunktion,

Signifikantztests,
Parameterschätzungen,
Tests in normalverteilten Grundgesamtheiten

Assigned Courses:

Statistik (Stochastik II) (lecture + exercise)

Examination
Einführung in die mathematische Statistik (Stochastik II)
written exam / length of examination: 180 minutes

Module MTH-1200: Introduction to Nonlinear and Combinatorial Optimization *Nichtlineare und kombinatorische Optimierung (Optimierung II)*	9 ECTS/LP

Version 1.3.0 (since WS15/16)
Person responsible for module: Prof. Dr. Mirjam Dür

Contents:
This course treats both nonlinear optimization and gives an introduction to discrete optimization, in particular network optimization.
Nonlinear Optimization:
* Tangent cone, linearized tangent cone
* Fritz-John and KKT points
* Sensitivity analysis
* Duality theory
* Numerical methods
Discrete Optimization:
* Graphs, paths, cycles
* Shortest paths
* Trees
* Flows

Learning Outcomes / Competences:
Students learn how to deal with real world problems and mathematical optimization problems under more general assumptions like nonlinearity of the functions or integrality of the variables involved.

Workload:
Total: 270 h
2 h exercise course (attendance)
4 h lecture (attendance)

Conditions: Grundvorlesungen zur Analysis und Lineare Algebra, Einführung in die Optimierung (Optimierung I)		**Credit Requirements:** Die Module MTH-1200 und MTH 1208 unterscheiden sich bei den ECTS/LP-Punkten, sind aber inhaltlich nahezu identisch. Daher dürfen Studierende nur eines dieser beiden Module einbringen.
Frequency: each winter semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Grundlagen der nichtlinearen und der kombinatorischen Optimierung (Optimierung II)
Mode of Instruction: lecture
Language: German
Workload:
2 Std. Übung (Präsenzstudium)
4 Std. Vorlesung (Präsenzstudium)
Contact Hours: 4
ECTS Credits: 9.0

Contents:

Examination

Grundlagen der nichtlinearen und der kombinatorischen Optimierung (Optimierung II)

written exam / length of examination: 180 minutes

Parts of the Module

Part of the Module: Nichtlineare und kombinatorische Optimierung (Optimierung II) (Übung)

Language: German

Contact Hours: 2

Contents:

Übungen vertiefen und ergänzen den Vorlesungsstoff; die Teilnahme wird unbedingt empfohlen.

Module MTH-1240: Numerical analysis of ordinary differential equations *Numerik gewöhnlicher Differentialgleichungen*		9 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Malte Peter		
Learning Outcomes / Competences: Verständnis der grundlegenden numerischen Verfahren zur Lösung gewöhnlicher Differentialgleichungen inkl. Kondition, Stabilität, Algorithmik und Konvergenzanalyse; integrierter Erwerb von Schlüsselqualifikationen: Die Studierenden lernen in Kleingruppe , Problemstellungen präzise zu definieren, numerische Lösungsstrategien zu entwickeln und deren Tauglichkeit abzuschätzen, dabei wird die soziale Kompetenz zur Zusammenarbeit im Team weiterentwickelt.		
Workload: Total: 270 h 2 h exercise course (attendance) 4 h lecture (attendance)		
Conditions: none		
Frequency: each summer semester	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Numerik gewöhnlicher Differentialgleichungen

Mode of Instruction: lecture + exercise

Language: German

Workload:

2 Std. Übung (Präsenzstudium)

4 Std. Vorlesung (Präsenzstudium)

Contact Hours: 6

ECTS Credits: 9.0

Contents:

Knappe Zusammenfassung der benötigten Resultate der Theorie gewöhnlicher Differentialgleichungen

Kondition von Anfangswertproblemen, Fehleranalyse

Rekursionsgleichungen

Einschrittverfahren

Schrittweitensteuerung

Extrapolationsmethoden

Mehrschrittverfahren

Steife Differentialgleichungen

Empfohlene Voraussetzungen: Grundlagen der reellen eindimensionalen und mehrdimensionalen Analysis, Eigenschaften linearer Abbildungen zwischen endlichdimensionalen Vektorräumen, Matrizenkalkül inkl. Spektraleigenschaften, Programmierkenntnisse, grundlegende Kenntnisse der Numerik

Literature:

Deuflhard, P., Bornemann, F.: Numerische Mathematik II. Walter de Gruyter.

Stoer, J., Bulirsch, R.: Numerische Mathematik II. Springer.

Hairer, E., Wanner, G.: Solving Ordinary Differential Equations. Springer.

Assigned Courses:

Numerik gewöhnlicher Differentialgleichungen (lecture)

Examination

Numerik gewöhnlicher Differentialgleichungen

module exam, Portfolio

Module MTH-1350: Mathematical Seminar *Mathematisches Seminar*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Marc Nieper-Wißkirchen		
Learning Outcomes / Competences: Befähigung zum selbständigen Erarbeiten wissenschaftlicher Literatur, Kompetenzen in der selbständigen Bearbeitung komplexer Problemstellungen, Fertigkeiten zur Formulierung und Bearbeitung von theoretischen Fragestellungen mithilfe der erlernten mathematischen Methoden Integrierter Erwerb von Schlüsselqualifikationen: Eigenständiges Arbeiten mit wissenschaftlicher Literatur, Erprobung verschiedener Präsentationstechniken und Präsentationsmedien, Führen wissenschaftlicher Diskussionen und die Vermittlung von Problemlösungsansätzen.		
Workload: Total: 180 h 2 h seminar (attendance)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** 3. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** any	

Parts of the Module
Part of the Module: Mathematisches Seminar **Mode of Instruction:** seminar **Language:** German / English **Contact Hours:** 2 **ECTS Credits:** 6.0
Contents: Seminar über ein mathematisches Thema
Literature: wird in der Veranstaltung bekanntgegeben
Assigned Courses: **Mathematisches Seminar** (seminar) **Seminar zur Algebra** (seminar) **Seminar zur Geometrie: Topologische Datenanalyse** (seminar) **Seminar zur Numerik (Bachelor)** (seminar) **Seminar zur Optimierung: Quadratische Optimierung** (seminar) **Seminar zur Stochastik (Bachelor)** (seminar) **Topologische K-Theorie** (seminar) **Variationsrechnung und Kontinuumsmechanik (Mathematische Elastizitätstheorie)** (seminar)

Examination

Mathematisches Seminar

module exam, Der konkrete Typ der Modulprüfung (Vortrag oder kombiniert schriftlich-mündliche Prüfung oder mündliche Prüfung oder Portfolio) wird jeweils spätestens eine Woche vor Beginn der Veranstaltung bekannt gegeben.

Module MTH-2080: Evolution equations *Spezialisierung Evolutionsgleichungen*		15 ECTS/LP
Version 2.0.0 (since SoSe18) Person responsible for module: Prof. Dr. Dirk Blömker		
Contents: recent research topics, will be announced in digicampus before the term starts		
Learning Outcomes / Competences: The students receive an in-depth knowledge of selected topics of dynamical systems described by differential equations (e.g. ordinary, partial, stochastic). At the same time, a well-founded introduction to modern qualitative theory is considered. You will achieve the competence to penetrate independently into advanced topics of the just mentioned fields and, subsequently, to write a thesis in the field of in the field of dynamical systems or evolutionary equations. Integrated acquisition of key qualifications: Self-study of English-language scientific literature, scientific work, conducting scientific discussions and presenting mathematical theories.		
Workload: Total: 450 h		
Conditions: Good knowledge of ordinary differential equations and functional analysis.		**Credit Requirements:** Passing the module exam (usually presentation and oral exam)
Frequency: as needed	**Recommended Semester:** 4. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** any	

Parts of the Module
Part of the Module: Seminar zu Evolutionsgleichungen **Language:** German / English **Contact Hours:** 2 **ECTS Credits:** 6.0
Learning Outcome: Durch Selbststudium mathematischer Themen im Bereich der Evolutionsgleichungen, Vortrag und wissenschaftlicher Diskussion sollen folgende Ziele erreicht werden: Befähigung zum selbständigen Erarbeiten wissenschaftlicher Literatur, Kompetenzen in der selbständigen Bearbeitung komplexer Problemstellungen, Fertigkeiten zur Formulierung und Bearbeitung von theoretischen Fragestellungen mithilfe der erlernten mathematischen Methoden Integrierter Erwerb von Schlüsselqualifikationen: Eigenständiges Arbeiten mit wissenschaftlicher Literatur, Erprobung verschiedener Präsentationstechniken und Präsentationsmedien, Führen wissenschaftlicher Diskussionen und die Vermittlung von Problemlösungsansätzen.
Contents: aktuelle wechselne Forschungsthemen.

Lehr-/Lernmethoden:

Eigenständige Einarbeitung in ein aktuelles Forschungsgebiet,
eigenständige Präsentation und wissenschaftliche Diskussion

Literature:

Wird in der jeweiligen Lehrveranstaltung vor Semesterbeginn bekannt gegeben.

Part of the Module: Lesekurs Evolutionsgleichungen

Language: German / English
Contact Hours: 2
ECTS Credits: 9.0

Learning Outcome:

Durch Selbststudium mathematischer Themen im Bereich der Evolutionsgleichungen,
Vortrag und wissenschaftlicher Diskussion sollen folgende Ziele erreicht werden:
Befähigung zum selbständigen Erarbeiten wissenschaftlicher Literatur,
Kompetenzen in der selbständigen Bearbeitung komplexer Problemstellungen,
Fertigkeiten zur Formulierung und Bearbeitung von theoretischen
Fragestellungen mithilfe der erlernten mathematischen Methoden
Integrierter Erwerb von Schlüsselqualifikationen:
Eigenständiges Arbeiten mit wissenschaftlicher Literatur,
Führen
wissenschaftlicher Diskussionen und die Vermittlung von Problemlösungsansätzen.

Contents:

aktuelle wechselne Forschungsthemen.

Lehr-/Lernmethoden:

Eigenständige Einarbeitung in ein aktuelles Forschungsgebiet und wissenschaftliche Diskussion

Literature:

Wird in der jeweiligen Lehrveranstaltung vor Semesterbeginn bekannt gegeben.

Examination

Abschlussprüfung

portfolio exam

Description:

Die Abschlussprüfung besteht aus einem Vortrag mit anschließender mündlicher Prüfung, und der aktiven Beteiligung an wissenschaftlichen Diskussionen in Seminar und Lesekurs

Module MTH-2550: Elementary algebraic geometry *Elementare Algebraische Geometrie*	9 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Marco Hien	

Contents:

The main topics of this course are algebraic varieties over a field and foundations of commutative algebra.

The students will learn the main ingredients of commutative algebra (localization, modules over rings) necessary for algebraic geometry, the definition and properties of affine algebraic varieties, the projective space and projective varieties - Hilbert's Nullstellensatz, function fields, dimension and smoothness.

kommutative Algebra: Lokalisierung, Moduln über Ringen, Tensorprodukt und Flachheit, Algebren über Körper, Hilbertscher Nullstellensatz Zahlkörper und deren Ringe ganzer Zahlen.

Irreduzibilität, Morphismen, Glattheit, Käherdifferentiale, Dimensionsbegriff, Aufblasungen, Auflösung von Singularitäten, Computeralgebra, kohomologische Methoden, elliptische Kurven

Learning Outcomes / Competences:

The students acquire the konwledge to approach geometric questions from an algebraic point of view. Many geometric structures allow an algebraic description and affine or projective varieties provide a vast class of geometric objects which have been studied for a long time and still are important obejcts in algebraic geometry, complex geometry, symplectic geometry, ...

The students obtain the techniques to study these objects and their properties (in particular their topology, smoothness, dimension). To this purpose, some foundational results from commutative algebra are discussed as well.

Students will encounter important examples of algebraic varieties and see how to use computer algebra systems for computations and visualisation.

Remarks:

Elementare Algebraische Geometrie: Mündliche Prüfung, Dauer: 20 Minuten

Dieses Modul kann nicht gleichzeitig mit dem "Spezialisierungsmodul Algebraische Geometrie" eingebracht werden.

Workload:

Total: 270 h

Conditions: Kenntnisse über algebraische Grundbegriffe (Körper, Galoistheorie)		**Credit Requirements:** Bestehen der Modulprüfung
Frequency:	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Elementare Algebraische Geometrie

Language: German

Literature:

Eisenbud, Commutative Algebra with a View toward Algebraic Geometry Silverman: The Arithmetic of Elliptic Curves, Springer Reid, Undergraduate Algebraic Geometry, LondonMathSoc. Hulek, Elementare Algebraische Geometrie, Springer

Assigned Courses:

Elementare Algebraische Geometrie (lecture + exercise)

Examination

MTH-2550 Elementare Algebraische Geometrie

oral exam / length of examination: 20 minutes

Module PHM-0001: Physics I (Mechanics, Thermodynamics) *Physik I (Mechanik, Thermodynamik)*	8 ECTS/LP

Version 2.0.0 (since SoSe22)
Person responsible for module: Andreas Hörner

Contents:

Mechanik:

1. Kinematik und Dynamik des Massenpunktes
2. Erhaltungsgrößen in der Mechanik
3. Massenpunktsysteme
4. Mechanik starrer Körper
5. Relativistische Mechanik
6. Mechanische Schwingungen und Wellen
7. Mechanik fester Körper, Flüssigkeiten, Gase

Thermodynamik

1. Temperatur, Wärme und der erste Hauptsatz der Thermodynamik
2. Kinetische Gastheorie
3. Entropie und der zweite Hauptsatz der Thermodynami

Learning Outcomes / Competences:

- Die Studierende wissen die grundlegenden Begriffe, Konzepte und Phänomene der klassischen Mechanik, von Schwingungen und Wellen in mechanischen Systemen und der Thermodynamik (Wärmelehre und statistische Deutung),
- besitzen Fertigkeiten in einfacher Modellbildung, der Formulierung mathematisch-physikalischer Ansätze und können diese auf Aufgabenstellungen in den genannten Bereichen anwenden und
- besitzen Kompetenzen in der selbständigen Bearbeitung von Problemstellungen aus den genannten Themenbereichen. Sie sind in der Lage, Genauigkeiten von Beobachtung und Analyse einschätzen zu können.
- Integrierter Erwerb von Schlüsselqualifikationen: analytisch-methodische Kompetenz, wissenschaftliches Denken, Abwägen von Lösungsansätzen, Training des logischen Denkens, Teamfähigkeit, Erlernen des eigenständigen Arbeitens mit (englischsprachiger) Fachliteratur

Workload:

Total: 240 h
90 h lecture and exercise course (attendance)
90 h studying of course content through exercises / case studies (self-study)
30 h studying of course content using literarture (self-study)
30 h studying of course content using provided materials (self-study)

Conditions: none		
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Physik I (Mechanik, Thermodynamik)
Mode of Instruction: lecture
Lecturers: Andreas Hörner
Language: German
Contact Hours: 4

Literature:

- Marcelo Alonso, Edward J. Finn: Physik (3., durchgesehene Aufl. - München [u.a.], Oldenbourg, 2000)
- Wolfgang Demtröder: Experimentalphysik I, Mechanik und Wärme (8. Auflage - Berlin [u.a.], Springer, 2018)
- David Halliday, Jearl Walker, Robert Resnick: Physik (3., vollständig überarbeitete und erweiterte Auflage - Weinheim, Wiley-VCH, 2018)
- Paul A. Tipler, Gene Mosca: Physik (8., korrigierte und erweiterte Auflage - Berlin, Springer Spektrum, 2019)
- Dieter Meschede: Gerthsen Physik (25. Aufl. - Berlin [u.a.], Springer Spektrum, 2015)

Bei allen Literaturvorschlägen stellt die angegebene Auflage nur die aktuellste in der Bibliothek vorhandene Version dar. Alle anderen Auflagen sind ebenso als Begleitung zum Modul geeignet.

Examination

Physik I (Mechanik, Thermodynamik)

written exam / length of examination: 150 minutes

Parts of the Module

Part of the Module: Übung zu Physik I

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

Module PHM-0003: Physics II (Electrodynamics, Optics) *Physik II (Elektrodynamik, Optik)*		8 ECTS/LP
Version 1.1.0 (since WS09/10) Person responsible for module: Andreas Hörner		

Contents:

Elektrodynamik

1. Elektrische Wechselwirkungen
2. Magnetische Wechselwirkungen
3. Elektrische Leitung
4. Materie in statischen elektrischen und magnetischen Feldern
5. Zeitabhängige elektromagnetische Felder

Optik

1. Harmonische Wellen im Raum
2. Elektromagnetische Wellen
3. Klassische Geometrische Optik

Learning Outcomes / Competences:

- Die Studierenden kennen die grundlegenden Begriffe, Konzepte und Phänomene der Elektrostatik und des Magnetismus; des weiteren die Grundbegriffe der Elektrodynamik sowie der elektromagnetischen Wellen und – daraus abgeleitet – der Optik,
- besitzen Fertigkeiten in der mathematischen Beschreibung elektromagnetischer Phänomene, Modellbildung, der Formulierung mathematisch-physikalischer Ansätze und können diese auf Aufgabenstellungen in den genannten Bereichen anwenden und
- besitzen Kompetenzen in der selbständigen Bearbeitung von Problemstellungen zu den genannten Themenbereichen. Sie sind in der Lage, Genauigkeiten von Beobachtung und Analyse einschätzen zu können.
- Integrierter Erwerb von Schlüsselqualifikationen: analytisch-methodische Kompetenz, wissenschaftliches Denken, Abwägen von Lösungsansätzen, Training des logischen Denkens, Teamfähigkeit, Erlernen des eigenständigen Arbeitens mit (englischsprachiger) Fachliteratur

Workload:

Total: 240 h
30 h studying of course content using provided materials (self-study)
30 h studying of course content using literarture (self-study)
90 h studying of course content through exercises / case studies (self-study)
90 h lecture and exercise course (attendance)

Conditions: Inhalte des Moduls Physik I		
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Physik II (Elektrodynamik, Optik)

Mode of Instruction: lecture
Lecturers: Andreas Hörner
Language: German
Contact Hours: 4

Literature:

- Marcelo Alonso, Edward J. Finn: Physik (3., durchgesehene Aufl. - München [u.a.], Oldenbourg, 2000)
- Wolfang Demtröder: Experimentalphysik II, Elektrizität und Optik (8. Auflage - Berlin [u.a.], Springer, 2013)
- David Halliday, Jearl Walker, Robert Resnick: Physik (3., vollständig überarbeitete und erweiterte Auflage - Weinheim, Wiley-VCH, 2018)
- Paul A. Tipler, Gene Mosca: Physik (8., korrigierte und erweiterte Auflage - Berlin, Springer Spektrum, 2019)
- Dieter Meschede: Gerthsen Physik (25. Aufl. - Berlin [u.a.], Springer Spektrum, 2015)

Bei allen Literaturvorschlägen stellt die angegebene Auflage nur die aktuellste in der Bibliothek vorhandene Version dar. Alle anderen Auflagen sind ebenso als Begleitung zum Modul geeignet.

Assigned Courses:

Physik II (Elektrodynamik, Optik) (lecture)

Examination

Physik II (Elektrodynamik, Optik)

written exam / length of examination: 150 minutes

Parts of the Module

Part of the Module: Übung zu Physik II

Mode of Instruction: exercise course
Language: German
Contact Hours: 2

Assigned Courses:

Übung zu Physik II (exercise course)

Module PHM-0035: Chemistry I (General and Inorganic Chemistry) *Chemie I (Allgemeine und Anorganische Chemie)*		8 ECTS/LP
Version 1.1.0 (since WS09/10) Person responsible for module: Prof. Dr. Dirk Volkmer		
Contents: • Einführung in die Allgemeine und Anorganische Chemie • Atombau und Periodensystem (Elemente, Isotope, Orbitale, Elektronenkonfiguration) • Thermodynamik, Kinetik • Massenwirkungsgesetz, Säure-Base-Gleichgewicht, Titrationskurven, Puffersysteme • Chemische Bindung (kovalente, ionische und Metallbindung; Dipolmoment; Lewis- Schreibweise; Kristallgitter; VSEPR-, MO-Theorie; Bändermodell) • Oxidationszahlen, Redoxreaktionen, Elektromototische Kraft, Galvanisches Element, Elektrolyse, Batterien, Korrosion • Großtechnische Verfahren der Chemischen Grundstoffindustrie • Stoffchemie der Hauptgruppenelemente und ihre Anwendung in der Materialchemie (Vorkommen, Darstellung der reinen Elemente, wichtige Verbindungen, Analogiebeziehungen, wichtige technische Anwendungen)		
Learning Outcomes / Competences: • Die Studierenden wissen die grundlegenden Methoden und Konzepten der Chemie und haben angemessene Kenntnisse über den Aufbau der Materie, die Beschreibung chemischer Bindungen und die Grundprinzipien der chemischen Reaktivität, • besitzen die Fertigkeit grundlegende chemische Fragestellungen unter Anwendung der erworbenen Kenntnisse zu formulieren und zu bearbeiten, • und besitzen die Kompetenz zur zielgerichteten Problemanalyse und Problembearbeitung in den genannten Teilgebieten. • Integrierter Erwerb von Schlüsselqualifikationen		
Workload: Total: 240 h 90 h studying of course content through exercises / case studies (self-study) 30 h studying of course content using literarture (self-study) 30 h studying of course content using provided materials (self-study) 90 h lecture and exercise course (attendance)		
Conditions: none		
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Chemie I (Allgemeine und Anorganische Chemie) **Mode of Instruction:** lecture **Language:** German **Contact Hours:** 4
Learning Outcome: siehe Modulbeschreibung

Contents:

siehe Modulbeschreibung

Literature:

- E. Riedel, C. Janiak, *Anorganische Chemie*, 9. Auflage, De Gruyter Verlag, Berlin 2015. ISBN-10: 3110355264.
- M. Binnewies, M. Jäckel, H. Willner, *Allgemeine und Anorganische Chemie*, 3. Auflage, Spektrum Akademischer Verlag, Heidelberg 2016. ISBN-10: 3662450666.
- T.L. Brown, H. E. LeMay, B.E. Bursten, *Chemie: Studieren kompakt*, 14. Auflage, Pearson Studium (Sept. 2018). ISBN-10: 3868943129.
- C.E. Mortimer, U. Müller, *Chemie* – Das Basiswissen der Chemie. Mit Übungsaufgaben., 13. Auflage, Georg Thieme Verlag Stuttgart, 2019. ISBN-10: 3132422746.
- Kewmnitz, Simon, Fischedick, Hartmann, Henning, *Duden Basiswissen Schule: Chemie Abitur*, Bibliographisches Institut, Mannheim, 5. Auflage (2020). ISBN-10: 3411045957.

Part of the Module: Übung zu Chemie I

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

Learning Outcome:

siehe Modulbeschreibung

Examination

Chemie I (Allgemeine und Anorganische Chemie)

written exam / length of examination: 90 minutes

Module PHM-0036: Chemistry II (Organic Chemistry) *Chemie II (Organische Chemie)*	8 ECTS/LP

Version 1.5.0 (since WS09/10)
Person responsible for module: Prof. Dr. Dirk Volkmer

Contents:

- OE: Organisation und Einleitung
- A: Formeln, Strukturen und Nomenklatur
- B: Funktions- und Stoffklassen organischer Moleküle
- B1: Alkane und Cycloalkane
- B2: Halogenkohlenwasserstoffe, SN und Eliminierung
- B3: Alkene
- B4: Alkine
- B5: Aromaten
- B6: Alkohole
- B7: Aldehyde und Ketone
- B8: Carbonsäure und Carbonsäurederivate
- C: Stereochemie
- D: Molekulare Materialien

Learning Outcomes / Competences:

- Die Studierenden kennen die Methoden und Konzepte der organischen Chemie und sind mit den Grundlagen der organischen Synthese, Reaktionsmechanismen,Polymerchemie und molekularer Materialien vertraut,
- haben Fertigkeiten zur Formulierung und Bearbeitung organisch-chemischer Fragestellungen unter Anwendung der erlernten Methoden erworben,
- und besitzen die Kompetenz zur fundierten Problemanalyse und zur eigenständigen Bearbeitung von Problemstellungen in den genannten Bereichen.
- Integrierter Erwerb von Schlüsselqualifikationen

Workload:
Total: 240 h
90 h lecture and exercise course (attendance)
30 h studying of course content using literarture (self-study)
90 h studying of course content through exercises / case studies (self-study)
30 h studying of course content using provided materials (self-study)

Conditions: none		
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Chemie II (Organische Chemie)
Mode of Instruction: lecture
Language: German
Contact Hours: 4

Learning Outcome:
siehe Modulbeschreibung

Contents:

- Einführung
- Formeln, Strukturen und Nomenklatur organischer Moleküle
- Funktions- und Stoffklassen organischer Moleküle
- Stereochemie
- Spektroskopie und Strukturaufklärung
- Molekulare Materialien

Literature:

- C. Schmuck, Basisbuch Organische Chemie (2018) (ISBN-10: 3868943331)

Assigned Courses:

Chemie II (Organische Chemie) (lecture)

Part of the Module: Übung zu Chemie II

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

Learning Outcome:

siehe Modulbeschreibung

Assigned Courses:

Übung zu Chemie II (exercise course)

Examination

Chemie II (Organische Chemie)

written exam / length of examination: 90 minutes

Module PHM-0191: Technical Physics II *Technische Physik II*			6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Dr. Judith Moosburger-Will Prof. Dr. Siegfried Horn			
Learning Outcomes / Competences: Die Studierenden • kennen die grundlegenden Begriffe, Konzepte und Phänomene der Elektrostatik und des Magnetismus; des Weiteren die Grundbegriffe der Elektrodynamik und der Optik, • besitzen Fertigkeiten in der mathematischen Beschreibung elektromagnetischer Phänomene, Modellbildung, der Formulierung mathematisch-physikalischer Ansätze und können diese auf Aufgabenstellungen in den genannten Bereichen anwenden und • besitzen Kompetenzen in der selbständigen Bearbeitung von Problemstellungen zu den genannten Themenbereichen. Sie sind in der Lage, Genauigkeiten von Beobachtung und Analyse einschätzen zu können.			
Remarks: Mathematische Hilfsmittel wie Differentiation & Integration, einfache Differentialgleichungen und komplexe Zahlen werden je nach Vorkommen in das Modul integriert			
Workload: Total: 180 h			
Conditions: Die Vorlesung baut auf den Inhalten der Vorlesung Technische Physik I auf.			**Credit Requirements:** schriftliche Prüfung
Frequency: each summer semester	**Recommended Semester:** 2.		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** any		

Parts of the Module

Part of the Module: Technische Physik II

Mode of Instruction: lecture

Lecturers: Prof. Dr. Siegfried Horn

Language: German

Contact Hours: 3

Contents:

1. Elektrizitätslehre
2. Magnetismus
3. Elektrodynamik, Maxwell-Gleichungen
4. Optik
5. Auswertung von Messungen

Lehr-/Lernmethoden:

Tafelvortrag und Beamer-Präsentation

Literature:

- U. Hahn; Physik für Ingenieure, Oldenburg Wissenschaftsverlag, ISBN: 978-3-486-27520-9
- W. Demtröder: Experimentalphysik Band 1-2, Springer Verlag
- D. Halliday, R. Resnick & J. Walker: Physik, Wiley-VCH, ISBN: 978-3527405992
- P. Tipler: Physik, Spektrum, ISBN: 978-3860251225
- D. Meschede: Gerthsen Physik, Springer, ISBN: 978-3540254218

Assigned Courses:

Technische Physik II (lecture)

Examination

Technische Physik II

written exam / length of examination: 90 minutes

Parts of the Module

Part of the Module: Übung zu Technische Physik II

Mode of Instruction: exercise course

Language: German

Contact Hours: 1

Contents:

Wiederholung und Vertiefung der Lehrinhalte mithilfe von Übungen. Übungsblätter werden regelmäßig angeboten.

Assigned Courses:

Übung zu Technische Physik II (exercise course)

Module MRM-0021: Commodity Risk Management *Commodity Risk Management*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Andreas Rathgeber		
Learning Outcomes / Competences: At the end of the module students are able to understand the risks and challenges coming along with comodity trading. Furthermore students will be able to apply quantitative methods to analyse and measure comodity risks.		
Workload: Total: 180 h		
Conditions: Profound Knowledge in business and information systems engineering (esp. resource management), stochastics and und financial management		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Commodity Risk Management

Mode of Instruction: lecture

Lecturers: Prof. Dr. Andreas Rathgeber

Language: English / German

Contact Hours: 2

Contents:

Definitions of resource management and general necessity of risk management, with a special focus on resource risk management; characteristics of comodity trading; statistical analysis and management of commodity risks

Lehr-/Lernmethoden:

Folien, Tafelarbeit

Literature:

- Steiner, M./Bruns, C.: Wertpapiermanagement, Stuttgart: Schäffer-Poeschel, 2007

- Geman, H. (2005): Commodities and commodity derivatives, Chichester: John Wiley & Sons

Examination

Commodity Risk Management

/ length of examination: 60 minutes

Parts of the Module

Part of the Module: Übung zu Commodity Risk Management

Mode of Instruction: exercise course

Language: German / English

Contact Hours: 2

Module MRM-0126: Ceramic Matrix Composites *Keramische Faserverbundwerkstoffe*		6 ECTS/LP
Version 3.0.0 (since WS21/22) Person responsible for module: Prof. Dr.-Ing. Dietmar Koch		
Contents: • Introduction in ceramic matrix composites • Basics of processing of technical ceramics • Processing chain of ceramic matrix composites (CMC) from raw materials to product • Processing and properties of ceramic fibers • Principal mechanisms of reinforcement in CMC • Properties of CMC • Application of CMC		
Learning Outcomes / Competences: • The students know the basic concepts of mechanical behavior of ceramic matrix composites • The students have the competence to explain processing of ceramic fibers and ceramic matrix composites and describe their specific properties • The students know the Weibull statistics which describe the fiber strength distribution • The students know how to describe mechanical interactions between fiber and matrix • The students get the knowledge of application of ceramic matrix composites and are able to choose the according material for specific application. • The students acquire scientific skills to search for scientific literature and to evaluate scientific content		
Workload: Total: 180 h 120 h studying of course content using provided materials (self-study) 60 h lecture and exercise course (attendance)		
Conditions: Recommended: basic knowledge of materials		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Keramische Faserverbundwerkstoffe **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 3
Learning Outcome: see description of module
Contents: see description of module

Literature:

- N.P. Bansal, J. Lamon, Ceramic Matrix Composites: Materials, Modeling and Technology. John Wiley & Sons, Inc., 2015.
- W. Krenkel, Ceramic Matrix Composites. Wiley-VCH Verlag GmbH & Co. KGaA, 2008.
- K. K. Chawla, Composite Materials 3rd ed., Springer, 2012
- T. Ohji, M. Singh, Engineered Ceramics: Current Status and Future Prospects, ISBN: 978-1-119-10042-3, 2015

Examination

Keramische Faserverbundwerkstoffe

written exam / length of examination: 60 minutes

Parts of the Module

Part of the Module: Übung Keramische Faserverbundwerkstoffe

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Learning Outcome:

see description of module

Contents:

see description of module

Literature:

see description of module

Module MRM-0128: Bioinspired Composites *Bioinspired Composites*		6 ECTS/LP
Version 2.0.0 (since WS20/21) Person responsible for module: Prof. Dr.-Ing. Dietmar Koch		
Contents: • Introduction in bionics and bioinspiration • Basics of bionic principles • Fundamental approaches to develop technical components based on bioinspired ideas • Topology optimization • Bioinspired ceramic and polymer based components • Natural fiber based bioinspired materials • Application of bioinspired materials		
Learning Outcomes / Competences: • The students know the basic principles of bionics and bioinspiration • The students know the bionically motivated development of technical components • The students have the competence to explain topology optimization • The students understand general principles bioinspired composites • The students get the knowledge about manufacturing, properties and application of natural fiber based composites • The students acquire scientific skills to search for scientific literature and to evaluate scientific content		
Workload: Total: 180 h 120 h studying of course content using provided materials (self-study) 60 h lecture and exercise course (attendance)		
Conditions: basic knowledge of material science		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Bioinspired Composites **Mode of Instruction:** lecture **Lecturers:** Prof. Dr.-Ing. Dietmar Koch **Language:** English / German **Frequency:** each summer semester **Contact Hours:** 3
Contents: see description of module

Literature:

- B. Arnold, Werkstofftechnik für Wirtschaftsingenieure. 1. Auflage, Springer Verlag (2013)
- W. Bobeth (Ed.), Textile Faserstoffe - Beschaffenheit und Eigenschaft, Springer-Verlag (1993)
- W. Nachtigal, K. G. Blüchel, Das große Buch der Bionik – Neue Technologien nach dem Vorbild der Natur. 2. Auflage, Deutsche Verlags-Anstalt (2001)
- C. Hamm (Ed.), Evolution of Light Weight Structures - Analyses and Technical Applications, Springer-Verlag (2015)
- J. Müssig (Ed.), C. V. Stevens (Series Ed.), Industrial Applications of Natural Fibres: Structure, Properties and Technical Applications, Wiley Series in Renewable Resources (2010)

Examination

Bioinspired Composites

written exam / length of examination: 60 minutes

Parts of the Module

Part of the Module: Übung Bioinspired Composites

Mode of Instruction: exercise course

Language: German

Frequency: each summer semester

Contact Hours: 1

Learning Outcome:

see description of module

Contents:

see description of module

Literature:

see description of module

Module MRM-0136: Mechanical Characterization of Materials *Mechanical Characterization of Materials*		6 ECTS/LP
Version 1.1.0 (since SoSe21) Person responsible for module: Prof. Dr. Markus Sause		
Contents: The following topics are presented: • Introduction to material characterization • Linear material behaviour • Non-linear material behaviour • Material failure • Measurement technologies • Tensile testing • Compression testing • Shear testing • Other static testing concepts • Fracture mechanics • Assembly testing • Surface mechanics • Creep testing • Fatigue testing • High-Velocity testing • Component testing		
Learning Outcomes / Competences: The students: • Acquire knowledge in the field of materials testing and evaluation of materials. • Are introduced to important concepts in measurement techniques, and material models. • Are able to independently acquire further knowledge of the scientific topic using various forms of information.		
Workload: Total: 180 h 80 h studying of course content through exercises / case studies (self-study) 20 h studying of course content using provided materials (self-study) 20 h studying of course content using literarture (self-study) 60 h lecture and exercise course (attendance)		
Conditions: None		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Mechanical Characterization of Materials **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 3

Literature:

- Issler, L., & Häfele, H. R. P. (2003). Festigkeitslehre — Grundlagen. Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-73485-7
- Dowling, N. E. (2019). Mechanical Behavior of Materials (4th ed.). Pearson.
- Gross, D., & Seelig, T. (2011). Fracture Mechanics. Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-19240-1
- J. Schijve. (2008). Fatigue of Structures and Materials (2nd Edition). Springer Science & Business Media.
- Sadd, M. H. (2018). Continuum Mechanics Modeling of Material Behavior. In Continuum Mechanics Modeling of Material Behavior. Elsevier. https://doi.org/10.1016/C2016-0-01495-X

Assigned Courses:

Mechanical Characterization of Materials (lecture)

Examination

Mechanical Characterization of Materials

written exam / length of examination: 90 minutes

Parts of the Module

Part of the Module: Mechanical Characterization of Materials (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Assigned Courses:

Mechanical Characterization of Materials (Tutorial) (exercise course)

Module MRM-0142: Complex 3D Structures and Components from 2D Materials *Complex 3D Structures and Components from 2D Materials*	6 ECTS/LP

Version 1.0.0
Person responsible for module: Prof. Dr.-Ing. Suelen Barg

Contents:

Introduction:

- Complex Materials in Nature
- Motivations in assembling 2D Materials in 3D with an overview of their demands for future technological applications (from energy to aerospace)

Nano and 2D Materials:

- Introduction to nano and 2D Materials
- Scaling laws and the evolution of properties with size
- Graphene structure, properties, and characterization
- 2D Transition Metal Carbides (MXenes)
- 2D Materials synthesis routes: top-down and bottom-up approaches

From 2D to 3D:

- Motivations, Challenges, and opportunities
- Colloidal processing routes with 2D Materials: Principles of wet processing
- Self-assembly, templating, and additive manufacturing (AM) routes
- Extrusion-based AM with 2D Materials
- Functionalities and Applications
- Aerogel supports for functional composite development
- 3D architectures for energy storage

Learning Outcomes / Competences:

By completing this unit, the students should be able to:

Knowledge and understanding:

- Define the classes of nanomaterials depending on their dimensionality.
- Identify the different families of 2D materials beyond graphene, including transition metal dichalcogenides (TMDs), carbides and/or nitrides (MXenes).
- Summarize top-down and bottom-up synthesis strategies towards 2D materials.
- Select appropriate syntheses routes for a given application based on property requirements and cost efficiency of the approach.
- Explain the basic principles, advantages and disadvantages of innovative colloidal processing routes applied to 2D materials-based 3D structures.

Intellectual skills:

- Solve problems involving the evolution of properties with size in nanomaterials by the application of simple spherical cluster approximation models.
- Evaluate the effect of microstructure and composition to develop new materials properties and/or control device efficiency using real examples from the literature.

Transferable and practical skills:

- Evaluate English language scientific content in the specialist literature.
- Apply analytical methods to solve problems.

Workload:

Total: 180 h

Conditions: materials science basic knowledge		Credit Requirements: Bestehen der Modulprüfung
Frequency: each winter semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Complex 3D Structures and Components from 2D Materials

Mode of Instruction: lecture

Lecturers: Prof. Dr.-Ing. Suelen Barg

Language: English

Contact Hours: 4

Learning Outcome:

See description of the module

Contents:

See description of the module

Literature:

- Sulabha K Kulkarni, Nanotechnology: principles and Practice, 3rd Ed., 2015 (Springer-Verlag GmbH).
- Leonard W. T. Ng, Guohua Hu, Richard C. T. Howe, Xiaoxi Zhu, Zongyin Yang, Printing of Graphene and Related 2D Materials, in: Technology, Formulation and Applications. 1st ed., 2019, (Springer-Verlag GmbH)
- Research papers presented in class

Examination

Complex 3D Structures and Components from 2D Materials

written exam / length of examination: 1 hours

Module MTH-1360: Seminar Analysis *Seminar zur Analysis*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Dirk Blömker		
Contents: Differs for each of the seminar, please check in digicampus before the term starts.		
Learning Outcomes / Competences: Through self-study of mathematical topics in the field of analysis, talks and scientific discussion, the following goals are to be achieved: Ability to work with scientific literature, skills in formulating and presenting theoretical questions based on the mathematical methods learnt. Integrated acquisition of key qualifications: Working independently with scientific literature, trying out different presentation techniques and presentation media, conducting scientific discussions and communicating problem-solving approaches.		
Workload: Total: 180 h 2 h seminar (attendance)		
Conditions: none		**Credit Requirements:** One needs to pass one of the offered seminars. The precise form of the exam (talk/homework/etc) will be announced in digicampus for the individual seminar before the term starts.
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** any	

Parts of the Module
Part of the Module: Seminar zur Analysis **Mode of Instruction:** seminar **Language:** German / English **Contact Hours:** 2 **ECTS Credits:** 6.0
Learning Outcome: Durch Selbststudium mathematischer Themen im Bereich der Analysis und ihrer Anwendungen, Vortrag und wissenschaftlicher Diskussion sollen folgende Ziele erreicht werden: Befähigung zum selbständigen Erarbeiten wissenschaftlicher Literatur, Kompetenzen in der selbständigen Bearbeitung komplexer Problemstellungen, Fertigkeiten zur Formulierung und Bearbeitung von theoretischen Fragestellungen mithilfe der erlernten mathematischen Methoden Integrierter Erwerb von Schlüsselqualifikationen: Eigenständiges Arbeiten mit wissenschaftlicher Literatur, Erprobung verschiedener Präsentationstechniken und Präsentationsmedien, Führen wissenschaftlicher Diskussionen und die Vermittlung von Problemlösungsansätzen.

Contents:

aktuelle wechselne Forschungsthemen.

Wird in der jeweiligen Lehrveranstaltung vor Semesterbeginn bekannt gegeben.

Lehr-/Lernmethoden:

Eigenständige Einarbeitung in ein aktuelles Forschungsgebiet, eigenständige Präsentation und wissenschaftliche Diskussion

Literature:

Wird in der jeweiligen Lehrveranstaltung vor Semesterbeginn bekannt gegeben.

Assigned Courses:

Seminar zur Analysis (seminar)

Variationsrechnung und Kontinuumsmechanik (Mathematische Elastizitätstheorie) (seminar)

Examination

Seminar zur Analysis Seminar zur Analysis

module exam, wird in der jeweiligen Veranstaltung vor dem Semesterbeginn festgelegt

Module MTH-1380: Seminar in Geometry *Seminar zur Geometrie*		6 ECTS/LP
Version 1.0.1 (since WS15/16) Person responsible for module: Prof. Dr. Bernhard Hanke		
Learning Outcomes / Competences: Selbststudium vertieften Wissens im Bereich der Geometrie und ihrer Anwendungen. Befähigung zum wissenschaftlichen Erarbeiten von Literaturquellen, Integrierter Erwerb von Schlüsselqualifikationen: Die Studierenden lernen und erproben verschiedene Präsentationstechniken und Präsentationsmedien; Sie erlernen das Führen wissenschaftlicher Diskussionen und die Vermittlung von Problemlösungsansätzen		
Workload: Total: 180 h 2 h seminar (attendance) 2 h seminar (attendance) 2 h seminar (attendance)		
Conditions: none		
Frequency:	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 4 semester[s]
Contact Hours: 8	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Seminar zur Geometrie

Language: German / English

Frequency: every 3rd semester

Workload:

2 Std. Seminar (Präsenzstudium)

Contact Hours: 2

ECTS Credits: 6.0

Contents:

(ohne Anspruch auf Vollständigkeit)

Lie-Gruppen und ihre Darstellungen: Dieses Seminar führt in die Theorie der Lie-Gruppen und ihre Darstellungen ein.

Geometrie und Topologie (Morsetheorie): Die Morsetheorie ist eines der fundamentalen Werkzeuge zur Untersuchung der Topologie glatter Mannigfaltigkeiten. Wir erarbeiten die Grundzüge dieser Theorie an Hand des klassischen Textes von Milnor und diskutieren Anwendungen auf die Klassifikation von Mannigfaltigkeiten (h-Kobordismussatz) und die Berechnung der Homotopiegruppen kompakter Liegruppen (Bott-Periodizität).

Voraussetzungen: Einführung in die Geometrie

Topologie

Die Voraussetzungen sind abhängig vom jeweiligen Seminarthema

Literature:

Bröcker, T., Dieck, T. Tom: Representations of Compact Lie Groups.

Fulton, W., Harris, J.: Representation theory.

Milnor, J.: Morse Theory. Annals of Mathematics Studies, Princeton University Press.

Milnor, J.: Lectures on the h-Cobordism Theorem. Princeton University Press.

Assigned Courses:

Masterseminar zur Algebra (seminar)

Seminar zu Topos Theorie (seminar)

Seminar zur Geometrie: Topologische Datenanalyse (seminar)

Topologische K-Theorie (seminar)

Part of the Module: Seminar zur Topologie
Language: German
Contact Hours: 2
ECTS Credits: 6.0

Contents:
Aufbauend auf einführende Vorlesungen in der Topologie oder Geometrie werden weiterführende Themen im Bereich der Topologie behandelt. Diese können auch als Grundlage für Bachelorarbeiten dienen.
Voraussetzungen: Grundlage ist eine einführende Vorlesung im Bereich der Geometrie oder Topologie.

Assigned Courses:

Seminar zur Geometrie: Topologische Datenanalyse (seminar)

Topologische K-Theorie (seminar)

Part of the Module: Seminar zur Geometrie: Seminar Finsler-Geometrie
Language: German
Frequency: every 3rd semester
Workload:
2 Std. Seminar (Präsenzstudium)
Contact Hours: 2
ECTS Credits: 6.0

Contents:
Seminar über Finsler-Geometrie
Voraussetzungen: Einführung in die Geometrie
Topologie
Die Voraussetzungen sind abhängig vom jeweiligen Seminarthema

Literature:
Bröcker, T., Dieck, T. Tom: Representations of Compact Lie Groups.
Fulton, W., Harris, J.: Representation theory.
Milnor, J.: Morse Theory. Annals of Mathematics Studies, Princeton University Press.
Milnor, J.: Lectures on the h-Cobordism Theorem. Princeton University Press.

Part of the Module: Seminar zur Geometrie: Seminar Topics in Symplectic Geometry
Language: German
Frequency: every 3rd semester
Workload:
2 Std. Seminar (Präsenzstudium)
Contact Hours: 2
ECTS Credits: 6.0

Contents:
Seminar über Symplectic Geometry
Voraussetzungen: Einführung in die Geometrie
Topologie
Die Voraussetzungen sind abhängig vom jeweiligen Seminarthema

Literature:

Bröcker, T., Dieck, T. Tom: Representations of Compact Lie Groups.

Fulton, W., Harris, J.: Representation theory.

Milnor, J.: Morse Theory. Annals of Mathematics Studies, Princeton University Press.

Milnor, J.: Lectures on the h-Cobordism Theorem. Princeton University Press.

Assigned Courses:

Topics in Symplectic Geometry (seminar)

Examination

Seminar zur Geometrie

oral exam / length of examination: 90 minutes

Examination

Seminar zur Topologie

oral exam / length of examination: 90 minutes

Examination

Seminar zur Geometrie: Seminar Finsler-Geometrie

oral exam / length of examination: 90 minutes

Examination

Seminar zur Geometrie: Seminar Topics in Symplectic Geometry

oral exam / length of examination: 90 minutes

Module MTH-1510: Riemannian Geometry *Riemannsche Geometrie*		9 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Bernhard Hanke		
Learning Outcomes / Competences: Verbindung von geometrischem Denken mit analytischen Methoden, Verständnis der Zusammenhänge von lokaler und globaler Geometrie		
Workload: Total: 270 h 4 h lecture (attendance) 2 h exercise course (attendance)		
Conditions: none		
Frequency:	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Riemannsche Geometrie

Language: English

Frequency: every 3rd semester

Workload:

4 Std. Vorlesung (Präsenzstudium)

2 Std. Übung (Präsenzstudium)

Contact Hours: 6

ECTS Credits: 9.0

Contents:

Wie sieht die Geometrie unseres Raumes aus? Euklidisch? Aber wie sollen wir wissen, ob zwei Parallelen hinter dem nächsten Busch immer noch den gleichen Abstand haben? Wie sollen wir die Geometrie im Großen, gar im Weltall, beurteilen, wo wir uns doch kaum weg von unserem Fleck Erde rühren können? Die Riemannsche Geometrie stellt einen Begriff vor, der flexibel genug ist, um eine Geometrie zu beschreiben, die lokal euklidisch aussieht, über deren globale Struktur wir aber vielleicht keine Kenntnis haben. Das Unterscheidungsmerkmal zur euklidischen Geometrie ist die Krümmung, der wichtigste Begriff dieser Theorie. Wir werden diese Geometrie im Kleinen und im Großen untersuchen. Naturgemäß werden wir dabei auch die Grundlagen von Einsteins Allgemeiner Relativitätstheorie behandeln, in der die Geometrie von Raum und Zeit mit der Massenverteilung im Weltall gekoppelt wird.

Untermannigfaltigkeiten des euklidischen Raums

Kovariante Ableitung (Levi-Civita-Ableitung)

Krümmung

Allgemeine Relativitätstheorie

Geodäten im Kleinen und Großen

Vollständigkeit

Rolle der Krümmung für die Topologie

Voraussetzungen: Einführung in die Geometrie

Literature:

J.-H. Eschenburg, J. Jost: Differentialgeometrie und Minimalflächen. Springer, 2007.

W. Kühnel: Differentialgeometrie. Vieweg, 1999.

S.Gallot, D.Hulin, J.Lafontaine: Riemannian Geometry. Springer, 1990.

J. Jost: Riemannian Geometry and Geometric Analysis. Springer, 2008.

M. Do Carmo: Riemannian Geometry. Birkhäuser, 1992.

D.Gromoll, W.Klingenberg, W.Meyer: Riemannsche Geometrie im Großen. Springer LN 55, 1975.

Examination

Riemannsche Geometrie

oral exam / length of examination: 30 minutes

Module MTH-1520: Differential Topology *Differentialtopologie*	9 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Bernhard Hanke	

Learning Outcomes / Competences:
Entwicklung und Schulung der geometrischen Anschauung bei gleichzeitiger Beherrschung der modernen mathematischen Sprache und Argumentationsweise. Verständnis der grundlegenden Konzepte der Differentialtopologie. Erarbeitung von Grundwissen für Spezialvorlesungen in Geometrie und Topologie.

Workload:
Total: 270 h
4 h lecture (attendance)
2 h exercise course (attendance)

Conditions: none		
Frequency:	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Differentialtopologie
Language: German / English
Frequency: every 3rd semester
Workload:
4 Std. Vorlesung (Präsenzstudium)
2 Std. Übung (Präsenzstudium)
Contact Hours: 6
ECTS Credits: 9.0

Contents:
Diese Vorlesung widmet sich der Theorie differenzierbarer Mannigfaltigkeiten vom Standpunkt der Analysis und Topologie. Der behandelte Stoff ist fundamental für ein vertieftes Verständnis der Differentialgeometrie und globalen Analysis.
Differenzierbare Mannigfaltigkeiten
Tangentialraum
Flüsse
Blätterungen
Faserbündel
Transversalität
de Rham-Kohomologie
Chern-Weil-Theorie
exotische Sphären
Voraussetzungen: Einführung in die Geometrie

Literature:
R. Bott, L. Tu: Differential Forms in Algebraic Topology. GTM Springer.
L. Conlon: Differentiable Manifolds - A First Course. Birkhäuser.
M. Hirsch: Differential Topology. GTM Springer.
J. Milnor: Topology from the Differentiable Viewpoint. Princeton University Press.

Examination

Differentialtopologie

oral exam / length of examination: 30 minutes

Module MTH-1530: Algebraic Topology *Algebraische Topologie*	9 ECTS/LP
Version 2.0.0 (since WS16/17) Person responsible for module: Prof. Dr. Bernhard Hanke	
Learning Outcomes / Competences: Die Studierenden können mit algebraischen Hilfsmitteln umgehen, die es Ihnen erlauben, geometrische Anschauung in exakte Argumente zu übersetzen.	
Workload: Total: 270 h	
Conditions: Grundlegendes Wissen in Algebra und Topologie	

Frequency: every 3rd semester	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Algebraische Topologie I

Language: English / German

Contact Hours: 6

ECTS Credits: 9.0

Contents:

Dieses Modul bietet eine Einführung in die Algebraische Topoolgie, also die systematische Nutzung algebraischer Hilfsmittel beim Studium topologischer Fragestellungen.

Mathematische Inhalte sind unter anderem: Fundamentalgruppe, Überlagerungen, Kategorien, Zellkomplexe, zelluläre und singuläre Homologie und Kohomologie, Homotopietheorie, (Ko-)Faserungen

Lehr-/Lernmethoden:

Vorlesung und Übung

Literature:

Bredon, G.E.: Topology and Geometry, vol. 139, Graduate Texts in Mathematics. Springer-Verlag, 1993.

Dold, A.: Lectures on Algebraic Topology, vol. 200. Grundlehren der mathematischen Wissenschaften in Einzeldarstellungen, Springer-Verlag, 1972.

Spanier, E.: Algebraic Topology. McGraw-Hill, 1966.

May, J.P.: A Concise Course in Algebraic Topology, University of Chicago Press, 1999.

Examination

Algebraische Topologie

portfolio exam

Module MTH-1560: Stochastic Differential Equations *Stochastische Differentialgleichungen*		9 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Dirk Blömker		
Contents: This module introduces the theory of stochastic differential equations. Ito formula, Ito isometry, Ito integral, martingales, Brownian motion, existence and uniqueness theorem, diffusion processes, partial differential equations, Black-Scholes formula, Option pricing		
Learning Outcomes / Competences: The students know the fundamental terms, concepts and phenomena of stochastic of stochastic analysis, especially of stochastic differential equations. Ability to independently compile further literature for applications in the field of financial mathematics and stochastic dynamics, Competences in the independent processing of problems, Skills in the formulation and processing of theoretical questions using the theoretical questions with the help of the methods learned Integrated acquisition of key qualifications: Independent work with (English-language) scientific literature, Scientific thinking, in-depth competences in the independent processing of problems, skills in formulating and processing theoretical questions.		
Workload: Total: 270 h 2 h exercise course (attendance) 4 h lecture (attendance)		
Conditions: A good basic knowledge of probability theory and analysis is required. and calculus. Helpful, but not absolutely necessary, is previous knowledge of in ordinary differential equations and stochastic processes.		**Credit Requirements:** Oral exam
Frequency: every 3rd semester	**Recommended Semester:** 1. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Stochastische Differentialgleichungen

Mode of Instruction: lecture

Lecturers: Prof. Dr. Dirk Blömker

Language: German / English

Workload:

2 Std. Übung (Präsenzstudium)

4 Std. Vorlesung (Präsenzstudium)

Contact Hours: 6

ECTS Credits: 9.0

Contents:

Dieses Modul führt in die Theorie der stochastischen Differentialgleichungen ein.
Ito-Formel
Ito-Isometrie
Ito-Integral
Martingale
Brownsche Bewegung
Existenz-und Eindeutigkeitssatz
Diffusionsprozesse
partielle Differentialgleichungen
Black-Scholes Formel
Optionspreisbewertung
Voraussetzungen: Notwendig ist ein gutes Grundwissen in der Wahrscheinlichkeitstheorie
und der Analysis.
Hilfreich, aber nicht zwingend notwendig, sind Vorkenntnisse
in gewöhnlichen Differentialgleichungen
und stochastischen Prozessen.

Literature:

Oksendal: Stochastic Differential Equations. Springer.
Karatzas Shreve: Brownian Motion and Stochastic Calculus. Springer.
Evans: An Introduction to Stochastic Differential Equations.
Steele: Stochastic Calculus and Financial Applications. Springer.

Examination

Stochastische Differentialgleichungen

oral exam / length of examination: 30 minutes

Module MTH-1570: Dynamical Systems *Dynamische Systeme*	9 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Dirk Blömker	
Contents: among others: dynamical systems, attractors, invariant manifolds, semi-flows, Markov semigroups, invariant measures, iterated mappings, chaos	
Learning Outcomes / Competences: The students know the basic terms, concepts and phenomena in the field of in the field of dynamical systems. Ability to work independently on further literature, Competences in the independent processing of problems, Skills to formulate and work on theoretical questions using the questions with the aid of the methods learnt. Integrated acquisition of key qualifications: Independent work with (English-language) scientific literature, scientific thinking, in-depth competences in the independent processing of problems, Skills in formulating and working on theoretical questions.	
Workload: Total: 270 h 2 h exercise course (attendance) 4 h lecture (attendance)	
Conditions: Good knowledge of linear algebra and analysis. Basic knowledge of functional analysis and differential equations is helpful.	**Credit Requirements:** oral exam

Frequency: every 3rd semester	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Dynamische Systeme

Mode of Instruction: lecture

Language: German / English

Workload:

2 Std. Übung (Präsenzstudium)

4 Std. Vorlesung (Präsenzstudium)

Contact Hours: 6

ECTS Credits: 9.0

Contents:

unter anderem: dynamische Systeme (zufällig und nicht-autonom), Attraktoren, Halbflüsse, Markov Halbgruppen, invariante Maße, iterierte Abbildungen, Chaos

Assigned Courses:

Dynamical Systems (lecture)

Examination

Dynamische Systeme

oral exam / length of examination: 30 minutes

Module MTH-1590: Numerical analysis of partial differential equations *Numerik partieller Differentialgleichungen*		9 ECTS/LP
Version 1.1.0 (since WS15/16) Person responsible for module: Prof. Dr. Malte Peter		
Learning Outcomes / Competences: Verständnis der Finite-Differenzen-Methode sowie der Ideen der Finite-Elemente-Methode im allgemeinen und Konstruktion der Lagrange-Elemente bzgl. simplizialen Triangulierungen und a posteriori Fehlerschätzung für elliptische Probleme im speziellen; Konvergenzaussagen, Zusammenhänge sowie Vor- und Nachteile der Methoden, auch in Hinblick auf die Anwendung auf konkrete Probleme; Komplexe Algorithmik; integrierter Erwerb von Schlüsselqualifikationen: Die Studierenden lernen in Kleingruppen, Problemstellungen präzise zu definieren, numerische Lösungsstrategien zu entwickeln und deren Tauglichkeit abzuschätzen, dabei wird die soziale Kompetenz zur Zusammenarbeit im Team weiterentwickelt.		
Workload: Total: 270 h 2 h exercise course (attendance) 4 h lecture (attendance)		
Conditions: Empfohlen: Analysis (insb. Funktionalanalysis), Einführung in die Numerik, Numerik gewöhnlicher Differentialgleichungen		
Frequency:	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Numerik partieller Differentialgleichungen

Mode of Instruction: lecture + exercise

Lecturers: Prof. Dr. Malte Peter

Language: English / German

Frequency: each winter semester

Workload:

2 Std. Übung (Präsenzstudium)

4 Std. Vorlesung (Präsenzstudium)

Contact Hours: 6

ECTS Credits: 9.0

Contents:

Es werden die Grundlagen der Standardmethoden zur numerischen Lösung partieller Differentialgleichungen behandelt.

Finite-Differenzen-Methode auf rechteckigen und nicht rechteckigen Gebieten

Finite-Elemente-Methode inkl. Triangulierung

Lagrange-Elemente

Adaptivität für elliptische Probleme

Literature:

Grossmann, C., Ross, H.-G.: Numerische Behandlung partieller Differentialgleichungen. Teubner, 2005 .

Hackbusch: Theorie und Numerik elliptischer Differentialgleichungen. Springer. 2010

Examination

Numerik partieller Differentialgleichungen

oral exam / length of examination: 30 minutes

Module MTH-1600: Multiscale methods *Multiskalenmethoden*		9 ECTS/LP
Version 1.1.0 (since WS15/16) Person responsible for module: Prof. Dr. Malte Peter		
Learning Outcomes / Competences: Tieferes Verständnis der Finite-Elemente-Methode in ihren wichtigsten Ausprägungen; Zusammenhänge sowie Vor- und Nachteile der Methoden, auch in Hinblick auf die Anwendung auf konkrete Probleme; Verständnis der Mehrskalenproblematik sowie grundlegender Lösungsansätze; Komplexe Algorithmik; integrierter Erwerb von Schlüsselqualifikationen: Die Studierenden lernen in Kleingruppen, Problemstellungen präzise zu definieren, numerische Lösungsstrategien zu entwickeln und deren Tauglichkeit abzuschätzen, dabei wird die soziale Kompetenz zur Zusammenarbeit im Team weiterentwickelt.		
Workload: Total: 270 h 2 h exercise course (attendance) 4 h lecture (attendance)		
Conditions: none		
Frequency:	**Recommended Semester:** 2. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Multiskalenmethoden

Mode of Instruction: lecture + exercise

Language: English / German

Frequency: irregular

Workload:

2 Std. Übung (Präsenzstudium)

4 Std. Vorlesung (Präsenzstudium)

Contact Hours: 6

ECTS Credits: 9.0

Contents:

Aufbauend auf grundlegende Inhalte der Module Numerik partieller Differentialgleichungen bzw. Methoden der finiten Elemente werden weiterführende Aspekte der Finite-Elemente-Methode behandelt, insbesondere im Hinblick auf Multiskalenprobleme.

Finite-Elemente-Methode und parabolische Gleichungen

Discontinuous Galerkin Method

Einführung in Multiskalenprobleme

Multiskalen-Finite-Elemente-Methode

Voraussetzungen: Es wird empfohlen, die mit dem erfolgreichen Absolvieren einer der Module "Numerik partieller Differentialgleichungen" oder "Finite Elemente Methoden" einhergehenden Kompetenzen erworben zu haben.

Literature:

C. Grossmann, H.-G. Roos: Numerische Behandlung partieller Differentialgleichungen. Teubner.

Y. Efendiev, T. Y. Hou: Multiscale Finite Element Methods. Springer.

Examination

Multiskalenmethoden

module exam, mündliche Prüfung / length of examination: 30 minutes

Module MTH-1610: Mathematical modelling *Mathematische Modellierung*		9 ECTS/LP
Version 1.1.0 (since WS15/16) Person responsible for module: Prof. Dr. Malte Peter		
Learning Outcomes / Competences: Verständis der Abbildung realer Prozesse in mathematische Strukturen; integrierter Erwerb von Schlüsselqualifikationen: Die Studierenden lernen in Kleingruppen, Problemstellungen präzise zu definieren, numerische Lösungsstrategien zu entwickeln und deren Tauglichkeit abzuschätzen, dabei wird die soziale Kompetenz zur Zusammenarbeit im Team weiterentwickelt.		
Workload: Total: 270 h 4 h lecture (attendance) 2 h exercise course (attendance)		
Conditions: none		
Frequency:	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Mathematische Modellierung
Mode of Instruction: lecture + exercise
Language: English / German
Frequency: irregular
Contact Hours: 6

Examination
Mathematische Modellierung
oral exam / length of examination: 30 minutes

Module MTH-1630: Mathematical Game Theory *Mathematische Spieltheorie (Optimierung IV)*		9 ECTS/LP
Version 3.0.0 (since WS21/22) Person responsible for module: Prof. Dr. Tobias Harks		
Contents: • Existence, complexity and computation of Nash equilibria in non-cooperative games • Congestion games • Pricing games • Cooperative games • Core • Shapley value • Auctions and mechanism design		
Learning Outcomes / Competences: This course offers an introduction into the main contents of mathematical and algorithmic game theory.		
Workload: Total: 270 h 2 h exercise course (attendance) 4 h lecture (attendance)		
Conditions: • Module Introduction to Optimization (MTH-1140) - recommended Module Introduction to Nonlinear and Combinatorial Optimization (MTH-1200) - recommended Module Combinatorial Optimization (MTH-1620) - recommended		
Frequency: Wintersemester alle 2 Jahre	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Mathematische Spieltheorie (Optimierung IV)
Mode of Instruction: lecture
Language: English
Frequency: every 3rd semester
Contact Hours: 6
ECTS Credits: 9.0

Examination
Mathematische Spieltheorie (Optimierung IV)
module exam, Der konkrete Typ der Modulprüfung (Klausur oder mündliche Prüfung oder Portfolio) wird jeweils spätestens eine Woche vor Beginn der Veranstaltung bekannt gegeben.

Module MTH-1730: Research Seminar Analysis *Oberseminar zur Analysis*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Dirk Blömker Beck, Peter, Schmidt		
Contents: The Oberseminar deals with recent scientific research texts in the field of analysis.The specific topics of the seminar vary according to the previous knowledge of the students.		
Learning Outcomes / Competences: Through self-study of mathematical topics in the field of calculus and its applications, lecture and scientific discussion the following goals are to be achieved: Ability to work independently and scientifically with current scientific literature in the field of analysis, skills to formulate and work on theoretical questions with the help of analytical theoretical questions with the help of analytical methods, Development of new mathematical methods. Integrated acquisition of key qualifications: Independent work with English-language scientific literature, scientific presentation techniques, conducting scientific discussions and teaching mathematical theories.		
Workload: Total: 180 h 2 h seminar (attendance)		
Conditions: Differential equations or functional analysis. At least two consecutive lectures or seminars in the field of advanced analysis are recommended		**Credit Requirements:** presentation
Frequency: each semester	**Recommended Semester:** 3. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Oberseminar zur Analysis

Mode of Instruction: seminar

Lecturers: Prof. Dr. Fritz Colonius, Prof. Dr. Malte Peter, Prof. Dr. Dirk Blömker, Prof. Dr. Bernd Schmidt, Prof. Dr. Lisa Beck

Language: German

Workload:

2 Std. Seminar (Präsenzstudium)

Contact Hours: 2

ECTS Credits: 6.0

Contents:

Das Oberseminar behandelt aktuelle wissenschaftliche Forschungstexte im Bereich der Analysis. Die Themen variieren nach den Vorkenntnissen der Studierenden.

Literature: Nach Vereinbarung
Assigned Courses: **Oberseminar Differentialgleichungen**
Examination **Vortrag** oral exam / length of examination: 90 minutes

Module MTH-1770: Mathematical software project *Mathematisches Softwareprojekt*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Marc Nieper-Wißkirchen		
Learning Outcomes / Competences: Die Studierenden erhalten die Kompetenz, ein mathematisches Problem in einer Weise zu erarbeiten und aufzubereiten, dass es einen rechnergestützten Zugang ermöglicht. Sie erlernen, die Lösung selbständig in Form eines Software-Projekts auf dem Computer zu realisieren, und erarbeiten sich dadurch einen zielgerichteten Umgang mit einer Programmiersprache oder einem mathematischen Software-System.		
Workload: Total: 180 h 2 h preparation of written term papers (self-study)		
Conditions: none		
Frequency:	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 0	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Mathematisches Softwareprojekt

Language: German / English

Frequency: each semester

ECTS Credits: 6.0

Contents:

Ziel des Moduls ist die selbständige Erarbeitung eines mathematischen Problems und dessen rechnergestützte Lösung. Diese kann sowohl mithilfe in einer der üblichen Programmiersprachen (wie C/C++, Java, Python) eigenständig erstellten Software oder durch selbständig entwickelte Module zu bestehenden Software-Systemen und -Umgebungen (wie Mathematica, Maple, R, Sage) realisiert werden. Das Thema des Projekts wird von der jeweiligen Betreuerin/dem jeweiligen Betreuer vorgeschlagen. Es umfasst ein mathematisches Problem aus einem beliebigen, am Institut vertretenen Teilgebiet der Mathematik.

Voraussetzungen:

Examination

Mathematisches Softwareprojekt

practical exam / length of examination: 1 months

Module MTH-1810: Topological Combinatorics *Topologische Kombinatorik*		9 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Bernhard Hanke		
Learning Outcomes / Competences: Die Studierenden erkennen kombinatorische Probleme, zu deren Lösung topologische Hilfsmittel beitragen können, und können topologische Methoden auf sie anwenden.		
Workload: Total: 270 h 2 h exercise course (attendance) 4 h lecture (attendance)		
Conditions: none		
Frequency:	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Topologische Kombinatorik

Language: German

Workload:

2 Std. Übung (Präsenzstudium)

4 Std. Vorlesung (Präsenzstudium)

Contact Hours: 6

ECTS Credits: 9.0

Contents:

Diese Vorlesung führt in die topologische Kombinatorik ein. Dieses junge Fachgebiet beschäftigt sich unter anderem damit, kombinatorische und kombinatorisch-geometrische Probleme mit Hilfe topologischer Methoden zu lösen. Wir werden einige solcher Beispiele kennen lernen. Die dazu notwendigen Hilfsmittel aus der Topologie und der Algebraischen Topologie werden wir in der Vorlesung entwickeln oder darstellen.

Massenpartitionen, insbesondere das Problem des Teilens von Perlenketten (siehe den Artikel `Necklace splitting problem' in der englischsprachigen Wikipedia).

Graphfärbungsprobleme, insbesondere die Kneser-Vermutung (siehe den Artikel `Topologische Kombinatorik' in der deutschsprachigen Wikipedia) und verwandte Resultate.

Der Satz von Tverberg (siehe den Artikel `Tverberg's theorem' in der englischsprachigen Wikipedia) und Verallgemeinerungen davon, darunter auch sehr neue Resultate.

Simplizialkomplexe und simpliziale Abbildungen.

Einfache Hilfsmittel aus der algebraischen Topologie wie Kettenkomplexe und in Ansätzen Homologie. Der Satz von Borsuk-Ulam und Verallgemeinerungen davon.

Voraussetzungen: Grundlegende Kenntnisse in Analysis

Grundlegende Kenntnisse in Lineare Algebra

Diese Vorlesung wendet sich an alle mit einem Interesse an kombinatorischen Fragestellungen oder topologischen Methoden. Es wird versucht, die Vorlesung so gut wie möglich an die Vorkenntnisse der Hörer anzupassen. Da die benötigten Ergebnisse und Methoden aus der Topologie eingeführt werden, ist kein Vorwissen, das über die Grundvorlesungen in Analysis und Linearer Algebra hinausgeht, nötig. Für die, die nur diese Kenntnisse mitbringen, wird aber die Menge an Neuem groß sein, daher ist eine gewisse mathematische Reife wünschenswert.

Literature:

Mark de Longueville: A course in topological combinatorics. Springer.
Jiri Matousek: Using the Borsuk-Ulam Theorem (2nd printing). Springer, 2008.

Examination

Topologische Kombinatorik

oral exam / length of examination: 30 minutes

Module MTH-1940: String Topology *String Topology*	9 ECTS/LP

Version 1.0.0 (since WS15/16)
Person responsible for module: Prof. Dr. Kai Cieliebak

Learning Outcomes / Competences:
Learning about methods for computing homology and homotopy groups, algebraic structures arising in the topology of loop spaces, and their applications in geometry.

Workload:
Total: 270 h
4 h lecture (attendance)
2 h exercise course (attendance)

Conditions: none		**Credit Requirements:** Passing the module exam.
Frequency: as needed	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: String Topology
Language: English / German
Frequency: irregular
Workload:
  4 Std. Vorlesung (Präsenzstudium)
  2 Std. Übung (Präsenzstudium)
Contact Hours: 6
ECTS Credits: 9.0

Contents:
This course is an introduction to the algebraic topology of loop spaces, an area of growing importance in mathematics and physics. It covers the following topics: homology of based and free loop spaces, Pontrjagin product and Hopf algebras, Chas-Sullivan operations and Batalin-Vilkovisky algebras, Hochschild and cyclic homology of the de Rham complex, minimal models and applications to closed geodesics.
Voraussetzungen: Basic algebraic and and differential topology (singular homology, manifolds, differential forms)

Literature:
Cohen, R., Hess, K., Voronov, A.: String topology and cyclic homology. Birkhäuser.
Griffiths, P., Morgan, J.: Rational homotopy theory and differentiel forms. Birkhäuser.

Examination
String Topology
oral exam / length of examination: 30 minutes

Module MTH-2010: Numerics of stochastic differential equations *Numerik Stochastischer Differentialgleichungen*	6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Dirk Blömker	

Contents:
numerical method for stochastic differential equations, Euler-Maruyama, weak and strong convergence, error estimates

Learning Outcomes / Competences:
The students know the basic terms, concepts and phenomena of the numerical treatment of stochastic differential equations.
of the numerical treatment of stochastic differential equations, can implement the corresponding algorithms and are familiar with the basics of stochastic analysis.
Ability to work independently on further literature.
Competences in the independent processing and implementation of numerical algorithms,
Skills in formulating and working on theoretical and applied problems using the
and applied questions with the help of the methods learnt.
Integrated acquisition of key qualifications:
Independent work with (English-language) scientific literature,
working with scientific computers,
in-depth competences in the independent processing of problems,
Skills in formulating and working on applied questions.

Workload:
Total: 180 h
2 h exercise course (attendance)
2 h lecture (attendance)

Conditions: knowledge in stochastic differential equations and numerical methods for ordinary differential equations are helpful		**Credit Requirements:** oral exam
Frequency: irregular	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Numerik Stochastischer Differentialgleichungen
Language: German / English
Workload:
2 Std. Übung (Präsenzstudium)
2 Std. Vorlesung (Präsenzstudium)
Contact Hours: 4
ECTS Credits: 6.0

Contents:

Dieses Modul führt in die Theorie der numerischen Behandlung stochastischer Differentialgleichungen ein.
Stochastische Differentialgleichungen
Zeitdiskretisierung
Fehlerabschätzungen
Implementierung numerischer Verfahren
Spektrales Galerkinverfahren für stochastische partielle DGL
Voraussetzungen: Die Vorlesung verwendet die grundlegende Theorie stochastischer Differentialgleichungen.
Zwingend notwendig ist ein gutes Grundwissen in der Wahrscheinlichkeitstheorie,
stochastischen Prozessen und der Analysis.
Hilfreich, aber nicht zwingend notwendig, sind Vorkenntnisse
in gewöhnlichen Differentialgleichungen und Numerik gewöhnlicher Differentialgleichungen,
sowie Programmiererfahrung.

Examination

Numerik Stochastischer Differentialgleichungen

oral exam / length of examination: 30 minutes

Module MTH-2090: Seminar on numerical mathematics *Seminar zur Numerik*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Malte Peter		
Learning Outcomes / Competences: Entwicklung, Analyse und Implementation moderner numerischer Methoden. Die Studierenden haben Kenntnisse verschiedener mathematischer Modelle der Kontinuumsmechanik sowie zugehöriger numerischer Lösungsstrategien. Sie haben die Fertigkeit, sich Problemstellungen aus dem Gebiet der mathematischen Modellierung und der Numerik der zugehörigen Differentialgleichungen selbstständig mittels Literaturstudium zu erarbeiten und in Form einer Präsentation darzustellen. Sie besitzen die Kompetenz, die Bedeutung entsprechender Problemstellungen und Lösungsansätze anderen zu vermitteln.		
Workload: Total: 180 h 2 h seminar (attendance)		
Conditions: none		
Frequency:	**Recommended Semester:** 2. - 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Seminar zur Numerik: Die TOP 10 Algorithmen

Mode of Instruction: seminar
Language: German
Frequency: jedes 3. Semester
Contact Hours: 2
ECTS Credits: 6.0

Contents:

Von den Editoren der Zeitschrift "Computing in Science and Engineering" wurden 2000 zehn Algorithmen ausgewählt, die ihrer Ansicht nach die größte Bedeutung für Wissenschaft und Technik im 20. Jahrhundert hatten.
In diesem Seminar sollen diese Algorithmen und ihre Anwendungen näher betrachtet werden.
Empfohlene Voraussetzungen: Kenntnisse in Numerik I.

Literature:

Special Issue of the Computing in Science and Engineering, J. Dongarra, F. Sullivan, eds., 2000

Examination

Seminar zur Numerik: Die TOP 10 Algorithmen

module exam, Der konkrete Typ der Modulprüfung (Vortrag oder kombiniert schriftlich-mündliche Prüfung oder mündliche Prüfung oder Portfolio) wird jeweils spätestens eine Woche vor Beginn der Veranstaltung bekannt gegeben.

Parts of the Module

Part of the Module: Seminar zur Numerik: Seminar zur Numerischen Mathematik
Mode of Instruction: seminar
Language: German / English
Frequency: jedes 3. Semester
Workload:
2 Std. Seminar (Präsenzstudium)
Contact Hours: 2
ECTS Credits: 6.0

Contents:
Seminar über ein Thema der Numerischen Mathematik
(ohne Anspruch auf Vollständigkeit)
Fortgeschrittene Lösungsverfahren für große lineare Gleichungssysteme bzw. Eigenwertprobleme
Regelung dynamischer Systeme
Modellierung und Differentialgleichungen (Themen aus der mathematischen Modellierung mit Differentialgleichungen und der zugehörigen Theorie von Differentialgleichungen)
Modellierung und Numerische Analysis (Themen aus der Mathematischen Modellierung mit Differentialgleichungen und der Numerik der zugehörigen Differentialgleichungen)
Voraussetzungen: keine besonderen Voraussetzungen

Literature:
Billingham, J., King, A.C.: Wave motion. Cambridge.
Braun, M.: Differential equations and their applications. Springer.
Eck, C., Garcke, G., Knabner, P.: Mathematische Modellierung. Springer.
Dautray, R., Lions, J.-L.: Mathematical Analysis and Numerical Methods for Science and Technology. Springer.
Hinrichsen, D., Pritchard, A.J.: Mathematical Systems Theory I. Springer.
Hornung, U.: Homogenization and Porous Media. Springer.
Meister, A.: Numerik linearer Gleichungssysteme. Vieweg.
Saad, Y.: Iterative methods for sparse linear systems. SIAM.
Saad, Y.: Numerical methods for large eigenvalue problems. SIAM.

Assigned Courses:

Seminar zur Numerik (seminar)

Seminar zur Numerik (Master) (seminar)

Examination
Seminar zur Numerik: Seminar zur Numerischen Mathematik
module exam, kombiniert schriftlich-mündliche Prüfung. Bearbeitungszeit: 3 Monate, Dauer der mündlichen Darstellung: 75 Minuten.

Parts of the Module

Part of the Module: Seminar zur Numerik: Seminar zur Numerischen Linearen Algebra
Mode of Instruction: seminar
Language: German
Frequency: jedes 3. Semester
Contact Hours: 2
ECTS Credits: 6.0

Contents:
Das Seminar behandelt aktuelle wissenschaftliche Forschungstexte im Bereich der Numerischen Linearen Algebra. Die Themen variieren nach den Vorkenntnissen der Studierenden.
Empfohlene Voraussetzungen: Kenntnisse in Numerik I

Examination

Seminar zur Numerik: Seminar zur Numerischen Linearen Algebra

module exam, Der konkrete Typ der Modulprüfung (Vortrag oder kombiniert schriftlich-mündliche Prüfung oder mündliche Prüfung oder Portfolio) wird jeweils spätestens eine Woche vor Beginn der Veranstaltung bekannt gegeben.

Module MTH-2210: Stochastic Evolution Equations *Stochastische Evolutionsgleichungen*		9 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Dirk Blömker		
Contents: Infinite dimensional spaces Fourier series and transforms cylindrical Wiener processes analytic semigroups stochastic evolution equations stochastic dynamical systems		
Learning Outcomes / Competences: The students know the basic terms, concepts and phenomena in the field of stochastic evolution equations and stochastic dynamic systems. Ability to work independently on further research literature, competences in the independent processing of problems, skills in the formulation and processing of theoretical questions with the help of the methods learned. Integrated acquisition of key qualifications: Independent work with (English-language) scientific literature, scientific thinking, deepened competences in the independent processing of problems.		
Workload: Total: 270 h		
Conditions: Knowledge of calculus on infinite dimensional spaces and basic knowledge of stochastics.		
Frequency: irregular	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Stochastische Evolutionsgleichungen
Language: German
Contact Hours: 6
ECTS Credits: 9.0

Contents:

Unendlich dimensionale Räume
Fourierreihen und -transformation
zylindrische Wienerprozesse
analytische Halbgruppen
stochastische Evolutionsgleichungen
stochastische dynamische Systeme
Voraussetzungen: Kenntnisse in Analysis auf unendlich.-dimen. Räumen und Grundkenntnisse in Stochastik

Examination

Stochastische Evolutionsgleichungen

oral exam / length of examination: 30 minutes

Module MTH-2215: Evolution Equations *Evolutionsgleichungen*		9 ECTS/LP
Version 1.0.0 (since SoSe19) Person responsible for module: Prof. Dr. Dirk Blömker		
Contents: Theory of parabolic and/or hyperbolic partial differential equations, existence and uniqueness of solutions, weak and mild solutions, semigroups, dynamical systems, stability, attractors and other topics.		
Learning Outcomes / Competences: Students know the basic terms, concepts and phenomena in the field of evolutionary equations. Ability to work independently on further research literature, competences in the independent processing of problems. of problems, skills in formulating and working on theoretical questions with the help of the methods questions with the help of the methods learnt. Integrated acquisition of key qualifications: Independent work with (English-language) scientific literature, scientific thinking, deepened competences in the independent processing of problems.		
Conditions: Knowledge of calculus on infinite dimensional spaces, basic knowledge of ordinary differential equations.		**Credit Requirements:** oral exam
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: * LV-Gruppe neu***** **Language:** German

Examination
***** Prf neu ***** oral exam / length of examination: 30 minutes

Module MTH-2250: Symplectic Geometry *Symplectic Geometry*		9 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Kai Cieliebak		
Learning Outcomes / Competences: Learning about techniques of symplectic geometry and their applications in the theory of classical mechanical systems.		
Workload: Total: 270 h		
Conditions: none		**Credit Requirements:** Passing the module exam.
Frequency: every 3rd semester	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Symplectic Geometry and Hamiltonian Dynamics
Language: English / German
Contact Hours: 6
ECTS Credits: 9.0

Contents:

This course is an introduction to symplectic techniques in the theory of Hamiltonian systems. It covers the following topics: Hamilton's equations, symplectic manifolds, symmetries and Noether's theorem, symplectic reduction, rigid bodies, integrable systems, stability and the KAM theorem, chaos, applications to celestial mechanics, fluid dynamics, and quantum mechanics.

Voraussetzungen: Basic differential geometry (manifolds, differential forms)

Literature:

V.I.Arnold, Mathematical Methods of Classical Mechanics (Springer)

H.Hofer and E.Zehnder, Symplectic Invariants and Hamiltonian Dynamics (Birkhaeuser)

Examination

Symplectic Geometry and Hamiltonian Dynamics

oral exam / length of examination: 30 minutes

Module MTH-2270: Advanced Topics in Algebraic Topology *Algebraische Topologie (Vertiefung)*		9 ECTS/LP
Version 2.0.0 (since WS16/17) Person responsible for module: Prof. Dr. Bernhard Hanke		
Learning Outcomes / Competences: Es werden vertiefte Kenntnisse in der algebraischen Topologie vermittelt. Die Studierenden werden befähigt, sich eigenständig mit Literatur im Gebiet der algebraischen Topologie zu befassen. Dieser Modul dient auch als Vorbereitung zu weiterführenden Seminaren und Abschlussarbeiten.		
Workload: Total: 270 h		
Conditions: none		
Frequency:	**Recommended Semester:** 2. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Algebraische Topologie (Vertiefung)

Language: German / English
Frequency: irregular
Contact Hours: 6
ECTS Credits: 9.0

Contents:

Dieser Modul baut auf den Modul Algebraische Topologie auf. Es werden weiterführende Themen der algebraischen Topologie behandelt wie Kohomologie, Poincaré-Dualität, Homotopietheorie, Vektorbündel, Bordismus, K-Theorie.

Voraussetzungen: Algebraische Topologie

Literature:

Bredon, G.E.: Topology and Geometry, vol. 139, Graduate Texts in Mathematics. Springer-Verlag, 1993.

Dold, A.: Lectures on Algebraic Topology, vol. 200. Grundlehren der mathematischen Wissenschaften in Einzeldarstellungen, Springer-Verlag, 1972.

May, J. P.: A Concise Course in Algebraic Topology, University of Chicago Press.

Spanier, E.: Algebraic Topology. McGraw-Hill, 1966.

Assigned Courses:

Algebraische Topologie (Vertiefung) (lecture + exercise)

Examination

Algebraische Topologie (Vertiefung)

portfolio exam / length of examination: 120 minutes

Module MTH-2440: Approximation Algorithms *Approximationsalgorithmen*		3 ECTS/LP
Version 1.0.0 (since SoSe16) Person responsible for module: Prof. Dr. Tobias Harks		
Contents: • Greedy algorithms • Facility location • Steiner tree • Scheduling • TSP • Set cover • Clustering		
Learning Outcomes / Competences: This course offers an introduction to the main contents of polynomial time algorithmswith worst-case performance guarantees for NP-hard optimization problems.		
Conditions: Module Introduction to Optimization (MTH-1140) - recommended		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: irregular	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Approximationsalgorithmen **Mode of Instruction:** lecture **Language:** German / English **Contact Hours:** 2 **ECTS Credits:** 4.0
Literature: Die Vorlesung wird u.a. einige Kapitel aus folgendem Buch behandeln. Williamson/Shmoys. The design of approximation algorithms (Download unter http://www.designofapproxalgs.com/ möglich)
Examination **MTH-2222 Approximationsalgorithmen** module exam, Die genaue Prüfungsform wird in der jeweiligen Veranstaltung bekannt gegeben

Module MTH-2510: Advanced Methods in Machine Learning *Advanced Methods in Machine Learning*		3 ECTS/LP
Version 1.0.0 (since WS20/21) Person responsible for module: Prof. Dr. Gernot Müller		
Learning Outcomes / Competences: Verständnis von weiterführenden Konzepten des Machine Learnings. Fähigkeit, diese Konzepte auf Datensätze anzuwenden und die Ergebnisse zu interpretieren.		
Workload: Total: 90 h 1 h exercise course (attendance) 1 h lecture (attendance)		
Conditions: Stochastik I, Stochastik II		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: every 3rd semester	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Advanced Methods in Machine Learning

Mode of Instruction: lecture + exercise
Lecturers: Prof. Dr. Gernot Müller
Language: German / English
Contact Hours: 2
ECTS Credits: 3.0

Contents:

Erklärbarkeit, verbundenes Lernen, sowie andere weiterführende Themen

Literature:

Aktuelle Veröffentlichungen zum Thema Machine Learning, insbesondere zur Erklärbarkeit und zu verbundenem Lernen

Examination

Advanced Methods in Machine Learning

module exam, Mündliche Prüfung à 30 Minuten oder Klausur à 60 Minuten / length of examination: 60 minutes

Module MTH-2511: Advanced Methods in Machine Learning II *Advanced Methods in Machine Learning II*	3 ECTS/LP

Version 1.0.0 (since WS21/22)
Person responsible for module: Prof. Dr. Gernot Müller

Learning Outcomes / Competences:
Verständnis von weiterführenden Konzepten des Machine Learnings.
Fähigkeit, diese Konzepte auf Datensätze anzuwenden und die Ergebnisse zu interpretieren.

Workload:
Total: 90 h
1 h exercise course (attendance)
1 h lecture (attendance)

Conditions: Stochastik I, Stochastik II, AMML (MTH-2510)		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: every 3rd semester	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Advanced Methods in Machine Learning II
Mode of Instruction: lecture + exercise
Lecturers: Prof. Dr. Gernot Müller
Language: German / English
Contact Hours: 2
ECTS Credits: 3.0

Contents:
Erklärbarkeit, verbundenes Lernen, sowie andere weiterführende Themen

Literature:
Aktuelle Veröffentlichungen zum Thema Machine Learning, insbesondere zur Erklärbarkeit und zu verbundenem Lernen

Examination
Advanced Methods in Machine Learning II
module exam, Mündliche Prüfung à 30 Minuten oder Klausur à 60 Minuten / length of examination: 60 minutes

Module MTH-2520: Algebraic groups and homogeneous spaces *Algebraic groups and homogeneous spaces*		9 ECTS/LP
Version 1.0.0 (since WS19/20) Person responsible for module: Prof. Dr. Maxim Smirnov		
Workload: Total: 270 h 4 h lecture (attendance) 2 h exercise course (attendance)		
Conditions: none		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: irregular	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Algebraic groups and homogeneous spaces **Language:** English **Contact Hours:** 6 **ECTS Credits:** 9.0

Examination
Algebraic groups and homogeneous spaces oral exam / length of examination: 30 minutes

Module MTH-2590: Topics in Galois Fields *Topics in Galois Fields*		9 ECTS/LP
Version 1.0.0 (since WS21/22) Person responsible for module: apl. Prof. Dr. Dirk Hachenberger		

Contents:

1. Algebraic and number theoretical foundation
2. Multiplicative group, existence and uniqueness
3. Mappings for extensions of finite fields and normal bases
4. The algebraic closure of a finite field
5. Irreducible polynomials over finite fields
6. Factorization of univariate polynomials over finite fields
7. Nomal bases and cyclotomic modules
8. Characters, Gauss sums and the DFT
9. Primitive normal bases
10. Basis representation and arithmetics
11. Primitive elements in affine hyperplanes

Learning Outcomes / Competences:
"Finite fields" (resp. "Galois fields") belong to the fundamental structures which play an important role in modern applications, such as Coding Theory, Cryptography or Signal processing. After establishing the classical results on finite fields, our focus will be on developments from the last 25 years.

Remarks:
Concerning the contents, the previous modules MTH-2240 and MTH-2490 are nearly identical to MTH-2590. It is therefore possible to earn credit points only for one of these modules.

Conditions: Linear Algebra; foundations of Algebra, Combinatorics and elementary Number Theory.		**Credit Requirements:** This module can only be credited, when module MTH-2240 or module MTH-2490 have not already been credited.
Frequency: irregular	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Topics in Galois Fields: Lectures and Exercises
Mode of Instruction: lecture + exercise
Lecturers: apl. Prof. Dr. Dirk Hachenberger
Language: English
Contact Hours: 6
ECTS Credits: 9.0

Learning Outcome:
"Finite fields" (resp. "Galois fields") belong to the fundamental structures which play an important role in modern applications, such as Coding Theory, Cryptography or Signal processing. After establishing the classical results on finite fields, our focus will be on developments from the last 25 years.

Contents:

1. Algebraic and number theoretical foundation
2. Multiplicative group, existence and uniqueness
3. Mappings for extensions of finite fields and normal bases
4. The algebraic closure of a finite field
5. Irreducible polynomials over finite fields
6. Factorization of univariate polynomials over finite fields
7. Nomal bases and cyclotomic modules
8. Characters, Gauss sums and the DFT
9. Primitive normal bases
10. Basis representation and arithmetics
11. Primitive elements in affine hyperplanes

Literature:

Dirk Hachenberger and Dieter Jungnickel, Topics in Galois Fields, Springer Nature Switzerland, Cham, 2020.

Examination

Topics in Galois Fields

term paper

Module MTH-2640: Category Theory *Kategorientheorie*	9 ECTS/LP
Version 1.0.0 (since WS17/18) Person responsible for module: Prof. Dr. Marc Nieper-Wißkirchen	

Contents:

- Mengentheoretische Grundlagen
- Kategorien, Funktoren, natürliche Transformationen
- Beispiele
- Limiten und Kolimiten
- Adjungierte Funktoren
- Kan-Erweiterungen
- Enden und Koenden
- Monoidale Kategorien
- Lokalisierung von Kategorien
- Anwendungen

Learning Outcomes / Competences:

Die Studenten haben einen Überblick über die wesentlichen Konzepte der Kategorientheorie gewonnen. Sie erkennen in anderen Teilgebieten der Mathematik universelle Konstruktionen und können die Kategorientheorie gewinnbringend in anderen Disziplinen einbringen. Sie nehmen Kategorien weiter als algebraische Objekte wahr, die Invarianten anderer Strukturen sein können. Die Studenten verstehen schließlich die grundlagentheoretischen Probleme, die sich durch einen zu naiven Begriff einer Menge ergeben, und haben Anwendungen außerhalb der Mathematik, z.B. in der theoretischen Informatik gesehen.

Conditions:	**Credit Requirements:**
Zur erfolgreichen Belegung des Moduls benötigen die Teilnehmer lediglich eine gewisse mathematische Reife und das Interesse, sich mit abstrakten Strukturen zu beschäftigen.	Bestehen der Modulprüfung

Frequency: irregular	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Kategorientheorie

Mode of Instruction: lecture

Language: German / English

Part of the Module: Übungen zur Kategorientheorie

Mode of Instruction: exercise course

Language: German / English

Examination

Modulprüfung

portfolio exam

Description:

Es sind schriftliche Übungsaufgaben zu bearbeiten, mündlich an der Tafel vorzurechnen und am Ende eine kurze mündliche Prüfung zu bestehen.

Module MTH-2650: Homotopy Type Theory *Homotopietypentheorie*		9 ECTS/LP
Version 1.0.0 Person responsible for module: Prof. Dr. Marc Nieper-Wißkirchen		
Contents: Zunächst wird mathematisches Arbeiten innerhalb einer intuitionistischen Typentheorie vermittelt. Dabei wird ein besonderer Fokus auf den Gleichheitsbegriff gelegt. Gleichheit in elementaren Typen wird charakterisiert. Homotopietheoretische Begriffe, das Univalenzaxiom und Beispiele von höheren induktiven Typen werden eingeführt. Diese Homotopietheoretische Erweiterung der Typentheorie wird eingesetzt, um ausgewählte Homotopiegruppen zu berechnen und abstrakte Varianten klassischer Resultate der algebraischen Topologie zu beweisen.		
Learning Outcomes / Competences: * Mathematisches Argumentieren und Beweisen in einer abhängigen Typentheorie. Diese Kenntnisse sind eine Grundlage für die Verwendung der meisten computergestützten Beweisassistenzsysteme. * Grundlegendes Verständnis für Fragestellungen und Techniken der abstrakten Homotopietheorie. Die gewonnenen Vorstellungen sind übertragbar auf andere Herangehensweisen wie etwa höhere Kategorientheorie. * Anwendung von Univalenz und höheren Induktiven Typen auf homotopietheoretische Probleme. Ein Studium fortgeschrittener Themen der Homotopietypentheorie ist damit möglich.		
Conditions: Erfahrung mit abstrakter Mathematik, wie sie etwa im Rahmen von einführenden Modulen der Bereiche Topologie und Algebra erlangt werden kann. Elementare Kenntnisse in diesen Bereichen sind hilfreich, aber nicht erforderlich.		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: irregular	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Homotopietypetheorie
Mode of Instruction: lecture
Language: German / English
Contact Hours: 4

Part of the Module: Übungen zur Homotopietypentheorie
Mode of Instruction: exercise course
Language: German / English
Contact Hours: 2

Examination
Modulprüfung
portfolio exam

Module MTH-2710: Homotopical Algebra *Homotopische Algebra*		18 ECTS/LP
Version 1 Person responsible for module: Prof. Dr. Marc Nieper-Wißkirchen		
Conditions: none		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: irregular	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
	Repeat Exams Permitted: according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Homotopische Algebra I **Language:** German / English
Assigned Courses: **Homotopische Algebra II (Unendlich-Kategorien)** (lecture)

Examination
Homotopische Algebra module exam

Module MTH-3000: Topics in Geometry *Spezielle Kapitel der Geometrie*			6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Kai Cieliebak			
Contents: Advanced topics such as fibre bundles, gauge theory, or characteristic classes.			
Learning Outcomes / Competences: Independent work with scientific literature, scientific reasoning, problem solving, presentation of results.			
Remarks: The modules MTH-3000 and MTH-3001 are mutually exclusive.			
Workload: 2 h lecture (attendance)			
Conditions: An advanced lecture on geometry or algebra such as Einführung in die Geometrie, Differentialtopologie, Differentialgeometrie, Kommutative Algebra		**Credit Requirements:** Passing the module exam. Exclusion condition: This module may not be brought in, if the module MTH-3001 has already been taken!	
Frequency: irregular	**Recommended Semester:** 1. - 3.	**Minimal Duration of the Module:** semester[s]	
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Spezielle Kapitel der Geometrie **Language:** German / English **Contact Hours:** 2 **ECTS Credits:** 6.0
Examination **Spezielle Kapitel der Geometrie** oral exam / length of examination: 20 minutes

Module MTH-3240: Morse Homology *Morse Homologie*		9 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Urs Frauenfelder		
Contents: Morse functions, Gradient flow equation, Fredholm theory		
Workload: Total: 270 h		
Conditions: none		**Credit Requirements:** passing the module exam
Frequency: irregular	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Morse Homologie **Language:** German / English **Contact Hours:** 6 **ECTS Credits:** 9.0
Contents: Morse-Funktionen, Gradientenflussgleichung, Fredholmtheorie
Examination **Morse Homologie** oral exam / length of examination: 30 minutes

Module MTH-3250: Complex Geometry *Komplexe Geometrie*		9 ECTS/LP
Version 1.0.0 (since WS16/17) Person responsible for module: Prof. Dr. Marc Nieper-Wißkirchen		
Workload: Total: 270 h		
Conditions: none		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: irregular	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Komplexe Geometrie **Language:** German

Parts of the Module
Part of the Module: Complex Geometry **Language:** English / German **Contact Hours:** 6 **ECTS Credits:** 9.0
Literature: Phillip Griffiths/Joseph Harris: Principles of Algebraic Geometry Daniel Huybrechts: Complex Geometry - An Introduction Claire Voisin: Hodge Theory and Complex Algebraic Geometry I Raymond Wells: Differential Analysis on Complex Manifolds
Examination **Komplexe Geometrie** portfolio exam

Module MTH-3270: Algebraic K-Theory *Algebraische K-Theorie*			3 ECTS/LP
Version 1.0.0 (since SoSe17) Person responsible for module: Prof. Dr. Wolfgang Steimle			
Learning Outcomes / Competences: The participants learn the basic definitions and theorems in algebraic K-theory. Some applications to geometry and algebra will be discussed.			
Workload: Total: 90 h			
Conditions: Keine.			**Credit Requirements:** Bestehen der Modulprüfung
Frequency: irregular	**Recommended Semester:** 1. - 4.		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Algebraische K-Theorie **Language:** German / English **Contact Hours:** 2 **ECTS Credits:** 3.0
Learning Outcome: Die Studenten lernen grundlegende Definitionen und Resultate aus der algebraischen K-Theorie und einige Anwendungen in der Geometrie und Algebra kennen. The participants learn the basic definitions and theorems in algebraic K-theory. Some applications to geometry and algebra will be discussed.

Examination
Algebraische K-Theorie module exam, Die Prüfungsform wird in der jeweiligen Veranstaltung bekannt gegeben.

Module MTH-3280: Nonlinear Functional Analysis *Nonlinear Functional Analysis*		9 ECTS/LP
Version 1.0.0 (since WS17/18) Person responsible for module: Prof. Dr. Kai Cieliebak		
Contents: This course is an introduction to nonlinear functional analysis and its applications. It covers the following topics: Banach manifolds, nonlinear Fredholm operators, implicit function theorem, Sard-Smale theorem, Leray-Schauder degree, Frechet manifolds, Nash-Moser implicit function theorem, scaled Banach spaces, applications to ordinary and partial differential equations.		
Learning Outcomes / Competences: Learning about the basic techniques of nonlinear functional analysis and their applications to differential equations.		
Workload: Total: 270 h 270 h lecture and exercise course (attendance)		
Conditions: Module Funktionalanalysis (MTH-1100)		**Credit Requirements:** Passing the module exam
Frequency: as needed	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module
Part of the Module: Nonlinear Functional Analysis **Mode of Instruction:** lecture + exercise **Lecturers:** Prof. Dr. Kai Cieliebak **Language:** English / German **Contact Hours:** 6 **ECTS Credits:** 9.0
Learning Outcome: Learning about the basic techniques of nonlinear functional analysis and their applications to differential equations.
Contents: This course is an introduction to nonlinear functional analysis and its applications. It covers the following topics: Banach manifolds, nonlinear Fredholm operators, implicit function theorem, Sard-Smale theorem, Leray-Schauder degree, Frechet manifolds, Nash-Moser implicit function theorem, scaled Banach spaces, applications to ordinary and partial differential equations.
Literature: K. Deimling, Nonlinear Functional Analysis
Examination **Nonlinear Functional Analysis** oral exam / length of examination: 30 minutes

Module MTH-3290: Introduction to Celestial Mechanics *Einführung in die Himmelsmechanik*		3 ECTS/LP
Version 1.1.1 (since WS17/18) Person responsible for module: Prof. Dr. Urs Frauenfelder		
Contents: Newton equations, Conserved quantities, Restricted Three-Body problem, Regularizations, Special solutions		
Conditions: none		**Credit Requirements:** passing the module exam
Frequency: irregular	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** any	

Parts of the Module
Part of the Module: Einführung in die Himmelsmechanik **Mode of Instruction:** lecture **Lecturers:** Prof. Dr. Urs Frauenfelder **Language:** English / German **Contact Hours:** 2 **ECTS Credits:** 3.0
Examination **Himmelsmechanik Einführung in die Himmelsmechanik** individual oral exam

Module MTH-3560: Ausgewählte Kapitel der Variationsrechnung		9 ECTS/LP
Version 1.0.0 (since WS18/19) Person responsible for module: Prof. Dr. Bernd Schmidt		
Learning Outcomes / Competences: Die Student(inn)en kennen moderne Zugänge zu freien Randwertproblemen, insbesondere die Theorie der Funktionen von beschränkter Variation in mehreren Dimensionen. Sie sind in der Lage, aufbauend auf den Inhalten der Vorlesung, Forschungsliteratur in diesem Gebiet zu lesen, sich selbstständig in weiterführende Aspekte einzuarbeiten sowie die erlernte Theorie in anwendungsorientierten Problemen einzusetzen.		
Workload: Total: 270 h 2 h exercise course (attendance) 4 h lecture (attendance)		
Conditions: none		**Credit Requirements:** Bestehen der Modulprüfung
Frequency:	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Ausgewählte Kapitel der Variationsrechnung

Language: German / English
Frequency: irregular
Contact Hours: 6
ECTS Credits: 9.0

Literature:

Luigi Ambrosio, Nicola Fusco, and Diego Pallara. Functions of bounded variation and free discontinuity problems. Oxford Mathematical Monographs. The Clarendon Press, Oxford University Press, New York, 2000.

Lawrence C. Evans and Ronald F. Gariepy. Measure theory and fine properties of functions. Textbooks in Mathematics. CRC Press, Boca Raton, FL, revised edition, 2015.

Herbert Federer. Geometric measure theory. Die Grundlehren der mathematischen Wissenschaften, Band 153. Springer-Verlag New York Inc., New York, 1969.

Examination

Ausgewählte Kapitel der Variationsrechnung

portfolio exam

Module MTH-3570: Reading Course Dynamical Systems *Lesekurs Dynamische Systeme*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Dirk Blömker		
Contents: Students will gain an in-depth knowledge of current research topics in dynamical systems and at the same time a sound introduction to modern qualitative theory.		
Learning Outcomes / Competences: You will achieve the competence to work independently on advanced subject areas and current research topics. research topics. Integrated acquisition of key qualifications: Self-study of English-language scientific literature, scientific work, conducting scientific discussions and presenting mathematical theories.		
Conditions: Some knowledge of dynamic systems		**Credit Requirements:** presentation and/or oral exam
Frequency: irregular	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Lesekurs Dynamische Systeme **Mode of Instruction:** **Language:** German **Contact Hours:** 2 **ECTS Credits:** 6.0

Examination
Lesekurs portfolio exam, Vortrag und aktive Mitarbeit / length of examination: 90 minutes

Module MTH-3590: Computational uncertainty quantification for partial differential equations *Numerische Methoden für partielle Differentialgleichungen mit Unsicherheiten*		9 ECTS/LP
Version 1.0.0 Person responsible for module: Prof. Dr. Daniel Peterseim		
Learning Outcomes / Competences: Tieferes Verständnis der Unsicherheitsquantifizierung bei partiellen Differentialgleichungen mit Unsicherheiten in ihren wichtigsten Ausprägungen; Zusammenhänge sowie Vor- und Nachteile der Methoden, auch in Hinblick auf die Anwendung auf konkrete Probleme; Verständnis der Problematik hochdimensionaler Probleme sowie grundlegender Lösungsansätze; Komplexe Algorithmik; integrierter Erwerb von Schlüsselqualifikationen: Die Studierenden lernen in Kleingruppen, Problemstellungen präzise zu definieren, numerische Lösungsstrategien zu entwickeln und deren Tauglichkeit abzuschätzen, dabei wird die soziale Kompetenz zur Zusammenarbeit im Team weiterentwickelt.		
Workload: Total: 270 h 2 h exercise course (attendance) 4 h lecture (attendance)		
Conditions: Empfohlen: Numerik partieller Differentialgleichungen		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: irregular	**Recommended Semester:** 1. - 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Numerische Methoden für partielle Differentialgleichungen mit Unsicherheiten

Language: English / German

Contact Hours: 6

ECTS Credits: 9.0

Contents:

Grundlagen der Theorie partieller Differentialgleichungen mit Unischerheiten;

Approximationstheorie und Numerik hochdimensionaler Probleme;

Monte-Carlo-Methoden, stochastische Kollokations- und Galerkin-Methoden, Momentenmethode, Bayessche Methoden

Literature:

R.G. Ghanem, P.D. Spanos: Stochastic finite elements: a spectral approach. Springer-Verlag, 1991

O.P. Le Maître, O.M. Knio: Spectral methods for uncertainty quantification. Springer, 2010

M.B. Giles: Multilevel Monte Carlo methods, Acta Numerica 24 (2015), 259–328

T.J. Sullivan: Introduction to uncertainty quantification, Springer, 2015

Assigned Courses:

Numerische Methoden für partielle Differentialgleichungen mit Unsicherheiten (lecture + exercise)

Examination

MTH-3590 Numerische Methoden für partielle Differentialgleichungen mit Unsicherheiten

portfolio exam

Description:

Die genauen Prüfungsmodalitäten werden am Anfang der Vorlesung bekannt gegeben.

Module MTH-3610: Complements on analysis *Ergänzungen zu Analysis*			6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Malte Peter			
Learning Outcomes / Competences: Das Ergänzungsmodul dient der gezielten Einarbeitung in Grundlagen der analytischen Themengebiete bzw. des analytischen Themenumfeldes der mathematischen Wahlpflicht- und Wahlmodule der Modulgruppen B1 bis B7 bzw. E.			
Workload: Total: 180 h			
Conditions: none			**Credit Requirements:** Bestehen der Modulprüfung
Frequency: as needed	**Recommended Semester:** 1. - 2.		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** any		

Parts of the Module

Part of the Module: Ergänzungen zu Analysis
Language: English / German
Contact Hours: 4
ECTS Credits: 6.0

Examination
Ergänzungen zu Analysis
oral exam / length of examination: 15 minutes, not graded

Module MTH-3620: Complements on functional analysis/partial differential equations *Ergänzungen zu Funktionalanalysis/Partielle Differentialgleichungen*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Malte Peter		
Learning Outcomes / Competences: Das Ergänzungsmodul dient der gezielten Einarbeitung in Grundlagen der funktionalanalytischen Themengebiete bzw. des funktionalanalytischen Themenumfeldes mit Bezug zu partiellen Differentialgleichungen der mathematischen Wahlpflicht- und Wahlmodule der Modulgruppen B1 bis B7 bzw. E.		
Workload: Total: 180 h		
Conditions: none		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: as needed	**Recommended Semester:** 1. - 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** any	

Parts of the Module
Part of the Module: Ergänzungen zu Funktionalanalysis/Partielle Differentialgleichungen **Language:** English / German **Contact Hours:** 4 **ECTS Credits:** 6.0

Examination
Ergänzungen zu Funktionalanalysis/Partielle Differentialgleichungen oral exam / length of examination: 15 minutes, not graded

Module MTH-3630: Complements on stochastics *Ergänzungen zu Stochastik*			6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Malte Peter			
Learning Outcomes / Competences: Das Ergänzungsmodul dient der gezielten Einarbeitung in Grundlagen der stochastischen Themengebiete bzw. des stochastischen Themenumfeldes der mathematischen Wahlpflicht- und Wahlmodule der Modulgruppen B1 bis B7 bzw. E.			
Workload: Total: 180 h			
Conditions: none			**Credit Requirements:** Bestehen der Modulprüfung
Frequency: as needed	**Recommended Semester:** 1. - 2.		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** any		

Parts of the Module

Part of the Module: Ergänzungen zu Stochastik

Language: English / German

Contact Hours: 4

ECTS Credits: 6.0

Examination

Ergänzungen zu Stochastik

oral exam / length of examination: 15 minutes, not graded

Module MTH-3640: Complements on numerics *Ergänzungen zu Numerik*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Malte Peter		
Learning Outcomes / Competences: Das Ergänzungsmodul dient der gezielten Einarbeitung in Grundlagen der numerischen Themengebiete bzw. des numerischen Themenumfeldes der mathematischen Wahlpflicht- und Wahlmodule der Modulgruppen B1 bis B7 bzw. E.		
Workload: Total: 180 h		
Conditions: none		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: as needed	**Recommended Semester:** 1. - 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** any	

Parts of the Module

Part of the Module: Ergänzungen zu Numerik
Language: English / German
Contact Hours: 4
ECTS Credits: 6.0

Examination
Ergänzungen zu Numerik
oral exam / length of examination: 15 minutes, not graded

Module PHM-0046: Theoretical Solid State Physics *Theoretische Festkörperphysik*	8 ECTS/LP

Version 2.1.0 (since WS16/17)
Person responsible for module: Prof. Dr. Liviu Chioncel

Contents:

- Kristallstruktur, reziprokes Gitter
- Nichtwechselwirkende Elektronen im periodischen Potential: Bloch-Theorem, Störungstheorie, stark gebundene Elektronen
- Semiklassische Dynamik von Blochelektronen: Zener-Durchbruch, Semiklassik im konstanten Magnetfeld, Drude-Theorie, Diffusion
- Gitterdynamik: Born-Oppenheimer-Näherung, Phononen, Debye- und Einstein-Modell
- Elektron-Elektron-Wechselwirkung: Hartree-Fock-Näherung, Dichtefunktionaltheorie, Abschirmung
- Formalismus der zweiten Quantisierung

Learning Outcomes / Competences:

- Die Studierenden kennen die Grundlagen und Methoden der quantentheoretischen Beschreibung von Festkörpern und ihren Eigenschaften im Rahmen nicht wechselwirkender Vielteilchensysteme bzw. effektiver Einteilchentheorien,
- sind in der Lage, physikalische Fragestellungen der Festkörperphysik theoretisch zu formulieren und durch Anwendung geeigneter Näherungsmethoden zu untersuchen,
- haben die Fähigkeit, Problemstellungen in den genannten Teilgebieten selbständig zu bearbeiten.
- Integrierter Erwerb von Schlüsselqualifikationen: eigenständiges Arbeiten mit englischsprachiger Fachliteratur, Erfassen komplexer Zusammenhänge und deren modellhafte Darstellung mit Hilfe mathematischer Strukturen, Methodenkompetenz

Workload:
Total: 240 h
30 h studying of course content using provided materials (self-study)
90 h studying of course content through exercises / case studies (self-study)
30 h studying of course content using literarture (self-study)
90 h lecture and exercise course (attendance)

Conditions: Das Modul baut insbesondere auf den Inhalten der Bachelor-Vorlesungen Theoretische Physik II + III und Physik IV auf.		
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Theoretische Festkörperphysik
Mode of Instruction: lecture
Language: German
Contact Hours: 4

Learning Outcome:
siehe Modulbeschreibung

Contents:
siehe Modulbeschreibung

Literature:

- N. W. Ashcroft and N. D. Mermin, Solid State Physics (Rinehart and Winston)
- J. Callaway, Quantum Theory of the Solid State (Academic)
- P. Coleman, Introduction to Many Body Physics (Cambridge)
- P. Fulde, Electron Correlations in Molecules and Solids (Springer)
- G. Giuliani and G. Vignale, Quantum Theory of the Electron Liquid (Cambridge)
- C. Kittel, Quantum Theory of Solids (Wiley)
- P. L. Taylor and O. Heinonen, A Quantum Approach to Condensed Matter Physics (Cambridge)
- J. M. Ziman, Prinzipien der Festkörpertheorie (Harri Deutsch)

Part of the Module: Übung zu Theoretische Festkörperphysik

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

Learning Outcome:

siehe Modulbeschreibung

Examination

Theoretische Festkörperphysik

written exam / length of examination: 150 minutes

Description:

Ausnahme WS 20/21: Prüfungsform mündliche Prüfung

siehe Anlage 1a der Corona-Satzung

Module PHM-0048: Physics and Technology of Semiconductor Devices *Physics and Technology of Semiconductor Devices*		6 ECTS/LP
Version 1.0.0 (since WS09/10) Person responsible for module: apl. Prof. Dr. Helmut Karl		
Contents: 1. Basic properties of semiconductors (electronic bandstructure, doping, carrier excitations and carrier transport) 2. Semiconductor diodes and transistors 3. Semiconductor technology		
Learning Outcomes / Competences: • Basic knowledge of solid-state and semiconductor physics such as electronic bandstructure, doping, carrier excitations, and carrier transport. • Application of developed concepts (effective mass, quasi-Fermi levels) to describe the basic properties of semiconductors. • Application of these concepts to describe and understand the operation principles of semiconductor devices such as diodes and transistors • Knowledge of the technologically relevant methods and tools in semiconductor micro- and nanofabrication. • Integrated acquisition of soft skills: autonomous working with specialist literature in English, acquisition of presentation techniques, capacity for teamwork, ability to document experimental results, and interdisciplinary thinking and working.		
Workload: Total: 180 h 20 h studying of course content using provided materials (self-study) 20 h studying of course content using literarture (self-study) 80 h studying of course content through exercises / case studies (self-study) 60 h lecture and exercise course (attendance)		
Conditions: recommended prerequisites: basic knowledge in solid state physics, statistical physics and quantum mechanics.		
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Physics and Technology of Semiconductor Devices **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 3
Learning Outcome: see module description
Contents: see module description

Literature:

- Yu und Cardona: Fundamentals of Semiconductors (Springer)
- Sze: Physics of Semiconductor Devices (Wiley)
- Sze: Semiconductor Devices (Wiley)
- Madelung: Halbleiterphysik (Springer)
- Singh: Electronic and Optoelectronic Properties of Semiconductor Structures (Cambridge University Press)

Assigned Courses:

Physics and Technology of Semiconductor Devices (lecture)

Part of the Module: Physics and Technology of Semiconductor Devices (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Contents:

see module description

Assigned Courses:

Physics and Technology of Semiconductor Devices (Tutorial) (exercise course)

Examination

Physics and Technology of Semiconductor Devices

written exam / length of examination: 90 minutes

Examination Prerequisites:

Physics and Technology of Semiconductor Devices

Module PHM-0049: Nanostructures / Nanophysics *Nanostructures / Nanophysics*	6 ECTS/LP

Version 1.2.0 (since WS09/10)
Person responsible for module: Prof. Dr. István Kézsmárki

Contents:

1. Semiconductor quantum wells, wires and dots, low dimensional electron systems
2. Magnetotransport in low-dimensional systems, Quantum-Hall-Effect, Quantized conductance
3. Optical properties of nanostructures and their application in modern optoelectonic devices, Nanophotonics
4. Fabrication and detection techniques of nanostructures
5. Ferroic properties of nanostructures (Ferroelectricity, Magnetism, Multiferroicity)

Learning Outcomes / Competences:

- The students gain basic knowledge of the fundamental concepts in modern nanoscale science.
- The students have detailed knowledge of low-dimensional semiconductor structures and how these systems can be applied for novel functional devices for high-frequency electronics and optoelectronics
- The students gain competence in selecting different fabrication and characterization approaches for specific nanostructures.
- The students are able apply these concepts to tackle present problems in nanophysics.
- The students acquire scientific skills to search for scientific literature and to evaluate scientific content.

Workload:
Total: 180 h
80 h studying of course content through exercises / case studies (self-study)
20 h studying of course content using literarture (self-study)
60 h lecture and exercise course (attendance)
20 h studying of course content using provided materials (self-study)

Conditions:
recommended prerequisites: basic knowledge in solid-state physics and quantum
mechanics.

Frequency: each summer semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Nanostructures / Nanophysics
Mode of Instruction: lecture
Language: English
Contact Hours: 4

Learning Outcome:
see module description

Contents:
see module description

Literature:

- Yu und Cardona: Fundamentals of Semiconductors
- Singh:Electronic and Optoelectronic Properties of Semiconductor Structures (Cambridge University Press)
- Davies: The Physics of low-dimensional Semiconductors (Cambridge University Press)

Assigned Courses:

Nanostructures / Nanophysics (lecture)

Examination

Nanostructures / Nanophysics

oral exam / length of examination: 30 minutes

Examination Prerequisites:

Nanostructures / Nanophysics

Module PHM-0050: Electronics for Physicists and Materials Scientists *Electronics for Physicists and Materials Scientists*	6 ECTS/LP

Version 1.0.0 (since WS09/10)
Person responsible for module: Andreas Hörner

Contents:

1. Basics in electronic and electrical engineering
2. Quadrupole theory
3. Analog technique, transistor and opamp circuits
4. Boolean algebra and logic
5. Digital electronics and calculation circuits
6. Microprocessors and Networks
7. Basics in Electronic
8. Implementation of transistors
9. Operational amplifiers
10. Digital electronics

Learning Outcomes / Competences:
The students:

- know the basic terms, concepts and phenomena of electronic and electrical engineering for the use in the Lab,
- have skills in easy circuit design, measuring and control technology, analog and digital electronics,
- have expertise in independent working on circuit problems. They can calculate and develop easy circuits.
- Integrated acquirement of soft skills: autonomous working with specialist literature in English, acquisition of presentation techniques, capacity for teamwork, ability to document experimental results, and interdisciplinary thinking and working.

Workload:
Total: 180 h
60 h lecture and exercise course (attendance)
20 h studying of course content using provided materials (self-study)
20 h studying of course content using literarture (self-study)
80 h studying of course content through exercises / case studies (self-study)

Conditions: none		
Frequency: each semester	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Electronics for Physicists and Materials Scientists
Mode of Instruction: lecture
Language: English
Contact Hours: 4

Learning Outcome:
see module description

Contents:
see module description

Literature:

- Paul Horowitz: The Art of Electronics (Cambridge University Press)
- National Instruments: MultiSim software package (available in the lecture)

Examination

Electronics for Physicists and Materials Scientists

oral exam / length of examination: 30 minutes

Examination Prerequisites:

Electronics for Physicists and Materials Scientists

Module PHM-0051: Biophysics and Biomaterials *Biophysics and Biomaterials*		6 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Dr. Stefan Thalhammer Westerhausen, Christoph, Dr.		
Contents: • Transcription and translation • Membranes • DNA and proteins • Enabling technologies • Microfluidics • Radiation Biophysics		
Learning Outcomes / Competences: The students know: · basic terms, concepts and phenomena of biological physics · models of the (bio)polymer-theory, microfluidics, radiation biophysics, nanobiotechnology, sequencing strategies, membranes and proteins The students obtain skills · for independent processing of problems and dealing with current literature. · to translate a biological observation into a physical question. The students improve the key competences: · self-dependent working with English specialist literature. · processing and interpretation of experimental data. · interdisciplinary thinking and working.		
Workload: Total: 180 h 60 h lecture and exercise course (attendance) 20 h studying of course content using provided materials (self-study) 80 h studying of course content through exercises / case studies (self-study) 20 h studying of course content using literarture (self-study)		
Conditions: Mechanics, Thermodynamics, Statistical Physics		
Frequency: each semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Biophysics and Biomaterials **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 3

Learning Outcome:

See module description.

Contents:

- Radiation Biophysics
  - Radiation sources
  - Interaction of radiation with biological matter
  - Radiation protection principles
  - Low dose radiation
  - LNT model in radiation biophysics
- Microfluidics
  - Life at Low Reynolds Numbers
  - The Navier-Stokes Equation
  - Low Reynolds Numbers – The Stokes Equation
  - Breaking the Symmetry
- Membranes
  - Thermodynamics and Fluctuations
  - Thermodynamics of Interfaces
  - Phase Transitions – 2 state model
  - Lipid membranes and biological membranes, membrane elasticity
- Membranal transport
  - Random walk, friction and diffusion
  - Transmembranal ionic transport and ion channels
  - Electrophysiology of cells
  - Neuronal Dynamics

Literature:

- T. Herrmann, Klinische Strahlenbiologie – kurz und bündig, Elsevier Verlag, ISBN-13: 978-3-437-23960-1
- J. Freyschmidt, Handbuch diagnostische Radiologie – Strahlenphysik, Strahlenbiologie, Strahlenschutz, Springer Verlag, ISBN: 3-540-41419-3
- S. Haeberle, R. Zengerle, Microfluidic platforms for lab-on-a-chip applications, Lab-on-a-chip, 2007, 7, 1094-1110
- J. Berthier, Microdrops and digital microfluidics, William Andrew Verlag, ISBN:978-0-8155-1544-9
- lecture notes

Assigned Courses:

Biophysics and Biomaterials (lecture)

Part of the Module: Biophysics and Biomaterials (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Contents:

See module description.

Assigned Courses:

Biophysics and Biomaterials (Tutorial) (exercise course)

Examination

Biophysics and Biomaterials

written exam / length of examination: 90 minutes

Examination Prerequisites:

Biophysics and Biomaterials

Module PHM-0052: Solid State Spectroscopy with Synchrotron Radiation and Neutrons *Solid State Spectroscopy with Synchrotron Radiation and Neutrons*		6 ECTS/LP
Version 1.2.0 (since WS09/10) Person responsible for module: Prof. Dr. Christine Kuntscher		

Contents:

1. Electromagnetic radiation: description, generation, detection [5]
2. Spectral analysis of electromagnetic radiation: monochromators, spectrometer, interferometer [2]
3. Excitations in the solid state: Dielectric function [2]
4. Infrared spectroscopy
5. Ellipsometry
6. Photoemission spectroscopy
7. X-ray absorption spectroscopy
8. Neutrons: Sources, detectors
9. Neutron scattering

Learning Outcomes / Competences:

The students:

- know the basics of spectroscopy and important instrumentation and methods,
- have acquired the skills of formulating a mathematical-physical ansatz in spectroscopy and can apply these in the field of solid state spectroscopy,
- have the competence to deal with current problems in solid state spectroscopy autonomously, and are able to judge proper measurement methods for application.
- Integrated acquirement of soft skills.

Workload:

Total: 180 h
20 h studying of course content using literarture (self-study)
20 h studying of course content using provided materials (self-study)
60 h lecture and exercise course (attendance)
80 h studying of course content through exercises / case studies (self-study)

Conditions: basic knowledge in solid-state physics		
Frequency: annually	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Solid State Spectroscopy with Synchrotron Radiation and Neutrons

Mode of Instruction: lecture
Language: English
Contact Hours: 3

Learning Outcome:

see module description

Contents:

see module description

Literature:

- H. Kuzmany, Solid State Spectroscopy (Springer)
- N. W. Ashcroft, N. D. Mermin, Solid State Physics (Holt, Rinehart and Winston)
- J. M. Hollas, Modern Spectroscopy

Assigned Courses:

Solid State Spectroscopy with Synchrotron Radiation and Neutrons (lecture)

Part of the Module: Solid State Spectroscopy with Synchrotron Radiation and Neutrons (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Assigned Courses:

Solid State Spectroscopy with Synchrotron Radiation and Neutrons (Tutorial) (exercise course)

Examination

Solid State Spectroscopy with Synchrotron Radiation and Neutrons

oral exam / length of examination: 30 minutes

Examination Prerequisites:

Solid State Spectroscopy with Synchrotron Radiation and Neutrons

Module PHM-0053: Chemical Physics I *Chemical Physics I*	6 ECTS/LP

Version 1.0.0 (since WS09/10)
Person responsible for module: Prof. Dr. Wolfgang Scherer

Contents:

- Basics of quantum chemical methods
- Molecular symmetry and group theory
- The electronical structure of transition metal complexes

Learning Outcomes / Competences:

The students:

- know the basics of the extended-Hückel-method and the density functional theory,
- know the basics of group theory,
- are able to apply the knowledge gained through consideration of symmetry from vibration-, NMR-, and UV/VIS-spectroscopy, and
- are able to interpret and predict the basical geometric, electronical and magnetical properties of transition metal complexes.
- Integrated acquirement of soft skills: ability to specialize in a scientific topic and to apply the acquired knowledge for solving scientific problems.

Remarks:

It is possible for students to do EHM calculations autonomously and analyze electronical structures of molecules on a computer cluster within the scope of the tutorial.

Workload:

Total: 180 h
20 h studying of course content using literarture (self-study)
80 h studying of course content through exercises / case studies (self-study)
20 h studying of course content using provided materials (self-study)
60 h lecture and exercise course (attendance)

Conditions:

It is recommended to complete the experiments FP11 (IR-spectroscopy) and FP17 (Raman-spectroscopy) of the module "Physikalisches Fortgeschrittenenpraktikum".

Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Chemical Physics I
Mode of Instruction: lecture
Language: English
Contact Hours: 3

Learning Outcome:

see module description

Contents:

- Basics of quantum chemical methods
  - Extended Hueckel method (EHM)
  - Modern quantum chemical methods of chemical physics
  - Application: exemplary calculations and interpretation of simple electronical structures
- Molecular symmetry and group theory
  - Symmetry operations and matrix transformations
  - Point groups
  - Reducible and irreducible representations
  - Character tables
  - Application: infrared- and raman-spectroscopy, NMR-spectroscopy
- The electronical structure of transition metal complexes
  - Ligand field theory and angular-overlap model (AOM)
  - The physical basics of the spectrochemical series
  - Molecular orbital theory of transition metal complexes
  - Application: UV/VIS-spectroscopy, molecular magnetism

Literature:

- J. Reinhold, Quantentheorie der Moleküle (Teubner)
- H.-H. Schmidtke, Quantenchemie (VCH)
- D. C. Harris und M. D. Bertolucci, Symmetry and Spectroscopy (Dover Publications)
- D. M. Bishop, Group Theory and Chemistry (Dover Publications)
- J. K. Burdett, Chemical Bonds: A Dialog (Wiley)
- F. A. Kettle, Physical Inorganic Chemistry (Oxford University Press)
- A. Frisch, Exploring Chemistry with Electronic Structure Methods (Gaussian Inc. Pittsburg, PA)

Part of the Module: Chemical Physics I (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Examination

Chemical Physics I

written exam / length of examination: 90 minutes

Examination Prerequisites:

Chemical Physics I

Module PHM-0054: Chemical Physics II *Chemical Physics II*	6 ECTS/LP

Version 1.3.0 (since WS09/10)
Person responsible for module: Prof. Dr. Wolfgang Scherer
PD Dr. Georg Eickerling

Contents:

- Introduction to computational chemistry
- Hartree-Fock Theory
- DFT in a nutshell
- Prediction of reaction mechanisms
- calculation of physical and chemical properties

Learning Outcomes / Competences:

The students:

- know the basic quantum chemical methods of chemical physics to interpret the electronic structures in molecules and solid-state compounds,
- have therefore the competence to autonomously perform simple quantum chemical calculations using Hartree-Fock and Density Functional Theory (DFT) and to interpret the electronic structure of functional molecules and materials with regard to their chemical and physical properties
- Integrated acquirement of soft skills: ability to specialize in a scientific topic and to apply the acquired knowledge for solving scientific problems.

Remarks:

It is possible for students to do quantum chemical calculations autonomously and analyze electronical structures of molecules on a computer cluster within the scope of the tutorial.

Workload:

Total: 180 h
60 h lecture and exercise course (attendance)
80 h studying of course content through exercises / case studies (self-study)
20 h studying of course content using literarture (self-study)
20 h studying of course content using provided materials (self-study)

Conditions:

It is highly recommended to complete the module Chemical Physics I first.

Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Chemical Physics II

Mode of Instruction: lecture
Language: English
Contact Hours: 3

Learning Outcome:

see module description

Literature:

- I. N. Levine, Quantum Chemistry, Pearson, 7th ed **2013**.
- A. Szabo, N. S. Ostlund, Modern Quantum Chemistry, Dover, **1996** (EbookCentral ebook).
- E. G. Lewars, Computational Chemistry, Springer, **2011**.
- D. C. Young, Computational Chemistry: A practical guide for applying techniques to real world problems, Wiley ebook, **2002**.
- R. A. van Santen, Ph. Sautet, Computational Methods in Catalysis and Materials Science, Wiley ebook, **2009**.
- P. Popelier, Atoms in Molecules: An Introduction, Pearson Education Limited, **2000**.
- A. Frisch, Exploring Chemistry with Electronic Structure Methods, Gaussian Inc. Pittsburg, PA.

Assigned Courses:

Chemical Physics II (lecture)

Part of the Module: Chemical Physics II (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Learning Outcome:

see module description

Assigned Courses:

Chemical Physics II (Tutorial) (exercise course)

Examination

Chemical Physics II

written exam / length of examination: 90 minutes

Examination Prerequisites:

Chemical Physics II

Module PHM-0056: Ion-Solid Interaction *Ion-Solid Interaction*	6 ECTS/LP

Version 1.0.0 (since WS09/10)
Person responsible for module: apl. Prof. Dr. Helmut Karl

Contents:

- Introduction (areas of scientific and technological application, principles)
- Fundamentals of atomic collision processes (scattering, cross-sections, energy loss models, potentials in binary collision models)
- Ion-induced modification of solids (integrated circuit fabrication with emphasis on ion induced phenomena, ion implantation, radiation damage, ion milling and etching (RIE), sputtering, erosion, deposition)
- Transport phenomena
- Analysis with ion beams

Learning Outcomes / Competences:

The students:

- know the physical principles and the basical mechanisms of the interaction between particles and solid state bodies in the energy range of eV to MeV,
- are able to choose adequate physical models for specific technological and scientific applications, and
- have the competence to work extensively autonomous on problems concerning the interaction between ions and solid state bodies.
- Integrated acquirement of soft skills.

Workload:

Total: 180 h
20 h studying of course content using literarture (self-study)
20 h studying of course content using provided materials (self-study)
80 h studying of course content through exercises / case studies (self-study)
60 h lecture and exercise course (attendance)

Conditions:
Basic Courses in Physics I–IV, Solid State Physics, Nuclear Physics

Frequency: annually	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Ion-Solid Interaction
Mode of Instruction: lecture
Language: English
Contact Hours: 3

Learning Outcome:
see module description

Contents:
see module description

Literature:

- R. Smith, Atomic and ion collisions in solids and at surfaces (Cambridge University Press, 1997)
- E. Rimini, Ion implantation: Basics to device fabrication (Kluwer, 1995)
- W. Eckstein: Computer Simulation of Ion-Solid Interactions (Springer, 1991)
- H. Ryssel, I. Ruge: Ionenimplantation (Teubner, 1978)
- Y. H. Ohtsuki: Charged Beam Interaction with Solids (Taylor & Francis, 1983)
- J. F. Ziegler (Hrsg.): The Stopping and Range of Ions in Solids (Pergamon)
- R. Behrisch (Hrsg.): Sputtering by Particle Bombardment (Springer)
- M. Nastasi, J. K. Hirvonen, J. W. Mayer: Ion-Solid Interactions: Fundamentals and Applications (Cambridge University Press, 1996)
- http://www.SRIM.org

Part of the Module: Ion-Solid Interaction (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Examination

Ion-Solid Interaction

written exam / length of examination: 90 minutes

Examination Prerequisites:

Ion-Solid Interaction

Module PHM-0057: Physics of Thin Films *Physics of Thin Films*		6 ECTS/LP
Version 1.6.0 (since WS09/10) Person responsible for module: PD Dr. German Hammerl		
Contents: • Thin film growth: basics, thermodynamic considerations, surface kinetics, growth mechanisms • Thin film growth techniques: vacuum technology, physical vapor deposition, chemical vapor deposition • Analysis and characterization of thin films: in-sit methods, ex-situ methods, direct methods • Properties and applications of thin films		
Learning Outcomes / Competences: The students: • know a broad spectrum of methods of thin film technology and material properties and applications of thin films, • have the competence to deal with current problems in the field of thin film technology largely autonomous, • are able to choose the right substrates and thin film materials for epitaxial thin film growth to achieve desired application conditions, • aquire skills of combining the various technologies for growing thin layers with respect to their properties and applications, and • aquire scientific soft skills to search for scientific literature, unterstand technical english, work with literature in the field of thin films, interpret experimental results.		
Workload: Total: 180 h 80 h studying of course content through exercises / case studies (self-study) 20 h studying of course content using literarture (self-study) 60 h lecture and exercise course (attendance) 20 h studying of course content using provided materials (self-study)		
Conditions: none		
Frequency: each winter semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Physics of Thin Films **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 4
Learning Outcome: see module description
Contents: see module description

Literature:

- H. Frey, G. Kienel, Dünnschichttechnologie (VDI Verlag, 1987)
- H. Lüth, Solid Surfaces, Interfaces and Thin Films (Springer Verlag, 2001)
- A. Wagendristel, Y. Wang, An Introduction to Physics and Technology of Thin Films (World Scientific Publishing, 1994)
- M. Ohring, The Materials Science of Thin Films (Academic Press, 1992)

Examination

Physics of Thin Films

written exam / length of examination: 90 minutes

Examination Prerequisites:

Physics of Thin Films

Module PHM-0058: Organic Semiconductors *Organic Semiconductors*		6 ECTS/LP
Version 1.3.0 (since WS09/10) Person responsible for module: Prof. Dr. Wolfgang Brütting		
Contents: Basic concepts and applications of organic semiconductors Introduction • Materials and preparation • Structural properties • Electronic structure • Optical and electrical properties Devices and Applications • Organic metals • Light-emitting diodes • Solar cells • Field-effect transistors		
Learning Outcomes / Competences: The students: • know the basic structural and electronic properties of organic semiconductors as well as the essential function of organic semiconductor devices, • have acquired skills for the classification of the materials taking into account their specific features in the functioning of components, • and have the competence to comprehend and attend to current problems in the field of organic electronics. • Integrated acquirement of soft skills: practicing technical English, working with English specialist literature, ability to interpret experimental results		
Workload: Total: 180 h 60 h lecture and exercise course (attendance) 40 h studying of course content through exercises / case studies (self-study) 40 h studying of course content using provided materials (self-study) 40 h studying of course content using literarture (self-study)		
Conditions: It is strongly recommended to complete the module solid-state physics first. In addition, knowledge of molecular physics is desired.		
Frequency: annually	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Organic Semiconductors **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 3

Learning Outcome:
see module description

Contents:
see module description

Literature:

- M. Schwoerer, H. Ch. Wolf: Organic Molecular Solids (Wiley-VCH)
- W. Brütting: Physics of Organic Semiconductors (Wiley-VCH)
- A. Köhler, H. Bässler: Electronic Processes in Organic Semiconductors (Wiley-VCH)
- S.R. Forrest: Organic Electronics (Oxford Univ. Press)

Part of the Module: Organic Semiconductors (Tutorial)

Mode of Instruction: exercise course

Language: English

Frequency: every 3rd semester

Contact Hours: 1

Examination

Organic Semiconductors
written exam / length of examination: 90 minutes

Examination Prerequisites:
Organic Semiconductors

Module PHM-0059: Magnetism *Magnetism*	6 ECTS/LP

Version 1.0.0 (since WS09/10)
Person responsible for module: Dr. Hans-Albrecht Krug von Nidda

Contents:

- History, basics
- Magnetic moments, classical and quantum phenomenology
- Exchange interaction and mean-field theory
- Magnetic anisotropy and magnetoelastic effects
- Thermodynamics of magnetic systems and applications
- Magnetic domains and domain walls
- Magnetization processes and micro magnetic treatment
- AC susceptibility and ESR
- Spintransport / spintronics
- Recent problems of magnetism

Learning Outcomes / Competences:

The students:

- know the basic properties and phenomena of magnetic materials and the most important methods and concepts for their description, like mean-field theory, exchange interactions and micro magnetic models,
- have the ability to classify different magnetic phenomena and to apply the corresponding models for their interpretation, and
- have the competence independently to treat fundamental and typical topics and problems of magnetism.
- Integrated acquirement of soft skills.

Workload:

Total: 180 h
60 h lecture and exercise course (attendance)
80 h studying of course content through exercises / case studies (self-study)
20 h studying of course content using literarture (self-study)
20 h studying of course content using provided materials (self-study)

Conditions: basics of solid-state physics and quantum mechanics		
Frequency: annually	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Magnetism
Mode of Instruction: lecture
Language: English
Contact Hours: 3

Learning Outcome:
see module description

Contents:
see module description

Literature:

- D. H. Martin, Magnetism in Solids (London Iliffe Books Ltd.)
- J. B. Goodenough, Magnetism and the Chemical Bond (Wiley)
- P. A. Cox, Transition Metal Oxides (Oxford University Press)
- C. Kittel, Solid State Phyics (Wiley)
- D. C. Mattis, The Theory of Magnetism (Wiley)
- G. L. Squires, Thermal Neutron Scattering (Dover Publications Inc.)

Assigned Courses:

Magnetism (lecture)

Part of the Module: Magnetism (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Assigned Courses:

Magnetism (Tutorial) (exercise course)

Examination

Magnetism

written exam / length of examination: 90 minutes

Examination Prerequisites:

Magnetism

Module PHM-0060: Low Temperature Physics *Low Temperature Physics*	6 ECTS/LP

Version 1.1.0 (since WS09/10)
Person responsible for module: Prof. Dr. Philipp Gegenwart

Contents:

- Introduction
- Properties of matter at low temperatures
- Cryoliquids and superfluidity
- Cryogenic engineering
- Thermometry
- Quantum transport, criticality and entanglement in matter

Learning Outcomes / Competences:

The students:

- know the basic properties of matter at low temperatures and the corresponding experimental techniques,
- have acquired the theoretical knowledge to perform low-temperature measurements,
- and know how to experimentally investigate current problems in low-temperature physics.

Workload:

Total: 180 h
20 h studying of course content using provided materials (self-study)
20 h studying of course content using literarture (self-study)
60 h lecture and exercise course (attendance)
80 h studying of course content through exercises / case studies (self-study)

Conditions: Physik IV - Solid-state physics		
Frequency: every 3rd semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Low Temperature Physics

Mode of Instruction: lecture
Language: English
Contact Hours: 3

Learning Outcome:

see module description

Contents:

- Introduction (temperature scale, history of low temperature physics)
- Properties of matter at low temperatures (specific heat, thermal expansion, electrical resistance, thermal conductivity)
- Cryoliquids and superfluidity (nitrogen, hydrogen, 4-He and 3-He: phase diagrams, superfluidity)
- Cryogenic engineering (liquefaction of gases, helium cryostats, dilution refrigerator, adiabatic demagnetization, further techniques)
- Thermometry (primary and secondary thermometers at different temperature regimes)
- Quantum Matter (quantum Transport, Quantum phase transitions, Quantum spin liquids)

Literature:

C. Enss, S. Hunklinger, Tieftemperaturphysik (Springer)

F. Pobell, Matter and Methods at Low Temperatures (Springer)

Part of the Module: Low Temperature Physics (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Examination

Low Temperature Physics

oral exam / length of examination: 30 minutes

Examination Prerequisites:

Low Temperature Physics

Module PHM-0061: Plasma Physics and Fusion Research *Plasmaphysik und Fusionsforschung*		6 ECTS/LP
Version 1.2.0 (since WS09/10) Person responsible for module: apl. Prof. Dr.-Ing. Ursel Fantz Dr. Stefan Briefi		
Contents: • Plasmaphysik (Wintersemester) • Fusionsforschung (Sommersemester)		
Learning Outcomes / Competences: • Die Studierenden kennen die Methoden und Konzepte der Plasmaphysik und sind mit einfachen, grundlegenden Anwendungen vertraut, • kennen den aktuellen Stand der Fusionsforschung • und besitzen die Kompetenz, Problemstellungen in den genannten Bereichen selbständig zu bearbeiten. • Integrierter Erwerb von Schlüsselqualifikationen: Erlernen des eigenständigen Arbeitens mit Lehrbüchern und englischsprachiger Fachliteratur, Training des logischen Denkens, Verknüpfung experimenteller Ergebnisse mit theoretischer Beschreibung, Aneignung einer interdisziplinären Denkweise.		
Workload: Total: 180 h 20 h studying of course content using literarture (self-study) 100 h studying of course content using provided materials (self-study) 60 h lecture (attendance)		
Conditions: Physik III		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: annually Beginn jedes WS	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Plasmaphysik **Mode of Instruction:** lecture **Language:** German / English **Frequency:** each winter semester **Contact Hours:** 2
Learning Outcome: siehe Modulbeschreibung
Contents: • Grundlagen • Plasmacharakteristika • Thermodynamisches Gleichgewicht • Stoßprozesse • Teilchenbewegung im Magnetfeld • Vielteilchenbeschreibung • Wellen im Plasma

Literature:

- Vorlesungsskript (EPP Homepage)
- M. Kaufmann: Plasmaphysik und Fusionsforschung (Teubner, 2003)
- R. J. Goldston, P. H. Rutherford: Introduction to Plasma Physics (IOP Publishing, 1997)
- F. F. Chen: Introduction to Plasma Physics and Controlled Fusion (Plenum Press, 1990)
- U. Schumacher: Fusionsforschung (wiss. Buchgesellschaft, 1993)
- M. Kikuchi, K. Lackner, M. Q. Tran: Fusion Physics (IAEA, 2012)
- M. A. Lieberman, A. J. Lichtenberg: Principles of Plasma Discharges and Materials Processing (Wiley, 2005)
- G. Janzen: Plasmatechnik (Hüthig, 1992)
- R. Hippler: Low Temperature Plasmas (Wiley-VCH, 2008)
- J. R. Roth: Industrial Plasma Engineering (IOP Publishing, 1995)
- A. Grill: Cold Plasma in Materials Fabrication (IEEE Press, 1994)

Part of the Module: Fusionsforschung

Mode of Instruction: lecture

Language: German / English

Frequency: each summer semester

Contact Hours: 2

Learning Outcome:

siehe Modulbeschreibung

Contents:

- Kernfusion
- Fusion durch Trägheitseinschluss
- Fusion mit magnetischem Einschluss
- Transport in magnetisierten Plasmen
- Diagnostik von Fusionsplasmen

Literature:

siehe Modulteil "Plasmaphysik"

Assigned Courses:

Fusionsforschung (lecture)

Examination

Plasmaphysik und Fusionsforschung

oral exam / length of examination: 30 minutes

Module PHM-0063: Physics of the Atmosphere I *Physik der Atmosphäre I*		6 ECTS/LP
Version 1.0.0 (since WS09/10) Person responsible for module: Prof. Dr. Michael Bittner		
Contents: • Allgemeine Einführung • Strahlung: Planck-Funktion, Strahlungsbilanz der Atmosphäre, Heizraten, Treibhauseffekt, Strahlungsmodelle • Dynamik: Navier-Stokes-, Kontinuitäts- und Adiabatengleichung, atmosphärische Wellen • Chemie: Absorptions- & Emissionsspektren, Heizraten • Darstellung der Prozesse in Modellen		
Learning Outcomes / Competences: • Die Studierenden kennen die grundlegenden Eigenschaften und Phänomene der atmosphärischen Prozesse im Bereich Strahlung und Dynamik sowie (eingeschränkt) der Chemie, • haben Fertigkeiten zur Formulierung moderner Fragestellungen der Atmosphärenphysik erworben • und besitzen die Kompetenz, aktuelle Problemstellungen aus den Bereichen der Atmosphärenphysik, der Fernerkundung und Modellierung weitgehend selbständig zu beurteilen und Lösungsansätze aufzuzeigen. • Integrierter Erwerb von Schlüsselqualifikationen		
Remarks: Im jeweils folgenden Sommersemester wird in der Regel das Vertiefungsmodul Physik der Atmosphäre II angeboten.		
Workload: Total: 180 h 60 h lecture and exercise course (attendance) 20 h studying of course content using literarture (self-study) 80 h studying of course content through exercises / case studies (self-study) 20 h studying of course content using provided materials (self-study)		
Conditions: Die Vorlesung baut auf den Inhalten der Experimentalphysik-Vorlesungen des Bachelorstudiengangs Physik auf.		
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Physik der Atmosphäre I **Mode of Instruction:** lecture **Language:** German **Contact Hours:** 2
Learning Outcome: siehe Modulbeschreibung
Contents: siehe Modulbeschreibung

Literature:

- G. Visconti, 2016. Fundamentals of physics and chemistry of the atmosphere (Springer, 2. Auflage)
- D. G. Andrews, 2010. An introduction to atmospheric physics (Cambridge, 2. Auflage)
- J. T. Houghton, 2002. The physics of atmospheres (Cambridge, 3. Auflage)
- L. D. Landau, E. M. Lifschitz, 2007. Lehrbuch der theoretischen Physik: Hydrodynamik (Harri Deutsch, 5. Auflage)
- H. Pichler, 1997. Dynamik der Atmosphäre (Spektrum, 2. Auflage)
- W. Rödel, 2000. Physik unserer Umwelt: Die Atmosphäre (Springer, 3. Auflage)
- M. Z. Jacobson, 2005. Fundamentals of atmospheric modeling (Cambridge, 2. Auflage)
- W. G. Rees, 2013. Physical principles of remote sensing: 1. Remote sensing (Cambridge, 3. Auflage)

Part of the Module: Übung zu Physik der Atmosphäre I

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

Learning Outcome:

siehe Modulbeschreibung

Examination

Physik der Atmosphäre I

oral exam / length of examination: 30 minutes

Module PHM-0065: Physics of the Atmosphere II *Physik der Atmosphäre II*	6 ECTS/LP

Version 2.0.0 (since SoSe16)
Person responsible for module: Prof. Dr. Michael Bittner
PD Dr. habil. Sabine Wüst

Contents:

- Dynamik der Atmosphäre (Grundlagen, Wellen)
- Chemie der Stratosphäre (Ozonabbau)
- Atmosphärenfernerkundung (satellitenbasierte Methoden, bodengestützte Messtechniken)
- Numerische Methoden

Learning Outcomes / Competences:

- Die Studierenden kennen die grundlegenden Prozesse im Bereich der atmosphärischen Dynamik mit Schwerpunkt auf Wellen, im Bereich der stratosphärischen Ozonchemie und sie kennen die grundlegenden messtechnischen Verfahren zur Fernerkundung der Atmosphäre sowie deren numerische Umsetzung
- haben Fertigkeiten zur Formulierung moderner Fragestellungen der Atmosphärenphysik erworben
- und besitzen die Kompetenz, aktuelle Problemstellungen aus dem Bereich der Atmosphärenphysik weitgehend selbständig zu beurteilen und Lösungsansätze aufzuzeigen.
- Integrierter Erwerb von Schlüsselqualifikationen

Remarks:
Jeweils im Wintersemester wird das Modul Physik der Atmosphäre I angeboten.

Workload:
Total: 180 h
60 h lecture (attendance)
80 h studying of course content through exercises / case studies (self-study)
20 h studying of course content using literarture (self-study)
20 h studying of course content using provided materials (self-study)

Conditions:
Das Modul baut auf den Inhalten der Experimentalphysik-Vorlesungen des Bachelorstudiengangs Physik sowie dem Modul "Physik der Atmosphäre I" auf.

Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Physik der Atmosphäre II
Mode of Instruction: lecture
Lecturers: Prof. Dr. Michael Bittner
Language: German
Contact Hours: 2

Learning Outcome:
siehe Modulbeschreibung

Contents:
siehe Modulbeschreibung

Literature:

- G. Visconti, 2016. Fundamentals of physics and chemistry of the atmosphere (Springer, 2. Auflage)
- D. G. Andrews, 2010. An introduction to atmospheric physics (Cambridge, 2. Auflage)
- J. T. Houghton, 2002. The physics of atmospheres (Cambridge, 3. Auflage)
- L. D. Landau, E. M. Lifschitz, 2007. Lehrbuch der theoretischen Physik: Hydrodynamik (Harri Deutsch, 5. Auflage)
- H. Pichler, 1997. Dynamik der Atmosphäre (Spektrum, 2. Auflage)
- W. Rödel, 2000. Physik unserer Umwelt: Die Atmosphäre (Springer, 3. Auflage)
- M. Z. Jacobson, 2005. Fundamentals of atmospheric modeling (Cambridge, 2. Auflage)
- W. G. Rees, 2013. Physical principles of remote sensing: 1. Remote sensing (Cambridge, 3. Auflage)

Assigned Courses:

Physik der Atmosphäre II (lecture)

Part of the Module: Physik der Atmosphäre II: Numerische Verfahren

Mode of Instruction: lecture
Lecturers: PD Dr. habil. Sabine Wüst
Language: German
Contact Hours: 2

Learning Outcome:

siehe Modulbeschreibung

Contents:

Ergänzend zum ersten Modulteil werden numerische Methoden behandelt.

Literature:

- M. Jacobson, 2005. Fundamentals of Atmospheric Modeling (Cambridge)
- G. Brasseur, D. Jacob, 2017. Modeling of Atmospheric Chemistry (Cambridge)
- H. Pichler, 1997. Dynamik der Atmosphäre (Spektrum, 2. Auflage)
- J. Houghton, 2015. Global Warming (Cambridge, 5. Auflage)
- G. Visconti, 2016 Fundamentals of physics and chemistry of the atmosphere (Springer)

Assigned Courses:

Physik der Atmosphäre II: Numerische Verfahren (lecture)

Examination

Physik der Atmosphäre II

oral exam / length of examination: 30 minutes

Module PHM-0066: Superconductivity *Superconductivity*	6 ECTS/LP

Version 1.0.0 (since WS11/12)
Person responsible for module: PD Dr. Reinhard Tidecks

Contents:

- Introductory Remarks and Literature
- History and Main Properties of the Superconducting State, an Overview
- Phenomenological Thermodynamics and Electrodynamics of the SC
- Ginzburg-Landau Theory
- Microscopic Theories
- Fundamental Experiments on the Nature of the Superconducting State
- Josephson-Effects
- High Temperature Superconductors
- Application of Superconductivity

Learning Outcomes / Competences:

The students:

- will get an introduction to superconductivity,
- by a presentation of experimental results they will learn the fundamental properties of the superconducting state,
- are informed about the most important technical applications of superconductivity.
- Special attention will be drawn to the basic concepts of the main phenomeno-logical and microscopic theories of the superconducting state, to explain the experimental observations.
- For self-studies a comprehensive list of further reading will be supplied.

Workload:

Total: 180 h
60 h lecture and exercise course (attendance)
80 h studying of course content through exercises / case studies (self-study)
20 h studying of course content using literarture (self-study)
20 h studying of course content using provided materials (self-study)

Conditions:

- Physik IV – Solid-state physics
- Theoretical physics I-III

Frequency: every 3rd semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Superconductivity
Mode of Instruction: lecture
Language: English
Contact Hours: 4

Learning Outcome:

see module description

Contents:

see module description

Literature:

- W. Buckel, Supraleitung, 5. Auflage (VCH, Weinheim, 1994)
- W. Buckel und R. Kleiner, Supraleitung, 6. Auflage (WILEY-VCH, Weinheim, 2004)
- M. Tinkham, Introduction to Superconductivity, 2nd Edition (McGraw-Hill, Inc., New York, 1996, Reprint by Dover Publications Inc. Miniola , 2004)
- Weitere Literatur wird in der Vorlesung angegeben

Examination

Superconductivity

oral exam / length of examination: 30 minutes

Examination Prerequisites:

Superconductivity

Module PHM-0067: Complex materials: Fundamentals and Applications *Complex Materials: Fundamentals and Applications*	8 ECTS/LP

Version 1.0.0 (since SoSe14)
Person responsible for module: Prof. Dr. Manfred Albrecht

Contents:

- Phasenbildung, Nukleation, Phasendiagramme
- Amorphe Materialien
- Ferrimagnete
- Ferroelektrika
- Multiferroika
- Formgedächtnislegierungen
- Thermoelektrische Materialien
- Niedrigdimensionale Materialsysteme (u.a. Quantenpunkte)
- Untersuchungsmethoden

Learning Outcomes / Competences:

- Die Studierenden kennen die grundlegenden Begriffe und Konzepte der modernen Festkörperphysik,
- besitzen ein fundiertes Verständnis grundlegender physikalsicher Zusammenhänge in komplexen Materialien und deren Anwendungen,
- besitzen Kenntnis von der qualitativen Beobachtung über die quantitative Messung bis hin zur verallgemeinernden mathematischen Beschreibung physikalischer Effekte ausgewählter komplexer Materialsysteme.
- Integrierter Erwerb von Schlüsselqualifikationen: Erlernen des eigenständigen Arbeitens mit englischsprachiger Fachliteratur, Erlernen von Präsentationstechniken, Teamfähigkeit, Fähigkeit zur Dokumentation experimenteller Ergebnisse, interdisziplinäres Denken und Arbeiten

Workload:
Total: 240 h
90 h lecture and exercise course (attendance)
30 h studying of course content using provided materials (self-study)
30 h studying of course content using literarture (self-study)
90 h studying of course content through exercises / case studies (self-study)

Conditions:
Grundlagen der Festkörperphysik

Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Complex Materials: Fundamentals and Applications
Mode of Instruction: lecture
Language: English / German
Contact Hours: 4

Learning Outcome:
siehe Modulbeschreibung

Contents:
siehe Modulbeschreibung

Literature:

wird in der Vorlesung bekannt gegeben

Part of the Module: Complex Materials: Fundamentals and Applications (Tutorial)

Mode of Instruction: exercise course

Language: English / German

Contact Hours: 2

Learning Outcome:

siehe Modulbeschreibung

Examination

Complex Materials: Fundamentals and Applications

oral exam / length of examination: 30 minutes

Module PHM-0068: Spintronics *Spintronics*	6 ECTS/LP
Version 1.4.0 (since SoSe14) Person responsible for module: PD Dr. German Hammerl	

Contents:

- Introduction into magnetism
- Basic spintronic effects and devices
- Novel materials for spintronic applications
- Spin-sensitive experimental methods
- Semiconductor based spintronics

Learning Outcomes / Competences:

The students:

- know the fundamental properties of magnetic materials, the basic spintronic effects, and the related device structures,
- have the competence to deal with current problems in the field of semi-conductor and metal-based spintronics largely autonomous.
- are able to choose materials in order to achieve demanding properties in spintronic applications,
- are able to design device components to achieve spin polarizations,
- aquire scientific skills in finding and understanding current literature dealting with spintronic devices and applications, identifying suitable materials and material combinations with respect to their applicability for spintronic devices.

Workload:

Total: 180 h

60 h lecture and exercise course (attendance)

20 h studying of course content using provided materials (self-study)

80 h studying of course content through exercises / case studies (self-study)

20 h studying of course content using literarture (self-study)

Conditions: none		
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Spintronics

Mode of Instruction: lecture

Language: English

Contact Hours: 3

Learning Outcome:

see module description

Contents:

see module description

Literature:

- N. W. Ashcroft, N. D. Mermin, Solid State Physics, Cengage Learning (2011), ISBN: 81-315-0052-7
- C. Felser, G. H. Hechter, Spintronics - From Materials to Devices, Springer (2013), ISBN: 978-90-481-3831-9
- S. Bandyopadhyay, M. Cahay, Introduction to Spintronics, CRC Press (2008), ISBN: 978-0-9493-3133-6

Part of the Module: Spintronics (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Examination

Spintronics

written exam / length of examination: 90 minutes

Examination Prerequisites:

Spintronics

Module PHM-0069: Applied Magnetic Materials and Methods *Applied Magnetic Materials and Methods*	6 ECTS/LP
Version 1.1.0 (since WS14/15) Person responsible for module: Prof. Dr. Manfred Albrecht	

Contents:

- Basics of magnetism
- Ferrimagnets, permanent magnets
- Magnetic nanoparticles
- Superparamagnetism
- Exchange bias effect
- Magnetoresistance, sensors
- Experimental methods (e.g. Mößbauer Spectroscopy, mu-SR)

Learning Outcomes / Competences:

- The students know the basic terms and concepts of magnetism,
- get a profound understanding of basic physical relations and their applications,
- acquire the ability to describe qualitative observations, interpret quantitative measurements, and develop mathematical descriptions of physical effects of chosen magnetic material systems.
- Integrated acquirement of soft skills: autonomous working with specialist literature in English, acquisition of presentation techniques, capacity for teamwork, ability to document experimental results, and interdisciplinary thinking and working.

Workload:

Total: 180 h
20 h studying of course content using provided materials (self-study)
20 h studying of course content using literarture (self-study)
80 h studying of course content through exercises / case studies (self-study)
60 h lecture and exercise course (attendance)

Conditions: Basics in solid state physics		
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Applied Magnetic Materials and Methods
Mode of Instruction: lecture
Language: English
Contact Hours: 3

Learning Outcome:

see module description

Contents:

see module description

Literature:

Stephan Bundell, Magnetism in Condensed Matter, Oxford University Press, ISBN: 0-19-850591-4 (Pbk)

J.M.C. Coey, Magnetism and Magnetic Materials, Cambridge University Press, ISBN: 978-0-521-81614-4 (hardback)

Part of the Module: Applied Magnetic Materials and Methods (Tutorial)
Mode of Instruction: exercise course
Language: English
Contact Hours: 1

Examination

Applied Magnetic Materials and Methods
oral exam / length of examination: 30 minutes
Examination Prerequisites:
Applied Magnetic Materials and Methods

Module PHM-0070: Many-Body Theory *Vielteilchentheorie*	8 ECTS/LP

Version 1.0.0 (since WS09/10)
Person responsible for module: Prof. Dr. Fabian Pauly

Contents:

- Quantenmechanik für Vielteilchensysteme (2. Quantisierung)
- Zweizeitige Green-Funktionen
- Lineare Responsetheorie (verallgemeinerte Suszeptibilitäten)
- Vielteilchensysteme ohne dynamische Korrelationen
- Das Wicksche Theorem
- Näherung des effektiven Feldes
- BCS-Theorie der Supraleitung
- Diagrammatische Störungsrechnung
- Statistische Physik des Nichtgleichgewichts
- Fermionische und bosonische Modellsysteme

Learning Outcomes / Competences:

- Die Studierenden kennen die grundlegenden Konzepte zur Beschreibung von quantenmechanischen Vielteilchensystemen.
- Sie sind in der Lage, approximative Methoden der Vielteilchenphysik zur Berechnung von spektroskopischen Meßgrößen und Transportkoeffizienten anzuwenden und
- sind kompetent, Problemstellungen aus den genannten Bereichen selbständig zu bearbeiten.
- Integrierter Erwerb von Schlüsselqualifikationen

Workload:
Total: 240 h
30 h studying of course content using provided materials (self-study)
90 h studying of course content through exercises / case studies (self-study)
30 h studying of course content using literarture (self-study)
90 h lecture and exercise course (attendance)

Conditions: Kenntnisse der Theoretischen Festkörperphysik		
Frequency: annually	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Vielteilchentheorie
Mode of Instruction: lecture
Language: German / English
Contact Hours: 4

Learning Outcome:
siehe Modulbeschreibung

Contents:
siehe Modulbeschreibung

Literature:

- W. Nolting, Grundkurs Theoretische Physik, Band 7, “Vielteilchentheorie“ (Verlag Zimmermann Neufang)
- A. Messiah, “Quantum Mechanics“, Band 2
- R.D. Mattuck, “A Guide to Feynman Diagrams in the Many Body Problem“ (Dover Publications)
- A.L. Fetter, I.D. Walecka, “Quantum Theory of Many-Particle Systems“ (McGraw Hill)
- A.A. Abrikosov, L.P. Gorkov, I. Dzyaloshinsky, “Methods of Quantum Field Theory“ (Dover Publications)
- S. Doniach, E.H. Sondheimer, Frontiers in Physics Lecture Note Series 44, “Green
- G.D. Mahan, “Many-Particle Physics“ (Plenum Press)
- I.W. Negele, H. Orland, “Quantum Many-Particle Physics“, Frontiers in Physics Lecture Note Series 68 (Addison Wesley).

Part of the Module: Übung zu Vielteilchentheorie

Mode of Instruction: exercise course

Language: German / English

Contact Hours: 2

Learning Outcome:

siehe Modulbeschreibung

Examination

Vielteilchentheorie

oral exam / length of examination: 30 minutes

Module PHM-0071: Nonequilibrium Statistical Physics *Nonequilibrium Statistical Physics*		8 ECTS/LP
Version 1.1.0 (since WS09/10) Person responsible for module: Prof. Dr. Christoph Alexander Weber		
Contents: • Coarse graining (BKKY, Boltzmann, Navier-Stokes) • Transport theory derived by symmetries & conservation laws • Nonequilibrium steady states • Irreversible Thermodynamics and Onsager linear response • Passive and active systems (Active Ising model, Collective Motion) • Coarsening kinetics in conserved and nonconserved systems • Hydrodynamic Instabilities		
Learning Outcomes / Competences: Students... • learn about the complexity and diversity of nonequilibrium phenomena of systems composed of many particles and degrees of freedom • will understand the differences between physics at thermodynamic equilibrium and out of equilibrium • learn systems maintained out of equilibrium, including active matter systems that are state-of-the-art research • obtain solid expertise in the theoretical techniques required to treat phenomena far from equilibrium, and are able to apply these methods to concrete problems, • and will become competent to acquaint themselves with modern scientific questions. Integrated acquirement of soft skills: • autonomous working with scientific literature in English, • improving written and spoken English during lectures and exercises, • interdisciplinary thinking, and working		
Workload: Total: 240 h 90 h studying of course content through exercises / case studies (self-study) 30 h studying of course content using literarture (self-study) 30 h studying of course content using provided materials (self-study) 90 h lecture and exercise course (attendance)		
Conditions: It is assumed that the students are familiar with the contents of a four-semester course in theoretical physics, including Thermodynamics and Statistical Physics.		
Frequency: annually	**Recommended Semester:** from 6.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Nonequilibrium Statistical Physics (lecture)
Mode of Instruction: lecture
Language: English
Contact Hours: 4

Learning Outcome:
see module description

Contents:
see module description

Literature:

- **Non-Equilibrium Thermodynamics,** S. R. De Groot and P. Mazur, Dover Publications, Dover ed edition, ISBN 486647412
- **From Macrophysics to Microphysics Part 1 und 2**, Roger Balian, Springer, ISBN 3540454780
- **Principles of Condensed Matter Physics,** P. M. Chaikin and T. C. Lubensky, Cambridge, ISBN 521794501
- **A Kinetic View of Statistical Physics,** Pavel L. Krapivsky, Sidney Redner, and Eli Ben–Naim, Cambridge, ISBN 486647412
- **Basic concepts for Simple and Complex Liquids,** Jean-Louis Barrat and Jean-Pierre Hansen, Cambridge, ISBN 521789532
- **Physical Hydrodynamics,** Etienne Guyon, Jean-Pierre Hulin, Luc Petit, Catalin D. Mitescu, Oxford, ISBN 521851033

Part of the Module: Nonequilibrium Statistical Physics (Tutorial)
Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Learning Outcome:
see module description

Examination
PHM-0071 Nonequilibrium Statistical Physics
oral exam / length of examination: 45 minutes

Module PHM-0073: Relativistic Quantum Field Theory *Relativistische Quantenfeldtheorie*		8 ECTS/LP
Version 1.5.0 (since WS09/10) Person responsible for module: Prof. Dr. Gert-Ludwig Ingold		
Contents: • Reminder of the covariant formulation of special relativity and of classical field theory • Free Klein-Gordon field • Free Dirac field • Free electromagnetic field • Quantum electrodynamics • Electroweak interaction		
Learning Outcomes / Competences: • Students know basic aspects of elementary particle physics, in particular the relativistic field theoretical description of fermions and bosons, the description of interactions with quantum electrodynamics as an example and group theoretical aspects. • They can make connections between relativistic quantum field theory and the quantum field theoretical description of condensed matter. • They are able to apply their knowledge to the analysis of concrete problems. • Integrated acquirement of soft skills: Students learn in small groups to define given problems in a precise way, to develop solution strategies and to assess their suitability. In addition, the social competences required for working in a team are further developed.		
Workload: Total: 240 h 90 h lecture and exercise course (attendance) 30 h studying of course content using provided materials (self-study) 30 h studying of course content using literarture (self-study) 90 h studying of course content through exercises / case studies (self-study)		
Conditions: Knowledge typically acquired in a 4 semester course on Theoretical Physics in a bachelor programme of physics.		**Credit Requirements:** The module examination needs to be passed.
Frequency: irregular (usu. winter semester)	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Relativistic Quantum Field Theory **Mode of Instruction:** lecture **Language:** German / English **Contact Hours:** 4
Learning Outcome: • Students know basic aspects of elementary particle physics, in particular the relativistic field theoretical description of fermions and bosons, the description of interactions with quantum electrodynamics as an example and group theoretical aspects. • They can make connections between relativistic quantum field theory and the quantum field theoretical description of condensed matter.

Contents:

see module description

Literature:

- F.Mandl, G. Shaw, *Quantum Field Theory* (Wiley, 2010)
- M. E. Peskin, D. V. Schroeder, *An Introduction to Quantum Field Theory* (CRC Press, 1995)
- M. Kaku, *Quantum field theory* (Oxford University Press, 1993)
- W. Greiner u. a., *Theoretische Physik, Bände 7, 7A, 8* (Europa-Lehrmittel, 1994)

Assigned Courses:

Relativistische Quantenfeldtheorie (lecture)

Part of the Module: Exercises on Relativistic Quantum Field Theory

Mode of Instruction: exercise course

Language: German / English

Contact Hours: 2

Learning Outcome:

- Students are able to apply their knowledge to the analysis of concrete problems.
- Integrated acquirement of soft skills: Students learn in small groups to define given problems in a precise way, to develop solution strategies and to assess their suitability. In addition, the social competences required for working in a team are further developed.

Contents:

see module description

Literature:

see literature entry for lecture

Assigned Courses:

Übung zu Relativistische Quantenfeldtheorie (exercise course)

Examination

Relativistic Quantum Field Theory

oral exam / length of examination: 30 minutes

Module PHM-0077: Theory of Magnetism *Theorie des Magnetismus*	8 ECTS/LP

Version 1.1.0 (since WS09/10)
Person responsible for module: Prof. Dr. Arno Kampf

Contents:

- Magnetism and electronic interactions
- Spin-exchange coupling
- Para- and diamagnetism
- Quantum Hall effect
- Ising model
- Heisenberg model
- Hubbard model
- Kondo problem

Learning Outcomes / Competences:

- The students recognize the basic mechanisms which lead to magnetism in solids,
- get to know the quantum mechanical models and strategies for their solution,
- identify the connection between magnetism and electronic correlations
- and are capable to solve problems in this context on their own.
- Acquiring key qualifications: independent studies with specialized literature in English, conception of complex contexts and their mathematical modelling, competence in theoretical methods

Workload:
Total: 240 h
30 h studying of course content using provided materials (self-study)
90 h lecture and exercise course (attendance)
30 h studying of course content using literarture (self-study)
90 h studying of course content through exercises / case studies (self-study)

Conditions:
Basic knowledge of condensed matter theory is recommended.

Frequency: every 3rd semester starting WS 21/22	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Theorie des Magnetismus
Mode of Instruction: lecture
Language: German / English
Contact Hours: 4

Learning Outcome:
siehe Modulbeschreibung

Contents:
siehe Modulbeschreibung

Literature:

- P. Fazekas, Electron Correlation and Magnetism (World Scientific)
- W. Nolting, Quantentheorie des Magnetismus (Teubner)
- K. Yosida, Theory of Magnetism (Springer)

Part of the Module: Übung zu Theorie des Magnetismus

Mode of Instruction: exercise course

Language: German / English

Contact Hours: 2

Learning Outcome:

siehe Modulbeschreibung

Examination

Theory of Magnetism

oral exam / length of examination: 30 minutes

Module PHM-0080: Theory of Superconductivity *Theorie der Supraleitung*	8 ECTS/LP
Version 1.0.0 (since WS09/10) Person responsible for module: Prof. Dr. Fabian Pauly	

Contents:

- Historie, wichtige Experimente
- Bardeen-Cooper-Schrieffer-Theorie
- Elektrodynamik von Supraleitern
- Ginzburg-Landau-Theorie
- Josephson-Effekt
- Fluktuationen des Ordnungsparameters
- Gorkov-Gleichungen, Nambu-Formalismus
- Schmutzige Supraleiter

Learning Outcomes / Competences:

- Die Studierenden kennen die grundlegenden Eigenschaften und Phänomene supraleitender Materialien sowie die wichtigsten theoretischen Methoden und Konzepte zu ihrer Beschreibung, wie die BCS-Theorie und die Methode der Greenschen Funktionen,
- haben Fertigkeiten zur Formulierung und Bearbeitung von modernen Fragestellungen der Vielteilchenphysik, insbesondere im Rahmen der Mean-Field-Näherung, erworben,
- und besitzen die Kompetenz, aktuelle Problemstellungen aus der Theorie der Supraleitung weitgehend selbständig zu bearbeiten.
- Integrierter Erwerb von Schlüsselqualifikationen: eigenständiges Arbeiten mit englischsprachiger Fachliteratur, Erfassen komplexer Zusammenhänge und deren modellhafte Darstellung mit Hilfe mathematischer Strukturen, Methodenkompetenz

Workload:
Total: 240 h
90 h studying of course content through exercises / case studies (self-study)
30 h studying of course content using literarture (self-study)
30 h studying of course content using provided materials (self-study)
90 h lecture and exercise course (attendance)

Conditions: Es wird empfohlen, das Modul Theoretische Festkörperphysik zuerst zu absolvieren. Außerdem sind Kenntnisse aus der Vielteilchentheorie wünschenswert.		
Frequency: irregular	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Theorie der Supraleitung
Mode of Instruction: lecture
Language: German / English
Frequency: every 3rd semester
Contact Hours: 4

Learning Outcome:
siehe Modulbeschreibung

Contents:

siehe Modulbeschreibung

Literature:

- N. W. Ashcroft, N. D. Mermin, Solid State Physics (Holt, Rinehart and Winston)
- M. Tinkham, Introduction to Superconductivity (McGraw-Hill)
- A. A. Abrikosov, Fundamentals of the Theory of Metals (Academic)
- E. M. Lifschitz, L. P. Pitaevskii, Statistical Physics Part 2 (Pergamon)
- P. G. de Gennes, Superconductivity in Metals and Alloys (Westview)
- R. D. Parks (editor), Superconductivity, Vol. 1 & 2 (Marcel Dekker)

Part of the Module: Übung zu Theorie der Supraleitung

Mode of Instruction: exercise course

Language: German / English

Frequency: every 3rd semester

Contact Hours: 2

Learning Outcome:

siehe Modulbeschreibung

Examination

Theorie der Supraleitung

oral exam / length of examination: 30 minutes

Module PHM-0083: Computational Physics and Materials Science *Computational Physics and Materials Science*		8 ECTS/LP
Version 1.0.0 (since WS09/10) Person responsible for module: Prof. Dr. Liviu Chioncel		
Contents: • Basic Numerical Methods • Ordinary and Partial Differential Equations • Density Functional Theory and Molecular Dynamics • Advanced Methods for Many-Particle Systems • Monte Carlo Simulations		
Learning Outcomes / Competences: • Die Studierenden kennen die numerischen Methoden, die für die Lösung physikalischer und materialwissenschaftlicher Probleme geeignet sind, insbesondere Methoden zur Lösung gewöhnlicher und partieller Differentialgleichungen sowie Molekulardynamik und Monte-Carlo-Simulationen, • sind in der Lage, diese Verfahren praktisch umzusetzen, • und besitzen die Kompetenz, theoretisch-numerische Problemstellungen aus den verschiedensten Bereichen der Physik und der Materialwissenschaften unter Anleitung zu bearbeiten. • Integrierter Erwerb von Schlüsselqualifikationen: eigenständiges Arbeiten mit englischsprachiger Fachliteratur, Erfassen komplexer Zusammenhänge und deren modellhafte Darstellung mit Hilfe mathematischer Strukturen, Methodenkompetenz		
Workload: Total: 240 h 30 h studying of course content using provided materials (self-study) 90 h studying of course content through exercises / case studies (self-study) 30 h studying of course content using literarture (self-study) 90 h lecture and exercise course (attendance)		
Conditions: Das Modul setzt die Inhalte des Bachelor-Moduls "Numerische Verfahren" (BaPhy-45-01) sowie elementare Programmierkenntnisse (zum Beispiel Fortran, C/C++, Python, …) voraus.		
Frequency: every 3rd semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Computational Physics and Materials Science **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 4
Learning Outcome: siehe Modulbeschreibung

Contents:

- Basic Numerical Methods
  - Programing languages: Fortran, C++, Perl, Python, compilation and execution
  - Differentiation and integration, interpolations and approximations
  - Zeros and extremes of a single-variable function
  - Matrices in physics: Gauss elimination, LU decomposition, Cholesky factorization, recursive algorithm
- Ordinary and Partial Differential Equations
  - The Euler method, the second and fourth order Runge-Kutta method
  - Simple pendulum, double pendulum, Poincare plots, chaotic regime
  - Boundary value and eigen value problems: elastic waves in a vibrating rod, the shooting method
  - One dimensional Schrödinger equation, Numerov algorithm
- Density Functional Theory and Molecular Dynamics
  - Density Functional Theory for solids: the muffin-tin concept
  - Electronic structure calculations with APW, KKR and LMTO methods
  - Molecular dynamics simulations, the Verlet algorithm
  - Structure and dynamics of real materials, ab-initio molecular dynamics
- Advanced Methods for Many-Particle Systems
  - The second quantization and the Hartree-Fock method
  - Models and many body Hamiltonians and their numerical representation
  - Exact diagonalization, the power method, Lanczos method
  - Lehmannn representation, Green functions, dynamic correlations
- Monte Carlo Simulations
  - Random numbers, high dimensional integrals, Importance sampling, Diffusion limited aggregation.
  - Markov chains, Metropolis algorithm, Ising model, Wang-Landau algorithm, simulated annealing, traveling salesman problem
  - Quantum Monte Carlo methods, path integrals and path integral Monte Carlo, QMC on the lattice, Heisenberg model, world-line approach
  - Determinantal QMC, the Hirsch-Fye algorithm, continuous time QMC

Literature:

- Tao Pang, An Introduction to Computational Physics (Cambridge University Press)
- J. M. Thijssen, Computational Physics (Cambridge University Press)
- S. Koonin, D. Meredith, Computational Physics (Addison-Wesley)
- W. H. Press et al., Numerical Recipes (Cambridge University Press) [available on-line at http://www.nr.com/]
- D. C. Rapaport, The Art of Molecular Dynamics Simulation (Cambridge University Press)
- R. H. Landau, M. J. Paez, C. Bordeianu, Computational Physics (Wiley-VCH)

Part of the Module: Computational Physics and Materials Science (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 2

Learning Outcome:

siehe Modulbeschreibung

Contents:

siehe Modulbeschreibung

Literature:

siehe zugehörige Vorlesung

Examination

Computational Physics and Materials Science

oral exam / length of examination: 30 minutes

Module PHM-0084: Condensed Matter Theory *Theorie der kondensierten Materie*		8 ECTS/LP
Version 1.1.0 (since SS10) Person responsible for module: Prof. Dr. Markus Heyl		
Contents: • Landau Fermi liquid theory • Transport theory: the Boltzmann equation • Theory of magnetism • Theory of superconductivity • Further special topics will be covered such as: Quantum Hall effect, topolog insulators, disordered systems, phase transitions		
Learning Outcomes / Competences: • The students acquire understanding of the basic principles and methods for the quantum theoretical description of condensed matter systems. • They have the skills to theoretically formulate physical problems in condensed matter physics and to investige their properties with suitable techniques. • The students have the competence to independently work on physical problems related to the covered topics. • Integrated acquisition of key qualifications: ability to work independently with literature in English professional language as well as to capture complex problems and their modeling with mathematical structures.		
Workload: Total: 240 h 90 h studying of course content through exercises / case studies (self-study) 30 h studying of course content using provided materials (self-study) 30 h studying of course content using literarture (self-study) 90 h lecture and exercise course (attendance)		
Conditions: This lecture builds on the content of the bachelor modules Theoretische Physik II + III, Physik IV as well we the master module Theoretische Festkörperphysik.		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: irregular (usu. summer semester)	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Theorie der kondensierten Materie **Mode of Instruction:** lecture **Language:** German / English **Frequency:** every 3rd semester **Contact Hours:** 4
Learning Outcome: siehe Modulbeschreibung
Contents: siehe Modulbeschreibung

Literature:

- N. W. Ashcroft and N. D. Mermin, Solid State Physics (Rinehart and Winston)
- P. M. Chaikin and T. C. Lubensky, Principles of Condensed Matter Physics (Cambridge University Press)
- G. Giuliani and G. Vignale, Quantum Theory of the Electron Liquid (Cambridge University Press)
- H. Bruus and K. Flensberg, Many-Body Quantum Theory in Condensed Matter Physics: An Introduction (Oxford Graduate Texts)
- G. D. Mahan, Many-Particle Physics (Springer)
- P. Phillips, Advanced Solid State Physics (Cambridge University Press)
- P. Fazekas, Lecture Notes on Electron Correlation and Magnetism (World Scientific)
- M. Z. Hasan and C. L. Kane, Colloquium: Topological insulators, Rev. Mod. Phys. **82**, 3046 (2010)
- P. G. de Gennes, Superconductivity of Metals and Alloys (Addison-Wesley)
- M. Tinkham, Introduction to Superconductivity (Dover)

Assigned Courses:

Theorie der kondensierten Materie (lecture)

Part of the Module: Übung zu Theorie der kondensierten Materie

Mode of Instruction: exercise course
Language: German / English
Frequency: every 3rd semester
Contact Hours: 2

Learning Outcome:
siehe Modulbeschreibung

Assigned Courses:

Übung zu Theorie der kondensierten Materie (exercise course)

Examination

Theorie der kondensierten Materie
oral exam / length of examination: 30 minutes

Module PHM-0085: Theoretical Biophysics *Theoretische Biophysik*	8 ECTS/LP

Version 2.1.0 (since WS16/17 to SoSe21)
Person responsible for module: PD Dr. Igor Goychuk

Contents:

- Cell structure and organization. Molecules of life, structure-function relations. Importance of dynamics, spatial and time scales
- Molecular forces in biological structures. Entropic forces and importance of electrostatics. Energy scales. Molecular dynamics and visualization
- Global transitions in proteins. Two-state thermodynamical model and Arrhenius kinetics, importance of both entropy and enthalpy changes
- Biochemical reactions: macroscopic enzyme kinetics and stochastic effects in real cells
- Gene-protein circuits (genetic regulation), genetic switches and oscillators
- Transmembrane transport: ion channels, pumps, and transporters
- Excitable membranes: Hodgkin-Huxley model and bottom-up approach
- Molecular motors as macromolecular Brownian machines and biochemical cycle kinetics

Learning Outcomes / Competences:

- Die Studierenden kennen Grundbegriffe, Konzepte, Phänomenologie und Theorie zur Erforschung von Struktur, Dynamik und Kinetik der biologisch relevanten molekularen Systeme, sowie die wichtigsten biophysikalischen Modelle,
- sind in der Lage, freie Software für biophysikalische Simulationen einzusetzen,
- sind kompetent, theoretische Modelle selbst vorzuschlagen und zu untersuchen.
- Integrierter Erwerb von Schlüsselqualifikationen: eigenständiges Arbeiten mit englischsprachiger Fachliteratur, Erfassen komplexer Zusammenhänge und deren modellhafte Darstellung mit Hilfe mathematischer Strukturen, Methodenkompetenz

Remarks:
In der Regel wird dieses Modul in zwei Teilen angeboten (jeweils 2 V + 1 Ü).

Workload:
Total: 240 h
30 h studying of course content using provided materials (self-study)
30 h studying of course content using literarture (self-study)
90 h studying of course content through exercises / case studies (self-study)
90 h lecture and exercise course (attendance)

Conditions: Mechanik, Elektrodynamik, Statistische Physik		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: every 3rd semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 2 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Theoretische Biophysik (Teil 1)
Mode of Instruction: lecture
Language: German / English
Frequency: each winter semester
Contact Hours: 2

Learning Outcome:
siehe Modulbeschreibung

Contents:
siehe Modulbeschreibung

Literature:
- P. Nelson, Biological Physics: Energy, Information, Life (Freeman, New York, 2004)
- P. Nelson, Physical Models of Living Systems (Freeman, New York, 2015)
- M. B. Jackson, Molecular and Cellular Biophysics (Cambridge University Press, 2006)
- J. Keener and J. Sneyd, Mathematical Physiology (Springer, New York, 2001)
- T. L. Hill, Free Energy Transduction and Biochemical Cycle Kinetics (Dover Publications, 2004)
- R. Nossal and H. Lecar, Molecular and Cell Biophysics (Addison-Wesley, Redwood City, 1991)
- T. D. Pollard, W. C. Earnshaw, and J. Lippincott-Schwartz, Cell Biology, second edition (Spektrum Verlag, 2007)

Part of the Module: Übung zu Theoretische Biophysik (Teil 1)
Mode of Instruction: exercise course
Language: German / English
Frequency: each winter semester
Contact Hours: 1

Learning Outcome:
siehe Modulbeschreibung

Part of the Module: Theoretische Biophysik (Teil 2)
Mode of Instruction: lecture
Language: German / English
Frequency: each summer semester
Contact Hours: 2

Learning Outcome:
siehe Modulbeschreibung

Contents:
siehe Modulbeschreibung

Literature:
- P. Nelson, Biological Physics: Energy, Information, Life (Freeman, New York, 2004)
- P. Nelson, Physical Models of Living Systems (Freeman, New York, 2015)
- M. B. Jackson, Molecular and Cellular Biophysics (Cambridge University Press, 2006)
- J. Keener and J. Sneyd, Mathematical Physiology (Springer, New York, 2001)
- T. L. Hill, Free Energy Transduction and Biochemical Cycle Kinetics (Dover Publications, 2004)
- R. Nossal and H. Lecar, Molecular and Cell Biophysics (Addison-Wesley, Redwood City, 1991)
- T. D. Pollard, W. C. Earnshaw, and J. Lippincott-Schwartz, Cell Biology, second edition (Spektrum Verlag, 2007)

Part of the Module: Übung zu Theoretische Biophysik (Teil 2)
Mode of Instruction: exercise course
Language: German / English
Frequency: each summer semester
Contact Hours: 1

Learning Outcome:
siehe Modulbeschreibung

Examination

Theoretische Biophysik

oral exam / length of examination: 30 minutes

Module PHM-0086: Dynamics of Nonlinear and Chaotic Systems *Dynamik nichtlinearer und chaotischer Systeme*	8 ECTS/LP

Version 1.0.0 (since WS12/13)
Person responsible for module: Prof. Dr. Christoph Alexander Weber

Contents:

- Grundlagen nichtlinearer Dynamik
- Seltsame Attraktoren und fraktale Dimensionen
- Chaos in Hamiltonschen Systemen
- Kontrolle und Synchronisation von Chaos
- Dynamisches Chaos in realen Systemen
- Quantenchaos

Learning Outcomes / Competences:

- Die Studierenden kennen die grundlegenden Eigenschaften chaotischer Systeme,
- kennen die Probleme, aber auch die Möglichkeiten, die gegenüber linearen Systemen entstehen,
- haben die Kompetenz, Fragen zu den genannten Themen zu formulieren und zu beantworten,
- und können solche Systeme im Hinblick auf Anwendungen qualitativ und quantitativ modellieren.
- Integrierter Erwerb von Schlüsselqualifikationen: eigenständiges Arbeiten mit englischsprachiger Fachliteratur, Einüben der Fachsprache Englisch

Workload:
Total: 240 h
90 h lecture and exercise course (attendance)
30 h studying of course content using literarture (self-study)
30 h studying of course content using provided materials (self-study)
90 h studying of course content through exercises / case studies (self-study)

Conditions:
Stoff eines viersemestrigen Kurses in theoretischer Physik, insbesondere Mechanik

Frequency: annually	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Dynamik nichtlinearer und chaotischer Systeme
Mode of Instruction: lecture
Language: English
Contact Hours: 4

Learning Outcome:
siehe Modulbeschreibung

Contents:
siehe Modulbeschreibung

Literature:
wird in der Vorlesung bekanntgegeben

Part of the Module: Übung zu Dynamik nichtlinearer und chaotischer Systeme

Mode of Instruction: exercise course

Language: English

Contact Hours: 2

Learning Outcome:

siehe Modulbeschreibung

Contents:

siehe Modulbeschreibung

Literature:

siehe zugehörige Vorlesung

Examination

Dynamik nichtlinearer und chaotischer Systeme

oral exam / length of examination: 30 minutes

Module PHM-0087: Basics of Quantum Computing *Basics of Quantum Computing*		8 ECTS/LP
Version 2.0.0 (since SoSe22) Person responsible for module: Prof. Dr. Markus Heyl		
Contents: • Qubits and their realizations • Quantum gates and quantum circuits • DiVincenzo criteria • Quantum algorithms • Digital quantum simulation		
Learning Outcomes / Competences: • The students acquire basic understanding of the principles of quantum computers and their applications. • They have the skills to construct and simulate concrete quantum circuits and algorithms. • They have the competence to identify and translate suitable problems into quantum circuits as well as to follow the modern developments in quantum computing. • Integrated acquisition of key qualifications: Abstraction skills through the translation of physics problems onto quantum computing language, familiarization with English professional language		
Workload: Total: 240 h 90 h lecture and exercise course (attendance) 90 h studying of course content through exercises / case studies (self-study) 30 h studying of course content using provided materials (self-study) 30 h studying of course content using literarture (self-study)		
Conditions: Good knowledge of quantum mechanics		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: irregular (usu. summer semester)	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Basics of Quantum Computing **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 4
Learning Outcome: see module description
Contents: see module description
Literature: • D. DiVincenzo, Quantum Computation, Science **270**, 255-261 (1995) • M. Nielsen and I. Chuang, Quantum Computation and Quantum Information (Cambridge University Press, 2000) • J. Stolze and D. Suter, Quantum Computing (Wiley-VCH, 2004)

Part of the Module: Basics of Quantum Computing (Tutorial)
Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Examination
Basics of Quantum Computing
oral exam / length of examination: 30 minutes

Module PHM-0088: Seminar Journal Club *Seminar Journal Club*			4 ECTS/LP
Version 1.0.0 (since WS09/10) Person responsible for module: Prof. Dr. Achim Wixforth			
Contents: Aktuelle Forschungsergebnisse und ‚Klassiker' der Physik sollen von den Studierenden zusammengefasst und in Form eines Vortrags vorgestellt werden. Dazu eine kurze Zusammenfassung der erarbeiteten Literatur als schriftliche Hausarbeit.			
Learning Outcomes / Competences: • Die Studierenden erarbeiten sich Kenntnisse in der Präsentation wissenschaftlicher Ergebnisse anhand der Vorstellung aktueller Veröffentlichungen, • haben Fertigkeiten, komplexe experimentelle Forschungsergebnisse aufzuarbeiten und in kurzer, prägnanter Form in einem Vortrag und einem ‚Term paper' darzustellen, und • besitzen die Kompetenz, übergreifende Problemstellungen im Bereich der experimentellen Festkörperphysik selbständig zu bearbeiten. • Integrierter Erwerb von Schlüsselkompetenzen: Erlernen des eigenständigen Arbeitens mit englischsprachiger Fachliteratur / Erlernen von Präsentationstechniken / kritische Reflexion experimenteller Ergebnisse im internationalen wissenschaftlichen Kontext / Präsentation eigener Ergebnisse auf wissenschaftlichen Konferenzen / Grundsätze guter wissenschaftlicher Praxis			
Workload: Total: 120 h 30 h seminar (attendance) 90 h preparation of presentations (self-study)			
Conditions: Solide Kenntnisse in den Grundlagen der Physik, insbesondere Festkörper- und Nanophysik		**Credit Requirements:** Seminarvortrag (ca. 30 - 45 min)	
Frequency: annually	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]	
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Seminar Journal Club **Mode of Instruction:** seminar **Language:** German / English **Contact Hours:** 2
Learning Outcome: siehe Modulbeschreibung
Contents: siehe Modulbeschreibung
Literature: Die zu bearbeitende Literatur wird den Studierenden zur Verfügung gestellt.

Examination
Seminar Journal Club seminar / length of examination: 45 minutes, not graded

Module PHM-0092: Seminar on Thermodynamics and Transport in Solids *Seminar über Thermodynamik und Transport im Festkörper*	4 ECTS/LP

Version 2.0.0 (since SoSe16 to WS21/22)
Person responsible for module: Prof. Dr. Georg Eickerling
Dr. Ernst-Wilhelm Scheidt

Contents:

Mögliche Themen:

- Experimentelle Methoden zur spezifischen Wärme: adiabatische Relaxations und ac–Methode
- Experimentelle Methoden zur Bestimmung magnetischer Suszeptibilität: Foner-Magnetometer, Faraday - Waage, Superconducting Quantum Interference Device-Methode, ac- und Torque-Methode
- Interpretation der Messgröße "spezifische Wärme"
    - Elektronen, Phononen und Magnonen in der spezifischen Wärme
    - Phasenübergänge (Supraleitung, Antiferro- und Ferromagnetismus)
    - Schottky-Anomalie (Kristallfeld und magnetische Beiträge)
- Interpretation der Messgröße "Magnetisierung" und "Suszeptibilität".
    - Band und lokaler Dia- bzw. Paramagnetismus in Metallen
    - Phasenübergänge (Supraleitung, Antiferro- und Ferromagnetismus)
    - Quasi-Phasenübergänge (Spin-Glass und Meta-Magnetismus)

Learning Outcomes / Competences:

- Die Studierenden lernen experimentelle Methoden zur Bestimmung thermodynamischer Eigenschaften in Festkörpern kennen (z. B. spezifische Wärme- und Magnetisierungsstudien). Weiter werden theoretische Beschreibungen von Elektronen, Phononen, Magnonen sowie von Phasenübergängen (Supraleitung, Antiferromagnetismus, Ferromagnetismus, etc.) vertieft.
- Sie besitzen die Fertigkeit, sich selbständig in ein aktuelles Themengebiet unter Verwendung moderner Methoden der Literaturrecherche einzuarbeiten und dieses zu durchdringen.
- Sie sind kompetent, das Thema mit angemessener Medienunterstützung anschaulich und überzeugend darzustellen.

Remarks:

Bei der Auswahl der Vortragsthemen können die Wünsche der Studierenden berücksichtigt werden, z. B. Hall-Effekt, thermische Transporteigenschaften, etc.

Workload:

Total: 120 h
90 h preparation of presentations (self-study)
30 h seminar (attendance)

Conditions:

Es wird dringend empfohlen, das Modul Experimentelle Festkörperphysik zuerst zu absolvieren.

Frequency: each winter semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar über Thermodynamik und Transport im Festkörper
Mode of Instruction: seminar
Language: German / English
Contact Hours: 2

Learning Outcome:
siehe Modulbeschreibung

Contents:
siehe Modulbeschreibung

Literature:

- Gängige Festkörperphysik-Lehrbücher wie C. Kittel, S. Hunklinger, Ashcroft/Mermin
- A. Tari, The Specific Heat of Matter at Low Temperatures (Imperial College Press)
- S. Blundell, Magnetism in Condensed Matter (Oxford University Press)
- Weitere Literatur wird im Seminar angegeben.

Examination

Seminar über Thermodynamik und Transport im Festkörper
seminar / length of examination: 60 minutes, not graded

Module PHM-0096: Seminar on Glass Physics *Seminar on Glass Physics*		4 ECTS/LP
Version 1.0.0 (since WS09/10) Person responsible for module: PD Dr. Peter Lunkenheimer		
Contents: • Technical glasses • Polymers • Metallic glasses • Relaxation phenomena • Models of the glass transition • Aging phenomena in glasses • Non-structural glasses • Ionic conductivity • Electrons in glasses		
Learning Outcomes / Competences: • The students know the phenomenology of the glass state and the glass transition, the material properties of glasses, their technical applications and the most important models of glassy matter. They have acquired knowledge concerning the preparation of scientific presentations. • They are able to independently acquaint themselves with a physical or material-science topic using various sources of information. They are capable of preparing a graphically attractive scientific talk using modern, computer-based presentation techniques. They are able to present a talk in a clear and informative way, adhering to a fixed time limit. • The students have the competence to distinguish between important and less important contents when preparing a scientific talk and to edit and restructure the chosen contents in order to provide a didactically sound presentation. • Integrated acquisition of key qualifications: Learning to work with English textbooks and scientific literature, acquisition of abstraction capabilities using the example of the physical definitions of glass, ability to comparatively assess competing models for the explanation of experimental results, learning of presentation techniques, getting practice in the technical language English.		
Workload: Total: 120 h 90 h preparation of presentations (self-study) 30 h seminar (attendance)		
Conditions: Basic knowledge of condensed-matter physics		**Credit Requirements:** Pass of module exam (seminar talk with discussion, 60 min)
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Seminar on Glass Physics **Mode of Instruction:** seminar **Language:** English **Contact Hours:** 2

Learning Outcome:
see module description

Contents:
see module description

Literature:
- H. Scholze, Glas: Natur, Struktur und Eigenschaften (Springer, Berlin, 1988).
- S.R. Elliott, Physics of Amorphous Materials (Longman, London, 1990).
- R. Zallen, The Physics of Amorphous Solids (Wiley-VCH, Weinheim, 1998).
- J. Zarzycki (ed.), Material Science and Technology, Vol. 9: Glasses and Amorphous Materials (VCH, Weinheim, 1991).
- J. Zarzycki, Glasses and the Vitreous State (Cambridge University Press, Cambridge, 1991).

Assigned Courses:

Seminar on Glass Physics (seminar)

Examination

Seminar on Glass Physics
seminar / length of examination: 60 minutes, not graded

Module PHM-0099: Seminar on Plasmas in Research and Industry *Seminar über Plasmen in Forschung und Industrie*		4 ECTS/LP
Version 1.0.0 (since WS09/10) Person responsible for module: apl. Prof. Dr.-Ing. Ursel Fantz		

Contents:

- Basics of low-temperature plasmas
- Plasma diagnostics
- Plasma processing
- Industrial applications of plasmas

Learning Outcomes / Competences:

- The students have in-depth knowledge of the ways of thinking and methods in a special field of plasma physics.
- They have the ability, after consultation with the respective supervisor, to familiarize thereselves with a limited subject area and to comprehend it. They are able to present the topic clearly for a student audience.
- The students are competent in working independently on a given topic. They can present their results in a structured way and defend them in the discussion.
- Integrated acquisition of key qualifications: learning how to present application-oriented topics scientifically, developing one's own point of view on complex issues, ability to engage in scientific discussion.

Remarks:

Student ideas for talk topics can be taken into consideration.

Workload:

Total: 120 h

30 h seminar (attendance)

90 h preparation of presentations (self-study)

Conditions: Knowledge of the lecture on plasma physics is desirable but not mandatory.		**Credit Requirements:** Talk in Seminar
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar on Plasmas in Research and Industry

Mode of Instruction: seminar

Language: German / English

Contact Hours: 2

Learning Outcome:

see description of the module

Contents:

see description of the module

Literature:

- M. Kaufmann: Plasmaphysik und Fusionsforschung (Teubner, 2003)
- R. J. Goldston, P.H. Rutherford: Introduction to Plasma Physics (IOP Publishing, 1997)
- F. F. Chen: Introduction to Plasma Physics and Controlled Fusion (Plenum Press, 1990)
- M. A. Lieberman, A. J. Lichtenberg: Principles of Plasma Discharges and Materials Processing (Wiley, 2005)
- G. Janzen: Plasmatechnik (Hüthig, 1992)
- R. Hippler: Low Temperature Plasmas (Wiley-VCH, 2008)
- J. R. Roth: Industrial Plasma Engineering (IOP Publishing, 1995)
- A. Grill: Cold Plasma in Materials Fabrication (IEEE Press, 1994)

Assigned Courses:

Seminar über Plasmen in Forschung und Industrie (seminar)

Examination

Seminar on Plasmas in Research and Industry

seminar / length of examination: 60 minutes, not graded

Module PHM-0106: Seminar on Thermoelectric Properties of Nano- and Heterostructures		4 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Fabian Pauly		

Contents:

- Thermodynamic description of thermoelectric effects, Onsager relations
- Boltzmann theory of thermoelectric effects
- Band-structure based calculations of transport coeffcients
- Electron-phonon and phonon-phonon scattering
- Spin caloritronics, spin-orbit interaction
- Charge, spin, and heat transport in nanostructures and quantum wires
- Charge, spin, and heat transport in heterostructures and layered systems
- Materials aspects, design of thermoelectric devices

Learning Outcomes / Competences:

- The students are familiar with the experimental and theoretical concepts in a modern research field, which has significant applications for converting waste heat to electrical energy.
- They acquire the skill to familiarize themselves independently with a current research topic, using modern methods of literature search. They are able to present the topic, using the appropriate media, clearly and convincingly.
- The students are competent in treating a given special topic in an autonomous way. They are able to present this topic in a structured way, to develop their own assessment, and to present and defend their opinion in the discussion with their fellow students.
- Integrated acquirement of key qualifications: The students will gain experience in working with books and articles in English, and improve their presentation techniques as well as their English speaking skills.

Remarks:

Once in a while and if time permits, the seminar will be supplemented by lectures from external experts.

Workload:

Total: 120 h
30 h seminar (attendance)
90 h preparation of presentations (self-study)

Conditions: Good knowledge of quantum mechanics, statistical physics, and solid state physics		**Credit Requirements:** presentation (60 min)
Frequency: annually	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar on Thermoelectric Properties of Nano- and Heterostructures

Mode of Instruction: seminar
Language: English
Contact Hours: 2

Learning Outcome:

see module description

Contents:

see module description

Literature:

- Herbert B. Callen, *Thermodynamics* (Wiley), esp. chapters 16 and 17
- Neil W. Ashcroft and N. David Mermin, *Solid State Physics* (Holt, Rinehart and Winston), esp. chapters 12, 13 and 16
- J. M. Ziman, *Principles of the Theory of Solids* (Cambridge University Press), esp. chapters 6 and 7
- J. M. Ziman, *Electrons and Phonons - The Theory of Transport Phenomena in Solids* (Oxford University Press), esp. chapters VII - XI
- Jaroslav Fabian, Alex Matos-Abiague, Christian Ertler, Peter Stano, and Igor Zutic, *Semiconductor Spintronics*, acta physica slovaca **57**, 565-907 (2007)
- Gerrit E. W. Bauer, Eiji Saitoh, and Bart J. van Wees, *Spin Caloritronics*, Nature Materials **11**, 391-399 (2012)
- L. D. Hicks and M. S. Dresselhaus, Thermoelectric Figure of Merit of a One-Dimensional Conductor, Phys. Rev. B **47**, 16631 (1993)
- Georg K. H. Madsen and David J. Singh, *BoltzTrap. A Code for Calculating Band-Structure Dependent Quantities*, Comp. Phys. Commun. **175**, 67-71 (2006)
- David J. Singh, *Oxide Thermoelectrics*, Mater. Res. Soc. Symp. Proc. 1044, 1044-U02-05 (2008)
- Mildred S. Dresselhaus, et al., *New Directions for Low-Dimensional Thermoelectric Materials*, Adv. Mater. **19**, 1043-1053 (2007)
- Karol I. Wysokinski, *Thermoelectric Transport in the Three Terminal Quantum Dot*, J. Phys. Condens. Matter **24**, 335303 (2012) (8 pp.)

Examination

Seminar on Thermoelectric Properties of Nano- and Heterostructures

seminar / length of examination: 60 minutes, not graded

Module PHM-0107: Practical Training *Fachpraktikum*	15 ECTS/LP

Version 1.0.1 (since WS09/10)
Person responsible for module: apl. Prof. Dr. Helmut Karl
bzw. Vorsitzender des Prüfungsausschusses

Contents:
entsprechend der gewählten Methodik

Learning Outcomes / Competences:

- Die Studierenden kennen ausgewählte Methoden, die in einer der Arbeitsgruppen des Instituts für Physik Anwendung finden,
- besitzen die Fertigkeit, diese Methoden in laufende wissenschaftliche Untersuchungen einzubringen, sowie die Fähigkeit, eine wissenschaftliche Methode und ihre beispielhafte Anwendung angemessen schriftlich darzustellen,
- und sind grundsätzlich kompetent, sich in moderne experimentelle oder theoretische Methoden einzuarbeiten.
- Integrierter Erwerb von Schlüsselqualifikationen: Teamfähigkeit, Methodenkompetenz, Fähigkeit, ein Thema schriftlich darzustellen

Remarks:
Das Fachpraktikum wird im SoSe 2020 angeboten, sobald es die aktuelle Situation erlaubt.

Es wird empfohlen, dieses Modul vor dem Modul Projektarbeit oder parallel dazu zu absolvieren. Die thematische Wahl des Moduls Fachpraktikum sollte im Hinblick auf das angestrebte Thema der Masterarbeit erfolgen.

Workload:
Total: 450 h
150 h preparation of written term papers (self-study)
300 h internship / practical course (attendance)

Conditions: werden vom jeweiligen Betreuer/von der jeweiligen Betreuerin bekannt gegeben		**Credit Requirements:** mindestens mit "ausreichend" bewerteter Abschlussbericht
Frequency: each semester Siehe Bemerkungen	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 12	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Fachpraktikum
Mode of Instruction: internship
Language: German / English

Learning Outcome:
siehe Modulbeschreibung

Lehr-/Lernmethoden:
Erarbeitung spezieller wissenschaftlicher Methoden anhand konkreter Fragestellungen; in der Regel Mitarbeit in der jeweiligen Arbeitsgruppe

Literature:
wird vom jeweiligen Betreuer/von der jeweiligen Betreuerin bekannt gegeben

Examination

Fachpraktikum

project work, schriftlicher Abschlussbericht, ca. 20 Seiten / work period for assignment: 4 weeks

Module PHM-0108: Project Work *Projektarbeit*	15 ECTS/LP

Version 1.0.1 (since WS09/10)
Person responsible for module: apl. Prof. Dr. Helmut Karl
bzw. Vorsitzender des Prüfungsausschusses

Contents:
entsprechend dem gewählten Thema

Learning Outcomes / Competences:

- Die Studierenden sind mit einem aktuellen Forschungsthema und der zugehörigen Literatur vertraut,
- sind in der Lage, ein Forschungsthema kritisch zu reflektieren und mit angemessener Medienunterstützung überzeugend darzustellen,
- besitzen die Kompetenz, ein kleineres Forschungsprojekt unter Anleitung mit wissenschaftlichen Methoden zu bearbeiten.
- Integrierter Erwerb von Schlüsselqualifikationen: Teamfähigkeit, eigenständiges Arbeiten, Präsentationstechniken, Fähigkeit, ein Thema in der Diskussion zu vertreten

Remarks:
Die Projektarbeit wird im SoSe 2020 angeboten, sobald es die aktuelle Situation erlaubt.

In diesem Modul bearbeitet der Student/die Studentin in der Regel einen kleineren, genau definierten Teilaspekt der laufenden wissenschaftlichen Forschungen einer Arbeitsgruppe.

Es wird empfohlen, dieses Modul nach dem Modul Fachpraktikum oder parallel dazu zu absolvieren. Die thematische Wahl des Moduls Projektarbeit sollte im Hinblick auf das angestrebte Thema der Masterarbeit erfolgen.

Workload:
Total: 450 h
90 h studying of course content through exercises / case studies (self-study)
300 h lecture and exercise course (attendance)
30 h studying of course content using literarture (self-study)
30 h studying of course content using provided materials (self-study)

Conditions: werden vom jeweiligen Betreuer/von der jeweiligen Betreuerin bekannt gegeben		**Credit Requirements:** mit "bestanden" bewertete mündliche Präsentation
Frequency: each semester Siehe Bemerkungen	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 12	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Projektarbeit
Mode of Instruction: internship
Language: German / English

Learning Outcome:
siehe Modulbeschreibung

Literature:
wird vom jeweiligen Betreuer/von der jeweiligen Betreuerin bekannt gegeben

Examination

Projektarbeit

project work, mündliche Präsentation mit Diskussion / length of examination: 90 minutes, not graded

Module PHM-0110: Materials Chemistry *Materials Chemistry*	6 ECTS/LP
Version 1.0.0 (since WS09/10) Person responsible for module: Prof. Dr. Henning Höppe	

Contents:

- Revision of basic chemical concepts
- Solid state chemical aspects of selected materials, such as
  - Thermoelectrics
  - Battery electrode materials, ionic conductors
  - Hydrogen storage materials
  - Data storage materials
  - Phosphors and pigments
  - Heterogeneous catalysis
  - nanoscale materials

Learning Outcomes / Competences:

The students will

- be able to apply basic chemical concepts on materials science problems,
- broaden their ability to derive structure-property relations of materials combining their extended knowledge about symmetry-related properties, chemical bonding in solids and chemical properties of selected compound classes,
- be able to assess synthetic approaches towards relevant materials,
- acquire skills to perform literature research using online data bases.

Workload:

Total: 180 h
60 h lecture and exercise course (attendance)
20 h studying of course content using provided materials (self-study)
20 h studying of course content using literarture (self-study)
80 h studying of course content through exercises / case studies (self-study)

Conditions: The lecture course is based on the Bachelor in Materials Science courses Chemie I and Chemie III (solid state chemistry).		
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Materials Chemistry

Mode of Instruction: lecture
Language: English
Contact Hours: 3

Learning Outcome:

see description of module

Contents:

see description of module

Literature:

- A. R. West, Solid State Chemistry, John Wiley, Chichester.
- U. Müller, Inorganic Structural Chemistry, Wiley-VCH.
- R. Dronskowski, Computational Chemistry of Solid State Materials, Wiley VCH.
- Textbooks on Basics of Inorganic Chemistry such as J. E. Huheey, E. Keiter, R. Keiter, Anorganische Chemie, de Gruyter, or equivalents.
- Moreover, selected reviews and journal articles will be cited on the slides.

Part of the Module: Materials Chemistry (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Learning Outcome:

see description of module

Contents:

see description of module

Literature:

see associated lecture

Examination

Materials Chemistry

written exam / length of examination: 90 minutes

Examination Prerequisites:

Materials Chemistry

Module PHM-0113: Advanced Solid State Materials *Advanced Solid State Materials*	6 ECTS/LP

Version 1.0.0 (since WS10/11)
Person responsible for module: Prof. Dr. Henning Höppe

Contents:

- Repitition of concepts
- Novel silicate-analogous materials
- Luminescent materials
- Pigments
- Heterogeneous catalysis

Learning Outcomes / Competences:

- The students are aware of correlations between composition, structures and properties of functional materials,
- acquire skills to predict the properties of chemical compounds, based on their composition and structures,
- gain competence to evaluate the potential of functional materials for future technological developments, and
- will know how to measure the properties of these materials.
- Integrated acquirement of soft skills

Workload:
Total: 180 h
60 h lecture and exercise course (attendance)
20 h studying of course content using literarture (self-study)
80 h studying of course content through exercises / case studies (self-study)
20 h studying of course content using provided materials (self-study)

Conditions:
Contents of the modules Chemie I, and Chemie II or Festkörperchemie (Bachelor Physik, Bachelor Materialwissenschaften)

Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Advanced Solid State Materials
Mode of Instruction: lecture
Language: English
Contact Hours: 3

Learning Outcome:
see module description

Contents:
see module description

Literature:

- A. West, Solid State Chemistry and Its Applications
- L. Smart, E. Moore, Solid State Chemistry
- Scripts Solid State Chemistry and Chemistry I and II

Assigned Courses:

Advanced Solid State Materials (lecture)

Part of the Module: Advanced Solid State Materials (Tutorial)
Mode of Instruction: exercise course
Language: English
Contact Hours: 1

Contents:
see module description

Literature:
- A. West, Solid State Chemistry and Its Applications
- L. Smart, E. Moore, Solid State Chemistry
- Scripts Solid State Chemistry and Chemistry I and II

Examination
Advanced Solid State Materials
written exam / length of examination: 90 minutes
Examination Prerequisites:
Advanced Solid State Materials

Module PHM-0114: Porous Functional Materials *Porous Functional Materials*		6 ECTS/LP
Version 1.0.0 (since SS11) Person responsible for module: Prof. Dr. Dirk Volkmer		
Contents: • Overview and historical developments • Structural families of porous frameworks • Synthesis strategies • Adsorption and diffusion • Thermal analysis methods • Catalytic properties • Advanced applications and current trends		
Learning Outcomes / Competences: • The students shall acquire knowledge about design principles and synthesis of porous functional materials, • broaden their capabilities to characterize porous solid state materials with special emphasis laid upon sorption and thermal analysis, • become introduced into typical technical applications of porous solids. • Integrated acquirement of soft skills		
Remarks: Subsequent to the lecture course, the students can take part in a hands-on method course ``Porous Materials Synthesis and Characterization'' to practice their knowledge.		
Workload: Total: 180 h 60 h lecture and exercise course (attendance) 80 h studying of course content through exercises / case studies (self-study) 20 h studying of course content using literarture (self-study) 20 h studying of course content using provided materials (self-study)		
Conditions: participation in the course Materials Chemistry		**Credit Requirements:** one written examination, 90 min
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Porous Functional Materials **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 4
Contents: see module description
Literature: • Paul A. Wright, Microporous Framework Solids (RSC Materials Monographs, 2008) • selected reviews and journal articles cited on the slides

Examination

Porous Functional Materials

written exam / length of examination: 90 minutes

Examination Prerequisites:

Porous Functional Materials

Module PHM-0116: Advanced Materials Physics *Advanced Materials Physics*		6 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: apl. Prof. Dr. Helmut Karl		

Contents:

- Magnetic materials
- Superconductivity
- Thermodynamics of materials
- Thermal properties
- Atomic transport

Learning Outcomes / Competences:

- The students know the physical and chemical fundamentals and the different resulting material properties,
- are able to characterize Materials according to their magnetic, thermal, and transportation properties, and to do correspondent calculations using simple models,
- have the competence to deal extensively autonomous with scientific problems of the
- above mentioned areas.
- Integrated acquirement of soft skills: Working with specialist literature, literature search and interdisciplinary thinking.

Workload:

Total: 180 h
80 h studying of course content through exercises / case studies (self-study)
20 h studying of course content using provided materials (self-study)
20 h studying of course content using literarture (self-study)
60 h lecture and exercise course (attendance)

Conditions: Basic knowledge of solid state physics		
Frequency: irregular (usu. summer semester)	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Advanced Materials Physics
Mode of Instruction: lecture
Language: English
Contact Hours: 3

Learning Outcome:
see module description

Contents:

- Magnetic materials
  - Magnetization
  - Atomic origin of magnetic moments
  - Paramagnetism
  - Ferromagnetism
  - Anisotropy
  - Ferromagnetic materials, hard and soft magnets
  - Magnetooptics
- Superconductivity
  - Basic phenomena
  - Meissner effect
  - Energy gap
  - London equation
  - Basic ideas of the BCS theory, Cooper pairs
  - Type I/II superconductors
  - High temperature superconducting materials, flux pinning
- Thermodynamics of materials
  - Review of basic terms
  - Equilibrium conditions
  - Phase diagrams
  - Multiphase-multicomponent equilibria
  - Thermodynamics of point defects
  - Thermodynamics of interfaces
- Thermal Properties
  - Specific Heat
  - Thermal Expansion
  - Thermal Transport
  - Thermal Radiation
  - Thermoelectricity
- Atomic transport
  - Diffusion
  - Electro-, thermo-, stress migration

Literature:

- Charles Kittel: Introduction to Solid State Physics (Wiley & Sons)
- Werner Buckel und Reinhold Kleiner: Supraleitung (Wiley-VCH)

Part of the Module: Advanced Materials Physics (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Learning Outcome:

see module description

Examination

Materials Physics II

written exam / length of examination: 90 minutes

Examination Prerequisites:

Materials Physics II

Module PHM-0117: Surfaces and Interfaces *Surfaces and Interfaces*	6 ECTS/LP

Version 1.0.0 (since WS09/10)
Person responsible for module: Prof. Dr. Manfred Albrecht

Contents:

Introduction

- The importance of surfaces and interfaces

Some basic facts from solid state physics

- Crystal lattice and reciprocal lattice
- Electronic structure of solids
- Lattice dynamics

Physics at surfaces and interfaces

- Structure of ideal and real surfaces
- Relaxation and reconstruction
- Transport (diffusion, electronic) on interfaces
- Thermodynamics of interfaces
- Electronic structure of surfaces
- Chemical reactions on solid state surfaces (catalysis)
- Interface dominated materials (nano scale materials)

Methods to study chemical composition and electronic structure, application examples

- Scanning electron microscopy
- Scanning tunneling and scanning force microscopy
- Auger – electron – spectroscopy
- Photo electron spectroscopy

Learning Outcomes / Competences:

The students:

- have knowledge of the structure, the electronical properties, the thermodynamics, and the chemical reactions on surfaces and interfaces,
- acquire the skill to solve problems of fundamental research and applied sciences in the field of surface and interface physics,
- have the competence to solve certain problems autonomously based on the thought physical basics.
- Integrated acquirement of soft skills.

Workload:

Total: 180 h
20 h studying of course content using literarture (self-study)
20 h studying of course content using provided materials (self-study)
80 h studying of course content through exercises / case studies (self-study)
60 h lecture and exercise course (attendance)

Conditions:
The module "Physics IV - Solid State Physics" of the Bachelor of Physics / Materials Science program should be completed first.

Frequency: each winter semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Surfaces and Interfaces

Mode of Instruction: lecture

Language: English

Frequency: annually

Contact Hours: 3

Learning Outcome:

see module description

Contents:

see module description

Literature:

- Ertl, Küppers: Low Energy Electrons and Surface Chemistry (VCH)
- Lüth: Surfaces and Interfaces of Solids (Springer)
- Zangwill: Physics at Surfaces (Cambridge)
- Feldmann, Mayer: Fundamentals of Surface and thin Film Analysis (North Holland)
- Henzler, Göpel: Oberflächenphysik des Festkörpers (Teubner)
- Briggs, Seah: Practical Surface Analysis I und II (Wiley)

Part of the Module: Surfaces and Interfaces (Tutorial)

Mode of Instruction: exercise course

Language: English

Frequency: annually

Contact Hours: 1

Examination

Surfaces and Interfaces

written exam / length of examination: 90 minutes

Examination Prerequisites:

Surfaces and Interfaces

Module PHM-0118: Physics of Surfaces and Interfaces *Physics of Surfaces and Interfaces*		5 ECTS/LP
Version 1.0.0 (since WS09/10) Person responsible for module: Prof. Dr. Siegfried Horn Dozenten: Dr. Aladin Ullrich, Dr. Judith Moosburger-Will		

Contents:

Introduction

- The importance of surfaces and interfaces

Some basic facts from solid state physics

- Crystal lattice and reciprocal lattice
- Electronic structure of solids
- Lattice dynamics

Physics at surfaces and interfaces

- Structure of ideal and real surfaces
- Relaxation and reconstruction
- Transport (diffusion, electronic) on interfaces
- Thermodynamics of interfaces
- Electronic structure of surfaces
- Chemical reactions on solid state surfaces (catalysis)
- Interface dominated materials (nano scale materials)

Methods to study chemical composition and electronic structure, application examples

- Scanning electron microscopy
- Scanning tunneling and scanning force microscopy
- Auger – electron – spectroscopy
- Photo electron spectroscopy

Learning Outcomes / Competences:

The students:

- have knowledge of the structure, the electronical properties, the thermodynamics, and the chemical reactions on surfaces and interfaces,
- acquire the skill to solve problems of fundamental research and applied sciences in the field of surface and interface physics,
- have the competence to solve certain problems autonomously based on the thought physical basics.
- Integrated acquirement of soft skills.

Workload:

Total: 150 h

Conditions: The module "Physics IV - Solid State Physics" of the Bachelor of Physics / Materials Science program should be completed first.		
Frequency: annually	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Physics of Surfaces and Interfaces
Mode of Instruction: lecture
Language: English
Contact Hours: 3

Learning Outcome:
see module description

Literature:

- Ertl, Küppers: Low Energy Electrons and Surface Chemistry (VCH)
- Lüth: Surfaces and Interfaces of Solids (Springer)
- Zangwill: Physics at Surfaces (Cambridge)
- Feldmann, Mayer: Fundamentals of Surface and thin Film Analysis (North Holland)
- Henzler, Göpel: Oberflächenphysik des Festkörpers (Teubner)
- Briggs, Seah: Practical Surface Analysis I und II (Wiley)

Part of the Module: Physics of Surfaces and Interfaces (Tutorial)
Mode of Instruction: exercise course
Language: English
Contact Hours: 1

Examination
Physics of Surfaces and Interfaces
written exam / length of examination: 90 minutes
Examination Prerequisites:
Physics of Surfaces and Interfaces

Module PHM-0121: Processing of Materials *Processing of Materials*	5 ECTS/LP

Version 1.0.0 (since WS15/16)
Person responsible for module: Prof. Dr. Ferdinand Haider

Contents:

- Processing of polymers
- Processing of thin films
- Processing of semiconductors
- Processing of composites
- Processing of metals and alloys

Learning Outcomes / Competences:

- Die Studierenden kennen die wichtigsten Methoden der Materialbe- und -verarbeitung für die unterschiedlichen Klassen von Materialien – Halbleiter, Dünnschichtmaterialien, Polymere, Metalle, Verbundmaterialien,
- beherrschen neben industriellen Verfahren auch Methoden, die bislang eher im Labormassstab realisisert sind,
- und besitzen die Kompetenz, aktuelle Problemstellungen aus dem obengenannten Themenbereich selbständig zu bearbeiten.
- Integrierter Erwerb von Schlüsselqualifikationen

Workload:
Total: 150 h
60 h lecture and exercise course (attendance)
20 h studying of course content using literarture (self-study)
20 h studying of course content using provided materials (self-study)
50 h studying of course content through exercises / case studies (self-study)

Conditions: none		
Frequency: annually	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 3	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Processing of Materials
Mode of Instruction: lecture
Language: English
Contact Hours: 3

Learning Outcome:
siehe Modulbeschreibung

Contents:
siehe Modulbeschreibung

Literature:

- M. Ohring, Materials science of thin films (Academic Press)
- H. E. H. Meijer (ed.), Processing of polymers (Wiley-VCH)
- K. A. Jackson, Processing of semiconductors (VCH)
- M. Stuke, Materials surface processing (Elsevier)
- R. W. Cahn, Processing of metals and alloys (VCH)

Examination

Processing of Materials

written exam / length of examination: 90 minutes

Examination Prerequisites:

Processing of Materials

Module PHM-0122: Non-Destructive Testing *Non-Destructive Testing*		6 ECTS/LP
Version 1.0.0 (since WS14/15) Person responsible for module: Prof. Dr. Markus Sause		
Contents: • Introduction to nondestructive testing methods • Visual inspection • Ultrasonic testing • Guided wave testing • Acoustic emission analysis • Thermography • Radiography • Eddy current testing • Specialized nondestructive methods		
Learning Outcomes / Competences: The students • acquire knowledge in the field of nondestructive evaluation of materials, • are introduced to important concepts in nondestructive measurement techniques, • are able to independently acquire further knowledge of the scientific topic using various forms of information. • Integrated acquirement of soft skills		
Workload: Total: 180 h 60 h lecture and exercise course (attendance) 20 h studying of course content using literarture (self-study) 20 h studying of course content using provided materials (self-study) 80 h studying of course content through exercises / case studies (self-study)		
Conditions: Basic knowledge on materials science, in particular composite materials		
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Non-Destructive Testing **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 3
Learning Outcome: see module description
Contents: see module description

Literature:

- Raj: Practical Non-destructive Testing
- Shull: Nondestructive Evaluation - Theory and Applications
- Krautkrämer: Ultrasonic testing of materials
- Grosse: Acoustic Emission Testing
- Rose: Ultrasonic waves in solid media
- Maldague: Nondestructive Evaluation of Materials by Infrared Thermography
- Herman: Fundamentals of Computerized Tomography

Further literature - actual scientific papers and reviews - will be announced at the beginning of the lecture.

Part of the Module: Non-Destructive Testing (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Examination

Non-Destructive Testing

written exam / length of examination: 90 minutes

Examination Prerequisites:

Non-Destructive Testing

Module PHM-0144: Materials Physics *Materials Physics*	6 ECTS/LP
Version 1.1.0 (since WS15/16) Person responsible for module: apl. Prof. Dr. Helmut Karl	

Contents:

- Electrons in solids
- Phonons
- Properties of metals, semiconductors and insulators
- Application in optical, electronic, and optoelectronic devices
- Dielectric solids, optical properties

Learning Outcomes / Competences:

- The students know the basic terms and concepts of solid state physics like the free electron gas, electronic band structure, charge carrier statistics, phonons, doping and optical properties,
- are capable to apply derived approximations as the effective mass or the electron-hole concept to describe basic characteristics of semiconductor materials,
- have the competence to apply these concepts for the description of electric, electro-optic and thermal properties of solids and to describe their functionalities,
- understand size effects on material physical properties.
- Integrated acquirement of soft skills: Working with specialist literature, literature search and interdisciplinary thinking.

Remarks:
compulsory module

Workload:
Total: 180 h
120 h studying of course content using provided materials (self-study)
60 h lecture and exercise course (attendance)

Conditions: basic knowledge of solid state physics		
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Materials Physics
Mode of Instruction: lecture
Language: English
Contact Hours: 3

Learning Outcome:
see module description

Contents:

- Electrons in solids: Free electron gas, band structure, effective mass
- Lattice dynamics: Phonons, phonon dispersion, acoustic and optical phonons
- Properties of metals: Electrical conductivity, Fermi surfaces, thermal properties
- Properties of semiconductors: Pure, intrinsic semiconductors, equilibrium conditions, doping
- Properties of dielectric materials: Propagation of electromagnetic waves, frequency dependent optical properties, polarization effects.
- Application in devices: Heterostructures, Schottky contact, pn-junction, solar cell, light emission and technological aspects

Literature:

- Hummel R. E. : Electronic Properties of Materials Springer 2001 (UP1000 H925)
- Burns G.: Solid State Physics Academic Press 1990 (UP1000 B967)
- Ashcroft N. W. , Mermin N.D. : Solid State Physics (UP1000 A 824)
- Kittel C. : Introduction to Solid State Physics (UP1000 K 62)

Part of the Module: Materials Physics (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Learning Outcome:

see module description

Examination

Materials Physics

written exam / length of examination: 90 minutes

Examination Prerequisites:

Materials Physics

Module PHM-0145: Practical Laboratory Project *Practical Laboratory Project*		6 ECTS/LP
Version 1.0.0 (since SoSe15 to SoSe18) Person responsible for module: Prof. Dr. Dirk Volkmer		
Contents: Experimental or theoretical work in a laboratory / research group in the Institute of Physics. Has to be conducted within 3 months.		
Learning Outcomes / Competences: The students: • know the basic terms, skills and concepts to pursuit a real research project in the existing laboratories within the research groups, • experience the day to day life in a research group from within, • prepare themselves to conduct a research project during their Masters thesis.		
Remarks: **ELECTIVE COURSE**		
Workload: Total: 180 h		
Conditions: Recommended: solid knowledge in (solid state) Physics, Chemistry and Materials Science, both experimentally and theoretically		**Credit Requirements:** 1 written report (editing time 2 weeks)
Frequency: each semester	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 0 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Practical Laboratory Project **Language:** English
Literature: • Various

Module PHM-0146: Method Course: Electronics for Physicists and Materials Scientists *Method Course: Electronics for Physicists and Materials Scientists*		8 ECTS/LP
Version 2.0.0 (since SoSe22) Person responsible for module: Andreas Hörner		

Contents:

1. Basics in electronic and electrical engineering
2. Quadrupole theory
3. Analog technique, transistor and opamp circuits
4. Boolean algebra and logic
5. Digital electronics and calculation circuits
6. Microprocessors and Networks
7. Basics in Electronic
8. Implementation of transistors
9. Operational amplifiers
10. Digital electronics
11. Practical circuit arrangement

Learning Outcomes / Competences:
The students:

- know the basic terms, concepts and phenomena of electronic and electrical engineering for the use in the laboratory,
- have skills in easy circuit design, measuring and control technology, analog and digital electronics,
- have expertise in independent working on circuit problems. They can calculate and develop easy circuits.

Remarks:
ELECTIVE COMPULSORY MODULE

Attendance in the **Method Course: Electronics for Physicists and Materials Scientists (combined lab course AND lecture)** excludes credit points for the lecture **Electronics for Physicists and Materials Scientists.**

Workload:
Total: 240 h
140 h studying of course content using provided materials (self-study)
60 h lecture (attendance)
10 h preparation of written term papers (self-study)
30 h internship / practical course (attendance)

Conditions: none		**Credit Requirements:** written report (one per group)
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Method Course: Electronics for Physicists and Materials Scientists
Mode of Instruction: lecture
Language: English
Contact Hours: 4

Literature:

- Paul Horowitz: The Art of Electronics (Cambridge University Press)
- National Instruments: MultiSim software package (available in lecture)

Assigned Courses:

Method Course: Electronics for Physicists and Materials Scientists (lecture)

Part of the Module: Method Course: Electronics for Physicists and Materials Scientists (Practical Course)

Mode of Instruction: laboratory course

Language: English

Contact Hours: 2

Assigned Courses:

Method Course: Electronics for Physicists and Materials Scientists (Practical Course) (internship)

Examination

Method Course: Electronics for Physicists and Materials Scientists

written exam / length of examination: 90 minutes

Module PHM-0147: Method Course: Electron Microscopy *Method Course: Electron Microscopy*	8 ECTS/LP

Version 1.3.0 (since SoSe15)
Person responsible for module: Prof. Dr. Ferdinand Haider

Contents:

Scanning electron microscopy (SEM)

- Electron optical components
- Detectors
- EDX, EBSD

Transmission electron microscopy (TEM)

- Diffraction
- Contrast mechanisms
- High resolution EM
- Scanning TEM
- Analytical TEM
- Aberration correction

Learning Outcomes / Competences:

The students:

- get introduced to the basics of scanning electron microscopy and transmission electron microscopy, using lectures to teach the theoretical basics, which are afterwards deepened using practical courses,
- are able to operate SEM and TEM on a basic level
- are able to characterize materials using different electron microscopy techniques
- Aquire the competence to decide about a technique feasible for a certain problem.
- aquire the competence to assess EM images, also regarding artefacts
- learn to search for scientific literature and to formulate a scientific report

Remarks:

ELECTIVE COMPULSORY MODULE

Workload:

Total: 240 h
90 h lecture and exercise course (attendance)
150 h studying of course content using provided materials (self-study)

Conditions: Recommended: knowledge of solid-state physics, reciprocal lattice		**Credit Requirements:** regular participation, oral presentation (10 min), written report (one report per group)
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Method Course: Electron Microscopy
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Contents:

SEM:

1. Layout of Electron Microscopes and Electron Optical Components
2. Electron Solid Interactions
3. Contrast Formation in Scanning Electron Microscopy (SEM)
4. SE/BSE contrast
5. Electron Back Scattering Diffraction (EBSD)
6. Analytical techniques
7. Special Applications of SEM

TEM:

1. TEM specimen preparation techniques
2. Components of a TEM, principle lens design, lens aberrations
3. Electron diffraction: fundamentals
4. Contrast formation at bright field, dark field, weak beam dark field, and many beam conditions, „chemical“ imaging
5. Bright field, dark field, weak beam dark field imaging of dislocations
6. Kinematical theory of electron wave propagation in crystals
7. Howie Whelan equations, contrast of defects
8. High resolution TEM, lattice imaging of crystals
9. Advanced diffraction techniques: Kikuchi patterns, HOLZ lines and Convergent Beam Diffraction (CBED)
10. Image simulation
11. Analytical TEM: Electron energy loss spectroscopy & energy filtered TEM

Literature:

- D.B.Williams and C.B.Carter, Transmission Electron Microscopy,Plenum Press, New York/London, 1996
- M.A. Hirsch, A. Howie, R. Nicholson, D.W. Pashley, M.J. Whelan, Electron microscopy of thin crystals, Krieger Publishing Company, Malabar (Florida), 1977
- L. Reimer, Transmission electron microscopy, Springer Verlag, Berlin/Heidelberg/New York, 1984
- P.J. Goodhew, Thin foil preparation for electron microscopy,Elsevier, Amsterdam, 1985
- P.R. Buseck, J.M. Cowley, L. Eyring, High-resolution transmission electron microscopy, Oxford University Press, 1988
- E. Hornbogen, B. Skrotzki, Werkstoff-Mikroskopie, Springer Verlag, Berlin/Heidelberg/New York, 1995
- K. Wetzig, In situ scanning electron microscopy in materials research, Akad.-Verl., 1995
- J. I. goldstein, Scanning electron microscopy and x-ray microanalysis, Plenum Press, 1992
- L. Reimer, Scanning electron microscopy, Springer Verlag, 1985
- S. L. Flegler, J. W. Heckman, K. L. Klomparens, Elektronenmikroskopie, Spektrum, Akad. Verl., 1995

Assigned Courses:

Method Course: Electron Microscopy (lecture)

Part of the Module: Method Course: Electron Microscopy (Practical Course)

Mode of Instruction: laboratory course

Language: English

Contact Hours: 4

Assigned Courses:

Method Course: Electron Microscopy (Practical Course) (internship)

Examination

Method Course: Electron Microscopy

report

Examination Prerequisites:

Method Course: Electron Microscopy

Module PHM-0149: Method Course: Methods in Biophysics *Method Course: Methods in Biophysics*		8 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Dr. Christoph Westerhausen		
Contents: Unit radiation biophysics • Concepts in radiation protection • Low-dose irradiation biophysics • DNA repair dynamics of living cells after ionizing radiation • Confocal scanning laser microscopy Unit microfluidic • Microfluidic systems • Accoustic driven microfluidics • Calculation of microfluidic problems Unit analysis		
Learning Outcomes / Competences: The students: • know basic terms, concepts and phenomena in radiation biophysics, • acquire basic knowledge of fluidic and biophysical phenomena on small length scales and applications and technologies of microfluidic analytical systems, • learn skills in tissue culture and immun-histochemical staining procedures, • learn skills in fluorescence and confocal scanning microscopy, • learn skills to calculate fluidic problems on small length scales, • learn skills to handle microfluidic channel systems.		
Remarks: **ELECTIVE COMPULSORY MODULE** The course will partly take place at the Helmholtz Center Munich.		
Workload: Total: 240 h		
Conditions: Attendance of the lecture "Biophysics and Biomaterials"		**Credit Requirements:** 1 written lab report
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Method Course: Methods in Biophysics **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 2

Part of the Module: Method Course: Methods in Biophysics (Practical Course)

Mode of Instruction: laboratory course

Language: English

Contact Hours: 4

Literature:

- T. Herrmann, Klinische Strahlenbiologie – kurz und bündig, Elsevier Verlag, ISBN-13: 978-3-437-23960-1
- J. Freyschmidt, Handbuch diagnostische Radiologie – Strahlenphysik, Strah-lenbiologie, Strahlenschutz, Springer Verlag, ISBN: 3-540-41419-3
- S. Haeberle und R. Zengerle, Microfluidic platforms for lab-on-a-chip applica-tions, Lab-on-a-chip, 2007, 7, 1094-1110
- J. Berthier, Microdrops and digital microfluidics, William Andrew Verlag, ISBN:978-0-8155-1544-9
- Lecture notes

Examination

Method Course: Methods in Biophysics

report

Examination Prerequisites:

Method Course: Methods in Biophysics

Module PHM-0150: Method Course: Spectroscopy on Condensed Matter *Method Course: Spectroscopy on Condensed Matter*	8 ECTS/LP

Version 1.0.0 (since SoSe15)
Person responsible for module: PD Dr. Stephan Krohns

Contents:

Dielectric Spectroscopy [8]

- Methods
- Cryo-techniques
- Measurement quantities
- Relaxation processes
- Dielectric phenomena

Ferroelectric Materials [7]

- Mechanism of ferroelectric polarization
- Hysteresis loop measurements
- Dielectric spectroscopy

Glassy Matter [8]

- Introduction
- Glassy phenomena
- Dielectric spectroscopy

Multiferroic Materials [7]

- Introduction
- Microscopic origins of multiferroicity
- Pyrocurrent measurements
- Dielectric spectroscopy

Learning Outcomes / Competences:

The students:

- learn about the basic concepts of dielectric spectroscopy and the phenomena examined with it. Therefore they are instructed in experimental methods for the investigation of the dielectric properties of condensed matter,
- are trained in planning and performing complex experiments. They learn to evaluate and analyze the collected data,
- are taught to work on problems in experimental solid state physics, including analysis of measurement results and their interpretation in the framework of models and theories.

Remarks:

ELECTIVE COMPULSORY MODULE

Workload:

Total: 240 h

Conditions: Recommended: basic knowledge in solid state physics, basic knowledge in physics of glasses and supercooled liquids		**Credit Requirements:** written report on the experiments (editing time 2 weeks)
Frequency: irregular (usu. winter semester)	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Method Course: Spectroscopy on Condensed Matter

Mode of Instruction: lecture

Language: English

Contact Hours: 2

Literature:

- N.W. Ashcroft, N.D. Mermin, Festkörperphysik (Oldenbourg)
- Ch. Kittel, Einführung in die Festkörperphysik (Oldenbourg)
- C.J.F. Böttcher, P. Bordewijk, Theory of Electric Polarization (Elsevier)
- J. R. Macdonald, Impedance Spectroscopy (Wiley)
- H. Scholze, Glas (Springer)
- S.R. Elliott, Physics of Amorphous Materials (Longman)
- R. Zallen, The Physics of Amorphous Solids (Wiley)

Assigned Courses:

Method Course: Spectroscopy on Condensed Matter (lecture)

Part of the Module: Method Course: Spectroscopy on Condensed Matter (Practical Course)

Mode of Instruction: laboratory course

Language: English

Contact Hours: 4

Assigned Courses:

Method Course: Spectroscopy on Condensed Matter (Practical Course) (internship)

Examination

Method Course: Spectroscopy on Condensed Matter

oral exam / length of examination: 45 minutes

Examination Prerequisites:

Method Course: Spectroscopy on Condensed Matter

Module PHM-0151: Method Course: Porous Materials - Synthesis and Characterization *Method Course: Porous Materials - Synthesis and Characterization*		8 ECTS/LP
Version 1.0.0 (since SoSe15 to WS21/22) Person responsible for module: Prof. Dr. Dirk Volkmer		
Contents: Synthesis of porous functional materials (e.g. aerogels, mesoporous silica materials, zeolites, Metal-Organic Frameworks) Characterization methods • Structure and composition (XRD, UV/VIS, IR, ESEM, EDX) • Thermal analysis (TGA) • Adsorption and diffusion (BET, pore size distribution, pulse chemisorption) • Catalytic properties (GC/MS, TPO, TPR)		
Learning Outcomes / Competences: The students will learn how to • use modern solid state preparation techniques (e.g. hydrothermal, solvothermal, microwave synthesis), • employ analytical methods dedicated to porous materials.		
Remarks: **ELECTIVE COMPULSORY MODULE**		
Workload: Total: 240 h 120 h internship / practical course (attendance) 80 h studying of course content through exercises / case studies (self-study) 20 h studying of course content using literarture (self-study) 20 h studying of course content using provided materials (self-study)		
Conditions: Recommended: lecture Functional Porous Materials		**Credit Requirements:** written report (editing time 3 weeks) + written exam Please note that final grade of the Method Course consists of the maximum point score of of the exam and the grade of the report of the practical part which are weighted (40:60).
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Method Course: Porous Materials Synthesis and Characterization (Practical Course) **Mode of Instruction:** laboratory course **Language:** English **Contact Hours:** 4

Examination

Method Course: Porous Materials Synthesis and Characterization

written exam / length of examination: 45 minutes

Examination Prerequisites:

Method Course: Porous Materials Synthesis and Characterization

Module PHM-0152: Method Course: Structure Determination in Solids *Method Course: Structure Determination in Solids*		8 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Prof. Dr. Wolfgang Scherer		

Contents:

Subject of the method course is the practical application of X-ray diffraction and solid state NMR techniques and their combined utilization to analyze structure property relationships in novel materials.

- Magic angle spinning (MAS) NMR
- Modern pulsed NMR techniques
- Utilization of chemical shift, dipolar and quadrupolar interaction to evaluate local structural motifs
- Analysis and interpretation of NMR data
- Data collection and reduction techniques for powder and single crystal X-ray diffraction experiments
- Symmetry and space group determination
- Structure determination (Patterson method, direct methods)
- Refinements of structural models (Rietveld method, difference fourier techniques)
- Combination of the complementary local and global structural information obtained from both experimental approaches

Learning Outcomes / Competences:

The students:

- acquire practical knowledge of operating a solid state NMR spectrometer,
- can - under guidance - plan, perform, and analyze modern solid state NMR experiments to analyze local strutural motifs in materials,
- gain basic practical knowledge on structural characterization methods for single crystalline and powder samples employing X-ray and neutron diffraction techniques,
- have the skill to - under guidance - perform phase analyses, structure determinations and refinements,
- can evaluate the opportunities and limits of solid state NMR and X-ray diffraction methods and know how to synergetically combine the two approaches to analyze the structure-property realationship of novel materials.

Remarks:

ELECTIVE COMPULSORY MODULE

Workload:

Total: 240 h

Conditions: none		
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Method Course: Structure Determination in Solids

Mode of Instruction: lecture

Language: English

Contact Hours: 2

Part of the Module: Method Course: Structure Determination in Solids (Practical Course)

Mode of Instruction: laboratory course

Language: English

Contact Hours: 4

Literature:

1. M. H. Levitt, Spin Dynamics, John Wiley and Sons Ltd., 2008.
2. H. Günther, NMR spectroscopy, Wiley, 2001.
3. M. Duer, Introduction to Solid-State NMR spectroscopy, Blackwell Publishing Ltd., 2004.
4. D. Canet, NMR - concepts and methods, Springer, 1994.
5. C. Hammond, The Basics of Crystallography and Diffraction, Oxford University Press Inc., New York, 1994.
6. W. Clegg, A. J. Blake, R. O. Gould, P. Main, Crystal Structure Analysis, Principle and Practice, Oxford University Press Inc., New York, 2001.
7. G. Giacovazzo, Fundamentals of Crystallography, Oxford University Press Inc., New York, 1994.
8. R. A. Young, The Rietveld Method, Oxford University Press Inc., New York, 2002.
9. W. Massa, Crystal Structure Determination, Springer, Berlin, 2004.

Examination

Method Course: Structure Determination in Solids

written exam / length of examination: 90 minutes

Examination Prerequisites:

Method Course: Structure Determination in Solids

Module PHM-0153: Method Course: Magnetic and Superconducting Materials *Method Course: Magnetic and Superconducting Materials*		8 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Prof. Dr. Philipp Gegenwart		

Contents:

Methods of growth and characterization:

Sample preparation (bulk materials and thin films), e.g.,

- arcmelting
- flux-growth
- sputtering and evaporation

Sample characterization, e.g.,

- X-ray diffraction
- electron microscopy, scanning tunneling microscopy
- magnetic susceptibility, electrical resistivity
- specific heat

Learning Outcomes / Competences:

The students

- get to know the basic methods of materials growth and characterization, such as poly- and single crystal growth, thin-film growth, X-ray diffraction, magnetic susceptibility, dc-conductivity, and specific heat measurements
- are trained in planning and performing complex experiments
- learn to evaluate and analyze the collected data, are taught to work on problems in experimental solid state physics, including analysis of measurement results and their interpretation in the framework of models and theories

Workload:

Total: 240 h
90 h lecture and exercise course (attendance)
30 h studying of course content using provided materials (self-study)
90 h studying of course content through exercises / case studies (self-study)
30 h studying of course content using literarture (self-study)

Conditions: Recommended: basic knowledge in solid state physics and quantum mechanics		**Credit Requirements:** presentation and written report on the experiments (editing time 3 weeks, max. 30 pages)
Frequency: each summer semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Method Course: Magnetic and Superconducting Materials
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Assigned Courses:

Method Course: Magnetic and Superconducting Materials (lecture)

Part of the Module: Method Course: Magnetic and Superconducting Materials (Practical Course)

Mode of Instruction: laboratory course

Language: English

Contact Hours: 4

Assigned Courses:

Method Course: Magnetic and Superconducting Materials (Practical Course) (internship)

Examination

Method Course: Magnetic and Superconducting Materials

report

Examination Prerequisites:

Method Course: Magnetic and Superconducting Materials

Module PHM-0154: Method Course: Modern Solid State NMR Spectroscopy *Method Course: Modern Solid State NMR Spectroscopy*	8 ECTS/LP

Version 2.0.0 (since SoSe17)
Person responsible for module: Prof. Dr. Leo van Wüllen

Contents:

Physical foundations of NMR spectroscopy

Internal interactions in NMR spectroscopy

- Chemical shift interaction
- Dipole interaction and
- Quadrupolar interaction

Magic Angle Spinning techniques

Modern applications of NMR in materials science

Experimental work at the Solid-State NMR spectrometers, computer-aided analysis and interpretation of acquired data

Learning Outcomes / Competences:

The students:

- gain basic knowledge of the physical foundations of modern Solid-State NMR spectroscopy,
- gain basic practical knowledge of operating a solid-state NMR spectrometer,
- can -- under guidance -- plan, perform, and analyze modern solid-state NMR experiments for the structural characterization of advanced materials.

Remarks:

ELECTIVE COMPULSORY MODULE

Workload:

Total: 240 h
30 h studying of course content using literarture (self-study)
90 h studying of course content through exercises / case studies (self-study)
30 h studying of course content using provided materials (self-study)
90 h lecture and exercise course (attendance)

Conditions: The attendance of the lecture "NOVEL METHODS IN SOLID STATE NMR SPECTROSCOPY" is highly recommended.		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Method Course: Modern Solid State NMR Spectroscopy
Mode of Instruction: seminar
Language: English
Contact Hours: 2

Literature:

- M. H. Levitt, spin Dynamics, John Wiley and Sons, Ltd., 2008.
- H. Günther NMR spectroscopy, Wiley, 2001.
- M. Duer, Introduction to Solid-State NMR spectroscopy, Blackwell Publishing Ltd., 2004.
- D. Canet, NMR - concepts and methods, Springer, 1994.

Part of the Module: Method Course: Modern Solid State NMR Spectroscopy (Practical Course)

Mode of Instruction: laboratory course

Language: English

Contact Hours: 4

Literature:

1. M. H. Levitt, Spin Dynamics, John Wiley and Sons, Ltd., 2008.
2. H. Günther, NMR spectroscopy, Wiley 2001.
3. M.Duer, Introduction to Solid-State NMR spectroscopy, Blackwell Publishing Ltd., 2004.
4. D. Canet: NMR - concepts and methods, Springer, 1994.

Examination

Method Course: Modern Solid State NMR Spectroscopy

report / work period for assignment: 2 weeks

Examination Prerequisites:

Method Course: Modern Solid State NMR Spectroscopy

Module PHM-0156: Method Course: Materials Synthesis *Method Course: Materials Synthesis*	8 ECTS/LP

Version 1.0.0 (since SoSe15)
Person responsible for module: Prof. Dr. Wolfgang Scherer

Contents:

Content of the practical course and the lecture are the theoretical basics, the synthesis and characterization of the following functional materials:

1. Organic polymers [4+2]
2. Zeolites and mesoporous materials [4+2]
3. Porous coordination polymers [4+2]
4. Ionic liquids [4+2]
5. Bio materials [4+2]
6. Oxides "sol-gel processing and ceramic methods" [4+2]
7. Lower dimensional structure materials [4+2]
8. Ferrofluides [2+1]

Learning Outcomes / Competences:

The students:

- gain basic practical knowledge about chemical materials synthesis and analytical methods (e.g. ICP / EA / REM-EDX), including the characterization via X-ray diffraction and spectroscopic techniques (e.g. IR / NMR) as well as physical methods (e.g. thermoelectric properties, magnetism),
- possess the ability to perform materials syntheses under instruction,
- are able to choose the appropriate characterization method for certain materials.

Remarks:

ELECTIVE COMPULSORY MODULE

Workload:

Total: 240 h
90 h studying of course content through exercises / case studies (self-study)
30 h studying of course content using literarture (self-study)
30 h studying of course content using provided materials (self-study)
90 h lecture and exercise course (attendance)

Conditions: recommended: the practical course is based on the modules Chemistry I,Chemistry II, Chemistry III and the practical course in physical chemistry		
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Method Course: Materials Synthesis
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

- U. Schubert, N. Hüsing, Synthesis of Inorganic Materials (Wiley-VCH)
- D. W. Bruce, D. O'Hare, Inorganic Materials (John Wiley & Sons)
- J.-P. Jolivet, Metal Oxide Chemistry and Synthesis – From Solution to Solid State (John Wiley & Sons)
- W. Jones, C.N.R. Rao, Supramolecular Organization and Materials Design (Cambridge University Press)
- L.V. Interrante, M.J. Hampden Smith, Chemistry of Advanced Materials – An Overview (Wiley)
- A. R. West, Basic Solid State Chemistry (John Wiley & Sons)

Part of the Module: Method Course: Materials Synthesis (Practical Course)

Mode of Instruction: internship

Language: English

Contact Hours: 4

Examination

Method Course: Materials Synthesis

written exam / length of examination: 90 minutes

Examination Prerequisites:

Method Course: Materials Synthesis

Module PHM-0158: Introduction to Materials *Introduction to Materials*			4 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Prof. Dr. Ferdinand Haider			
Contents: Varying topics for each year, giving an overview into scope, application, requirements and preparation of all types of modern materials.			
Learning Outcomes / Competences: The students: • know the major principles, applications and processes of modern materials, • acquire the competence to compile knowledge for examples of material specific topics and to present this knowledge in given time to an audience.			
Remarks: **COMPULSORY MODULE**			
Workload: Total: 120 h			
Conditions: Recommended: basic knowledge in materials science		**Credit Requirements:** regular participation, oral presentation with term paper (30 - 45 minutes)	
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]	
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Introduction to Materials (Seminar) **Mode of Instruction:** seminar **Language:** English **Contact Hours:** 2
Literature: specific for each topic, to be gathered by the students

Examination
Introduction to Materials presentation **Examination Prerequisites:** Introduction to Materials

Module PHM-0159: Laboratory Project *Laboratory Project*		10 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Prof. Dr. Dirk Volkmer		
Contents: Experimental or theoretical work in a laboratory / research group in the Institute of Physics. Has to be conducted within 3 months.		
Learning Outcomes / Competences: The students: • know the basic terms, skills and concepts to pursuit a real research project in the existing laboratories within the research groups, • experience the day to day life in a research group from within, • prepare themselves to conduct a research project during their Masters thesis.		
Remarks: The Laboratory Project will be offered in SoSe 2020 as soon as the current situation allows. **COMPULSORY MODULE**		
Workload: Total: 300 h		
Conditions: Recommended: solid knowledge in (solid state) Physics, Chemistry and Materials Science, both experimentally and theoretically		**Credit Requirements:** 1 written report (editing time 2 weeks)
Frequency: each semester Siehe Bemerkungen	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 0 semester[s]
Contact Hours: 8	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Laboratory Project **Mode of Instruction:** internship **Language:** English **Contact Hours:** 8
Literature: • Various

Examination

Laboratory Project

project work

Examination Prerequisites:

Laboratory Project

Module PHM-0161: Coordination Materials *Coordination Materials*	6 ECTS/LP

Version 1.0.0 (since SoSe15)
Person responsible for module: Prof. Dr. Dirk Volkmer
Dr. Hana Bunzen

Contents:

A) Basics of coordination Chemistry

- Historical development of coordination chemistry [2]
- Structures and nomenclature rules [2]
- Chemical bonds in transition metal coordination compounds [3]
- Stability of transition metal coordination compounds [2]
- Characteristic reactions [3]

B) Selected classes of functional materials

- Bioinorganic chemistry [3]
- Coordination polymers / metal-organic frameworks [3]
- Coordination compounds in medical applications [3]
- Photochemistry of coordination compounds [3]

Learning Outcomes / Competences:

The students

- shall acquire knowledge about concepts of chemical bonding in coordination chemistry (main emphasis: d-block transition metal compounds),
- broaden their capabilities to interpret UV/vis absorption spectra and to predict stability and reactivity of coordination compounds,
- learn how to transfer concepts of coordination chemistry onto topics of materials sciences.
- Integrated acquirement of soft skills.

Remarks:

ELECTIVE COMPULSORY MODULE

Workload:

Total: 180 h
60 h lecture and exercise course (attendance)
20 h studying of course content using literarture (self-study)
20 h studying of course content using provided materials (self-study)
80 h studying of course content through exercises / case studies (self-study)

Conditions:

Recommended: The lecture course is based on the courses "Chemistry I", "Chemistry II"

Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Coordination Materials

Mode of Instruction: lecture
Language: English
Contact Hours: 3

Literature:

- Joan Ribas Gisbert, Coordination Chemistry, Wiley-VCH
- Lutz H. Gade, Koordinationschemie, Wiley-VCH
- As well as selected reviews and journals articles cited on the slides

Part of the Module: Coordination Materials (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Examination

Coordination Materials

written exam / length of examination: 90 minutes

Examination Prerequisites:

Coordination Materials

Module PHM-0163: Fiber Reinforced Composites: Processing and Materials Properties *Fiber Reinforced Composites: Processing and Materials Properties*	6 ECTS/LP

Version 1.2.0 (since SoSe15)
Person responsible for module: Dr. Judith Moosburger-Will

Contents:

- Production of fibers (e.g. glass, carbon, or ceramic fibers)
- Physical and chemical properties of fibers and their precursor materials
- Physical and chemical properties of commonly used polymeric and ceramic matrix materials
- Semi-finished products
- Composite production technologies
- Application of fiber reinforced materials

Learning Outcomes / Competences:
The students:

- know the physical and chemical properties of fibers, matrices, and fiber-reinforced materials.
- know the basics of production technologies of fibers, polymeric, ceramic matrices, and fiber-reinforced materials.
- know the application areas of composite materials.
- have the competence to explain material properties of fibers, matrices, and composites.
- have the competence to choose the right materials according to application relevant conditions.
- are able to independently acquire further knowledge of the scientific topic using various forms of information.

Remarks:
ELECTIVE COMPULSORY MODULE

Workload:
Total: 180 h
80 h studying of course content through exercises / case studies (self-study)
20 h studying of course content using literarture (self-study)
20 h studying of course content using provided materials (self-study)
60 h lecture and exercise course (attendance)

Conditions: Recommended: basic knowledge in materials science, basic lectures in organic chemistry		
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Fiber Reinforced Composites: Processing and Materials Properties
Mode of Instruction: lecture
Language: English
Contact Hours: 3

Literature:

- Morgan: Carbon fibers and their composites
- Ehrenstein: Polymeric materials
- Krenkel: Ceramic Matrix Composites
- Henning, Moeller: Handbuch Leichtbau
- Schürmann: Konstruieren mit Faser-Kunstoff-Verbunden
- Neitzel, Mitschang: Handbuch Verbundwerkstoffe

Further litrature - actual scientific papers and reviews - will be announced at the beginning of the lecture.

Part of the Module: Fiber Reinforced Composites: Processing and Materials Properties (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Literature:

see lecture

Examination

Fiber Reinforced Composites: Processing and Materials Properties

written exam / length of examination: 90 minutes

Examination Prerequisites:

Fiber Reinforced Composites: Processing and Materials Properties

Module PHM-0164: Characterization of Composite Materials *Characterization of Composite Materials*		6 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Prof. Dr. Markus Sause		

Contents:

The following topics are presented:

- Introduction to composite materials
- Applications of composite materials
- Mechanical testing
- Thermophysical testing
- Nondestructive testing

Learning Outcomes / Competences:

The students:

- acquire knowledge in the field of materials testing and evaluation of composite materials.
- are introduced to important concepts in measurement techniques, and material models applied to composites.
- are able to independently acquire further information of the scientific topic using various forms of information.

Workload:

Total: 180 h

20 h studying of course content using literarture (self-study)

20 h studying of course content using provided materials (self-study)

60 h lecture and exercise course (attendance)

80 h studying of course content through exercises / case studies (self-study)

Conditions: Recommended: basic knowledge in materials science, particularly in composite materials		
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Characterization of Composite Materials

Mode of Instruction: lecture

Language: English

Contact Hours: 3

Literature:

- Morgan: Carbon fibers and their composites
- Henning, Moeller: Handbuch Leichtbau
- Schürmann: Konstruieren mit Faser-Kunststoff-Verbunden
- Neitzel, Mitschang: Handbuch Verbundwerkstoffe
- Dowling: Mechanical behaviour of materials
- Issler: Festigkeitslehre - Grundlagen
- Landau, Lifschitz: Theoretische Physik Vol. 7

Further literature - actual scientific papers and reviews - will be announced at the beginning of the lecture.

Part of the Module: Characterization of Composite Materials (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Literature:

see lecture

Examination

Characterization of Composite Materials

written exam / length of examination: 90 minutes

Examination Prerequisites:

Characterization of Composite Materials

Module PHM-0166: Carbon-based functional Materials (Carboterials) *Carbon-based functional Materials (Carboterials)*		6 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Prof. Dr. Dirk Volkmer		

Contents:

1. Introduction to carbon allotropes and porous carbon materials [4]

2. Physical properties of fullerenes, carbon nanotubes and graphene [4]

3. Solid state NMR spectroscopy of carbon materials [4]

4. Metal carbides [4]

5. Carbon thin films and coatings [4]

6. Manufacturing and processing technology of carbon fibres [4]

7. Carbon-fibre reinforced polymer composites [4]

8. Carbon-fibre reinforced aluminium (Metal Matrix Composites, MMC) [4]

9. Energy storage in carbon materials [4]

10. Carbon-based materials for opto-electronics [4]

11. Quantum transport phenomena relating to carbon materials [4]

12. a) Manipulating heat flow with carbon-based electronic analogs: phononics in place of electronics [2]

12. b) Carbon-based spintronics [2]

13. Fabrication and processing of carbon-based nanostructures [4]

Learning Outcomes / Competences:

The students:

- know the basics of the chemistry and physics of carbon materials and their applications,
- acquire knowledge about the structural characterization, physical properties and engineering of functional materials and carbon based devices,
- learn to work with specialist literature in english.

Workload:

Total: 180 h

20 h studying of course content using provided materials (self-study)

20 h studying of course content using literarture (self-study)

80 h studying of course content through exercises / case studies (self-study)

60 h lecture and exercise course (attendance)

Conditions: none		
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Carbon-based functional Materials (Carboterials) **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 4
Literature: will be announced by the lecturers

Examination
Carbon-based functional Materials (Carboterials) written exam / length of examination: 120 minutes **Examination Prerequisites:** Carbon-based functional Materials (Carboterials)

Module PHM-0167: Oxidation and Corrosion *Oxidation and Corrosion*	6 ECTS/LP

Version 1.0.0 (since SoSe15)

Person responsible for module: Prof. Dr. Ferdinand Haider

Contents:

Introduction

Review of thermodynamics

Chemical equilibria

Electrochemistry

Electrode kinetics

High temperature oxidation

Localized corrosion

- Shallow pit corrosion
- Pitting corrosion
- Crevice corrosion
- Intercrystalline corrosion
- Stress corrosion cracking
- Fatigue corrosion
- Erosion corrosion
- Galvanic corrosion

Water and seawater corrosion

Corrosion monitoring

Corrosion properties of specific materials

Specific corrosion problems in certain branches

- Oil and Gas industry
- Automobile industry
- Food industry

Corrosion protection

- Passive layers
- Reaction layers (Diffusion layers …)
- Coatings (organic, inorganic)
- Cathodic, anodic protection
- Inhibitors

Learning Outcomes / Competences:

The students:

- know the the fundamental basics, mechanics, types of corrosion processes and their electrochemical explanation
- obtain the skill to understand typical electrochemical quantification of corrosion processes.
- aquire the competence to assess corrosion phenomena from typical damage patterns

Remarks:

Scheduled every second summer semster.

Workload:

Total: 180 h

60 h lecture and exercise course (attendance)

120 h studying of course content using provided materials (self-study)		
Conditions: Recommended: good knowledge in materials science, basic knowledge in physical chemistry		**Credit Requirements:** written exam (90 min)
Frequency: each summer semester alternating with PHM-0168	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Oxidation and Corrosion
Mode of Instruction: lecture
Language: English
Frequency: each winter semester
Contact Hours: 3

Literature:

- Schütze: Corrosion and Environmental Degradation

Assigned Courses:

Oxidation and Corrosion (lecture)

Part of the Module: Oxidation and Corrosion (Tutorial)
Mode of Instruction: exercise course
Language: English
Frequency: each winter semester
Contact Hours: 1

Assigned Courses:

Oxidation and Corrosion (Tutorial) (exercise course)

Examination
Oxidation and Corrosion
written exam / length of examination: 90 minutes
Examination Prerequisites:
Oxidation and Corrosion

Module PHM-0168: Modern Metallic Materials *Modern Metallic Materials*		6 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Prof. Dr. Ferdinand Haider		
Contents: Introduction Review of physical metallurgy Steels: • principles • common alloying elements • martensitic transformations • dual phase steels • TRIP and TWIP steels • maraging steel • electrical steel • production and processing Aluminium alloys: • 2xxx • 6xxx • 7xxx • Processing – creep forming, hydroforming, spinforming Titanium alloys Magnesium alloys Superalloys Intermetallics, high entropy alloys		
Learning Outcomes / Competences: Students • learn about relevant classes of actual metallic alloys and their properties • aquire the skill to derive alloy properties from physical metallurgy principles and concepts • have the competence to choose and to explain appropriate metallic materials for special applications		
Remarks: Scheduled every second summer semster.		
Workload: Total: 180 h 60 h lecture and exercise course (attendance) 20 h studying of course content using provided materials (self-study) 20 h studying of course content using literarture (self-study) 80 h studying of course content through exercises / case studies (self-study)		
Conditions: Recommended: Knowledge of physical metallurgy and physical chemistry		
Frequency: each summer semester alternating with PHM-0167	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Modern Metallic Materials **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 4
Literature: Cahn-Haasen-Kramer: Materials Science and Technology Original literature

Examination

Modern Metallic Materials

written exam / length of examination: 90 minutes

Examination Prerequisites:

Modern Metallic Materials

Module PHM-0171: Method Course: Coordination Materials *Method Course: Coordination Materials*		8 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Prof. Dr. Dirk Volkmer Dr. Hana Bunzen		
Contents: 1. Synthesis of metal complexes: 2. Analytical characterization of metal complexes (thermal analysis, UV/vis spectroscopy, IR spectroscopy, X-ray diffraction) 3. Material composition and stability studies 4. Functional coordination materials (spin-crossover materials, oxygen-carrying materials)		
Learning Outcomes / Competences: The students will learn how to: • prepare transition metal complexes employing modern preparation techniques (e.g. microwave synthesis), inert synthesis conditions (Schlenk technique), • characterize coordination compounds by selected analytical techniques, • develop functional coordination materials based on organic / inorganic hybrid compounds, • employ X-ray diffraction methods for structural analysis.		
Remarks: **ELECTIVE COMPULSORY MODULE**		
Workload: Total: 240 h 20 h studying of course content using provided materials (self-study) 80 h studying of course content through exercises / case studies (self-study) 20 h studying of course content using literarture (self-study) 120 h lecture and exercise course (attendance)		
Conditions: none		**Credit Requirements:** written report (protocols)
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Method Course: Coordination Materials (Practical Course)
Mode of Instruction: laboratory course
Language: English
Contact Hours: 4

Part of the Module: Method Course: Coordination Materials (Seminar)
Mode of Instruction: seminar
Language: English
Contact Hours: 2

Literature:

- Chemical databases
- Primary literature

Examination

Method Course: Coordination Materials (Seminar)

seminar

Examination Prerequisites:

Method Course: Coordination Materials (Seminar)

Module PHM-0172: Method Course: Functional Silicate-analogous Materials *Method Course: Functional Silicate-analogous Materials*	8 ECTS/LP

Version 1.0.0 (since SoSe15)
Person responsible for module: Prof. Dr. Henning Höppe

Contents:
Synthesis and characterization of functional materials according to the topics:

1. Silicate-analogous compounds
2. Luminescent materials / phosphors
3. Pigments
4. Characterization methods: XRD, spectroscopy (luminescence, UV/vis, FT-IR), thermal analysis

Learning Outcomes / Competences:
The students will know how to:

- develop functional materials based on silicate-analogous materials,
- apply classical and modern preparation techniques (e.g. solid state reaction, sol-gel reaction, precipitation, autoclave reactions, use of silica ampoules),
- work under non-ambient atmospheres (e.g. reducing, inert conditions),
- solve and refine crystal structures from single-crystal data,
- describe and classify these structures properly.

Remarks:
ELECTIVE COMPULSORY MODULE

Workload:
Total: 240 h
120 h lecture and exercise course (attendance)
20 h studying of course content using provided materials (self-study)
20 h studying of course content using literarture (self-study)
80 h studying of course content through exercises / case studies (self-study)

Conditions: Recommended: attendance to the lecture "Advanced Solid State Materials"		**Credit Requirements:** written report (protocol)
Frequency: each semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Method Course: Functional Silicate-analogous Materials (Practical Course)
Mode of Instruction: laboratory course
Language: English
Contact Hours: 6

Learning Outcome:

The students will know how to:

- develop functional materials based on silicate-analogous materials,
- apply classical and modern preparation techniques (e.g. solid state reaction, sol-gel reaction, precipitation, autoclave reactions, use of silica ampoules),
- work under non-ambient atmospheres (e.g. reducing, inert conditions),
- solve and refine crystal structures from single-crystal data,
- describe and classify these structures properly.

Contents:

Synthesis and characterization of functional materials according to the topics:

1. Silicate-analogous compounds
2. Luminescent materials / phosphors
3. Pigments
4. Characterization methods: XRD, spectroscopy (luminescence, UV/vis, FT-IR), thermal analysis

Assigned Courses:

Method Course: Functional Silicate-analogous Materials (Practical Course) (internship)

Examination

Method Course: Functional Silicate-analogous Materials

seminar

Examination Prerequisites:

Method Course: Functional Silicate-analogous Materials

Module PHM-0173: Method Course: Finite element modeling of multiphysics phenomena *Method Course: Finite element modeling of multiphysics phenomena*		8 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Prof. Dr. Markus Sause		
Contents: • Modeling and simulation of physical processes and phenomena • Basic concepts of FEM programs • Generation of meshes • Optimization strategies • Selection of solvers • Examples from electrodynamics • Examples from thermodynamics • Examples from continuum mechanics • Examples from fluid dynamics		
Learning Outcomes / Competences: • Students know established numerical procedures to model and simulate physical processes and systems • Students acquire abilities to build numerical models based on real world challenges • Students learn basic operational principles of FEM tools based on the program "COMSOL Multiphysics"		
Remarks: **ELECTIVE COMPULSORY MODULE** This module is provided by external lecturers and lecturers from the mathematics and physics department. It is dedicated to materials scientists, physicists and engineers who intend to strengthen their background in numerical simulation using state-of-the-art FEM programs.		
Workload: Total: 240 h 80 h studying of course content through exercises / case studies (self-study) 120 h lecture and exercise course (attendance) 20 h studying of course content using provided materials (self-study) 20 h studying of course content using literarture (self-study)		
Conditions: Recommended: basic knowledge of numerical cocepts		**Credit Requirements:** 1 written report on selected topic, editing time 2 weeks
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Method Course: Finite element modeling of multiphysics phenomena **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 3

Part of the Module: Method Course: Finite element modeling of multiphysics phenomena (Tutorial)
Mode of Instruction: exercise course
Language: English
Contact Hours: 3

Examination
Method Course: Finite element modeling of multiphysics phenomena
report
Examination Prerequisites:
Method Course: Finite element modeling of multiphysics phenomena

Module PHM-0174: Theoretical Concepts and Simulation *Theoretical Concepts and Simulation*	6 ECTS/LP

Version 1.0.0 (since WS09/10)
Person responsible for module: Prof. Dr. Liviu Chioncel

Contents:

1. Introduction: operating systems, programming languages, data visualization tools
2. Basic numerical methods: interpolation, integration
3. Ordinary and Partial Differential Equations (e.g., diffusion equation, Schrödinger equation)
4. Molecular dynamics
5. Monte Carlo simulations

Learning Outcomes / Competences:
The students:

- know the principal concepts of thermodynamics and statistical physics as well as the numerical methods relevant in material science,
- are able to solve simple problems numerically. They are able to write the codes and to present the results,
- have the expertise to find the numerical method appropriate for the given problem and to judge the quality and validity of the numerical results,
- Integrated acquirement of soft skills: independent handling of hard- and software while using English documentations, ability to investigate abstract circumstances with the help of a computer and present the results in written and oral form, capacity for teamwork.

Remarks:
Links to software related to the course:

- http://www.bloodshed.net/
- http://www.cplusplus.com/doc/tutorial/
- http://www.cygwin.com/
- http://xmd.sourceforge.net/download.html
- http://www.rasmol.org/
- http://felt.sourceforge.net/

Workload:
Total: 180 h
60 h lecture and exercise course (attendance)
80 h studying of course content through exercises / case studies (self-study)
20 h studying of course content using literarture (self-study)
20 h studying of course content using provided materials (self-study)

Conditions: Recommended: basic knowledge of quantum mechanics, thermodynamics, and numerical methods as well as of a programming language		**Credit Requirements:** project work in small groups, including a written summary of the results (ca. 10-20 pages) as well as an oral presentation
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Theoretical Concepts and Simulation
Mode of Instruction: lecture
Language: English
Contact Hours: 3

Literature:

- Tao Pang, An Introduction to Computational Physics (Cambridge University Press)
- J. M. Thijssen, Computational Physics (Cambridge University Press)
- Koonin, Meredith, Computational Physics (Addison-Weseley)
- D. C. Rapaport, The Art of Molecular Dynamics Simulation, (Cambridge University Press)
- W. H. Press et al, Numerical Recipes (Cambridge University Press)

Part of the Module: Theoretical Concepts and Simulation (Project)
Mode of Instruction: exercise course
Language: English
Contact Hours: 1

Examination
Theoretical Concepts and Simulation
seminar / length of examination: 30 minutes
Examination Prerequisites:
Theoretical Concepts and Simulation

Module PHM-0180: Characterization of Materials *Characterization of Materials*	6 ECTS/LP

Version 1.0.0 (since SoSe15)
Person responsible for module: Prof. Dr. Markus Sause

Contents:

1. X-ray diffraction [2]
2. Mechanical characterization [2]
3. Optical methods [2]
4. Electrical measurements and characterization [2]
5. NMR spectroscopy [2]
6. Spectroscopy using synchrotron radiation[2]
7. Thermal analysis [2]
8. Ion beam methods [2]
9. Charakterization of organic systems [2]
10. Electron microscopy [2]

Learning Outcomes / Competences:
Basic characterization methods will be introduced to the students in a lecture series with a workload of 4 hrs each.

The students:

- know the basic characterization methods of materials science,
- acquire knowledge how to apply these methods,
- acquire the competence to use these techniques for the analysis of structural, chemical, electronical, magnetical, and optical properties of materials.

Remarks:
COMPULSORY MODULE

starting from summer term 2014 this compulsory lecture is replaced by "Characterization of Composite Materials"

Workload:
Total: 120 h
60 h studying of course content using provided materials (self-study)
60 h lecture and exercise course (attendance)

Conditions:
Recommended: basic knowledge in Materials Science

Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Characterization of Composite Materials
Mode of Instruction: lecture
Language: English
Contact Hours: 3

Literature:

- Morgan: Carbon fibers and their composites
- Henning, Moeller: Handbuch Leichtbau
- Schürmann: Konstruieren mit Faser-Kunststoff-Verbunden
- Neitzel, Mitschang: Handbuch Verbundwerkstoffe
- Dowling: Mechanical behaviour of materials
- Issler: Festigkeitslehre - Grundlagen
- Landau, Lifschitz: Theoretische Physik Vol. 7

Further literature - actual scientific papers and reviews - will be announced at the beginning of the lecture.

Part of the Module: Characterization of Composite Materials (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Literature:

see lecture

Examination

Characterization of Materials

written exam / length of examination: 90 minutes

Examination Prerequisites:

Characterization of Materials

Module PHM-0182: Method Course: Thin Film Analysis with Ion Beams *Method Course: Thin Film Analysis with Ion Beams*		8 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: apl. Prof. Dr. Helmut Karl		

Contents:

1. Introduction to ion beam analysis techniques and concepts
2. Rutherford backscattering spectroscopy
3. Theory of particle scattering and cross-section
4. Experimental setup
5. Dynamic secondary ion mass spectroscopy (SIMS)
6. Simulation and data evaluation of Rutherford backscattering spectrometry (RBS) experiments

Learning Outcomes / Competences:

The students:

- know basic terms, skills and concepts to plan and perform analysis of thin films by ion beams,
- prepare themselves for successful research during their Master thesis.

Remarks:

ELECTIVE COMPULSORY MODULE

Experimental work in the laboratory in the Institute of Physics has to be conducted within 3 months.

Workload:

Total: 240 h
90 h lecture and exercise course (attendance)
90 h studying of course content through exercises / case studies (self-study)
30 h studying of course content using provided materials (self-study)
30 h studying of course content using literarture (self-study)

Conditions: Recommended: solid knowledge in solid state and experimental physics		**Credit Requirements:** one written report
Frequency: annually	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Method Course: Thin Film Analysis with Ion Beams
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

- Will be provided by supervisor.

Part of the Module: Method Course: Thin Film Analysis with Ion Beams (Practical Course)
Mode of Instruction: internship
Language: English
Contact Hours: 4

Examination

Method Course: Thin Film Analysis with Ion Beams

seminar

Examination Prerequisites:

Method Course: Thin Film Analysis with Ion Beams

Module PHM-0187: Mathematics and Physics of Space-Time *Mathematik und Physik der Raum-Zeit*			8 ECTS/LP

Version 1.1.0 (since WS15/16)
Person responsible for module: Prof. Dr. Gert-Ludwig Ingold
Prof. Dr. Marc Nieper-Wißkirchen

Contents:
Within this interdisciplinary module, the mathematical and physical foundations of general relativity are jointly taught by two lecturers from the institutes of mathematics and physics, respectively. The module thus provides a bridge from differential geometry all the way to the observation of gravitational effects on cosmic scales.

Among the topics to be discussed are:

- Coordinate systems
- Symmetries and covariance
- Equivalence principle
- Vector fields, differential forms and tensors
- Parallel shift
- Curvature and torsion
- Geodesics
- Consequences of curved geometry in the solar system
- Einstein field equation and energy-momentum tensor
- Einstein-Cartan geometry
- Schwarzschild solution and further exact solutions
- Gravitational waves

Learning Outcomes / Competences:
- Students know the mathematical foundations of general relativity and understand their physical consequences.
- They know the physical consequences of general relativity as well as important experimental tests of the theory.
- Students are able to independently solve typical problems of general relativity.

Integrated acquirement of soft skills:

- By working in small groups, students develop their ability to work in a team.
- They are able to argue target group oriented within an interdisciplinary context and to assess and understand arguments from another discipline.

Workload:
Total: 240 h
60 h lecture (attendance)
90 h studying of course content through exercises / case studies (self-study)
30 h studying of course content using literarture (self-study)
30 h studying of course content using provided materials (self-study)
30 h exercise course (attendance)

Conditions: Knowledge of theoretical physics and mathematics as they are typically acquired in a bachelor programme in physics or mathematics with physics minor.		**Credit Requirements:** The module examination needs to be passed.
Frequency: irregular (usu. winter semester)	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Geometry and Gravitation
Mode of Instruction: lecture
Language: German / English
Contact Hours: 4

Learning Outcome:

- Students know the mathematical foundations of general relativity and understand their physical consequences.
- They know the physical consequences of general relativity as well as important experimental tests of the theory.

Contents:

see module description

Literature:

- R. W. Sharpe, *Differential Geometry* (Springer-Verlag, 2000)
- R. P. Feynman, *Feynman Lectures on Gravitation* (Westview Press, 2002)
- J. Foster, J. D. Nightingale, *A short course in general relativity* (Springer-Verlag, 2010)
- S. M. Carroll, *Spacetime and Geometry: An Introduction to General Relativity* (Cummings, 2003)
- Ch. W. Misner, K. S. Thorne, J. A. Wheeler, *Gravitation* (Princeton University Press, 2017)

Part of the Module: Exercises on Geometry and Gravitation
Mode of Instruction: exercise course
Language: German / English
Contact Hours: 2

Learning Outcome:

- Students are able to independently solve typical problems of general relativity.

Integrated acquirement of soft skills:

- By working in small groups, students develop their ability to work in a team.
- They are able to argue target group oriented within an interdisciplinary context and to asess and understand arguments from another discipline.

Contents:

see module description

Literature:

see literature entry for lecture

Examination

Geometry and Gravitation

oral exam / length of examination: 30 minutes

Module PHM-0188: Seminar on Spectroscopy of Organic Semiconductors *Seminar on Spectroscopy of Organic Semiconductors*	4 ECTS/LP

Version 1.0.0 (since WS15/16)
Person responsible for module: Prof. Dr. Wolfgang Brütting

Contents:
The seminar will cover selected examples from the physics of organic semiconductors and their applications in optoelectronic devices.

Learning Outcomes / Competences:
- The students know the basic concepts of organic semiconductors with respect to application in optoelectronic devices.
- They acquire the skill to identify the essential points of a current research topic and present them to their fellow students.
- The students are competent in treating a given problem in an autonomous way, using specialized literature. They are able to develop their own assessment, and to present and defend their opinion in the discussion with their fellow students.
- Integrated acquirement of key qualifications: gaining experience in working with scientific literature in English, and improving presentation techniques as well as English speaking skills.

Workload:
Total: 120 h
90 h preparation of presentations (self-study)
30 h seminar (attendance)

Conditions:
Sound knowledge of molecular and solid state physics as well as the physics of semiconductors; recommended participation in the lecture on Organic Semiconductors

Frequency: each semester	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar on Spectroscopy of Organic Semiconductors
Mode of Instruction: seminar
Language: English / German
Contact Hours: 2

Learning Outcome:
see module description

Contents:
see module description

Literature:
- M. Schwoerer, H.C. Wolf: Organic Molecular Solids (Wiley-VCH)
- W. Brütting: Physics of Organic Semiconductors (Wiley-VCH)
- A. Köhler, H. Bässler: Electronic Processes in Organic Semiconductors (Wiley-VCH)

Assigned Courses:

Seminar on Spectroscopy of Organic Semiconductors (seminar)

Examination

Seminar on Spectroscopy of Organic Semiconductors

seminar / length of examination: 60 minutes, not graded

Module PHM-0193: Plasma Material Interaction *Plasma-Material-Wechselwirkung*		6 ECTS/LP
Version 2.0.0 (since WS17/18) Person responsible for module: apl. Prof. Dr.-Ing. Ursel Fantz Dr. Marco Wischmeier		
Contents: • Fundamentals of plasma material interactions (winter term) • High heat load components in nuclear fusion devices (summer term)		
Learning Outcomes / Competences: • Knowledge: The students know the fundamental plasma material interaction processes and their implication for nuclear fusion research in light of the technological boundary conditions and challenges. • Skills: The students are proficient in a differentiated analysis of complex systems, based on learning from examples of power exhaust in fusion devices. • Competencies: The students are competent in elaborating current topics of plasma material interaction. • Integrated achievement of key qualifications: Acquirement of interdisciplinary knowledge, independent work with English literature, abstraction and approximation of complex processes using numerical models, application-oriented thinking and ability to contemplate about experimental results.		
Remarks: The two lectures of this module can be followed in an arbitrary order. Thus, the module can be started at a summer or winter term.		
Workload: Total: 180 h 60 h studying of course content using provided materials (self-study) 60 h studying of course content using literarture (self-study) 60 h lecture (attendance)		
Conditions: recommended: module "Plasmaphysik und Fusionsforschung"		**Credit Requirements:** general examination for entire module
Frequency: annually	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Fundamentals of plasma material interactions **Mode of Instruction:** lecture **Language:** English **Frequency:** each winter semester **Contact Hours:** 2
Learning Outcome: see description of module
Contents: Fundamental plasma boundary physics, erosion processes: physical sputtering, chemical erosion, radiation induced sublimation, arcs, experimental observation of surface processes in plasmas, methods for characterizing surfaces, coating techniques, hydrogen retention, surface modification by plasmas.

Literature:

- P. Stangeby: The plasma boundary of magnetic fusion devices (IOP, 2000)
- R. Clark, D. Reiter (Eds.): Nuclear Fusion Research, Understanding Plasma-Surface Interactions (Springer, 2005)
- O. Auciello, D. L. Flamm (Eds.): Plasma Diagnostics, Volume 2: Surface Analysis and Interactions (Plasma-Materials Interactions) (Academic Press, 1989)
- M. Turnyanskiy et al.: European roadmap to the realization of fusion energy: Mission for solution on heat-exhaust systems (Fusion Engineering and Design, 2015)

Part of the Module: High heat load components in nuclear fusion devices

Mode of Instruction: lecture

Language: English

Frequency: each summer semester

Contact Hours: 2

Learning Outcome:

see description of module

Contents:

Interdependency of material choices and fusion performance, material choices and technologies for power exhaust in a fusion power plant, migration of materials in a fusion plasma, diagnostics for plasma material interaction in fusion devices (in situ and post mortem), numerical methods for studying plasma material interaction.

Literature:

- P. Stangeby: The plasma boundary of magnetic fusion devices (IOP, 2000)
- R. Clark, D. Reiter (Eds.): Nuclear Fusion Research, Understanding Plasma-Surface Interactions (Springer, 2005)
- M. Turnyanskiy et al.: European roadmap to the realization of fusion energy: Mission for solution on heat-exhaust systems, Fusion Engineering and Design (2015)
- V. A. Evtikhin et al.: Lithium divertor concept and results of supporting experiments, Plasma Phys. Control. Fusion 44, 955 (2002)
- T. Hirai et al.: ITER tungsten divertor design development and qualification program, Fusion Eng. Des. 88, 1798 (2013)
- A. R. Raffray et al.: High heat flux components - Readiness to proceed from near term fusion systems to power plants, Fusion Eng. Des. 85, 93 (2010)

Assigned Courses:

High heat load components in nuclear fusion devices (lecture)

Examination

Plasma Material Interaction

oral exam / length of examination: 30 minutes

Module PHM-0197: Seminar on Selected Topics in Nanomagnetism *Seminar on Selected Topics in Nanomagnetism*		4 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Manfred Albrecht		
Contents: • Magnetic nanoparticles • Magnetic coupling phenomena • Magneto-transport phenomena • Magnetic sensors, permanent magnets • Experimental methods		
Learning Outcomes / Competences: • Knowledge of physical properties and applications of magnetic phenomena and material systems in selected fields • The students are competent in treating a given special topic in an autonomous way. They are able to present this topic in a structured way, to develop their own assessment, and to present and defend their opinion in the discussion with their fellow students. • Integrated acquirement of soft skills: practicing technical English, working with English specialist literature, ability to interpret experimental results		
Remarks: From time to time, the seminar will be supplemented by lectures from external experts.		
Workload: Total: 120 h 30 h seminar (attendance) 90 h preparation of presentations (self-study)		
Conditions: Basics in solid state physics and magnetism		**Credit Requirements:** presentation (60 minutes)
Frequency: each semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Seminar on Selected Topics in Nanomagnetism **Mode of Instruction:** seminar **Language:** English **Contact Hours:** 2
Learning Outcome: see module description
Contents: see module description

Literature:

- S. Blundell: Magnetism in Condensed Matter. Oxford Master Series in Condensed Matter Physics, Oxford, 2008
- R. C. O'Handley: Modern Magnetic Materials - Principles and Applications. Wiley-Interscience Publications, New York, 2000
- J. M. D. Coey: Magnetism and Magnetic Materials. Cambridge University Press, Cambridge, 2010
- J. Stöhr and H. C. Siegmann: Magnetism - From Fundamentals to Nanoscale Dynamics. Springer, Berlin, Heidelberg, 2006

Examination

Seminar on Selected Topics in Nanomagnetism

seminar / length of examination: 60 minutes, not graded

Module PHM-0199: Understanding Correlated Materials *Understanding Correlated Materials*		6 ECTS/LP
Version 1.0.0 (since SoSe16) Person responsible for module: Prof. Dr. Philipp Gegenwart Dr. Veronika Fritsch		
Contents: • Synthesis and characterization of correlated materials • Crystal structures and their symmetries, relation between crystallographic symmetry and physical properties • Electronic states of atoms and crystals, nature of electronic correlations • Magnetic phenomena and their origin • Low-temperature experiments on correlated materials		
Learning Outcomes / Competences: The students: • get to know the basic methods of materials growth and characterization • have acquired the theoretical knowledge to design low-temperature experiments and interpret their results • acquire the ability to treat fundamental and applied problems of correlated materials Integrated acquirement of soft skills. • Learn to work independently with literature in English language • Learn and apply presentation techniques • Learn the rules of good scientific practice		
Workload: Total: 180 h 15 h seminar (attendance) 30 h lecture (attendance) 15 h exercise course (attendance) 120 h studying of course content using provided materials (self-study)		
Conditions: basics of solid-state physics and quantum mechanics		**Credit Requirements:** oral presentation (60 min)
Frequency: each summer semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Understanding Correlated Materials **Mode of Instruction:** lecture **Lecturers:** Prof. Dr. Philipp Gegenwart **Language:** English **Contact Hours:** 2
Learning Outcome: see module description
Contents: see module description

Lehr-/Lernmethoden:

- Vorlesung und Präsenzstudium
- Vor- und Nachbereitung des Stoffes durch Literatur, Eigenstudium
- Vor und Nachbereitung des Stoffes anhand bereitgestellter Unterlagen, Eigenstudium

Literature:

- S. Blundell, Magnetism in Condensed Matter, Oxford, Oxford Univ. Press, 2003
- N. W. Ashcroft, N. D. Mermin: Festkörperphysik, Deutsch: München, Oldenbourg, 2013
- C. Kittel: Einführung in die Festkörperphysik, Deutsch: München, Oldenbourg, 2013
- J. B. Goodenough, Magnetism and the Chemical Bond, John Wiley & Sons, Inc. 1963
- W. Buckel, R. Kleiner, Superconductivity, WILEY-VCH Verlag GmbH & Co., Weinheim 2004

Part of the Module: Understanding Correlated Materials (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Learning Outcome:

see module description

Contents:

see module description

Lehr-/Lernmethoden:

- Übung
- Vor- und Nachbereitung des Stoffes durch Literatur, Eigenstudium
- Vor und Nachbereitung des Stoffes anhand bereitgestellter Unterlagen, Eigenstudium

Literature:

see module description

Part of the Module: Understanding Correlated Materials (Seminar)

Mode of Instruction: seminar

Language: English

Contact Hours: 1

Learning Outcome:

see module description

Contents:

see module description

Lehr-/Lernmethoden:

- Seminar
- Vor- und Nachbereitung des Stoffes durch Literatur, Eigenstudium
- Vor und Nachbereitung des Stoffes anhand bereitgestellter Unterlagen, Eigenstudium

Literature:

see module description

Examination

Understanding Correlated Materials

seminar / length of examination: 60 minutes

Module PHM-0203: Physics of Cells *Physics of Cells*	6 ECTS/LP

Version 1.3.0 (since SoSe22)
Person responsible for module: Dr. Christoph Westerhausen

Contents:

- Physical principles in Biology
- Cell components and their material properties: cell membrane, organelles, cytoskeleton
- Thermodynamics of proteins and biological membranes
- Physical methods and techniques for studying cells
- Cell adhesion – interplay of specific, universal and elastic forces
- Tensile strength and elasticity of tissue - macromolecules of the extra cellular matrix
- Micro mechanics and properties of the cell as a biomaterial
- Cell adhesion
- Cell migration
- Cell actuation, cell-computer-communication, and cell stimulatiion

Learning Outcomes / Competences:

The students

- know basic physical properties of human cells, as building blocks of living organisms and their material properties.
- know the basic functionality of mechanical and optical methods to study living cells
- know physical descriptions of fundamental biological processes and properties of biomaterials.
- are able to express biophysical questions and define model systems to answer these questions.

The students improve the key competences:

- self-dependent working with English specialist literature.
- processing of experimental data.
- interdisciplinary thinking and working.

Workload:

60 h lecture and exercise course (attendance)
20 h studying of course content using provided materials (self-study)
20 h studying of course content using literarture (self-study)
80 h studying of course content through exercises / case studies (self-study)

Conditions: Mechanics, Thermodynamics		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Physics of Cells
Mode of Instruction: lecture
Language: English / German
Contact Hours: 2

Learning Outcome:
see module description

Contents:

see module description

Literature:

- Sackmann, Erich, and Rudolf Merkel. *Lehrbuch der Biophysik*. Wiley-VCH, 2010.
- Heimburg, Thomas. *Thermal Biophysics of Membranes*. Wiley-VCH, 2007
- Nelson, Philip. *Biological physics*. New York: WH Freeman, 2004.
- Boal, D. *Mechanics of the Cell*. Cambridge University Press, 2012
- Lecture notes

Part of the Module: Physics of Cells (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 2

Learning Outcome:

see module description

Contents:

see module description

Literature:

see module description

Examination

Physics of Cells

oral exam / length of examination: 30 minutes

Module PHM-0216: Method Course: Thermal Analysis *Method Course: Thermal Analysis*		8 ECTS/LP
Version 1.0.0 (since WS16/17) Person responsible for module: Prof. Dr. Ferdinand Haider Dr. Robert Horny		
Contents: Methods of thermal analysis: - Differential Scanning Calorimetry: DSC, DTA - Thermo-gravimetric Analysis: TGA - Dilatometry: DIL - Dynamic-mechanical Analysis: DMA -Rheology: RHEO Advanced Methods: - Modulated Differential Scanning Calorimetry: MDSC - Evolved Gas Analysis: EGA (GCMS, FTIR)		
Learning Outcomes / Competences: The students: • get to know the basic principles of thermal analysis • learn about fundamental thermal processes in condensed matter ,e.g. phase transitions and relaxation processes (metals, polymers, ceramics) • learn to plan and carry out complex experiments and the usage of advanced measurement techniques • learn how to evaluate and analyze thermal data • are aware of common raw data artefacts leading to misinterpretation		
Remarks:		
Workload: Total: 240 h 90 h lecture and exercise course (attendance) 90 h studying of course content through exercises / case studies (self-study) 30 h studying of course content using literarture (self-study) 30 h studying of course content using provided materials (self-study)		
Conditions: Recommended: basic knowledge in solid-state physics		**Credit Requirements:** regular participation, oral presentation (10 min), written report
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Method Course: Thermal Analysis **Mode of Instruction:** lecture **Lecturers:** Prof. Dr. Ferdinand Haider **Language:** English **Frequency:** each winter semester **Contact Hours:** 2

Literature:

- Differential scanning calorimetry, Höhne, Hemminger, Flammersheim, H., Springer, 2003
- Practical Gas Chromatography, Dettmer-Wilde, Engewald, Springer, 2014
- Das Rheologie-Handbuch, Mezger, Vincentz, 2010

Part of the Module: Method Course: Thermal Analysis (Practical Course)

Mode of Instruction: laboratory course

Language: English

Frequency: each winter semester

Contact Hours: 4

Examination

Method Course: Thermal Analysis

report

Module PHM-0217: Advanced X-ray and Neutron Diffraction Techniques *Advanced X-ray and Neutron Diffraction Techniques*		6 ECTS/LP
Version 1.0.0 (since SoSe17) Person responsible for module: Prof. Dr. Wolfgang Scherer PD Dr. Georg Eickerling		
Contents: Subjects of the lecture are advanced X-ray and neutron diffraction techniques: • The failure of the standard *I*ndependent *A*tom *M*odel (IAM) in X-ray diffraction • Beyond the standard model: The multipolar model • How to obtain and analyze experimental charge densities • How to derive chemical and physical properties from diffraction data • Applications of joined X-ray and neutron diffraction experiments		
Learning Outcomes / Competences: The students: • gain basic theoretical knowledge on the reconstruction of accurate electron density maps from X-ray and neutron diffraction data • know the basics of the *Quantum Theory of Atoms in Molecules* • are competent to analyze the topology of the electron density and correlate it with the physical and chemical properties of materials		
Remarks: **ELECTIVE COMPULSORY MODULE**		
Workload: Total: 180 h 20 h studying of course content using provided materials (self-study) 80 h studying of course content through exercises / case studies (self-study) 20 h studying of course content using literarture (self-study) 60 h lecture and exercise course (attendance)		
Conditions: It is recommended to complete the Module PHM-0053 Chemical Physics I.		
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Advanced X-ray and Neutron Diffraction Techniques **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 3

Literature:

1. C. Giacovazzo et al., Fundamentals of Crystallography, Oxford Univ. Press, 2011.
2. P. Coppens, X-ray Charge Densities and Chemical Bonding, Oxford Univ. Press, 1997.
3. P. Popelier, Atoms in Molecules: An Introduction, Longman, 1999.
4. P. Coppens, X-ray Charge Densities and Chemical Bonding, Oxford Univ. Press, 1997.
5. P. Popelier, Atoms in Molecules: An Introduction, Longman, 1999.

Assigned Courses:

Advanced X-ray and Neutron Diffraction Techniques (lecture)

Part of the Module: Advanced X-ray and Neutron Diffraction Techniques (Tutorial)

Mode of Instruction: exercise course

Language: English

Contact Hours: 1

Assigned Courses:

Advanced X-ray and Neutron Diffraction Techniques (Tutorial) (exercise course)

Examination

Advanced X-ray and Neutron Diffraction Techniques

written exam / length of examination: 90 minutes

Examination Prerequisites:

Advanced X-ray and Neutron Diffraction Techniques

Module PHM-0221: Method Course: X-ray Diffraction Techniques *Method Course: X-ray Diffraction Techniques*		8 ECTS/LP
Version 1.3.0 (since WS15/16) Person responsible for module: Prof. Dr. Wolfgang Scherer PD Dr. Georg Eickerling		
Contents: Subjects of the practical training and the accompanying lecture are the theoretical basics and the practical application of X-ray diffraction techniques: Data collection and reduction techniques Symmetry and space group determination Structural refinements: • The Rietveld method • Difference Fourier synthesis Structure determination: • Patterson method • Direct methods Interpretation of structural refinement results Errors and Pitfalls: twinning and disorder		
Learning Outcomes / Competences: The students: • gain basic practical knowledge on structural characterization methods for single- and poly-crystalline samples employing X-ray diffraction techniques, • have the skill to perform under guidance phase-analyses and X-ray structure determinations • are competent to analyze hands-on the structure-property relationships of new materials		
Remarks: **ELECTIVE COMPULSORY MODULE**		
Workload: Total: 240 h 30 h studying of course content using provided materials (self-study) 30 h studying of course content using literarture (self-study) 90 h studying of course content through exercises / case studies (self-study) 90 h lecture and exercise course (attendance)		
Conditions: none		
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Method Course: X-ray Diffraction Techniques
Mode of Instruction: lecture
Language: English
Contact Hours: 2

Literature:

1. C. Giacovazzo et al., Fundamentals of Crystallography, Oxford Univ. Press, 2011.
2. W. Massa, Crystal structure determination, Berlin, Springer, 2016.

Part of the Module: Method Course: X-ray Diffraction Techniques (Practical Course)
Mode of Instruction: laboratory course
Language: German
Contact Hours: 4

Examination
Method Course: X-ray Diffraction Techniques
written exam / length of examination: 90 minutes

Module PHM-0223: Method Course: Tools for Scientific Computing *Method Course: Tools for Scientific Computing*	8 ECTS/LP
Version 1.5.0 (since SoSe18) Person responsible for module: Prof. Dr. Gert-Ludwig Ingold	

Contents:

Important tools for scientific computing are taught in this module and applied to specific scientific problems by the students. As far as tools depend on a particular programming language, Python will be employed. Tools to be discussed include:

- numerical libraries like NumPy and SciPy
- visualisation of numerical results
- use of a version control system like git and its application in collaborative work
- testing of code
- profiling
- documentation of programs

Learning Outcomes / Competences:

- The students are capable of solving a physical problem of some complexity by means of numerical techniques. They are able to visualize the results and to adequately document their program code.
- The students know examples of numerical libraries and are able to apply them to solve scientific problems.
- The students know methods for quality assurance like the use of unit tests and can apply them to their code. They know techniques to identify run-time problems.
- The students know a distributed version control system and are able to use it in a practical problem.
- The students have gained practical experience in a collaborative project work. They are able to plan and carry out a programming project in a small group.
- The students understand the relevance of the tools taught in the method course for good scientific practice.

Remarks:

The number of students will be limited to 12.

Workload:

Total: 240 h
60 h studying of course content (self-study)
90 h (attendance)
30 h preparation of presentations (self-study)
60 h preparation of written term papers (self-study)

Conditions:	**Credit Requirements:**
Knowledge of the programming language Python is expected on the level taught in the module PHM-0243 "Einführung in Prinzipien der Programmierung".	The module examination needs to be passed which is based on a scientific programming project carried out in a small team of 2-3 students. The work will be judged on the basis of a joint final report and the contributions of the individual students as documented in the team's Gitlab project. The final report should contain an explanation of the scientific problem and its numerical implementation as well as a presentation of results. The code should be appropriately documented and tested.

Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Method Course: Tools for Scientific Computing
Mode of Instruction: lecture
Language: English / German
Contact Hours: 2

Learning Outcome:

- The students know the numerical libraries NumPy and SciPy and selected tools for the visualization of numerical results.
- The students know fundamental techniques for the quality assurance of programs like the use of unit tests, profiling and the use of the version control system git. They are able to adequately document their code.
- The students understand the relevance of the tools taught in the method course for good scientific practice.

Contents:

- numerical libraries NumPy and SciPy
- graphics with matplotlib
- version control system Git and workflow for Gitlab/Github
- unit tests
- profiling
- documentation using docstrings and Sphinx

Literature:

- A. Scopatz, K. D. Huff, *Effective Computation in Physics* (O'Reilly, 2015)
- lecture notes are freely available at https://gertingold.github.io/tools4scicomp

Assigned Courses:

Method Course: Tools for Scientific Computing (lecture)

Part of the Module: Method Course: Tools for Scientific Computing (Practical Course)
Mode of Instruction: internship
Language: English / German
Contact Hours: 4

Learning Outcome:

- The students are capable of solving a physical problem of some complexity by means of numerical techniques and to visualize the results.
- They have gained some experience in the application of methods for quality assurance of their code and are able to appropriately document their programs.
- The students are able to work in a team and know how to make use of tools like Gitlab/Github.
- The students are able to present the status of their work, to critically assess it and to accept suggestions from others.

Contents:

The tools discussed in the lecture will be applied to specific scientific problems by small teams of 2-3 students under supervision. The teams regularly inform the other teams in oral presentations on their progress, the tools employed as well as encountered problems and their solution.

Assigned Courses:

Method Course: Tools for Scientific Computing (Practical Course) (internship)

Examination

Method Course: Tools for Scientific Computing

report / work period for assignment: 4 weeks

Description:

The requirement for credit points is based on a scientific programming project carried out in a small team of 2-3 students. The work will be judged on the basis of a joint final report and the contributions of the individual students as documented in the team's Gitlab project. The final report should contain an explanation of the scientific problem and its numerical implementation as well as a presentation of results. The code should be appropriately documented and tested.

Module PHM-0224: Method Course: Theoretical Concepts and Simulation *Method Course: Theoretical Concepts and Simulation*		8 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Liviu Chioncel		
Contents: This module covers Monte-Carlo methods (computational algorithms) for classical and quantum problems. Python as programing language will be employed. The following common applications will be discussed: • Monte-Carlo integration, stochastic optimization, inverse problems • Feynman path integrals: the connection between classical and quantum systems • Oder and disorder in spin systems, fermions, and boson		
Learning Outcomes / Competences: • The students are capable of obtaining numerical solutions to problems too complicated to be solved analytically • The students are able to present (graphically), discuss and analyze the results • The students gain experience in formulatind and carrying out a collaborative project		
Remarks: The number of students will be limited to 8.		
Workload: Total: 240 h 90 h preparation of presentations (self-study) 60 h preparation of written term papers (self-study) 60 h studying of course content (self-study) 90 h (attendance)		
Conditions: Knowledge of the programming language Phython is expected on the level taught in the modul PHM-0041. Requirements to understand basic concepts in physics: Classical Mechanics (Newton, Lagrange), Electrodynamics, Thermodynamics and Quantum Mechanics.		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each summer semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Method Course: Theoretical Concepts and Simulation **Mode of Instruction:** lecture **Language:** English / German **Contact Hours:** 2
Contents: Concepts of classical and quantum statistical physics: • the meaning of sampling, random variables, ergodicity • equidistribution, pressure, temperature • path integrals, quantum statistics, enumeration, cluster algorithms
Literature: 1. Werner Krauth, Algorithms and Computations (Oxford University Press, 2006) 2. R. H. Landau, A Survey of Computational Physics (Princeton Univ. Press, 2010)

Part of the Module: Method Course: Theoretical Concepts and Simulation (Practical Course)
Mode of Instruction: internship
Language: English / German
Contact Hours: 4

Contents:

see above

Literature:

see above

Examination

Method Course: Theoretical Concepts and Simulation

report / work period for assignment: 4 weeks

Description:

The requirement for the credit points is based on a programming project carried out in a team of 2-3 students. The final report contains the formulation and a theoretical introduction into the problem, the numerical implementation, and the presentation of the results.

Module PHM-0225: Analog Electronics for Physicists and Materials Scientists *Analog Electronics for Physicists and Materials Scientists*		6 ECTS/LP
Version 1.2.0 (since WS15/16) Person responsible for module: Andreas Hörner		
Contents: 1. Basics in electronic and electrical engineering 2. Quadrupole theory 3. Electronic Networks 4. Semiconductor Devices 5. Implementation of transistors 6. Operational amplifiers 7. Optoelectronic Devices 8. Measurement Devices		
Learning Outcomes / Competences: The students: • know the basic terms, concepts and phenomena of electronic and electrical engineering for the use in the Lab, • have skills in easy circuit design, measuring and control technology, analog electronics, • have expertise in independent working on circuit problems. They can calculate and develop easy circuits.		
Workload: Total: 180 h 20 h studying of course content using provided materials (self-study) 20 h studying of course content using literarture (self-study) 80 h studying of course content through exercises / case studies (self-study) 60 h lecture and exercise course (attendance)		
Conditions: none		
Frequency: each winter semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Analog Electronics for Physicists and Materials Scientists **Mode of Instruction:** lecture + exercise **Lecturers:** Andreas Hörner **Language:** English **Contact Hours:** 4 **ECTS Credits:** 6.0
Examination **Analog Electronics Analog Electronics for Physicists and Materials Scientists** written exam / length of examination: 90 minutes **Examination Prerequisites:** Analog Electronics for Physicists and Materials Scientists

Module PHM-0226: Digital Electronics for Physicists and Materials Scientists *Digital Electronics for Physicists and Materials Scientists*		6 ECTS/LP
Version 1.3.0 (since WS15/16) Person responsible for module: Andreas Hörner		
Contents: 1. Boolean algebra and logic gates 2. Digital electronics and calculation of digital circuits 3. Converters (Analog – Digital, Digital – Analog) 4. Principle of digital memory and communication, 5. Microprocessors and Networks		
Learning Outcomes / Competences: The students: • know the basic terms, concepts and phenomena of electronic and electrical engineering for the use in the Lab, • have skills in easy circuit design, measuring and control technology and digital electronics, • have expertise in independent working on circuit problems. They develop easy digital circuits and program microprocessors		
Workload: Total: 180 h 80 h studying of course content through exercises / case studies (self-study) 20 h studying of course content using provided materials (self-study) 20 h studying of course content using literarture (self-study) 60 h lecture and exercise course (attendance)		
Conditions: none		
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Digital Electronics for Physicists and Materials Scientists **Mode of Instruction:** lecture + exercise **Lecturers:** Andreas Hörner **Language:** English **Contact Hours:** 4 **ECTS Credits:** 6.0
Assigned Courses: **Digital Electronics for Physicists and Materials Scientists** (lecture + exercise)
Examination **Digital Electronics Digital Electronics for Physicists and Materials Scientists** written exam / length of examination: 90 minutes

Module PHM-0228: Symmetry concepts and their applications in solid state physics and materials science *Symmetry concepts and their applications in solid state physics and materials science*	6 ECTS/LP

Version 1.0.0 (since WS18/19)
Person responsible for module: Prof. Dr. István Kézsmárki
Deisenhofer, Joachim, Dr.

Contents:

The topical outline of the course is as follows:

- Introduction and common examples
  - o Motivating examples
  - o Polar and axial vectors and tensors
  - o Spatial and temporal symmetries and charge conjugation
  - o Symmetries of measurable quantities and fields
  - o Symmetries of physical laws (classical and quantum)
  - o Conservation laws (linear and angular momentum, energy, etc.)
  - o Symmetry of measurement configurations (reciprocity, etc.)
- Neumann principle
  - o Linear response theory and Onsager relations

o Applications to vector and tensor quantities: electric and magnetic dipole moment of molecules; ferroelectricity, ferromagnetism, piezoelectricity and magnetoelectricity in crystals; wave propagation in anisotropic media (sound and light)

- Symmetry allowed energy terms
  - o On the level of classical free energy: Polar, nematic and magnetic order parameters (Landau expansion)
  - o On the level of Hamiltonians: Molecular vibrations, crystal field potential, magnetic interactions
- Symmetry of physical states
  - o Spatial inversion and parity eigenstates
  - o Discrete translations and the Bloch states
- Spontaneous symmetry breaking upon phase transitions (Landau theory)
- Outlook: Symmetry guides for skyrmion-host materials, multiferroic compounds and axion insulators

Learning Outcomes / Competences:

- The students know the simple use of symmetry concepts to understand phenomena and material properties without performing detailed calculations.
- The students know how to make minimal plans for experiments using the symmetry of the studied materials or vice versa how to determine the symmetry of materials from the output of experiments.
- The students acquire scientific skills to search for scientific literature and to evaluate scientific content.

Workload:

Total: 180 h
60 h (attendance)
60 h exam preparation (self-study)
60 h studying of course content (self-study)

Conditions: Background in basic quantum mechanics is required.		
Frequency: nach Bedarf WS und SoSe	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Symmetry concepts and their applications in solid state physics and materials science

Mode of Instruction: lecture
Lecturers: Prof. Dr. István Kézsmárki
Language: English
Contact Hours: 3
ECTS Credits: 6.0

Assigned Courses:

Symmetry concepts and their applications in solid state physics and materials science (lecture)

Examination

Symmetry concepts and their applications in solid state physics and materials science
oral exam / length of examination: 30 minutes

Parts of the Module

Part of the Module: Symmetry concepts and their applications in solid state physics and materials science (Tutorial)

Mode of Instruction: exercise course
Language: English
Contact Hours: 1

Assigned Courses:

Symmetry concepts and their applications in solid state physics and materials science (Tutorial) (exercise course)

Module PHM-0249: Seminar on Magnetic skyrmions in crystals and thin films *Seminar on Magnetic skyrmions in crystals and thin films*	4 ECTS/LP

Version 1.0.0 (since WS15/16)
Person responsible for module: Prof. Dr. István Kézsmárki

Contents:

1.) Magnetic interactions governing the formation of spin spirals and skyrmions

- Competition between symmetric and antisymmetric exchange interactions leading to magnetic modulations (mechanism #1)
- Frustration of exchange interactions giving rise to magnetic modulations (mechanism #2)
- Competition between easy-axis magnetic anisotropy and magnetic dipole-dipole interaction leading to magnetic modulations (mechanism #3)

2.)Different classes of magnetic magnetic spirals and skyrmions

- Spin helices versus spin cycloids; Bloch- and Néel-type skyrmions versus antiskyrmions; introduction of vorticity and helicity
- Stability of the different types of skyrmion lattices depending on the crystal symmetry of the host materials (for skyrmions stabilized via mechanism #1)
- Experimental observation of magnetic skyrmions
- Real-space imaging of magnetic spirals and skyrmions using scanning probe techniques, such as magnetic force microscopy and scanning tunneling microscopy
- Real-space imaging of magnetic spirals and skyrmions using Lorentz transmission electron microscopy
- Reciprocal-space imaging of magnetic spirals and skyrmions using small angle neutron and X-ray scattering
- Signatures of magnetic spiral and skyrmion lattice states in thermodynamic and transport properties
- Spectroscopic studies on the excitations of magnetic spiral and skyrmion lattice states

3.) Possible magnetic memory applications of skyrmions

- Race-track type memories
- Hard-drive style memories

4.) Manipulation of individual skyrmions and skyrmion lattices by external stimuli

Learning Outcomes / Competences:

The students

- understand basic physical concepts behind the formation and manipulation of modulated magnetic textures, such as spin spirals and magnetic skyrmions, on the nano- to mesoscopic scale.
- learn to know the experimental methods frequently used to image/detect magnetic skyrmions
- learn to assess a scientific problem and present the subject in a concise and understandable manner

Remarks:

The seminar will consist of two parts: i) tutorial part about the basic concepts (different magnetic interactions leading to skyrmion formation and different classes of skyrmions), ii) seminar talks of students based on research articles (review articles whenever possible) describing the experimental observation of skyrmions, their manipulation and their possible applications in magnetic memories.

Workload:

Total: 120 h
90 h preparation of presentations (self-study)
30 h seminar (attendance)

Conditions: Grundkenntnisse der Quantenmechanik	

Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar on Magnetic skyrmions in crystals and thin films
Mode of Instruction: seminar
Lecturers: Prof. Dr. István Kézsmárki
Language: English
Contact Hours: 2
ECTS Credits: 4.0

Assigned Courses:

Seminar on Magnetic skyrmions in crystals and thin films (seminar)

Examination
Seminar on Magnetic skyrmions in crystals and thin films
seminar / length of examination: 60 minutes

Module PHM-0251: Theory of magnetic skyrmions *Theorie magnetischer Skyrmionen*			8 ECTS/LP
Version 1.0.0 (since WS19/20) Person responsible for module: Priv. Doz. Dr. Wolfgang Häusler			
Contents: Topologische Invarianten Topologische Anregungen in Ferromagneten in einer, in zwei und in drei Raumdimensionen Dzyaloshinsky-Moriya Wechselwirkung Energiefunktional und Euler-Lagrange-Gleichung mit Skyrmionenlösung Landau-Lifshitz-Gilbert Dynamik Skyrmionen-Erzeugung und Skyrmionen-Vernichtung Stromgetriebene Skyrmionen Skyrmionen auf Supraleitern			
Learning Outcomes / Competences: Die Studierenden kennen die Bedeutung von Topologie in der Physik Sie besitzen gründliche theoretische Kompetenzen und können sie sicher anwenden Sie kennen solitäre Lösungen nichtlinearer Differentialgleichungen und verstehen das topologische Problem einer Skyrmionenzahländerung, auch unter effektiv gedämpfter Dynamik Integrierter Erwerb von Schlüsselqualifikationen			
Workload: Total: 240 h 6 h lecture and exercise course (attendance)			
Conditions: Klassische Mechanik, Klassische Elektrodynamik/Feldtheorie, Quantenmechanik Module Theoretical Physics IV (Classical Field Theory) (PHM-0020) - recommended			**Credit Requirements:** Bestehen der Modulprüfung
Frequency: irregular (usu. winter semester) nach Bedarf: WS oder SoSe	**Recommended Semester:** from 1.		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** four times		

Parts of the Module
Part of the Module: Theorie magnetischer Skyrmionen **Mode of Instruction:** lecture + exercise **Lecturers:** Priv. Doz. Dr. Wolfgang Häusler **Language:** German / English **Frequency:** jährlich nach Bedarf WS oder SoSe **Contact Hours:** 4 **ECTS Credits:** 8.0
Learning Outcome: Die Studierenden kennen die Bedeutung von Topologie in der Physik Sie besitzen gründliche theoretische Kompetenzen und können sie sicher anwenden Sie kennen solitäre Lösungen nichtlinearer Differentialgleichungen und verstehen das topologische Problem einer Skyrmionenzahländerung, auch unter effektiv gedämpfter Dynamik Integrierter Erwerb von Schlüsselqualifikationen

Contents:

Topologische Invarianten

Topologische Anregungen in Ferromagneten in einer, in zwei und in drei Raumdimensionen

Dzyaloshinsky-Moriya Wechselwirkung

Energiefunktional und Euler-Lagrange-Gleichung mit Skyrmionenlösung

Landau-Lifshitz-Gilbert Dynamik

Skyrmionen-Erzeugung und Skyrmionen-Vernichtung

Stromgetriebene Skyrmionen

Skyrmionen auf Supraleitern

Literature:

Jan Seidel (Editor) "Topological Structures in Ferroic Materials - Domain Walls, Vortices and Skyrmions", Springer Series in Materials Science (2016)

Shinichiro Seki and Masahito Mochizuki "Skyrmions in Magnetic Materials", SpringerBriefs in Physics (2016)

Albert Fert, Vincent Cros and João Sampaio "Skyrmions on the track", Nat. Nanotechnol. 8, 152 (2013)

Wang Kang, Yangqi Huang, Xichao Zhang, Yan Zhou, Weisheng Zhao "Skyrmion-Electronics: An Overview and Outlook", Proceedings of the IEEE 104, 2040 (2016)

A. Bogdanov and A. Hubert "Thermodynamically stable magnetic vortex states in magnetic crystals", Journal of Magnetism and Magnetic Materials 138, 255 (1994)

Examination

PHM-0251 Theorie magnetischer Skyrmionen

oral exam / length of examination: 30 minutes

Module PHM-0252: Optical Excitations in Materials *Optical Excitations in Materials*	6 ECTS/LP

Version 1.9.0 (since SoSe20)
Person responsible for module: Prof. Dr. Joachim Deisenhofer

Contents:

1. Classical Light-Matter Interation in Solids:

- Introduction: Typical Optical Response of Metals and Semiconductors
- Classical electromagnetic wave propagation in linear optical media (Maxwell Equations, refractive index, reflection, transmission, absorption)
- Anisotropic media, birefringence, longitudinal solutions
- Classical Drude-Lorentz oscillator model
- Spectroscopic techniques: Fourier-Transform-Spectroscopy, Time-domain Spectroscopy, Ellipsometry

2. Quantum Aspects of Light-Matter interaction

- qm approach to absorption and emission: Lorentzian lineshape, Fermi's Golden Rule
- Electric-dipole and magnetic-dipole approximation
- Rabi-oscillations and the need for quantum optical approaches
- A glimpse of non-linear optics

3. Exitations in different material classes

- Optical properties of semiconductors/insulators, molecular materials, metals
- Absorption and Luminescence, excitons, luminescence centers
- Optoelectronics, detectors, light emitting devices
- Quantum confined structures: tuning of absorption and emission

Learning Outcomes / Competences:

- The students gain basic knowledge of the fundamental concepts of light-matter interaction in solids.
- The students have detailed knowledge of classical models of light-propagation and absorption and get the competence to choose adequate spectroscopic techniques for measuring the optical properties of different material classes.
- The students have a basic understanding of quantum aspects of optical processes in different materials.
- The students are able apply these concepts to understand and analyse optical properties of different materials.
- The students acquire scientific skills to search for scientific literature and to evaluate scientific content.

Workload:

Total: 180 h
20 h studying of course content using literarture (self-study)
80 h studying of course content through exercises / case studies (self-study)
20 h studying of course content using provided materials (self-study)
60 h lecture and exercise course (attendance)

Conditions:
Basic knowledge of classical electrodynamics, atomic and solid state physics.

Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Optical Excitations in Materials
Mode of Instruction: lecture
Language: English
Contact Hours: 4
ECTS Credits: 6.0

Literature:

1. Mark Fox, Optical Properties of Solids, Oxford Master Series
2. Mark Fox, Quantum Optics: An Introduction, Oxford Master Series
3. David B. Tanner, Optical Effects in Solids, Cambridge University Press
4. Y. Toyozawa, Optical Processes in Solids, Cambridge University Press

Assigned Courses:

Optical Excitations in Materials (lecture)

Examination
Optical Excitations in Materials
individual oral exam / length of examination: 30 minutes

Module PHM-0253: Dielectric Materials *Dielectric Materials*	6 ECTS/LP

Version 1.2.0 (since SoSe20)
Person responsible for module: PD Dr. Stephan Krohns
PD Dr. Peter Lunkenheimer

Contents:

- Experimental techniques: quantities, broadband dielectric spectroscopy, nonlinear and polarization measurements
- Dynamic processes in dielectric materials: relaxation processes, phenomenological models
- Dielectric properties of disordered matter: liquids, glasses, plastic crystals
- Charge transport: hopping conductivity, universal dielectric response
- Ionic conductivity: conductivity mechanism, dielectric properties, advanced electrolytes for energy-storage devices
- Maxwell-Wagner relaxations: equivalent-circuits, applications (supercapacitors), colossal-dielectric-constant materials
- Electroceramics: Materials, Properties (relaxor ferroelectric, ferroelectric, antiferroelectric and multiferroic), Applications

Learning Outcomes / Competences:
Students know the fundamentals of electromagnetic wave propagation and have a sound background for a broad spectrum of dielectric phenomena. They are able to analyze materials requirements and to interpret dielectric spectra in a broad frequency range. They have the competence to select materials for different kinds of applications and to critically assess experimental results on dielectric properties.

Remarks:
Elective compulsory module

Workload:
Total: 180 h
60 h lecture and exercise course (attendance)
20 h studying of course content using provided materials (self-study)
20 h studying of course content using literarture (self-study)
80 h studying of course content through exercises / case studies (self-study)

Conditions: Basic knowledge of solid state physics		
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Dielectric Materials
Mode of Instruction: lecture
Lecturers: PD Dr. Stephan Krohns, PD Dr. Peter Lunkenheimer
Language: English / German

Literature:

- F. Kremer and A. Schönhals (eds.), Broadband Dielectric Spectroscopy (Springer, Berlin, 2002).
- F. Kremer and A. Loidl (eds.), The scaling of relaxation processes (Springer, Cham, 2018).
- A.K. Jonscher, Dielectric Relaxations in Solids (Chelsea Dielectrics Press, London, 1983).
- C.J.F. Böttcher and P. Bordewijk, Theory of electric polarisation Vol II (Elsevier, Amsterdam, 1973).
- S.R. Elliott, Physics of Amorphous Materials (Longman, London, 1990)
- A.J.Moulson, J.M. Herbert, Electroceramics: Materials, Properties, Applications (Wiley, 2003)
- R. Waser, U. Böttger, S. Tiedke, Polar Oxides: Properties, Characterization, and Imaging (Wiley, 2005)

Assigned Courses:

Dielectric Materials (lecture)

Examination

Dielectric Materials Dielectric Materials

presentation / length of examination: 45 minutes

Examination Prerequisites:

Dielectric Materials

Module PHM-0258: Method course: Charge doping effects in semiconductors *Method course: Charge doping effects in semiconductors*		8 ECTS/LP
Version 1.0.0 (since SoSe21) Person responsible for module: Prof. Dr. István Kézsmárki Dr. Lilian Prodan, Dr. Somnath Ghara		

Contents:

The goal of the method course is to make students familiar with the concept of controlling the type and the concentration of charge carriers in semiconductors, which is widely used approach in electronics and various fields of materials science. For this purpose, the current method course will be dealing with the preparation of various electron-doped and / or hole-doped narrow-gap semiconductors and investigation of the influence of charge doping on transport and magnetic properties.

The following techniques will be involved:

- Synthesis of electron and hole doped narrow-gap semiconductors, such as Zn- and Ge-doped GaV4S8, in poly-crystalline forms using solid state reaction;
- Refining the structure and checking phase purity by X-ray powder diffraction;
- Resistivity and magneto-transport measurements;
- Hall effect measurements to quantify carrier concentration;
- Investigation of the doping-induced changes in the magnetic properties by magnetization measurements.

Learning Outcomes / Competences:

- The students gain basic knowledge how to tailor the bulk properties of narrow-gap semiconductors via different doping techniques.
- The students have detailed knowledge in performing XRD and magnetization experiments and know how to analyze the data.
- The students acquire the comptence to plan and perform Hall effect and magnetoresistance experiments and evaluate the obtained experimental results.
- The students have the skill to distinguish between an n-type and p-type semiconductor.
- The students know how to calculate the charge, mobility, and charge carrier density of a semiconductor using information obtained from the Hall effect experiments.

Remarks:

ELECTIVE COMPULSORY MODULES

Workload:

Total: 240 h

Conditions: Recommended: basic knowledge in solid state physics and semiconductors;		**Credit Requirements:** Written report on the experiments (editing time 2 weeks)
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Method course: Charge doping effects in semiconductors (Practical Course)

Mode of Instruction: internship

Language: English

Contact Hours: 4

Contents:

The following techniques will be involved:

- Synthesis of electron and hole doped narrow-gap semiconductors, such as Zn- and Ge-doped GaV4S8, in poly-crystalline forms using solid state reaction;
- Refining the structure and checking phase purity by X-ray powder diffraction;
- Resistivity and magneto-transport measurements;
- Hall effect measurements to quantify carrier concentration;
- Investigation of the doping-induced changes in the magnetic properties by magnetization measurements.

Assigned Courses:

Method course: Charge doping effects in semiconductors (Practical Course) (internship)

Part of the Module: Method course: Charge doping effects in semiconductors

Mode of Instruction: lecture
Language: English
Contact Hours: 2

Learning Outcome:

The goal of the method course is to make students familiar with the concept of controlling the type and the concentration of charge carriers in semiconductors, which is widely used approach in electronics and various fields of materials science. For this purpose, the current method course will be dealing with the preparation of various electron-doped and / or hole-doped narrow-gap semiconductors and investigation of the influence of charge doping on transport and magnetic properties.

Assigned Courses:

Method course: Charge doping effects in semiconductors (lecture)

Examination

Method course: Charge doping effects in semiconductors

report

Module PHM-0264: Functional and Smart Macromolecular Materials	6 ECTS/LP

Version 1.2.0 (since WS21/22)
Person responsible for module: PD Dr. Klaus Ruhland

Contents:

Electro-active polymeric materials

- Intrinsically electric conducting polymers (ICPs)
- Working principles of ICPs in selected applications
- Red/Ox-responsive ICPs
- Electrochromism
- Electroactive Actuators
- Non-electric-conducting electrically functional polymers
- Ferroelectric polymers
- Piezoelectric polymers
- Dielectric elastomers

Thermo-active polymeric materials

- Difference between invertibility and reversibility
- Pyro-electric effect vs electro-caloric effect
- High-temperature-stabile polymers
- Thermochromic polymers

Mechano-active polymeric materials

- Shape-Memory-polymers
- Self-healing polymers

Photo-active polymeric materials

- Important chromophors and switching mechanisms
- Photo-responsive polymerization initiators and catalysts

Smart polymer gels

- Thermo-responsive polymer gels (LCST/UCST)
- Electrically charged polymer gels
- pH-responsive polymer gels

Learning Outcomes / Competences:

The Students get to know which functional properties can be implemented into macromolecular marterials by action of which external stimulus.

They reach the ability to differentiate between different mechanisms to introduce smart behaviour into polymeric materials and to decide about dependences between different external stimuli.

They will be competent to design smart functional multi-resonsive macromolecular materials that serve specific application needs time- and space-dependent.

Examples for applications of this type of material design will be discussed.

Workload:

Total: 180 h
80 h studying of course content using provided materials (self-study)
20 h studying of course content using literarture (self-study)
60 h lecture (attendance)
20 h exercise course (attendance)

Conditions:	**Credit Requirements:**
none	passing the final examination

Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Functional and Smart Macromolecular Materials

Mode of Instruction: lecture

Language: English

Contact Hours: 4

Contents:

see description of the module

Lehr-/Lernmethoden:

see description of the module

Literature:

- Smart Polymers and their Applications; M. R. Aguilar, J. S. Roman (ISBN 978-0-85709-695-1)
- Functional Monomers and Polymers; K. Takemoto, R. M. Ottenbrite, M. Kamachi (ISBN 0-8247-9991-7)
- Biomedical Applications of Electroactive Polymer Actuators; F. Carpi, E. Smela (ISBN 978-0-470-77305-5)
- Electroactive Polymer Actuators as Artificial Muscles; Y. Bar-Cohen (ISBN0-8194-5297-1)
- Smart Polymers; I. Galaev, B. Mattiasson (ISBN 978-0-8493-9161-3)
- Semiconducting and Metallic Polymers; A. J. Heeger, N. S. Sariciftci, E. B. Namdas (ISBN 978-0-19-852864-7)
- Polymers and Light; W. Schnabel (ISBN978-3-527-31866-7)
- Shape Memory Polymers; J. Hu (ISBN 978-1-90903-050-3)
- Shape Memory Maerials; D. I. Arun, P. Chakravarthy, K. R. Arockia, B.
- Santhosh (ISBN 978-0-367-57169-6)
- Polymer Materials with Smart Properties; M. Bercea (ISBN 978-1-62808-876-2)
- Self-healing Materials; K. Ghosh (ISBN 978-3-527-31829-2)
- Self-Healing Polymers; W. H. Binder (ISBN 978-3-527-33439-1)
- High Performance Polymers; J. K. Fink (ISBN 978-0-8155-1580-7)
- Functional Coatings; S. K. Ghosh (ISBN 978-3-527-31296-2)
- Handbook of Stimuli-Responsive Materials; M. W. Urban (ISBN 978-3-527-32700-3)
- Renewable Resources for Functional Polymers and Biomaterials; P. A. Williams (ISBN 978-1-84973-245-1)
- Thermochromic and Thermotropic Materials; A. Seeboth, D. Lötzsch (ISBN 978-981-4411-02-8)
- Thermochromic Phenomena in Polymers; A. Seeboth, D. Lötzsch (ISBN 978-1-84735-112-8)
- Shape-Memory Polymers for Aerospace Applications; G. P. Tandon, A. J. W. McClung, J. W. Baur (ISBN 978-1-60595-118-8)
- Polymer Mechanochemistry; R. Boulatov (ISBN 978-3-319-22824-2

Examination

Functional and Smart Macromolecular Materials

written exam / length of examination: 90 minutes

Module PHM-0265: Research challenges in cell biophysics *Research challenges in cell biophysics*			6 ECTS/LP

Version 1.0.0 (since WS21/22)
Person responsible for module: Prof. Dr. Christoph Alexander Weber

Contents:

- Thermodynamics of phase separation
- Random phase approximation
- Kinetics of phase separation
- Chemical reactions in crowded environments
- Chemically active emulsions

Students can pick one research topic per lecture and accept a research challenge for the second half of the lecture. Research challenges will cover various questions on the Origin of life, Phase Transitions and Chemical Reactions in Living Cells.

Learning Outcomes / Competences:
The students

- have basic theoretical knowledge about the physics of livings systems such as the cell or non-equilibrium assemblies with life-like features
- are capable of reading leading-edge research papers relevant to solve their research challenge and know how to bridge between textbook knowledge and research questions
- know how to productively discuss their research approach and progress with the project supervisor and other students forming a research team
- are able to communicate their results in a final seminar talk.

Workload:
Total: 180 h
100 h studying of course content through exercises / case studies (self-study)
60 h lecture and exercise course (attendance)
20 h exam preparation (self-study)

Conditions: Knowledge of thermodynamics and statistical mechanics as taught on the bachelor level in the corresponding theory course.		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: every 3rd semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Research challenges in cell biophysics
Mode of Instruction: lecture
Language: English / German
Contact Hours: 3

Literature:

- Samuel A. Safran, *Statistical Thermodynamics of Surfaces, Interfaces and Membranes* (CRC Press, 2003)
- Christoph A. Weber, David Zwicker, Frank Jülicher und Chiu Fan Lee, *Physics of active emulsions*, Rep. Prog. Phys. **82**, 064601 (2019)

Part of the Module: Übung zu Research challenges in cell biophysics
Mode of Instruction: exercise course
Language: English / German
Contact Hours: 1

Examination
Research challenges in cell biophysics
oral exam / length of examination: 30 minutes

Module PHM-0267: Fundamentals of Materials for Energy *Fundamentals of Materials for Energy*			6 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Prof. Dr. Wolfgang Brütting			
Contents: This class teaches fundamentals of conventional as well as renewable energy conversion. The following topics will be addressed: • Basics facts on energy conversion and climate change • Fossile energy • Nuclear energy • Renewable energy • Energy storage and transport			
Learning Outcomes / Competences: Students know the fundamentals of different energy technologies. They are able to assess their respective efficiency and their potential for covering current and future energy demand. They are able to deal with a specific problem using up-to-date literature and participate in the ongoing discussion about how to cover our increasing need for various forms of energy.			
Conditions: Sound background in physics, in particular solid state physics and thermodynamics.			**Credit Requirements:** Passing the exam
Frequency: annually	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: * LV-Gruppe neu*****

Language: English / German

Contact Hours: 4

ECTS Credits: 6.0

Literature:

- D.S. Ginley, D. Cahen: Fundamentals of Materials for Energy and Environmental Sustainability (Cambridge Univ. Press)
- J. Fricke, W.L. Borst: Essentials of Energy Technology (Wiley-VCH)
- D.J.C. MacKay: Sustainable Energy - without the hot air (https://www.withouthotair.com/)

Examination

Fundamentals of Materials for Energy

written exam / length of examination: 90 minutes

Module INF-0029: Research Module Software Methodologies for Distributed Systems *Forschungsmodul Softwaremethodiken für verteilte Systeme*		6 ECTS/LP
Version 1.0.0 (since SoSe13) Person responsible for module: Prof. Dr. Bernhard Bauer		

Learning Outcomes / Competences:
After participating in the research module, students can understand problems of medium complexity in the field of software methodologies for distributed systems. They have detailed and up-to-date knowledge in the mentioned field and can actively participate in research projects. To this end, they understand advanced concepts, methods, procedures, techniques, and technologies and can contribute this knowledge to research projects. In addition, students have the teamwork and communication skills, the ability to study literature, and the learning and working techniques to discuss problems in the field and critically evaluate, combine, and present interim results.

Key qualifications: Ability to think logically, analytically, and conceptually; independent work with literature; comprehensible, confident, and convincing presentation of ideas, concepts, and results; quality awareness; communication skills; ability to work in teams and understand team processes; principles of good scientific practice;

Workload:
Total: 180 h
15 h seminar (attendance)
165 h internship / practical course (self-study)

Conditions: none		
Frequency: each semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Forschungsmodul Softwaremethodiken für verteilte Systeme
Mode of Instruction: internship
Language: German / English
Contact Hours: 1

Contents:
Current research topics at the DS-Lab.

Literature:
Provided for the respective topics.

Assigned Courses:

Oberseminar zu Softwaremethodik für verteilte Systeme

Examination
Presentation and written paper
internship

Module INF-0048: Research Module Theoretical Computer Science *Forschungsmodul Theoretische Informatik*	6 ECTS/LP

Version 1.0.0 (since SoSe13)
Person responsible for module: Prof. Dr. Torben Hagerup

Learning Outcomes / Competences:
After successful participation in the research module, the students will be in a position to understand problems of intermediate complexity in the field of Theoretical Computer Science. Furthermore, they will have detailed and up-to-date knowledge in the field, enabling them to actively develop and apply its concepts, methods, processes, and techniques for their research projects. The students will have team spirit and the ability to communicate, conduct literature research, and evaluate solutions and results in a critical manner.

Key Qualifications:
Logical, analytical, and conceptual comprehension; independent work with English technical literature; capability to present thoughts, concepts, and conclusions in an understandable, confident, and convincing way; quality awareness; communication skills; knowledge of fundamentals of good scientific practice.

Workload:
Total: 180 h
165 h internship / practical course (self-study)
15 h seminar (attendance)

Conditions: none		
Frequency: each semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Research Module Theoretical Computer Science
Mode of Instruction: internship
Language: German
Contact Hours: 1

Contents:
Collaboration on current research topics of the group.

Literature:
- Scientific papers, manuals.

Assigned Courses:

Oberseminar Theoretische Informatik

Examination
Oral presentation and written paper.
internship

Module INF-0062: Seminar: Selforganization in Distributed Systems *Seminar: Selbstorganisation in Verteilten Systemen*		4 ECTS/LP
Version 1.0.0 (since SoSe14) Person responsible for module: Prof. Dr. Jörg Hähner		

Learning Outcomes / Competences:
After attending the seminar, students are able to independently work out and understand basic problems, concepts, methods, procedures, techniques and technologies in the field of self-organising distributed systems.

They possess the working techniques, communication skills and ability to use appropriate media to present a special topic clearly and comprehensibly in speech and writing and to discuss topics from the named field critically and argumentatively. Furthermore, they can recognise the logical structures of thinking and argumentation and use them in a goal-oriented manner.

Participants can formulate clearly and comprehensibly and present specialist content freely. They understand how to structure a presentation in a clear and reasonable way and how to focus the presentation on essential messages and convey them comprehensibly.

The students understand how to present themselves and how to deal confidently with common presentation media. They manage to gear a talk to a specific target group and to motivate the listener and apply various moderation techniques.

Key qualifications: Literature research; independent work with English-language specialist literature;

Analytical-methodical competence; scientific methodology; principles of good scientific practice;

Ability to describe and document (practical and theoretical) ideas, concepts and results in a comprehensible, confident and convincing manner (written and oral); ability to think logically, abstractly, analytically and conceptually and to argue formally; quality awareness, meticulousness; communication skills; time management.

Workload:
Total: 120 h
30 h seminar (attendance)
90 h preparation of written term papers (self-study)

Conditions: none		
Frequency: each summer semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar: Selbstorganisation in Verteilten Systemen
Mode of Instruction: seminar
Language: German / English
Contact Hours: 2

Contents:
The topics of the seminar are determined each year and adapted to current trends.

Literature:
Literature depending on the current topics: scientific papers or books

Assigned Courses:

Seminar zu Selbstorganisation in verteilten Systemen (seminar)

Examination

Presentation and written paper

seminar

Module INF-0063: Seminar Ad Hoc and Sensor Networks *Seminar Ad Hoc und Sensornetze*		4 ECTS/LP
Version 1.0.0 (since SoSe14) Person responsible for module: Prof. Dr. Jörg Hähner		

Learning Outcomes / Competences:
After attending the seminar, students are able to independently work out and understand basic problems, concepts, methods, procedures, techniques and technologies in the field of ad-hoc and sensor networks.

They possess the working techniques, communication skills and ability to use appropriate media to present a special topic clearly and comprehensibly in speech and writing and to discuss topics from the named field critically and argumentatively. Furthermore, they can recognise the logical structures of thinking and argumentation and use them in a goal-oriented manner.

Participants can formulate clearly and comprehensibly and present specialist content freely. They understand how to structure a presentation in a clear and reasonable way and how to focus the presentation on essential messages and convey them comprehensibly.

The students understand how to present themselves and how to deal confidently with common presentation media. They manage to gear a talk to a specific target group and to motivate the listener and apply various moderation techniques.

Key qualifications: Literature research; independent work with English-language specialist literature;

Analytical-methodical competence; scientific methodology; principles of good scientific practice;

Ability to describe and document (practical and theoretical) ideas, concepts and results in a comprehensible, confident and convincing manner (written and oral); ability to think logically, abstractly, analytically and conceptually and to argue formally; quality awareness, meticulousness; communication skills; time management.

Workload:
Total: 120 h
90 h preparation of written term papers (self-study)
30 h seminar (attendance)

Conditions: none		
Frequency: each winter semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Ad Hoc und Sensornetze
Mode of Instruction: seminar
Language: German / English
Contact Hours: 2

Contents:
The topics of the seminar are determined each year and adapted to current trends.

Literature:
Literature depending on the current topics: scientific papers or books.

Examination

Presentation and written paper.

seminar

Module INF-0064: Research Module Organic Computing *Forschungsmodul Organic Computing*		6 ECTS/LP
Version 1.0.0 (since SoSe14) Person responsible for module: Prof. Dr. Jörg Hähner		
Learning Outcomes / Competences: After participating in the research module, students are able to understand problems of medium complexity in the field of "Organic Computing". They have detailed and up-to-date knowledge in the mentioned field and can actively participate in research projects. To this end, they understand advanced concepts, methods, procedures, techniques and technologies and can contribute this knowledge to research projects. In addition, students have the teamwork and communication skills, the ability to research literature and the learning and working techniques to discuss problems in the field, as well as to critically evaluate, combine and present interim results. **Key qualifications:** Ability to think logically, analytically and conceptually; independent work with specialist literature in English; comprehensible, confident and convincing presentation of ideas, concepts and results; quality awareness; communication skills; ability to work in teams and understand team processes; principles of good scientific practice.		
Workload: Total: 180 h 165 h internship / practical course (self-study) 15 h seminar (attendance)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Research Module Organic Computing

Mode of Instruction: internship
Language: German / English
Contact Hours: 1

Contents:

Collaboration on current research topics.

Literature:

Depending on the topic to be worked on:

- Paper
- Book
- Handbook

Assigned Courses:

Oberseminar Organic Computing

Examination

Presentation and final report.

internship

Module INF-0075: Research Module Databases and Information Systems

Forschungsmodul Datenbanken und Informationssysteme

6 ECTS/LP

Version 1.2.0 (since SoSe14)
Person responsible for module: Prof. Dr. Peter Michael Fischer

Learning Outcomes / Competences:
After participating in the research module, students can understand medium-complexity problems in the field of databases and information systems. They have detailed and up-to-date knowledge in the aforementioned field and can actively participate in research projects. To this end, they understand advanced concepts, methods, procedures, techniques, and technologies out of this field and can apply this knowledge to research projects. In addition, students have skills in teamworking and communication, the ability to study research literature and the methods to discuss problems in the field, as well as to critically evaluate, combine and present intermediate results.
Key Skills: Logical, analytical, and conceptual thinking; Independent work with English-language literature; Intelligible, confident, and persuasive presentation of ideas, concepts, and results; Quality awareness; Communication skills; Working in teams and understanding team processes; Principles of good scientific practice.

Workload:
Total: 180 h
15 h seminar (attendance)
165 h internship / practical course (self-study)

Conditions:
Module Database Systems (INF-0073) - recommended

Frequency: each semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Forschungsmodul Datenbanken und Informationssysteme
Mode of Instruction: internship
Language: German / English
Contact Hours: 1

Contents:
Current research topics in the field of database systems and Big Data

Literature:
- Current research articles with relation to "Big Data"
- Manuals of the relevant products and frameworks

Assigned Courses:

Forschungsmodul Datenbanken und Informationssysteme (internship)

Oberseminar Datenbanken und Informationssysteme

Examination
Software acceptance, presentation, final report
internship

Module INF-0089: Seminar Multimedia Computing & Computer Vision (BA) *Seminar Multimediale Datenverarbeitung*	4 ECTS/LP

Version 1.0.0 (since SoSe14)
Person responsible for module: Prof. Dr. Rainer Lienhart

Learning Outcomes / Competences:
After attending the seminar, the students can independently work out and analyse advanced problems, concepts, methods, procedures, techniques, and technologies from the field of multimedia computing and computer vision (e.g. image and video processing, machine learning, and image and video search) and evaluate them in relation to the individual seminar topic.
Participants possess scientific methodology, communication skills, and the ability to present a special topic clearly and comprehensibly in speech and writing and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively.
Furthermore, they learn to recognise logical structures of thinking and argumentation and use them in a goal-oriented manner. The participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a talk that is clear and easy to follow. Additionally, the students know how to focus on essential messages and convey them in a comprehensible way, even with complex content. They skilfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to confidently deal with common presentation media and use them interactively. They manage to gear a talk to a specific target group, apply various moderation techniques, and keep their audience engaged even over a longer period.
Key qualifications: Presentation techniques; literature research; principles of good scientific practice; evaluating solution approaches, procedures, techniques, and technologies from different points of view.

Workload:
Total: 120 h
30 h seminar (attendance)
90 h preparation of written term papers (self-study)

Conditions: none		
Frequency: each semester	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Multimediale Datenverarbeitung
Mode of Instruction: seminar
Language: German
Frequency: each winter semester
Contact Hours: 2

Contents:
The topics of the seminar from the wide-ranging field of multimedia and machine vision are determined each year and adapted to current trends.

Literature:
Current research literature

Assigned Courses:

Seminar über Multimediale Datenverarbeitung (Bachelor) (seminar)

Examination

Presentation and written paper

seminar

Module INF-0090: Research Module Multimedia Computing & Computer Vision (BA) *Forschungsmodul Multimedia Computing & Computer Vision*		6 ECTS/LP
Version 1.0.0 (since SoSe14) Person responsible for module: Prof. Dr. Rainer Lienhart		
Learning Outcomes / Competences: After participating in the research module, students can understand problems of medium complexity in the field of multimedia (image, video, and audio processing with machine learning). They have detailed and up-to-date knowledge in the aforementioned field and can actively participate in research projects. To this end, they understand advanced concepts, methods, procedures, techniques and technologies and can apply this knowledge in research projects. In addition, students have teamwork and communication skills, the ability to research literature, and techniques to discuss problems in the field, as well as to critically evaluate, combine, and present interim results. **Key qualifications**: Ability to think logically, analytically and conceptually; independent work with specialist literature; comprehensible, confident and convincing presentation of ideas, concepts and results; quality awareness; communication skills; ability to work in teams and understand team processes; principles of good scientific practice.		
Workload: Total: 180 h 15 h seminar (attendance) 165 h internship / practical course (self-study)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Research Module Multimedia Computing & Computer Vision

Mode of Instruction: internship
Language: German
Frequency: as needed
Contact Hours: 1

Contents:

The specific task from the wide-ranging field of multimedia and machine vision (image, video and audio processing, object recognition, search of image, video and audio material) is designed individually for each student every year.

Literature:

scientific papers, manuals

Assigned Courses:

Oberseminar Multimedia Computing

Examination

Presentation and written paper

internship

Module INF-0105: Research Module Teaching Professorship Informatics *Forschungsmodul Lehrprofessur für Informatik*		6 ECTS/LP
Version 1.0.0 (since SoSe14) Person responsible for module: Prof. Dr. Robert Lorenz		
Learning Outcomes / Competences: After participating in the research module, students can understand problems of medium complexity in the fields of *concurrent systems*, *petri nets* or *process mining*. They have detailed and up-to-date knowledge in the aforementioned field and can actively participate in research projects. To this end, they understand advanced concepts, methods, procedures, techniques and technologies and can apply this knowledge in research projects. In addition, students have teamwork and communication skills, the ability to research literature, and techniques to discuss problems in the field, as well as to critically evaluate, combine, and present interim results. **Key qualifications:** Ability to think logically, analytically and conceptually; independent work with specialist literature; comprehensible, confident and convincing presentation of ideas, concepts and results; quality awareness; communication skills; ability to work in teams and understand team processes; principles of good scientific practice.		
Workload: Total: 180 h 165 h internship / practical course (self-study) 15 h seminar (attendance)		
Conditions: Basic knowledge in research topics *concurrent systems*, *petri nets* or *process mining*		
Frequency: each semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Research Module Teaching Professorship Informatics

Mode of Instruction: internship

Language: German / English

Contact Hours: 1

Contents:

Collaboration on current research topics in the field of *concurrent systems*, *petri nets* or *process mining.*

Literature:

- J. Desel, W. Reisig, G. Rozenberg: Lectures on Concurrency and Petri Nets, Springer, Lecture Notes in Computer Science 3098, 2004
- Wil M. P. van der Aalst: Process Mining. Data Sciemce in Action. Springer, 2016.

Assigned Courses:

Oberseminar zu Lehrprofessur für Informatik

Examination

Research Module Teaching Professorship Informatics

practical exam

Module INF-0124: Seminar Robotics *Seminar Robotik*	4 ECTS/LP

Version 1.1.0 (since SoSe14)
Person responsible for module: Prof. Dr. Wolfgang Reif

Learning Outcomes / Competences:
After successful completion of the seminar, the students are able to understand and solve basic problems, concepts, methods, procedures, techniques and technologies in the field of robotics.

They will have the working techniques, communication skills and ability to use appropriate media in order to present a special topic clearly and comprehensibly and to critically and argumentatively discuss topics from the aforementioned field. Furthermore they are able to recognise the logical structures of thinking and arguing and use them in a goal-oriented manner.

Participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a lecture in a clear and comprehensible way and to focus on the convey these in an understandable way.

The students understand how to present themselves and how to deal confidently with current presentation media. They manage to gear a lecture to a specific target group and to motivate the listener.

Soft-skills:

- Literature research
- Independently work with technical literature, including English-language literature.
- Analytical competence
- Working methodical
- Principles of good scientific practice
- Ability to present (in writing and orally) ideas,concepts and results (practical or theoretical) and to document them
- Ability to think logically, abstractly, analytically and conceptually, and to argue precisely
- Awareness for quality aspects
- Communication skills
- Time management

Workload:
Total: 120 h
30 h seminar (attendance)
90 h preparation of written term papers (self-study)

Conditions: none		
Frequency: each summer semester	**Recommended Semester:** from 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Robotik
Mode of Instruction: seminar
Language: German / English
Contact Hours: 2

Contents:
The concrete topics of the seminar deal with the use and programming of robots of all kinds and are determined annually and adapted to current developments.

Literature:

Depends on the concrete topics of the seminar.

Assigned Courses:

Seminar zu Robotik (seminar)

Examination

Seminar Robotik

seminar / length of examination: 45 minutes

work period for assignment: 3 months

Module INF-0125: Seminar Internet Security *Seminar Internetsicherheit*		4 ECTS/LP
Version 2.0.0 (since SoSe17) Person responsible for module: Prof. Dr. Wolfgang Reif		

Learning Outcomes / Competences:
After completion of the seminar, students are able to understand basic problems, concepts, methods, procedures, techniques and technologies in the field of Internet security and independently learn new such concepts.

They have the working techniques, communication skills and ability to use appropriate media to present this field clearly and comprehensibly in speech and writing and to discuss topics from the mentioned field critically. They will also be able to recognize the logical structures of reasoning and argumentation and use them.

The participants are able to formulate clearly and understandably and to present specialist knowledge freely. They understand how to structure a presentation in a clear and comprehensible way and how to focus the presentation on the core messages and convey them in a comprehensible way.

The students understand how to present themselves and how to work with common presentation media. They manage to focus a presentation to a specific target group and to motivate the audience.

Soft Skills:

- Literature research
- Independently work with English technical literature
- Analytical competence
- Working methodical
- Principles of good scientific practice
- Ability to present (written and oral) ideas, concepts and results in a comprehensible and convincing manner and to document them
- Ability to think logically, abstractly, analytically and conceptually and to argue precisely
- Awareness for quality aspects
- Communication skills
- Time management

Workload:
Total: 120 h
30 h seminar (attendance)
90 h preparation of written term papers (self-study)

Conditions: none		
Frequency: irregular (usu. summer semester)	**Recommended Semester:** from 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Internet Security
Mode of Instruction: seminar
Language: German / English
Contact Hours: 2

Contents:
The specific topics of the seminar deal with the security of computer systems on the Internet and they change from year to year to adapt to current developments.

Literature: Depends on the concrete topic.	
Assigned Courses: **Seminar zu Internetsicherheit** (seminar)	

Examination

Seminar Internet Security

seminar / length of examination: 45 minutes

work period for assignment: 3 months

Module INF-0126: Seminar Software- and Systems Engineering (Bachelor) *Seminar Software- und Systems Engineering (Bachelor)*		4 ECTS/LP
Version 1.1.0 (since SoSe14) Person responsible for module: Prof. Dr. Wolfgang Reif		

Learning Outcomes / Competences:

After successful completion of the seminar, students are able to understand basic problems, concepts, methods, procedures, techniques and technologies in the field of software and systems engineering and independently learn new such concepts.

They have the working techniques, communication skills and the ability to use appropriate media to present a specific topic clearly and comprehensibly in speech and writing and to discuss topics from the aforementioned field critically. They will also be able to recognize the logical structures of reasoning and argumentation and use them.

The participants are able to formulate clearly and understandably and to present specialist knowledge freely. They understand how to structure a presentation in a clear and comprehensible way and how to focus the presentation on the core messages and convey them in a comprehensible way.

The students understand how to present themselves and how to deal confidently with common presentation media. They manage to focus a presentation to a specific target group and to motivate the audience.

Soft Skills:

- Literature research
- Independently work with English technical literature
- Analytical competence
- Working methodical
- Principles of good scientific practice
- Ability to present (written and oral) ideas, concepts and results in a comprehensible and convincing manner and to document them
- Ability to think logically, abstractly, analytically and conceptually and to argue precisely
- Awareness for quality aspects
- Communication skills
- Time management

Workload:

Total: 120 h

90 h preparation of written term papers (self-study)

30 h seminar (attendance)

Conditions: none		
Frequency: each winter semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Software- und Systems Engineering (Bachelor)

Mode of Instruction: seminar

Language: German / English

Contact Hours: 2

Contents: The topics of the seminar deal wtih current trends in Software and Systems Engineering on the level of undergraduate students. The topics change from year to year and are regulary adapted to reflect new developments.	
Literature: Depends on the concrete topic.	

Examination

Seminar Software- und Systems Engineering (Bachelor)

seminar / length of examination: 45 minutes

work period for assignment: 3 months

Module INF-0127: Research Module Software- and Systems Engineering *Forschungsmodul Software- und Systems Engineering*		6 ECTS/LP
Version 1.1.0 (since SoSe14) Person responsible for module: Prof. Dr. Wolfgang Reif		

Learning Outcomes / Competences:
After participating in the research module, students are able to understand problems of medium complexity from the field of software and systems engineering. They have detailed and up-to-date knowledge in the aforementioned field and can actively participate in research projects. They understand advanced concepts, methods, procedures, techniques and technologies and can apply this knowledge in research projects. In addition, students have teamwork and communication skills, the ability to do literature research and the learning and working techniques to discuss problems in the field, as well as to critically evaluate, combine and present intermediate results.

Soft Skills:

- Skill in logical, analytical and conceptual thinking.
- Ability to work independently with technical literature, including English literature
- Clear, confident and convincing presentation of ideas, concepts and results
- Awareness for quality aspects
- Communication skills
- Ability to work in teams and understand team processes
- Principles of good scientific practice

Workload:
Total: 180 h
165 h internship / practical course (self-study)
15 h seminar (attendance)

Conditions: none		
Frequency: each semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Research Module Software- and Systems Engineering
Mode of Instruction: internship
Language: German / English
Contact Hours: 1

Contents:
Contribution to current research projects of the chair for Software Engineering

Literature:
Depends on the project: Scientific papers, system documentation, books, ...

Assigned Courses:

Oberseminar Software- und Systems Engineering

Examination
Research Module Software- and Systems Engineering Project Presentation
practical exam / work period for assignment: 6 weeks

Module INF-0173: Research Module Human-Centered Multimedia *Forschungsmodul Human-Centered Multimedia*		6 ECTS/LP
Version 1.0.0 (since SoSe13) Person responsible for module: Prof. Dr. Elisabeth André		
Learning Outcomes / Competences: After participating in the research module, students are able to understand problems of medium complexity in the field of "Human-Centered Multimedia". They have detailed and up-to-date knowledge in the aforementioned field and can actively participate in research projects. To this end, they understand advanced concepts, methods, procedures, techniques and technologies and can apply this knowledge in research projects. In addition, students have the teamwork and communication skills, the ability to research literature and the learning and working techniques to discuss problems in the field, as well as to critically evaluate, combine and present intermediate results. **Key qualifications:** Skill in logical, analytical, and conceptual thinking; Independent work with English-language literature; Understandable, confident, and persuasive presentation of ideas, concepts, and results; Quality awareness; Communication skills; Skill in working in teams and understanding team processes; Principles of good scientific practice;		
Workload: Total: 180 h 165 h internship / practical course (self-study) 15 h seminar (attendance)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Research Module Human-Centered Multimedia **Mode of Instruction:** internship **Language:** German **Contact Hours:** 1
Contents: Collaborate on current research topics in the area of Human-Centered Multimedia.
Literature: Literature references will be given at the beginning of the module depending on the topic.
Assigned Courses: **Oberseminar Human-Centered Multimedia**

Examination
Research Module Human-Centered Multimedia practical exam

Module INF-0188: Seminar Algorithms and Data Structures for Bachelors *Seminar Algorithmen und Datenstrukturen für Bachelor*	4 ECTS/LP

Version 1.0.0 (since WS15/16)
Person responsible for module: Prof. Dr. Torben Hagerup

Learning Outcomes / Competences:
Upon completion of the seminar, the students will be able to independently acquire algorithm-related contents from less demanding original scientific texts and to present them clearly and understandably, in spoken and written form. They will understand how to condense a text to its essentials and to structure a presentation within a given time frame.
Key Qualifications:
Capability of logical, analytical, and conceptual comprehension and of participating in concise debates on technical topics; literature research; self-contained work with English technical literature; quality awareness; meticulousness; communication skills; time management.

Workload:
Total: 120 h
30 h seminar (attendance)
90 h preparation of written term papers (self-study)

Conditions:
Familiarity with basic algorithms and data structures (as imparted, e.g., by the course "Informatik III") will be highly useful.

Frequency: irregular	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Algorithms and Data Structures
Mode of Instruction: seminar
Language: German
Contact Hours: 2

Contents:
Current and classical topics from the field of Algorithms and Data Structures are studied, using original literature.

Literature:
Selected scientific articles.

Examination
Written paper and oral presentation.
seminar

Module INF-0226: Seminar Database Systems Bachelor *Seminar Datenbanksysteme für Bachelor*		4 ECTS/LP
Version 1.0.0 (since SoSe16) Person responsible for module: Prof. Dr. Peter Michael Fischer		

Learning Outcomes / Competences:
After attending the seminar, students are able to independently work out and understand basic problems, concepts, methods, procedures, techniques and technologies in the field of database systems.
They have the working techniques, communication skills and ability to use appropriate media to present a special topic clearly and comprehensibly, both verbally and in writing, and to discuss topics from the aforementioned field critically and argumentatively. They will also be able to recognize and use logical structures of reasoning and argumentation in a goal-oriented manner.
The participants are able to formulate clearly and understandably and to present specialist content freely. They understand how to structure a lecture in a clear and comprehensible way and how to focus the lecture on essential messages and convey them in a comprehensible way.
The students understand how to present themselves and how to deal confidently with common presentation media. They manage to gear a lecture to a specific target group and to motivate the listener and to apply various moderation techniques.
Key qualifications: Literature research; Independent work with English-language specialist literature; Analytical-methodical competence; Scientific methodology; Principles of good scientific practice; Skill in the comprehensible, confident and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts and results and for their documentation; Skill in logical, abstract, analytical and conceptual thinking and formal argumentation; Quality awareness, meticulousness; Communication skills; Time management.

Workload:
Total: 120 h
90 h preparation of written term papers (self-study)
30 h seminar (attendance)

Conditions: Module Database Systems (INF-0073) - recommended		
Frequency: each semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Datenbanksysteme für Bachelor
Mode of Instruction: seminar
Language: German / English
Frequency: irregular (usu. summer semester)
Contact Hours: 2

Contents:
Current research contributions from the field of "Databases and Information Systems".

Literature:
Current research contributions

Assigned Courses:

Seminar Datenbanksysteme für Bachelor (seminar)

Examination

Presentation and written elaboration

seminar

Module INF-0231: Seminar Medical Information Sciences (BA) *Seminar Medical Information Sciences (BA)*		4 ECTS/LP
Version 1.0.0 (since WS16/17) Person responsible for module: Prof. Dr. Bernhard Bauer		
Learning Outcomes / Competences: After attending the seminar, students are able to work out and understand fundamental problems, concepts, methods, procedures, techniques, and technologies in the field of Medical Information Sciences independently. They have the working techniques, communication skills, and the ability to use appropriate media to present a particular topic clearly and comprehensibly in speech and writing and discuss issues from the mentioned field critically and argumentatively. Furthermore, they can recognize the logical structures of thinking and argumentation and use them goal-oriented. The participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a lecture clearly and understandably, focus the study on important messages, and convey them in a comprehensible way. The students understand how to present themselves and deal confidently with joint presentation media. They manage to gear a lecture to a specific target group, motivate the listener, and apply various moderation techniques. Key qualifications: Literature research; independent work with English-language specialist literature; analytical-methodical competence; scientific methodology; principles of good scientific practice; skills in the understandable, confident, and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts, and results and in documenting them; skills in logical, abstract, analytical and conceptual thinking and formal argumentation; quality awareness, meticulousness; communication skills; time management.		
Workload: Total: 120 h 90 h preparation of written term papers (self-study) 30 h seminar (attendance)		
Conditions: none		
Frequency: irregular	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Medical Information Sciences (Seminar) **Mode of Instruction:** seminar **Language:** German **Contact Hours:** 2
Contents: This seminar will cover the basics of Medical Information Sciences. Various topics are to be worked on which are to serve as a basis for a subsequent practical course.
Literature: Will be presented in the respective kick-off event.
Assigned Courses: **Seminar Medical Information Sciences (Bachelor)** (seminar)

Examination

Presentation and written paper

seminar

Module INF-0261: Practical Module on Manufacturing Technology *Praktikum Produktionstechnik*		5 ECTS/LP
Version 1.1.0 (since WS17/18) Person responsible for module: Prof. Dr.-Ing. Johannes Schilp		
Learning Outcomes / Competences: Students will be able to apply basic knowledge of production engineering and technical order processing in practice. They transfer theoretical methods and models from the lecture Production Engineering to practice-oriented tasks. They are able to successfully solve and present project tasks in small groups. Key qualifications: Teamwork and communication skills, structured and conscientious work, application-oriented problem solving, evaluation of results and weighing of solution approaches, ability to think logically, analytically and conceptually.		
Remarks: It is not possible to take INF-0261 if the module INF-0242 has already been taken!		
Workload: Total: 150 h 90 h studying of course content through exercises / case studies (self-study) 60 h internship / practical course (attendance)		
Conditions: Recommendation: First experience with Catia V5 (preliminary course). It is recommended that you have previously taken one of the following modules: INF-0196: Production Informatics INF-0197: Process modeling and production control INF-0260: Production Engineering		
Frequency: each summer semester	**Recommended Semester:** from 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Practical Module on Manufacturing Technology

Mode of Instruction: internship

Language: German

Contact Hours: 4

Contents:

In the internship, project tasks/experiments/learning games are offered on each of the following main topics:

- Production organization
- Automation technology
- Production planning and control
- Quality management
- Logistics

Assigned Courses:

Praktikum für Produktionstechnik (internship)

Examination

Praktikum Produktionstechnik

practical exam / length of examination: 45 minutes

Module INF-0267: Practical Module Deep Learning *Praktikum Deep Learning*		5 ECTS/LP
Version 1.1.0 (since WS17/18) Person responsible for module: Prof. Dr. Björn Schuller		
Learning Outcomes / Competences: The students get to know systems for pattern recognition by means of deep learning and acquire basic knowledge of neural machine learning methods. After participating in the practical course, the students understand the functionality and concepts of neural networks, in particular their mathematical foundations, and the concepts of software tools for their implementation, such as Tensorflow. The participants can evaluate intelligent neural systems in relation to the algorithmic solution and transfer their knowledge and solution approaches to other problems. They are also familiar with methods for quantitatively evaluating the performance of a corresponding system. In addition, fundamental problems of pattern recognition and deep learning can be analyzed and behaviors of deep neural networks can be interpreted. The students can specify different types of information processing and analysis and implement them algorithmically within the framework of practical programming tasks. You can also critically identify and evaluate misconduct and find solutions to reduce it. **Key qualifications:** Implementation of solution concepts using machine learning in software; Ability to analyze and structure IT problems and to develop and implement solution strategies; Knowledge of the advantages/disadvantages of design alternatives, evaluation in the respective application context; skill of teamwork; Ability to understand, document and present results; quality awareness.		
Workload: Total: 150 h 90 h studying of course content through exercises / case studies (self-study) 60 h internship / practical course (attendance)		
Conditions: none		
Frequency: usu. at least once per acad. year	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Praktikum Deep Learning **Mode of Instruction:** internship **Language:** English **Frequency:** each semester **Contact Hours:** 4
Contents: On the basis of practical tasks, primarily neural models for information processing are considered. Examples include intelligent processing of audio and video signals. Common current network topologies such as convolutional networks, recurrent networks with memory or generative adversial networks are presented. In the field of deep learning, complex neural networks are treated, whose behavior cannot be easily predicted and which are subject to constant change.
Literature: Will be announced by the lecturer.
Assigned Courses:

Praktikum Deep Learning (internship)

Examination

Praktikum Deep Learning

internship

Module INF-0268: Practical Module Computational Intelligence *Praktikum Computational Intelligence*		5 ECTS/LP
Version 1.5.0 (since WS17/18) Person responsible for module: Prof. Dr. Björn Schuller		
Learning Outcomes / Competences: The students get to know and be able to use the basic concepts and algorithms of machine learning transfer these to practical problems after participating in the internship. The students understand the functionality and concepts of data-based modelling, including its mathematical foundations, and can apply the knowledge gained using various software tools and libraries. The participants can evaluate intelligent systems with regard to their algorithmic solution and transfer their knowledge and solution approaches to other problems. They are also familiar with methods for quantitatively evaluating the performance of a corresponding system. In addition, fundamental problems of pattern recognition can be analyzed and the behavior of machine learning methods, such as decision trees, support vector machines, or neural networks, can be interpreted. The students can specify different types of information processing and analysis and implement them algorithmically within the framework of practical programming tasks. You can also critically identify and evaluate misconduct and find solutions to reduce it. Key qualifications: Implementation of solution concepts using machine learning in software; Ability to analyze and structure IT problems and to develop and implement solution strategies; Knowledge of the advantages/disadvantages of design alternatives, evaluation in the respective application context; skill of teamwork; Ability to understand, document and present results; quality awareness.		
Workload: Total: 150 h 60 h internship / practical course (attendance) 90 h studying of course content through exercises / case studies (self-study)		
Conditions: none		
Frequency: irregular (usu. winter semester)	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Praktikum Computational Intelligence
Mode of Instruction: internship
Language: English
Frequency: irregular
Contact Hours: 4

Contents:

Introduction to intelligent systems. Symbolic and signal-based features. basis of machine intelligence: linear decision functions, distance classifiers, nearest neighbor rule, Kernel machines, Bayesian classifier, rule-based methods, decision trees, ensemble learning, neural networks, dynamic classification. Classification and Regression. learning method. feature reduction and feature selection. Methods of cluster analysis, semi-supervised learning. evaluation.

Literature:

- I.H. Witten, F. Eibe, M.A. Hall: Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann, 2011.
- B. Schuller: Intelligent Audio Analysis, Springer, 2013.
- K. Kroschel, G. Rigoll, B. Schuller: Statistische Informationstechnik, 5. Neuauflage, Springer, 2011.

Examination

Praktikum Computational Intelligence (Klausur)

written exam / length of examination: 90 minutes

Module INF-0269: Seminar Embedded Intelligence for Health Care and Wellbeing (Bachelor) *Seminar Embedded Intelligence for Health Care and Wellbeing (Bachelor)*	4 ECTS/LP

Version 1.0.0 (since WS17/18)
Person responsible for module: Prof. Dr. Björn Schuller

Learning Outcomes / Competences:
After attending the seminar, the students are able to independently develop and understand basic problems, concepts, methods, procedures, techniques and technologies in the field of e-health and m-health. You have the working techniques, communication skills and ability to use the appropriate media to present a specific topic in spoken and written form in a clear and understandable way and to discuss topics from the area mentioned critically and argumentatively. You can also recognize the logical structures of thinking and arguing and use them effectively.

The participants can formulate clearly and understandably and present specialist content freely. You know how to structure a presentation clearly and to focus the presentation on essential messages and to convey them in an understandable way.

The students know how to be present and how to handle common presentation media confidently. You manage to align a lecture to a specific target group and to motivate the listener and to use various moderation techniques.

Key qualifications: Principles of good scientific practice; Analytical-methodical competence; time management; literature research; Independent work with English-language specialist literature; communication skills; Ability to present practical and theoretical ideas in an understandable, secure and convincing (oral and written) way, writing papers in the LaTeX typesetting language; quality awareness.

Workload:
Total: 120 h
90 h preparation of written term papers (self-study)
30 h seminar (attendance)

Conditions:
none

Frequency: irregular	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Embedded Intelligence for Health Care and Wellbeing (Bachelor)
Mode of Instruction: seminar
Language: German
Contact Hours: 2

Contents:

The seminar deals with current relevant topics in the context of embedded intelligence in the health sector. These include u.a. Sensor technologies for knowledge-based monitoring of health-related activities, vital signs and context factors, multi-sensory acquisition, analysis and interpretation of biological parameters (e.g. metabolic, cardiological and neurological signals), but also user modeling and user interfaces for health and fitness applications.

The students work on the given topic based on scientific literature and give a presentation and prepare a written summary.

Literature:

Will be announced by the lecturer

Examination

Vortrag und schriftliche Ausarbeitung

seminar

Module INF-0271: Research Module Embedded Intelligence for Health Care and Wellbeing *Forschungsmodul Embedded Intelligence for Health Care and Wellbeing*	6 ECTS/LP

Version 1.1.0 (since WS17/18)
Person responsible for module: Prof. Dr. Björn Schuller

Learning Outcomes / Competences:
After participating in the research module, students are able to understand problems of medium complexity in the field of intelligent embedded systems, in particular signal analysis for e-health and m-health applications. They have detailed and up-to-date knowledge in the area mentioned and can actively participate in research projects. In addition, they understand advanced concepts, methods, procedures, techniques and technologies and can contribute this knowledge to research projects. In addition, the students have the team and communication skills, the ability to research scientific literature and the learning and working techniques to discuss problems in the field, as well as to critically evaluate, combine and present interim results.

Key Qualifications: Ability to think logically, analytically and conceptually; Independent work with English-language specialist literature; Understandable, safe and convincing presentation of ideas, concepts and results; quality awareness; communication skills; Team collaboration skills and understanding of team processes; principles of good scientific practice; project management skills; Scientific Method.

Workload:
Total: 180 h
165 h internship / practical course (self-study)
15 h seminar (attendance)

Conditions: none		
Frequency: each semester	**Recommended Semester:** 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Research Module Embedded Intelligence for Health Care and Wellbeing
Mode of Instruction: internship
Language: German / English
Contact Hours: 1

Contents:
Participation in current research topics.

Literature:
Scientific publications; manuals; is provided by the chair.

Assigned Courses:

Oberseminar Embedded Intelligence for Health Care and Wellbeing

Examination
Presentation and written paper
internship

<table>
<tr><td colspan="2">Module INF-0276: Practical Module Automotive Software Engineering (BA)
Praktikum Automotive Software Engineering (BA)</td><td>6 ECTS/LP</td></tr>
<tr><td colspan="3">Version 1.0.0 (since SoSe18)
Person responsible for module: Prof. Dr. Bernhard Bauer</td></tr>
<tr><td colspan="3">Learning Outcomes / Competences:
After participating in the practical course Automotive Software Engineering, the students understand practical problems of higher complexity in the field of development and validation of driving assistance systems with current methods and tools of model-based development of embedded systems. The students acquire in-depth subject-specific and interdisciplinary knowledge and skills, such as control engineering, driving physics, and mathematics. They are able to develop concepts, methods, procedures, techniques, and technologies of the named area in research projects and are able to apply strategies in solving problems. In addition, students have teamwork and communication skills the ability to research literature to discuss problems in the field, define intermediate goals, and critically evaluate, classify, combine, present, and document intermediate results and innovative ideas in an understandable way.

Key qualifications: Ability to think logically, analytically, and conceptually; Independent work with English-language technical literature; Understandable, confident, and convincing presentation of ideas, concepts, and results; Quality awareness; Communication skills; Ability to work in teams and understand team processes; Project management skills.</td></tr>
<tr><td colspan="3">Workload:
Total: 180 h
90 h studying of course content through exercises / case studies (self-study)
90 h internship / practical course (attendance)</td></tr>
<tr><td colspan="2">Conditions:
Empfohlen wird die Teilnahme am links aufgeführten Seminar.

Module Seminar Basics of Software Engineering for Automotive Systems (BA) (INF-0027) - recommended</td><td></td></tr>
<tr><td>Frequency: irregular (usu. winter semester)</td><td>Recommended Semester:
from 5.</td><td>Minimal Duration of the Module:
1 semester[s]</td></tr>
<tr><td>Contact Hours:
6</td><td>Repeat Exams Permitted:
according to the examination regulations of the study program</td><td></td></tr>
</table>

<table>
<tr><td>Parts of the Module</td></tr>
<tr><td>Part of the Module: Practical Module Automotive Software Engineering (BA)
Mode of Instruction: internship
Language: German
Frequency: each winter semester
Contact Hours: 6</td></tr>
<tr><td>Contents:
In the automotive practical course, participants learn how various selected functions within vehicles can be simulated and analyzed. The necessary theoretical foundations are laid for working on the experimental task in a two-day introductory course. The anti-lock braking system (ABS) model is treated on control units during the initial period. Among other things, the participants will get to know the modeling tool combination "Matlab/Simulink", which is frequently used in the automotive environment, and the graphical simulation and analysis tool "CarMaker" and gain a practical insight into the functioning of FlexRay bus systems.
After the introductory course, the model of an ACC (Adaptive Cruise Control) system will be created, simulated, and verified in groups of two to three participants.</td></tr>
</table>

Literature:

depending on the subject

Examination

Practical Module Automotive Software Engineering (BA)

oral exam / length of examination: 30 minutes

Module INF-0313: Seminar IT Infrastructure in Medical Information Systems for Bachelor Students *Seminar IT-Infrastrukturen in der Medizin für Bachelor*		4 ECTS/LP
Version 1.0.0 (since SoSe19) Person responsible for module: Prof. Dr. Frank Kramer		
Learning Outcomes / Competences: After attending the seminar, students are able to independently work out and understand basic problems, concepts, methods, procedures, techniques and technologies in the field of IT infrastructures for translational medical research. They have the working techniques, communication skills and ability to use appropriate media to present a specific topic clearly and comprehensibly, both verbally and in writing, and to discuss topics from the aforementioned field critically and argumentatively. They will also be able to recognize and use logical structures of reasoning and argumentation in a goal-oriented manner. The participants are able to formulate clearly and understandably and to present specialist content freely. They understand how to structure a lecture in a clear and comprehensible way and how to focus the lecture on essential messages and convey them in a comprehensible way. The students understand how to present themselves and how to deal confidently with common presentation media. They manage to gear a lecture to a specific target group and to motivate the listener and to apply various moderation techniques. **Key qualifications:** Literature research; Independent work with English-language specialist literature; Analytical-methodical competence; Scientific methodology; Principles of good scientific practice; Skill in the comprehensible, confident and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts and results and in documenting them; Skill in logical, abstract, analytical and conceptual thinking and formal argumentation; Quality awareness, meticulousness; Communication skills; Time management.		
Workload: Total: 120 h 30 h seminar (attendance) 90 h preparation of written term papers (self-study)		
Conditions: none		**Credit Requirements:** Passing the module examination
Frequency: each semester	**Recommended Semester:** from 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Seminar IT Infrastructure in Medical Information Systems for Bachelor Students **Mode of Instruction:** seminar **Language:** German / English **Contact Hours:** 2
Contents: Current topics of IT infrastructures in medicine
Literature: will be presented in the respective kickoff event.
Assigned Courses: **Seminar IT-Infrastrukturen in der Medizin für Bachelor** (seminar)

Examination

Seminar IT Infrastructure in Medical Information Systems for Bachelor Students

written/oral exam

Module INF-0321: Practical Module Speech Pathology *Praktikum Speech Pathology*		5 ECTS/LP
Version 1.0.0 (since WS19/20) Person responsible for module: Prof. Dr. Björn Schuller		

Learning Outcomes / Competences:
Knowledge: The students learn concepts relating to signal processing, speech production, phonetics, speech and language pathology, feature extraction, denoising, information reduction and natural language processing as exemplified through the analysis of automated voice pathology detection. They further gain insight into machine learning principles, with a particular focus on deep learning solutions, as is needed to diagnose a range of different voice pathologies. They will learn about different problems and solutions in the analysis of a variety of speech, relevant in the context of health care and wellbeing.
Skills: Participants are trained in their logical, analytical and conceptional skills as well as in practical programming skills to transfer their knowledge to a practical task. The students will be able to choose appropriate algorithms of signal processing and machine intelligence, further develop these, design new solutions, and apply these to the task of voice pathology detection. All knowledged obtained during the Praktikum is applied in practice-oriented tasks. Students will be able to assess developed systems in a scientific way. They will be able to recognise important technical evolution and novelties in the fields of speech analysis and medical machine learning.
Competences: The students are able to characterise, judge on the quality and suitability, and design suited algorithmic solutions for intelligent signal analysis with a focus on voice pathology detection. They are further able to present and document results in a reasonable and meaningful way. Students will work in teams and organise their work and task distribution in an autonomous way.
Key skills: Formal methods; Knowledge of advantages and disadvantages of different design alternatives; Systematical advancement of design tools; Ability to work in teams; Understanding of team management; Knowledge of workflows and processes; Ability to find solutions for practical problems; Ability to work autonomously; Quality awareness; Scientific working.

Workload:
Total: 150 h
60 h internship / practical course (attendance)
90 h studying of course content through exercises / case studies (self-study)

Conditions: none		**Credit Requirements:** Passing the module exam
Frequency: irregular	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Praktikum Speech Pathology
Mode of Instruction: internship
Language: English
Contact Hours: 4

Contents:

The course "Speech Pathology Praktikum" will give an introduction to models of speech production (e.g., source-filter models) with a focus on aspects that are relevant to pathologies and their recognition using automated methods of signal processing and machine learning. Moreover, students learn about robust feature extraction, modern methods of machine learning and machine intelligence, and implementation of such systems on devices

Topics: Speech production; Phonetics; Speech and language pathology; Signal processing; Natural language processing; Speech analysis; Feature extraction; Machine learning; Deep learning; Denoising; Information reduction; Healthcare.

Literature:

- Björn Schuller, Anton Batliner: "Computational Paralinguistics: Emotion, Affect and Personality in Speech and Language Processing", Wiley, ISBN: 978-1119971368, 2013.
- Further literature is going to be announced during the lecture.

Examination

Praktikum Speech Pathology

practical exam

Module INF-0327: Research Module IT Infrastructure in Medical Information Systems *Forschungsmodul IT-Infrastrukturen in der Medizin*		6 ECTS/LP
Version 1.0.0 (since WS19/20) Person responsible for module: Prof. Dr. Frank Kramer		
Learning Outcomes / Competences: After participating in the research module, students are able to understand problems of medium complexity in the field of IT infrastructures in translational medical research. They have detailed and up-to-date knowledge in the aforementioned field and can actively participate in research projects. To this end, they understand advanced concepts, methods, procedures, techniques and technologies and can apply this knowledge in research projects. In addition, students have the teamwork and communication skills, the ability to research literature and the learning and working techniques to discuss problems in the field, as well as to critically evaluate, combine and present intermediate results. Key Skills: Skill in logical, analytical, and conceptual thinking; Independent work with English-language literature; Understandable, confident, and persuasive presentation of ideas, concepts, and results; Quality awareness; Communication skills; Skill in working in teams and understanding team processes; Principles of good scientific practice.		
Workload: Total: 180 h		
Conditions: none		**Credit Requirements:** Passing the module examination
Frequency: each semester	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Research Module IT Infrastructure in Medical Information Systems

Mode of Instruction: internship

Language: German / English

Contact Hours: 1

Contents:

Current research topics in the field of IT infrastructures in translational medical research.

Literature:

scientific essays, manuals

Assigned Courses:

Oberseminar IT-Infrastrukturen für die Translationale Medizinische Forschung

Examination

Research Module IT Infrastructure in Medical Information Systems

practical exam

Module INF-0330: Seminar Computational Intelligence (Bachelor) *Seminar Computational Intelligence (Bachelor)*	4 ECTS/LP

Version 1.0.0 (since SoSe20)
Person responsible for module: Prof. Dr. Björn Schuller

Learning Outcomes / Competences:
After attending the seminar, students will be able to autonomously acquire and understand advanced problem statements, concepts, methods, approaches, techniques, and technologies in the field of Computational Intelligence. They possess the scientific techniques, communication skills, and the ability to employ suitable media, to present understandingly a special topic in spoken and written, and to discuss and evaluate scientifically challenging themes from the field in a critical way. Furthermore, they can recognise logical structures of thinking and debating and employ them constructively.
Participants can express themselves in a clear and understandable way and present scientific topics. They understand how to structure a talk, to focus it - also given a complex content - on the essential messages, and to communicate them in a suitable way. The lines of arguments and strategies in case of disturbances are applied by the students. Students know how to perform energetically, to cope with the presentation media and to use them interactively. They manage to orient a talk toward a certain audience, to motivate the listeners also over a longer duration, and to employ different methods of moderation.

Key qualifications: Fundamentals of good scientific practice; Analytical-methodological competency; Time management; Literature research; Self-contained work with English technical literature; Communication skills; Ability to present (in written and spoken) practical and theoretical ideas in an understandable, confident, and convincing way; Writing a report in the markup language LaTeX; Evaluation of methods, technologies, and solutions w.r.t. different aspects; Quality awareness.

Workload:
Total: 120 h
30 h seminar (attendance)
90 h preparation of written term papers (self-study)

Conditions: none		
Frequency: each semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Computational Intelligence (Bachelor)
Mode of Instruction: seminar
Language: German / English
Contact Hours: 2

Contents:
Fuzzy Logic, Neural Networks, Evolutionary Computation, Learning Theory, Probabilistic Methods

Literature:
To be announced by the lecturers.

Assigned Courses:

Seminar Computational Intelligence (Bachelor & Master) (seminar)

Examination

Seminar Computational Intelligence (Bachelor)

written/oral exam

Module INF-0332: Artificial Intelligence *Artificial Intelligence*		5 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Björn Schuller		
Learning Outcomes / Competences: The course Artificial Intelligence covers the broad research area of artificial intelligence including the core topics Learning, Knowledge representation, Perception, Natural Language Processing, Socio-Emotional Intelligence, Artificial Creativity, Reasoning, Problem Solving, Planning, and General intelligence. Upon completing the course, students will have the skills and knowledge to be able to choose suitable approaches and for specific tasks in artificial intelligence and know the pros and cons of design alternatives, as assessed in the respective application context. They will be able to apply and implement the discussed technical concepts in programs and systems. During the course, the participants will improve their skills in logical, analytical, and conceptual thinking. Students will gain the ability to make scientifically meaningful assessments in the field of artificial intelligence using appropriate methods. They will get used to the way of thinking and the language of relevant disciplines. Moreover, students will gain the ability to, convincingly, present their developed ideas and concepts. They will be able to apply their new knowledge to practical tasks and solve many real-life problems through the appropriate application of machine learning. They will also develop the competence to identify significant technical developments in the field. **Key qualifications:** analytical skills, data science cross-disciplinary knowledge, procedures and processes in creating practical systems, ability to present and document results in a comprehensible way, skill to solve problems under practical conditions, self-reflection, quality awareness, meticulousness, teamwork		
Workload: Total: 150 h 15 h studying of course content using literarture (self-study) 15 h studying of course content using provided materials (self-study) 30 h lecture (attendance) 60 h studying of course content through exercises / case studies (self-study) 30 h exercise course (attendance)		
Conditions: Knowledge of basic mathematic lectures should be present.		
Frequency: irregular (usu. summer semester)	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Artificial Intelligence (Vorlesung) **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 2
Contents: Learning, Knowledge representation, Perception, Natural Language Processing, Socio-Emotional Intelligence, Artificial Creativity, Reasoning, Problem Solving, Planning, and General intelligence.
Literature: Literature will be anounced during the lecture.

Part of the Module: Artificial Intelligence (Übung)
Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Examination
Artificial Intelligence
written exam / length of examination: 90 minutes

Module INF-0334: Practical Module Human-Centered Artificial Intelligence for Health Care Applications *Praktikum Human-Centered Artificial Intelligence for Health Care Applications*		8 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Elisabeth André		
Learning Outcomes / Competences: After successful participation in this module, students are familiar with basic concepts of artificial intelligence for the development of health-related applications. They are able to translate technical solution concepts into models and master the selection and safe application of suitable methods. In addition, they will gain an insight into current work in the research field. Furthermore, competencies in the areas of teamwork and communication skills as well as self-organization are taught through the processing of project tasks and their independent project planning. In the context of these project tasks, knowledge of the mindset and language of the research field is fostered through the discussion and presentation of project results. **Key qualifications:** Conversion of technical solution concepts into programs and models; subject-specific consolidation; interdisciplinary knowledge; ability to make scientifically meaningful evaluations using suitable methods; knowledge of the mindset and language of application-relevant disciplines; ability to work in teams; knowledge of practice-relevant tasks; familiarity with procedures and processes in the application environment of computer science; ability to present and document results in a comprehensible manner; ability to expand existing knowledge independently; competence in recognizing significant technical developments.		
Workload: Total: 240 h 150 h studying of course content through exercises / case studies (self-study) 90 h internship / practical course (attendance)		
Conditions: Programming experience		
Frequency: each summer semester	**Recommended Semester:** from 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Practical Module Human-Centered Artificial Intelligence for Health Care Applications
Mode of Instruction: internship
Language: German
Contact Hours: 6

Assigned Courses:

Praktikum Human-Centered Artificial Intelligence for Health Care Applications (internship)

Examination
Practical Module Human-Centered Artificial Intelligence for Health Care Applications
practical exam

Module INF-0336: Seminar Embedded Systems (Bachelor) *Seminar Embedded Systems (Bachelor)*		4 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Sebastian Altmeyer		
Learning Outcomes / Competences: After attending the seminar, students are able to independently work out and understand basic problems, concepts, methods, procedures, techniques and technologies in the field of embedded systems. They have the working techniques, communication skills and ability to use appropriate media to present a special topic clearly and comprehensibly, both verbally and in writing, and to discuss topics from the aforementioned field critically and argumentatively. They will also be able to recognize and use logical structures of reasoning and argumentation in a goal-oriented manner. The participants can formulate clearly and comprehensibly and present specialist content freely. They understand how to structure a scientific presentation in a clear and comprehensible way and how to focus the presentation on essential messages and convey them in a comprehensible way. The students understand how to present themselves and how to deal confidently with common presentation media. They manage to gear a presentation to a specific target group and to motivate the listener and to apply various moderation techniques. **Key qualifications:** Literature research; Independent work with English-language specialist literature; Analytical-methodical competence; Scientific methodology; Principles of good scientific practice; Skill in the comprehensible, confident and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts and results and for their documentation; Skill in logical, abstract, analytical and conceptual thinking and formal argumentation; Quality awareness, meticulousness; Communication skills; Time management.		
Workload: Total: 120 h 90 h preparation of written term papers (self-study) 30 h seminar (attendance)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Seminar Embedded Systems (Bachelor) **Mode of Instruction:** seminar **Language:** German / English **Contact Hours:** 2
Contents: In the seminar, topics from the field of embedded systems will be covered. Each seminar participant receives individual literature references, which are then to be supplemented in the course of the seminar by further independently compiled references. The seminar will end with a written paper and a presentation on the topic covered.
Literature: given individually and self research
Assigned Courses: **Seminar Embedded Systems (Bachelor)** (seminar)

Examination

Seminar Embedded Systems (Bachelor)

written/oral exam

Module INF-0338: Research Module Embedded Systems *Forschungsmodul Embedded Systems*		6 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Sebastian Altmeyer		
Learning Outcomes / Competences: After participating in the research module, students are able to understand problems of medium complexity in the field of embedded systems. They have detailed and up-to-date knowledge in the aforementioned field and can actively participate in research projects. To this end, they understand advanced concepts, methods, procedures, techniques and technologies and can apply this knowledge in research projects. In addition, students have the teamwork and communication skills, the ability to research literature and the learning and working techniques to discuss problems in the field, as well as to critically evaluate, combine and present intermediate results. **Key qualifications:** Skill in logical, analytical, and conceptual thinking; Independent work with English-language literature; Intelligible, confident, and persuasive presentation of ideas, concepts, and results; Quality awareness; Communication skills; Skill in working in teams and understanding team processes; Principles of good scientific practice.		
Workload: Total: 180 h 15 h seminar (attendance) 165 h internship / practical course (self-study)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Forschungsmodul Embedded Systems **Mode of Instruction:** internship **Language:** German / English **Contact Hours:** 1
Contents: Participation in current research topics.
Literature: scientific papers, handbooks
Assigned Courses: **Oberseminar Embedded Systems**

Examination
Forschungsmodul Embedded Systems practical exam

Module INF-0341: Seminar Digital Health (Bachelor) *Seminar Digital Health (Bachelor)*		4 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Björn Schuller		
Learning Outcomes / Competences: After attending the seminar, students will be able to autonomously acquire and understand advanced problem statements, concepts, methods, approaches, techniques, and technologies in the field of Digital Health, E-Health and M-Health. They possess the scientific techniques, communication skills, and the ability to employ suitable media, to present understandingly a special topic in spoken and written, and to discuss and evaluate scientifically challenging themes from the field in a critical way. Furthermore, they can recognise logical structures of thinking and debating and employ them constructively. Participants can express themselves in a clear and understandable way and present scientific topics. They understand how to structure a talk, to focus it - also given a complex content - on the essential messages, and to communicate them in a suitable way. The lines of arguments and strategies in case of disturbances are applied by the students. Students know how to perform energetically, to cope with the presentation media and to use them interactively. They manage to orient a talk toward a certain audience, to motivate the listeners also over a longer duration, and to employ different methods of moderation. **Key qualifications:** Fundamentals of good scientific practice; Analytical-methodological competency; Time management; Literature research; Self-contained work with English technical literature; Communication skills; Ability to present (in written and spoken) practical and theoretical ideas in an understandable, confident, and convincing way; Writing a report in the markup language LaTeX; Evaluation of methods, technologies, and solutions w.r.t. different aspects; Quality awareness.		
Workload: Total: 120 h 90 h preparation of written term papers (self-study) 30 h seminar (attendance)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Seminar Digital Health (Bachelor) **Mode of Instruction:** seminar **Language:** German / English **Contact Hours:** 2
Contents: In the seminar Digital Health, recent research works in this field are going to be discussed. This comprises both the acquisition of data through sensors and (e.g., microphones or electrodes) and the analysis and the modelling of the data. One important aspect is also the practicability of modern deep learning methods. Digital Health applications reach from tracking of health states (e.g., epilepsy or depression) to personal assistance services. The participating students will work on a certain aspect, supervised by a research associate of the chair. They will summarise their results in a written report and an oral presentation. **Topics:** E-Health, M-Health, Sensor Signal Analysis, Vital Signs, Big Data.

Literature:

Depends on the chosen topic

Assigned Courses:

Seminar Digital Health (Bachelor & Master) (seminar)

Examination

Seminar Digital Health (Bachelor)

written/oral exam

Module INF-0343: Seminar Software Engineering of Distributed Systems (BA) *Seminar Software Engineering verteilter Systeme (BA)*		4 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Bernhard Bauer		
Learning Outcomes / Competences: After attending the seminar, students can independently analyze and evaluate advanced problems, concepts, methods, procedures, techniques, and technologies in distributed systems software engineering about the particular seminar topic from the named field. They have the scientific methodology, communication skills, and ability to use appropriate media to present a specific case clearly and comprehensibly in speech and writing and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively. Furthermore, they can recognize the logical structures of thinking and argumentation and use them goal-oriented. The participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a lecture clearly and understandably, focus the study on essential messages, and understandably convey them, even with complex content. They skillfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to present themselves and confidently deal with joint presentation media and use them interactively. They manage to gear a lecture to a specific target group, motivate the listener even during longer lecture durations, and apply various moderation techniques. Key qualifications: Literature research; independent work with English-language specialist literature; analytical-methodical competence; scientific methodology; principles of good scientific practice; skills in the understandable, confident, and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts, and results and in documenting them; skills in logical, abstract, analytical and conceptual thinking and formal argumentation; quality awareness, meticulousness; communication skills; time management. Translated with www.DeepL.com/Translator (free version)		
Workload: Total: 120 h 90 h preparation of written term papers (self-study) 30 h seminar (attendance)		
Conditions: The previous course "Seminar on Software Engineering of Distributed Systems (BA)" (INF-0026) must not have been taken due to overlaps.		
Frequency: irregular	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Seminar Software Engineering verteilter Systeme (BA) **Mode of Instruction:** seminar **Language:** German **Contact Hours:** 2
Contents: Current software engineering topics from industry and research.
Literature: Will be presented at the respective kick-off event.
Assigned Courses:

Seminar Software Engineering verteilter Systeme (Bachelor) (seminar)

Examination

Seminar Software Engineering verteilter Systeme (BA)

written/oral exam

Module INF-0345: Seminar Automotive Software and Systems Engineering (BA) *Seminar Automotive Software and Systems Engineering (BA)*		4 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Bernhard Bauer		
Learning Outcomes / Competences: After attending the seminar, students can independently work out and understand fundamental problems, concepts, methods, procedures, techniques, and technologies in automotive software & systems engineering. They have the working techniques, communication skills, and ability to use appropriate media to present a particular topic clearly and comprehensibly in speech and writing and discuss issues from the named field critically and argumentatively. Furthermore, they can recognize the logical structures of thinking and argumentation and use them goal-oriented. The participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a lecture clearly and understandably, focus the study on important messages, and convey them in a comprehensible way. The students understand how to present themselves and deal confidently with joint presentation media. They manage to gear a lecture to a specific target group, motivate the listener, and apply various moderation techniques. Key qualifications: Literature research; Independent work with English-language specialist literature; Analytical-methodical competence; Scientific methodology; Principles of good scientific practice; Skill in the understandable, confident, and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts, and results and in documenting them; Skill in logical, abstract, analytical and conceptual thinking and formal argumentation; Quality awareness, meticulousness; Communication skills; Time management.		
Workload: Total: 120 h 30 h seminar (attendance) 90 h preparation of written term papers (self-study)		
Conditions: The previous course "Seminar Fundamentals of Software Engineering for Automotive Systems (BA)" (INF-0027) must not have been taken due to overlaps.		
Frequency: irregular	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Automotive Software and Systems Engineering (BA)

Mode of Instruction: seminar

Language: German

Contact Hours: 2

Contents:

Current software engineering topics from industry and research.

Literature:

Will be presented in the respective kick-off event.

Examination

Seminar Automotive Software and Systems Engineering (BA)

written/oral exam

Module INF-0347: Seminar Avionic Software and Systems Engineering (BA) *Seminar Avionic Software and Systems Engineering (BA)*		4 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Bernhard Bauer		

Learning Outcomes / Competences:
After attending the seminar, students can independently analyze and evaluate advanced problems, concepts, methods, procedures, techniques, and technologies in Avionic Software & Systems Engineering about the particular seminar topic from the named field. They have the scientific methodology, communication skills, and ability to use appropriate media to present a specific case clearly and comprehensibly in speech and writing and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively. Furthermore, they can recognize the logical structures of thinking and argumentation and use them goal-oriented. The participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a lecture clearly and understandably focus the study on essential messages and convey them in a comprehensible way, even in the case of complex content. They skillfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to present themselves and confidently deal with joint presentation media and use them interactively. They manage to gear a lecture to a specific target group, motivate the listener even during longer lecture durations, and apply various moderation techniques.

Key qualifications: Literature research; independent work with English-language specialist literature; analytical-methodical competence; scientific methodology; principles of good scientific practice; skills in the understandable, confident, and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts, and results and in documenting them; skills in logical, abstract, analytical and conceptual thinking and formal argumentation; quality awareness, meticulousness; communication skills; time management. Translated with www.DeepL.com/Translator (free version)

Workload:
Total: 120 h
90 h preparation of written term papers (self-study)
30 h seminar (attendance)

Conditions: The previous course "Seminar Grundlagen des Software Engineering für Avionic Systems (BA)" (INF-0028) must not have been taken due to overlaps.		
Frequency: irregular	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Avionic Software and Systems Engineering (BA)
Mode of Instruction: seminar
Language: German
Contact Hours: 2

Contents:
Current software engineering topics from industry and research.

Literature:
Will be presented in the respective kick-off event.

Examination

Seminar Avionic Software and Systems Engineering (BA)

written/oral exam

Module INF-0350: Practical Module Engineering 4.0 *Praktikum Engineering 4.0*	6 ECTS/LP

Version 1.0.0 (since SoSe20)
Person responsible for module: Prof. Dr.-Ing. Johannes Schilp

Learning Outcomes / Competences:
After students have attended the module, they will be able to,
understand mechatronic development processes and the associated methods and process models
apply various tools for digital development processes themselves
design and use digital development processes with a focus on virtual commissioning
exercise agile development in practical projects
Key qualifications: Teamwork and communication skills, structured and conscientious work, application-oriented problem solving, evaluation of results and weighing of solution approaches, ability to think logically, analytically and conceptually

Workload:
Total: 180 h
120 h studying of course content through exercises / case studies (self-study)
60 h internship / practical course (attendance)

Conditions:

Frequency: each summer semester	**Recommended Semester:** from 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Practical Module Engineering 4.0
Mode of Instruction: internship
Language: German
Frequency: each winter semester
Contact Hours: 4
ECTS Credits: 6.0

Contents:
Theory:
Basics of mechatronic and agile development
digital engineering
Output and discussion of the development task
Application:
Requirements analysis, concept phase, design, virtual commissioning, prototypical construction and implementation of a miniature packaging system.
agile development methodology Scrum (Sprint Planning, Sprint Review, Sprint Retrospective, Sprint Planning)
The internship takes place in the premises of our partner institute, the Fraunhofer IGCV in Augsburg. The participants are responsible for their own travel to and from the practical module.

Literature:

- Gloger, B.: Scrum. Produkte zuverlässig und schnell entwickeln. 4. Aufl. München: Hanser 2013. ISBN: 978-3-446-43338-0.
- Bracht, Uwe, Dieter Geckler, and Sigrid Wenzel. "Digitale Fabrik." Methoden und Praxisbeispiele, Berlin, Heidelberg (2011).

Assigned Courses:

Praktikum Engineering 4.0 (internship)

Examination

Practical Module Engineering 4.0

practical exam / length of examination: 60 minutes

Module INF-0352: Practical Module Biomedical Programming (Bachelor) *Praktikum Programmieren in der biomedizinischen Informatik (Bachelor)*		6 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Frank Kramer		
Learning Outcomes / Competences: After participation in the practical course Programming in Biomed. Informatics, students will understand practical problems of higher complexity in the field of software development and evaluations in the application areas of biomedical informatics. Students will gain in-depth subject-specific as well as cross-disciplinary knowledge and skills, for example bioinformatics, medical informatics and statistics. They are able to develop concepts, methods, techniques and technologies of the mentioned field in research projects and are able to apply innovative methods in solving problems. This enables them to link up with international research and to make their own scientific contribution in this field. In addition, students have the teamwork and communication skills, the ability to research the literature and the scientific methodology to discuss problems in the field, define intermediate goals, and critically evaluate, classify, combine, present and document intermediate results and innovative ideas in an understandable way. Key Skills: Ability to think logically, analytically, and conceptually; Work independently with technical literature; Present ideas, concepts, and results in an understandable, confident, and persuasive manner; Quality awareness; Communication skills; Teamwork skills;		
Remarks: Wenn Sie bereits das Modul "INF-0325: Praktikum Grundlagen des Programmierens in der biomedizinischen Informatik" gehört haben, ist eine erneute Einbringung **nicht** möglich!		
Workload: Total: 180 h 30 h studying of course content through exercises / case studies (self-study) 30 h studying of course content using literarture (self-study) 90 h internship / practical course (attendance) 30 h studying of course content using provided materials (self-study)		
Conditions: none		**Credit Requirements:** Passing the module examination
Frequency: irregular (usu. winter semester)	**Recommended Semester:** from 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Practical Module Biomedical Programming (Bachelor) **Mode of Instruction:** internship **Language:** German / English **Frequency:** irregular (usu. summer semester) **Contact Hours:** 6

Contents:

Participants of the Bio-/Medical Informatics Programming Internship will learn how to implement small application and infrastructure programs in a biological and medical context.

The goal of the internship is for students to develop various small programs in Python related to medical issues.

Through daily work assignments, students will acquire basic knowledge of:

- Python programming
- Use of biological/medical databases
- Data transformation in a biological and medical context
- Disease research in bio/medical informatics
- High throughput data analysis

The internship is offered as a 2-week block course during the semester break, consists of a short daily introduction to the current work tasks and subsequent independent implementation by the students.

During independent work, a supervisor will be present at designated times for assistance and questions.

There will be a one-time meeting during the semester for organizational reasons.

Examination

Practical Module Biomedical Programming (Bachelor)

practical exam / length of examination: 30 minutes

Module INF-0363: Seminar Software Engineering in Safety- and Security-Critical Systems (BA) *Seminar Software Engineering in sicherheitskritischen Systemen (BA)*	4 ECTS/LP
Version 1.0.0 (since WS20/21) Person responsible for module: Prof. Dr. Bernhard Bauer	

Learning Outcomes / Competences:

After attending the seminar, students can independently develop, analyze and evaluate advanced problems, concepts, methods, procedures, techniques, and technologies in software engineering in safety-critical systems and their related disciplines about the particular seminar topic from the named field. They have the scientific methodology, communication skills, and ability to use appropriate media to present a specific case clearly and comprehensibly in speech and writing and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively. Furthermore, they can recognize the logical structures of thinking and argumentation and use them goal-oriented. The participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a lecture clearly and understandably focus the study on important messages and understandably convey them, even in the case of complex content. They skillfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to present themselves and confidently deal with joint presentation media and use them interactively. They manage to gear a lecture to a specific target group, motivate the listener even during longer lecture durations, and apply various moderation techniques.

Key qualifications: Literature research; independent work with English-language specialist literature; analytical-methodical competence; scientific methodology; principles of good scientific practice; skills in the understandable, confident, and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts, and results and in documenting them; skills in logical, abstract, analytical and conceptual thinking and formal argumentation; quality awareness, meticulousness; communication skills; time management. Translated with www.DeepL.com/Translator (free version)

Workload:

Total: 120 h

30 h seminar (attendance)

90 h preparation of written term papers (self-study)

Conditions: none		
Frequency: irregular	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Software Engineering in Safety- and Security-Critical Systems (BA)

Mode of Instruction: seminar

Language: German

Contact Hours: 2

Contents:

Current software engineering topics from industry and research.

Literature:

Will be presented in the respective kick-off event.

Assigned Courses:

Seminar Software Engineering in sicherheitskritischen Systemen (Bachelor) (seminar)

Examination

Seminar Software Engineering in Safety- and Security-Critical Systems (BA)

written/oral exam

Module INF-0365: Practical Module Interaction Design and Engineering for Health Care Applications *Praktikum Interaction Design and Engineering for Health Care Applications*	8 ECTS/LP

Version 1.0.0 (since WS20/21)
Person responsible for module: Prof. Dr. Elisabeth André

Learning Outcomes / Competences:
Students are familiar with methods and techniques of interaction design and engineering for health care applications. After successful participation, they will have the necessary knowledge to analyze application scenarios according to the guidelines of the user-centered design process and to design software solutions tailored to the target group. They are able to translate current interaction paradigms and design guidelines into models and programs for novel interaction devices, as well as to independently familiarize themselves with the necessary technologies. Furthermore, they are able to apply practice-relevant evaluation methods to assess the quality of the created software prototype. They are able to plan larger project tasks in small teams, solve them according to a self-developed project plan and discuss the results appropriately in plenary sessions and present them as a team.

Key qualifications: Skill in confident and persuasive presentation of ideas and concepts; knowledge of the mindset and language of application-relevant disciplines; understanding of team processes; skill in collaborating in teams; skill in leading teams; skill in presenting and documenting results in a comprehensible manner; ability to expand existing knowledge independently; ability to contribute to science; competence in recognizing significant technical developments; quality awareness, meticulousness.

Workload:
Total: 240 h
150 h studying of course content through exercises / case studies (self-study)
90 h internship / practical course (attendance)

Conditions: none		
Frequency: each winter semester	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Practical Module Interaction Design and Engineering for Health Care Applications
Mode of Instruction: internship
Language: German
Contact Hours: 6

Contents:
The specific assignment for student projects is designed each year.

Literature:
Literature references will be announced at the beginning of the semester depending on the topic.

Examination
Practical Module Interaction Design and Engineering for Health Care Applications
practical exam

Module INF-0372: Research Module Resource Aware Algorithmics *Forschungsmodul Resource Aware Algorithmics*		6 ECTS/LP
Version 1.0.0 (since WS20/21) Person responsible for module: Prof. Dr. Tobias Mömke		
Learning Outcomes / Competences: After attending this research module, the students are able to understand algorithmic problems and solutions of medium difficulty in the area of resource aware algorithmics.They have acquired a detailed understanding of up-to-date topics within the area and can actively participate in research projects. Furthermore, they understand some deep concepts, methods, tools and technologies and can apply the acquired knowledge in research projects. Besides the technical abilities, they train their team and communication skills, the ability to perform literature research and to discurss and present technical topics. **Key Qualifications:** Ability to perform analytical and logic thinking; self-sufficient work with scientific literature in English language; ability to present results and ideas in form of understandable and inspiring presentations; aim for high-quality results; communication skills; ability to work with a team and to understand team processes; respect for clean scientific practices.		
Workload: Total: 180 h 165 h internship / practical course (self-study) 15 h seminar (attendance)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Forschungsmodul Resource Aware Algorithmics **Mode of Instruction:** internship **Language:** German / English **Contact Hours:** 1
Contents: Contribution to research on state of the art research topics.
Literature: scientific papers, books
Assigned Courses: **Oberseminar Resource Aware Algorithmics**

Examination
Reseach Module Resource Aware Algorithmics portfolio exam

Module INF-0384: Seminar Resource Aware Algorithmics (Bachelor) *Seminar Resource Aware Algorithmics (Bachelor)*		4 ECTS/LP
Version 1.0.0 (since SoSe21) Person responsible for module: Prof. Dr. Tobias Mömke		
Learning Outcomes / Competences: After attending the seminar, the students are able to understand basic algorithmic concepts, methods, tools and techniques in a self-sufficient manner. They have acquired communication skills, knowledge about work processes and the use of media to present a specific scientific topic both as a talk and in writte form. The participants have learned to express techical contents in a sturctured, understandable and inspiring manner. They have learned to confidently stand in front of the audience, using state of the art presentation tools and media. They are able to tailor the talk to the respective audience. **Key Qualifications:** Literature research; work with scientific literature in English language; analytic copetences; clean scientific practice; ability to present techincal content in confident, understandable and structured manner (both in written and spoken form); abstract, logical and analytical thinking; ability to argue formally; aim for high quality; communication skills; time management.		
Workload: Total: 120 h 30 h seminar (attendance) 90 h preparation of written term papers (self-study)		
Conditions: Good knowledge of content taught in mathematical Bachelor classes such as "Mathematik für Informatiker 1" and "Diskrete Strukturen und Logik." Knowledge about algorithms and data structures (Informatik 3) is useful.		**Credit Requirements:** Passing of Module exam
Frequency: irregular	**Recommended Semester:** from 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Resource Aware Algorithmics (Bachelor)
Mode of Instruction: seminar
Language: German / English
Contact Hours: 2

Contents:
The topics of the seminar are related to research in resource aware algorithmics. The precise topics change over time, in order to reflect up-to-date developments.

Literature:
Depending on the topic of the seminar.

Assigned Courses:

Seminar Resource Aware Algorithmics (Bachelor) (seminar)

Examination
Seminar Resource Aware Algorithmics (Bachelor)
written/oral exam

Module INF-0386: Practical Module Biomedical Analysis of Single Cell Data *Praktikum Biomedical Analysis of Single Cell Data*		8 ECTS/LP
Version 1.0.0 (since SoSe21) Person responsible for module: Prof. Dr. Matthias Schlesner		
Learning Outcomes / Competences: In the practical course, students learn how to analyze and integrate single cell data across multiple omics levels. To answer current biological questions, students perform complex analysis workflows. During the course, creative problem solving approaches are developed in teams and professionally presented and documented. After participating in the course, students will be familiar with commonly used bioinformatical software packages and will be able to critically compare, extend, and combine available solutions in innovative ways. The students will be well versed in the application of common methods of dimensionality reduction and visualization, up to interactive visualization of high dimensional data. They will be familiar with current methods for pre-processing and quality assurance of data and will be able to combine data sets from different sources using appropriate batch corrections. They will know the basic methods for clustering single cell data and will be able to efficiently apply them to larger data sets using appropriate program libraries. They will be able to identify characteristic features of cell clusters, such as marker genes, using appropriate statistical methods. The students will be able to critically assess and appropriately apply advanced analyses from the field of pseudo-time analysis. They will be able to analyze multidimensional datasets across different omics levels in an integrated manner. This methodological knowledge builds on a biological understanding of the different underlying omics levels, including their interplay in the cell. As part of the course, students will examine the function of biological tissues and differentiation systems. They will be familiar with the current literature on this topic and will be able to develop their own analysis strategies using the current literature and evaluate them in their context. The students perform all these analysis tasks independently using Python and R and document their approach as well as their biological results in interactive notebooks. **Key Skills**: Skills in logical, analytical, and conceptual thinking; Skills in solving programming tasks independently and learning new software packages using existing documentation; Skills in presenting ideas and concepts confidently and persuasively; Ability to work independently with technical literature; Ability to collaborate in teams; Ability to work independently with public databases; Ability to present results clearly;		
Workload: Total: 240 h 90 h internship / practical course (attendance) 30 h studying of course content using literarture (self-study) 30 h studying of course content using provided materials (self-study) 90 h studying of course content through exercises / case studies (self-study)		
Conditions: Module Computer Science 1 (INF-0097) - recommended Module Foundations of biomedical Computer Science (INF-0375) - recommended		**Credit Requirements:** Passing the module examination
Frequency: irregular (usu. summer semester)	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Praktikum Biomedical Analysis of Single Cell Data **Mode of Instruction:** internship **Language:** German / English **Contact Hours:** 6
Contents: · Biological principles for understanding current issues in the field of single cell data. · Application of current bioinformatic program libraries and biostatistical methods for the analysis of single cell data sets · Performance of complex analysis workflows, starting with the initial pre-processing of data, up to the integration of data from different omics levels · Analysis and documentation with interactive notebooks (Jupyter or R Markdown) · Data visualization
Assigned Courses: **Praktikum zu Biomedical analysis of single cell data** (internship)

Examination

Praktikum Biomedical Analysis of Single Cell Data

portfolio exam

Module INF-0406: Seminar Digital Ethics (Bachelor) *Seminar Digitale Ethik (Bachelor)*	4 ECTS/LP

Version 1.0.0 (since WS21/22)
Person responsible for module: Prof. Dr. Robert Lorenz

Learning Outcomes / Competences:
After attending the seminar, the students can independently work out and analyse advanced problems, concepts, methods, procedures, techniques, and technologies from the field of digital ethics and evaluate them in relation to the individual seminar topic.

Participants possess scientific methodology, communication skills, and the ability to present a special topic clearly and comprehensibly in speech and writing and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively.

Furthermore, they learn to recognise logical structures of thinking and argumentation and use them in a goal-oriented manner. The participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a talk that is clear and easy to follow. Additionally, the students know how to focus on essential messages and convey them in a comprehensible way, even with complex content. They skilfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to confidently deal with common presentation media and use them interactively. They manage to gear a talk to a specific target group, apply various moderation techniques, and keep their audience engaged even over a longer period.

Key qualifications: Presentation techniques; literature research; principles of good scientific practice; evaluating solution approaches, procedures, techniques, and technologies from different points of view.

Workload:
Total: 120 h
90 h preparation of presentations (self-study)
30 h seminar (attendance)

Conditions:	**Credit Requirements:**
Module Database Systems (INF-0073) - recommended Module Computer Science 1 (INF-0097) - recommended Module Computer Science 2 (INF-0098) - recommended Module Computer Science 3 (INF-0111) - recommended	Passing the module examination

Frequency: irregular	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Digital Ethics (Bachelor)
Mode of Instruction: seminar
Language: German / English
Contact Hours: 2
ECTS Credits: 4.0

Contents:
The topics change over time, in order to reflect up-to-date developments

Literature:
Literature depends on the chosen topic

Examination

Seminar Digital Ethics (Bachelor)

presentation / length of examination: 45 minutes

Module INF-0037: Practical Module Automotive Software Engineering *Praktikum Automotive Software Engineering*		6 ECTS/LP
Version 1.0.0 (since SoSe13) Person responsible for module: Prof. Dr. Bernhard Bauer		
Learning Outcomes / Competences: After participating in the practical course Automotive Software Engineering, the students understand practical problems of higher complexity in the field of development and validation of driving assistance systems with current methods and tools of model-based development of embedded systems. The students acquire in-depth subject-specific and interdisciplinary knowledge and skills, such as control engineering, driving physics, and mathematics. They are able to develop concepts, methods, techniques, and technologies of the mentioned field in research projects and are able to apply innovative approaches in solving problems. This enables them to link up with international research and make their scientific contribution to the field. In addition, students have the teamwork and communication skills, the ability to research literature and the scientific methodology to discuss problems in the area, define intermediate goals, and critically evaluate, classify, combine, present and document intermediate results and innovative ideas understandably. Key qualifications: Ability to think logically, analytically, and conceptually; Independent work with English-language technical literature; Understandable, confident, and convincing presentation of ideas, concepts, and results; Quality awareness; Communication skills; Ability to work in teams and understand team processes; Project management skills.		
Workload: Total: 180 h 90 h internship / practical course (attendance) 90 h studying of course content through exercises / case studies (self-study)		
Conditions: Empfohlen wird die Teilnahme an einem der beiden links aufgeführten Seminare. Module Seminar Basics of Software Engineering for Automotive Systems (BA) (INF-0027) - recommended Module Seminar Basics of Software Engineering for Automotive Systems (MA) (INF-0040) - recommended		
Frequency: irregular (usu. winter semester)	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Praktikum Automotive Software Engineering (MA)
Mode of Instruction: internship
Language: German
Frequency: each winter semester
Contact Hours: 6

Contents:

In the automotive practical course, participants learn how various selected functions within vehicles can be simulated and analyzed. The necessary theoretical foundations are laid for working on the experimental task in a two-day introductory course. The anti-lock braking system (ABS) model is treated on control units during the initial period. Among other things, the participants will get to know the modeling tool combination "Matlab/Simulink", which is frequently used in the automotive environment, and the graphical simulation and analysis tool "CarMaker" and gain a practical insight into the functioning of FlexRay bus systems.
After the introductory course, the model of an ACC (Adaptive Cruise Control) system will be created, simulated, and verified in groups of two to three participants.

Literature:

depending on the subject

Examination

Praktikum Automotive Software Engineering (MA)

oral exam / length of examination: 30 minutes

Module INF-0042: Project Module Software Methodologies for Distributed Systems *Projektmodul Softwaremethodiken für verteilte Systeme*		10 ECTS/LP
Version 1.0.0 (since SoSe13) Person responsible for module: Prof. Dr. Bernhard Bauer		
Learning Outcomes / Competences: After participating in the project module, students understand problems of higher complexity in the field of software methodologies for distributed systems and have in-depth specialist knowledge and skills there. They are able to develop concepts, methods, procedures, techniques, and technologies of the mentioned field in research projects and are able to apply innovative approaches in solving problems. This enables them to link up with international research and make their scientific contribution to the field. In addition, students have the teamwork and communication skills, the ability to research literature and the scientific methodology to discuss problems in the area, define intermediate goals, and critically evaluate, classify, combine and present intermediate results and innovative ideas. Key qualifications: Ability to think logically, analytically, and conceptually; Independent work with literature; Understandable, confident, and convincing presentation of ideas, concepts, and results; Quality awareness; Communication skills; Skill of working in teams and understanding team processes; Principles of good scientific practice; Project management skills; Scientific methodology;		
Workload: Total: 300 h 15 h seminar (attendance) 285 h internship / practical course (self-study)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Projektmodul Softwaremethodiken für verteilte Systeme
Mode of Instruction: internship
Language: German / English
Contact Hours: 1

Contents:
Current research topics at the Software Methodology for Distributed Systems Lab

Literature:
Provided for the respective topics.

Assigned Courses:

Oberseminar zu Softwaremethodik für verteilte Systeme

Examination
Project acceptance, presentation, final report
internship

Module INF-0058: Seminar Algorithms and Data Structures for Masters *Seminar Algorithmen und Datenstrukturen für Master*		4 ECTS/LP
Version 1.5.0 (since SoSe13) Person responsible for module: Prof. Dr. Torben Hagerup		
Learning Outcomes / Competences: Upon completion of the seminar, the students will be able to independently acquire algorithm-related contents from demanding original scientific texts, evaluate the readings in a critical way, and place them in a wider context. They will understand how to select meaningful topics, structure a presentation, focus on the essential messages and communicate them, either in writing or orally, in an interesting and motivating manner, within a given time frame. **Key Qualifications:** Capability of logical, analytical, and conceptual comprehension for a critical analysis of technical issues with convincing arguments; literature research and independent work with English technical literature; ability to evaluate solutions, processes, and techniques from different perspectives; quality awareness; meticulousness; communication skills; time management.		
Workload: Total: 120 h 90 h preparation of written term papers (self-study) 30 h seminar (attendance)		
Conditions: Familiarity with basic algorithms and data structures (as imparted, e.g., by the course "Informatik III") will be highly useful.		
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Seminar Algorithms and Data Structures **Mode of Instruction:** seminar **Language:** German **Contact Hours:** 2
Contents: Current and classical topics from the field of Algorithms and Data Structures are studied, using original literature.
Literature: Selected scientific articles.

Examination
Written paper and oral presentation. seminar

Module INF-0059: Project Module Theoretical Computer Science *Projektmodul Theoretische Informatik*		10 ECTS/LP
Version 1.0.0 (since SoSe13) Person responsible for module: Prof. Dr. Torben Hagerup		
Learning Outcomes / Competences: After successful participation in the project module, the students will be able to understand problems of increased complexity in the field of Theoretical Computer Science. They will possess the skills to develop concepts, methods, procedures, and techniques in research projects, and to apply innovative methods in solving arising problems. In this way, the students acquire good prerequisites for autonomous scientific work and for linking to international research. Furthermore, they will be able to communicate and conduct literature research and have a scientific methodology that enables them to discuss issues of Theoretical Computer Science; they can define intermediate goals, evaluate solution proposals critically and present own approaches. **Key Qualifications:** Logical, analytical, and conceptual competence; quality awareness; meticulousness; independent work; time management; self-contained literature research; work with English technical literature; fundamentals of good scientific practice.		
Workload: Total: 300 h 285 h internship / practical course (self-study) 15 h seminar (attendance)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Project Module Theoretical Computer Science
Mode of Instruction: internship
Language: German
Contact Hours: 1

Contents:
Collaboration on current research topics.

Literature:
Scientific papers, manuals.

Assigned Courses:

Oberseminar Theoretische Informatik

Examination
Oral presentation and written paper.
internship

Module INF-0070: Seminar Organic Computing *Seminar Organic Computing*		4 ECTS/LP
Version 1.0.0 (since SoSe14) Person responsible for module: Prof. Dr. Jörg Hähner		
Learning Outcomes / Competences: After attending the seminar, the students are able to independently work out advanced problems, concepts, methods, procedures, techniques and technologies in the fields of organic computing and to analyse and evaluate them in relation to the individual seminar topic from the named field. They possess the scientific methodology, communication skills and ability to use appropriate media to present a special topic clearly and comprehensibly in speech and writing and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively. Furthermore, they can recognise the logical structures of thinking and argumentation and use them in a goal-oriented manner. Participants can formulate clearly and comprehensibly and present specialist content freely. They understand how to structure a presentation clearly and reasonable and how to focus on essentials and convey those in a comprehensible way, even with complex content. They skilfully apply lines of argument and solution strategies in the event of disruptions. The students understand how to present themselves and confidently deal with common presentation media, using them interactively. They manage to gear a talk to a specific target group, motivate the listener even during longer talks and apply various moderation techniques. **Key qualifications:** Literature research; independent work with English-language specialist literature; Analytical-methodical competence; scientific methodology; principles of good scientific practice; Ability to describe and document (practical and theoretical) ideas, concepts and results in a comprehensible, confident and convincing manner (written and oral); Ability to think logically, abstractly, analytically and conceptually and to argue formally; Quality awareness, meticulousness; Communication skills; Time management; Evaluation of approaches, procedures, techniques and technologies.		
Workload: Total: 120 h 90 h preparation of written term papers (self-study) 30 h seminar (attendance)		
Conditions: none		
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Seminar Organic Computing **Mode of Instruction:** seminar **Language:** German / English **Contact Hours:** 2
Contents: The topics of the seminar are determined each year and adapted to current trends.
Literature: Literature depending on the current topics: scientific papers or books.

Examination

Presentation and written paper.

seminar

Module INF-0071: Seminar Nature inspired Algorithms and Multi Agent Systems *Seminar Naturanaloge Algorithmen und Multiagentensysteme*		4 ECTS/LP
Version 1.0.0 (since SoSe14) Person responsible for module: Prof. Dr. Jörg Hähner		

Learning Outcomes / Competences:
After attending the seminar, the students are able to independently work out advanced problems, concepts, methods, procedures, techniques and technologies in the fields of nature-inspired algorithms and multi-agent systems and to analyse and evaluate them in relation to the individual seminar topic from the named field.

They possess the scientific methodology, communication skills and ability to use appropriate media to present a special topic clearly and comprehensibly in speech and writing and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively. Furthermore, they can recognise the logical structures of thinking and argumentation and use them in a goal-oriented manner.

Participants can formulate clearly and comprehensibly and present specialist content freely. They understand how to structure a presentation clearly and reasonable and how to focus on essentials and convey those in a comprehensible way, even with complex content. They skilfully apply lines of argument and solution strategies in the event of disruptions.

The students understand how to present themselves and confidently deal with common presentation media, using them interactively. They manage to gear a talk to a specific target group, motivate the listener even during longer talks and apply various moderation techniques.

Key qualifications: Literature research; independent work with English-language specialist literature;
Analytical-methodical competence; scientific methodology; principles of good scientific practice;
Ability to describe and document (practical and theoretical) ideas, concepts and results in a comprehensible, confident and convincing manner (written and oral); Ability to think logically, abstractly, analytically and conceptually and to argue formally; Quality awareness, meticulousness; Communication skills; Time management; Evaluation of approaches, procedures, techniques and technologies.

Workload:
Total: 120 h
30 h seminar (attendance)
90 h preparation of written term papers (self-study)

Conditions: none		
Frequency: each summer semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Naturanaloge Algorithmen und Multiagentensysteme
Mode of Instruction: seminar
Language: German / English
Contact Hours: 2

Contents:
The topics of the seminar are determined each year and adapted to current trends.

Literature:
Literature depending on the current topics: scientific papers or books.

Assigned Courses:

Seminar über Naturanaloge Algorithmen und Multi-Agenten Systeme (seminar)

Examination

Presentation and written paper.

seminar

Module INF-0072: Project Module Organic Computing *Projektmodul Organic Computing*	10 ECTS/LP

Version 1.0.0 (since SoSe14)
Person responsible for module: Prof. Dr. Jörg Hähner

Learning Outcomes / Competences:
After participating in the project module, the students understand problems of higher complexity in the field of "Organic Computing" and have deeper specialist knowledge and skills in this area. They can develop concepts, methods, procedures, techniques and technologies of the mentioned field in research projects and are able to apply innovative methods in solving problems. This enables them to connect to international research and make their own scientific contribution to the field. In addition, students have the teamwork and communication skills, the ability to research literature and the scientific methodology to discuss problems in the field, define intermediate goals, and critically evaluate, classify, combine and present intermediate results and innovative ideas.

Key qualifications: Ability to think logically, analytically and conceptually; Independent work with literature in English. Understandable, confident and convincing presentation of ideas, concepts and results; Quality awareness; Communication skills; Skill of working in teams and understanding team processes; Principles of good scientific practice; Project management skills; Scientific methodology.

Workload:
Total: 300 h
285 h internship / practical course (self-study)
15 h seminar (attendance)

Conditions: none		
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Projektmodul Organic Computing
Mode of Instruction: internship
Language: German / English
Contact Hours: 1

Contents:
Collaboration on current research topics.

Literature:
Depending on the topic to be worked on:

- Paper
- Book
- Handbook

Assigned Courses:

Oberseminar Organic Computing

Examination
Presentation and final report.
internship

Module INF-0080: Project Module Databases and Information Systems *Projektmodul Datenbanken und Informationssysteme*		10 ECTS/LP
Version 1.6.0 (since SoSe14) Person responsible for module: Prof. Dr. Peter Michael Fischer		
Learning Outcomes / Competences: After participating in the project module, students understand problems of higher complexity levels in the field of databases and information systems and have deeper professional knowledge and skills there. They are able to develop concepts, methods, procedures, techniques and technologies of the mentioned field in research projects and are able to apply innovative methods in solving problems. This enables them to connect to international research and make their own scientific contribution to the field. In addition, students have the teamwork and communication skills, the ability to research literature and the scientific methodology to discuss problems in the field, define intermediate goals, and critically evaluate, classify, combine and present intermediate results and innovative ideas. Key Skills: Skill in logical, analytical, and conceptual thinking; Independent work with English-language literature; Intelligible, confident, and persuasive presentation of ideas, concepts, and results; Quality awareness; Communication skills; Skill in working in teams and understanding team processes; Principles of good scientific practice; Project management skills; Scientific methodology.		
Workload: Total: 300 h 15 h seminar (attendance) 285 h internship / practical course (self-study)		
Conditions: Module Database Systems (INF-0073) - recommended Module Search Engines (INF-0077) - recommended Module Analyzing Massive Data Sets (INF-0277) - recommended		
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Projektmodul Datenbanken und Informationssysteme
Mode of Instruction: internship
Language: German / English
Contact Hours: 1

Contents:
Work on current research topics

Literature:
- Current research articles on the topic of databases and Big Data
- Manuals

Assigned Courses:

Oberseminar Datenbanken und Informationssysteme

Examination
Software acceptance, presentation, final report
internship

Module INF-0088: Bayesian Networks *Bayesian Networks*	5 ECTS/LP
Version 1.0.0 (since WS15/16) Person responsible for module: Prof. Dr. Rainer Lienhart	

Learning Outcomes / Competences:

Bayesian networks are one of the most versatile statistical machine learning methods. After successfully completing this module, participants will understand and deepen their understanding of the core principles of Bayesian networks and be able to apply them to many practical problems in a variety of disciplines. These include robotics, web search, intelligent agents, automated diagnostic systems and medical systems. Students will be able to understand and apply Bayesian networks and analyse and evaluate cross-disciplinary problems in this context. Participation in this module promotes logical, analytical and conceptual thinking skills. Students will be able to produce scientifically meaningful evaluations using Bayesian networks.

Key qualifications: advanced mathematical-formal logic; implementation of subject-specific solution concepts in models; interdisciplinary knowledge; development and implementation of solution strategies for complex problems; systematic further development of design methods; ability to solve problems under practical boundary conditions.

Remarks:

INF-0263 and this module **cannot** be attended at the same time.

Workload:

Total: 150 h
15 h studying of course content using provided materials (self-study)
60 h studying of course content through exercises / case studies (self-study)
15 h studying of course content using literarture (self-study)
30 h exercise course (attendance)
30 h lecture (attendance)

Conditions: none		
Frequency: irregular (usu. summer semester)	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Bayesian Networks (Vorlesung)
Mode of Instruction: lecture
Language: German
Contact Hours: 2

Contents:

1. Basics of Probability Theory
2. Example: Bayesian Network based Face Detection
3. Inference
4. Influence Diagrams
5. Parameter Learning
6. Example: probabilistic Latent Semantic Analysis (pLSA)

Literature:

- Richard E. Neapolitan. Learning Bayesian Networks. Prentice Hall Series in Artifical Intelligence, 2004. ISBN 0-13-012534-2
- Daphne Koller, Nir Friedman. Probabilistic Graphical Models: Principles and Techniques. The MIT Press, 2009. 978-0262013192

Part of the Module: Bayesian Networks (Übung)

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

Examination

Bayesian Networks (Examination)

written exam / length of examination: 90 minutes

Description:

The examination can be taken every semester during the examination period.

Module INF-0093: Probabilistic Robotics *Probabilistic Robotics*		5 ECTS/LP
Version 1.0.0 (since SoSe14) Person responsible for module: Prof. Dr. Rainer Lienhart		
Learning Outcomes / Competences: After successful participation in this module, participants understand basics and in-depth issues and algorithms of robotics (e.g. recursive state estimation, Gaussian and non-parametric filters, Kalman filters, motion and localisation, perception, mapping, SLAM) from a probabilistic point of view and can apply learned concepts to complex, practice-relevant tasks. Students can analyse and evaluate problems in this context. Participation in this module promotes skills in logical, analytical and conceptual thinking in the field of probabilistic robotics. Students can select suitable methods from the concepts learned in a targeted manner, apply them confidently and transfer them to new problems, including those from other disciplines. The module imparts competencies for recognising current research and significant technological developments in this field. **Key qualifications**: advanced mathematical-formal logic; implementation of subject-specific solution concepts; interdisciplinary knowledge; development and implementation of solution strategies for complex problems; systematic further development of design methods; ability to solve problems under practical boundary conditions.		
Workload: Total: 150 h 30 h exercise course (attendance) 30 h lecture (attendance) 15 h studying of course content using provided materials (self-study) 60 h studying of course content through exercises / case studies (self-study) 15 h studying of course content using literarture (self-study)		
Conditions: none		
Frequency: irregular (usu. summer semester)	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Probabilistic Robotics (Lecture) **Mode of Instruction:** lecture **Language:** German **Contact Hours:** 2
Contents: 1. Introduction to Probabilistic Robotics 2. Recursive State Estimation 3. Gaussian Filters 4. Nonparametric Filters 5. Robot Motion 6. Robot Perception 7. Mobile RobotLocalization: Markow and Gaussian 8. Mobile Robot Localization: Grid and MonteCarlo 9. Occupancy Grid Mapping 10. SLAM

Literature:

Sebastian Thrun, Wolfram Burgard, Dieter Fox. Probabilistic Robotics. Springer Verlag.

Assigned Courses:

Probabilistic Robotics (lecture)

Part of the Module: Probabilistic Robotics (Tutorial)

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

Assigned Courses:

Übung zu Probabilistic Robotics (exercise course)

Examination

Probabilistic Robotics (Examination)

written exam / length of examination: 90 minutes

Description:

The examination can be taken every semester during the examination period.

Module INF-0095: Seminar Multimedia Computing & Computer Vision (MA) *Seminar Multimedia Computing (MA)*	4 ECTS/LP
Version 1.0.0 (since SoSe14) Person responsible for module: Prof. Dr. Rainer Lienhart	

Learning Outcomes / Competences:

After attending the seminar, the students can independently work out and analyse advanced problems, concepts, methods, procedures, techniques, and technologies from the field of multimedia computing and computer vision (e.g. image and video processing, machine learning, and image and video search) and evaluate them in relation to the individual seminar topic.

Participants possess scientific methodology, communication skills, and the ability to present a special topic clearly and comprehensibly in speech and writing and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively.

Furthermore, they learn to recognise logical structures of thinking and argumentation and use them in a goal-oriented manner. The participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a talk that is clear and easy to follow. Additionally, the students know how to focus on essential messages and convey them in a comprehensible way, even with complex content. They skilfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to confidently deal with common presentation media and use them interactively. They manage to gear a talk to a specific target group, apply various moderation techniques, and keep their audience engaged even over a longer period.

Key qualifications: Presentation techniques; literature research; principles of good scientific practice; evaluating solution approaches, procedures, techniques, and technologies from different points of view.

Workload:

Total: 120 h

90 h preparation of written term papers (self-study)

30 h seminar (attendance)

Conditions: none		
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Multimedia Computing (MA)

Mode of Instruction: seminar

Language: German

Frequency: each summer semester

Contact Hours: 2

Contents:

The concrete topic of the seminar from the wide-ranging field of multimedia is determined anew each year and adapted to current trends.

Literature:

current research literature

Assigned Courses:

Seminar über Multimedia und Maschinelles Sehen (Master) (seminar)

Examination

Presentation and written paper

seminar

Module INF-0096: Project Module Multimedia Computing *Projektmodul Multimedia Computing*		10 ECTS/LP
Version 1.0.0 (since SoSe14) Person responsible for module: Prof. Dr. Rainer Lienhart		
Learning Outcomes / Competences: After participating in this project module, students understand problems of higher complexity in the field of multimedia computing (e.g. image, video, and audio processing as well as image, video, and audio search) and computer vision (object detection, people detection, human pose estimation) and have more in-depth specialist knowledge and skills there. They can develop concepts, methods, procedures, techniques, and technologies in the mentioned field in research projects and can apply innovative methods in solving problems. This enables them to connect to international research and make their scientific contribution to the field. In addition, students have teamwork and communication skills, the ability to research literature, the scientific methodology to discuss problems in the field, define intermediate goals, and critically evaluate, classify, combine, and present intermediate results and innovative ideas. **Key qualifications**: Ability to think logically, analytically and conceptually; Independent work with specialist literature; Comprehensible, confident and convincing presentation of ideas, concepts, and results; Quality awareness; Communication skills; Ability to work in teams and understand team processes; Principles of good scientific practise; Project management skills; Scientific methodology.		
Workload: Total: 300 h 285 h internship / practical course (self-study) 15 h seminar (attendance)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Project Module Multimedia Computing **Mode of Instruction:** internship **Language:** German **Frequency:** as needed **Contact Hours:** 1
Contents: The specific task from the wide-ranging field of multimedia and machine vision (image, video and audio processing, object recognition, search in image, video and audio material) is designed individually for each student every year.
Literature: Literature references will be announced at the beginning of the course.
Assigned Courses: **Oberseminar Multimedia Computing**

Examination
Software presentation; elaboration with software documentation; explanation of source code (code review) internship

Module INF-0108: Project Module Teaching Professorship Informatics *Projektmodul Lehrprofessur für Informatik*		10 ECTS/LP
Version 1.0.0 (since SoSe14) Person responsible for module: Prof. Dr. Robert Lorenz		
Learning Outcomes / Competences: After participating in this project module, students understand problems of higher complexity in the fields of *concurrent systems*, *petri nets* or *process mining* and have more in-depth specialist knowledge and skills there. They can develop concepts, methods, procedures, techniques, and technologies in the mentioned field in research projects and can apply innovative methods in solving problems. This enables them to connect to international research and make their scientific contribution to the field. In addition, students have teamwork and communication skills, the ability to research literature, the scientific methodology to discuss problems in the field, define intermediate goals, and critically evaluate, classify, combine, and present intermediate results and innovative ideas. **Key qualifications:** Ability to think logically, analytically and conceptually; Independent work with specialist literature; Comprehensible, confident and convincing presentation of ideas, concepts, and results; Quality awareness; Communication skills; Ability to work in teams and understand team processes; Principles of good scientific practise; Project management skills; Scientific methodology.		
Workload: Total: 300 h 15 h seminar (attendance) 285 h internship / practical course (self-study)		
Conditions: Basic knowledge in the research fields of *concurrent systems*, *petri nets* or *process mining*		
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Projektmodul Lehrprofessur für Informatik
Mode of Instruction: internship
Language: German / English
Contact Hours: 1

Contents:

Collaboration on current research topics of the group

Literature:

- J. Desel, W. Reisig, G. Rozenberg: Lectures on Concurrency and Petri Nets, Springer, Lecture Notes in Computer Science 3098, 2004
- Wil M. P. van der Aalst: Process Mining. Data Science in Action. Springer, 2016.

Assigned Courses:

Oberseminar zu Lehrprofessur für Informatik

Examination

Projektmodul Lehrprofessur für Informatik

practical exam

Module INF-0136: Seminar Software- and Systems Engineering (Master) *Seminar Software- und Systems Engineering (Master)*	4 ECTS/LP

Version 1.1.0 (since SoSe14)
Person responsible for module: Prof. Dr. Wolfgang Reif

Learning Outcomes / Competences:

After successful completion of the seminar, students are able to understand, to learn, to analyse and evaluate advanced problems, concepts, methods, procedures, techniques and technologies in the field of software and systems engineering.

They known the scientific methods, communication skills and the ability to use appropriate media to present a specific topic clearly and comprehensibly in speech and writing and to discuss challenging scientific topics from the aforementioned field critically. They will also be able to recognize the logical structures of reasoning and argumentation and use them.

The participants are able to formulate clearly and understandably and to present specialist knowledge freely. They understand how to structure a presentation in a clear and comprehensible way and how to focus the presentation on the core messages and convey them in a comprehensible way even for complex and advanced subjects.

Die Studierenden verstehen es, präsent aufzutreten und souverän mit gängigen Präsentationsmedien umzugehen und diese interaktiv einzusetzen. Sie schaffen es, einen Vortrag auf eine bestimmte Zielgruppe auszurichten und den Zuhörer auch bei längeren Vortragsdauern zu motivieren und verschiedene Moderationstechniken anzuwenden.

The students understand how to present themselves and how to deal confidently with common presentation media. They manage to focus a presentation to a specific target group and to motivate the audience and they have working knowledge of moderation techniques to guide a discussion.

Soft Skills:

- Literature research
- Independently work with English technical literature
- Analytical competence
- Working methodical
- Principles of good scientific practice
- Ability to present (written and oral) ideas, concepts and results in a comprehensible and convincing manner and to document them
- Ability to think logically, abstractly, analytically and conceptually and to argue precisely
- Awareness for quality aspects
- Communication skills
- Time management
- Evaluation of solution approaches, procedures, techniques and technologies from different points of view

Workload:

Total: 120 h
90 h preparation of written term papers (self-study)
30 h seminar (attendance)

Conditions: none		
Frequency: irregular (usu. winter semester)	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Seminar Software- und Systems Engineering (Master) **Mode of Instruction:** seminar **Language:** German / English **Contact Hours:** 2
Contents: The topics of the seminar deal wtih current trends in Software and Systems Engineering on the level of graduate students. The topics change from year to year and are regulary adapted to reflect new developments.
Literature: Depends on the concrete topic.

Examination
Seminar Software- und Systems Engineering (Master) seminar / length of examination: 45 minutes work period for assignment: 3 months

Module INF-0137: Project Module Software- and Systems Engineering *Projektmodul Software- und Systems Engineering*	10 ECTS/LP
Version 1.1.0 (since SoSe14) Person responsible for module: Prof. Dr. Wolfgang Reif	

Learning Outcomes / Competences:

After participating in the project module, students understand problems of higher complexity from the field of software and systems engineering and have more in-depth knowledge and skills. They are able to develop concepts, methods, techniques and technologies of the mentioned field in research projects and are able to apply innovative methods in solving problems. This enables them to connect to international research and make their own scientific contribution to the field. In addition, students have teamwork and communication skills, the ability to research literature and the scientific methodology to discuss problems in the field, define intermediate goals, and critically evaluate, classify, combine and present intermediate results and innovative ideas.

Soft Skills:

- Skill in logical, analytical and conceptual thinking.
- Ability to work independently with technical literature, including English literature
- Clear, confident and convincing presentation of ideas, concepts and results
- Awareness for quality aspects
- Communication skills
- Ability to work in teams and understand team processes
- Principles of good scientific practice
- Competencies in project management
- Research methodology

Workload:

Total: 300 h

285 h internship / practical course (self-study)

15 h seminar (attendance)

Conditions: none		
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Project Module Software- and Systems Engineering

Mode of Instruction: internship

Language: German / English

Contact Hours: 1

Contents:

Contribution to current research projects of the chair for Software Engineering

Literature:

Depends on the project: Scientific papers, system documentation, books, ...

Assigned Courses:

Oberseminar Software- und Systems Engineering

Examination

Project Module Software- and Systems Engineering Project Presentation

practical exam / work period for assignment: 2 months

Module INF-0149: Practical Module Embedded Systems *Praktikum Eingebettete Systeme*		5 ECTS/LP
Version 2.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Sebastian Altmeyer		
Learning Outcomes / Competences: Students acquire competencies in the following areas at an advanced, practice-oriented but scientific level: independent work with microcontrollers, data sheets and specifications, interfacing of analog and digital peripherals, design and modeling of embedded software with state diagrams and their transformation into code. Further emphasis is placed on the configuration of sequential interfaces as well as scheduling and task-based programming. By implementing tasks for a microcontroller, they put the concepts they have learned directly into practice. The focus is on interaction with sensors and actuators as well as communication with other system parts. To this end, they are able to distinguish between and apply different types of sequence control. In a final project phase, students learn to plan a complex task in a team, to solve it according to a self-developed sound project plan and to discuss and present the results appropriately in a plenary session. **Key qualifications:** Skill in the comprehensible presentation and documentation of ideas, concepts and results; quality awareness, meticulousness; project-bound work and time management; selection and confident application of appropriate methods; ability to expand existing knowledge independently; self-reflection.		
Workload: Total: 150 h 90 h studying of course content through exercises / case studies (self-study) 60 h internship / practical course (attendance)		
Conditions: Knowledge in C-Programming.		
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Praktikum Eingebettete Systeme
Mode of Instruction: internship
Language: German / English
Contact Hours: 4

Contents:

In the practical course "Embedded Systems", the limitations and challenges for programming embedded systems are to be learned. A robot vacuum cleaner (ROOMBA) and a microcontroller connected to it to control the ROOMBA serve as the platform. The programming is done in C and the created programs should read the sensors of the ROOMBA and set the corresponding actuators. In particular, the challenges of embedded systems, such as the timing behavior of the software and working with data sheets are to be learned. In a project phase, the initially learned basic knowledge will be deepened and more complex control programs will be developed, e.g. an autonomous explorer or a "ROOMBA race" through a maze. The projects are worked on individually or in teams, documented and presented at the end of the internship.

Literature:

- Marwedel, Wehmeyer: Eingebettete Systeme, Springer Verlag, Heidelberg, 2007
- Wiegelmann: Softwareentwicklung in C für Mikroprozessoren und Mikrocontroller, 6. Auflage, VDE Verlag, Berlin, 2011

Assigned Courses:

Praktikum Eingebettete Systeme (internship)

Examination

Praktikum Eingebettete Systeme

practical exam

Module INF-0170: Project Module Human-Centered Multimedia *Projektmodul Human-Centered Multimedia*		10 ECTS/LP
Version 1.0.0 (since SoSe13) Person responsible for module: Prof. Dr. Elisabeth André		
Learning Outcomes / Competences: After participating in the project module, students understand problems of higher complexity in the field of "Human-Centered Multimedia" and have deeper expertise and skills there. They are able to develop concepts, methods, procedures, techniques and technologies of the mentioned field in research projects and are able to apply innovative methods in solving problems. This enables them to connect to international research and make their own scientific contribution to the field. In addition, students have the teamwork and communication skills, the ability to research literature and the scientific methodology to discuss problems in the field, define intermediate goals, and critically evaluate, classify, combine and present intermediate results and innovative ideas. **Key qualifications:** Skill in logical, analytical, and conceptual thinking; Independent work with English-language literature; Intelligible, confident, and persuasive presentation of ideas, concepts, and results; Quality awareness; Communication skills; Skill in working in teams and understanding team processes; Principles of good scientific practice; Project management skills; Scientific methodology;		
Workload: Total: 300 h 15 h seminar (attendance) 285 h internship / practical course (self-study)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Project Module Human-Centered Multimedia
Mode of Instruction: internship
Language: German
Contact Hours: 1

Contents:
Collaborate on current research topics.

Literature:
Literature references will be given at the beginning of the module depending on the topic.

Assigned Courses:

Oberseminar Human-Centered Multimedia

Examination
Project Module Human-Centered Multimedia
practical exam

Module INF-0182: Practical Module Multimodal Real Time Signal Processing *Praktikum Multimodale Echtzeitsignalverarbeitung*		8 ECTS/LP
Version 1.0.0 (since SoSe13) Person responsible for module: Prof. Dr. Elisabeth André		
Learning Outcomes / Competences: After successful participation in this module, students are familiar with the basic concepts of signal processing and machine learning. They are able to translate technical solution concepts into programs and models and master the selection and safe application of suitable methods. During the internship, they also learn to plan larger project tasks (development of software modules) in small teams, to solve them according to a self-developed project plan and to discuss the results appropriately in plenary sessions and present them as a team. The ability to evaluate suitable methods in a scientifically meaningful way, to develop the methods and algorithms independently and to implement them technically is also particularly encouraged. **Key qualifications:** Advanced knowledge of signal processing and machine learning, skill in analyzing and structuring complex computer science problems, skill in developing and implementing solution strategies for complex problems, understanding of team processes, skill in working in teams, self-reflection; acting responsibly in the face of inadequacy and conflicting interests, quality awareness, meticulousness.		
Workload: Total: 240 h 90 h internship / practical course (attendance) 150 h studying of course content through exercises / case studies (self-study)		
Conditions: Programming experience Module Foundations of Multimedia I (INF-0087) - recommended Module Foundations of Multimedia II (INF-0166) - recommended		
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Practical Module Multimodal Real Time Signal Processing

Mode of Instruction: internship

Language: German

Contact Hours: 6

Contents:

The specific task from the wide field of multimodal real-time signal processing is designed every year.

Literature:

Literature references will be announced at the beginning of the semester depending on the topic.

Examination

Practical Module Multimodal Real Time Signal Processing

practical exam

Module INF-0183: Practical Module Game Programming *Praktikum Spieleprogrammierung*		8 ECTS/LP
Version 1.0.0 (since SoSe13) Person responsible for module: Prof. Dr. Elisabeth André		
Learning Outcomes / Competences: After successful participation in this module, students understand the essential concepts of game development. They are able to plan larger project tasks in small teams, to solve them according to a self-developed project plan and to discuss and present the results appropriately in plenary sessions. They are able to translate technical solution concepts into programs and models and master the selection and safe application of suitable methods. They have the knowledge of the way of thinking and the language of application-relevant disciplines. During the internship, they learn to evaluate various components of a game in a scientifically meaningful way using suitable methods, to develop the methods and algorithms independently and to implement them technically. The skills of confident and convincing presentation of ideas and concepts, comprehensible presentation and documentation of results as well as logical, analytical and conceptual thinking are also particularly promoted in this context. **Key qualifications:** Skill in confident and persuasive presentation of ideas and concepts; knowledge of the thinking and language of application-relevant disciplines; understanding of team processes; skill in working in teams; ability to lead teams; skill in comprehensible presentation and documentation of results; ability to expand existing knowledge independently; ability to contribute to science; competence in recognizing significant technical developments; quality awareness, meticulousness.		
Workload: Total: 240 h 90 h internship / practical course (attendance) 150 h studying of course content through exercises / case studies (self-study)		
Conditions: Module Foundations of Game Programming (INF-0179) - recommended		
Frequency: each winter semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Practical Module Game Programming

Mode of Instruction: internship

Language: German

Contact Hours: 6

Contents:

A game is to be developed within the internship. The content focus of the internship is determined each year.

Literature:

References will be announced at the beginning of the semester.

Examination

Practical Module Game Programming

practical exam

Module INF-0217: Practical Module Autonomous Driving *Praktikum Autonomes Fahren*			10 ECTS/LP
Version 2.0.0 (since WS21/22) Person responsible for module: Prof. Dr. Bernhard Bauer Prof. Dr. Lars Mikelsons			
Learning Outcomes / Competences: After participating in the practical course on autonomous driving, students will be able to solve practical problems of high complexity in conceptual design, development, and safeguarding of highly automated/autonomous vehicles using current methods and tools of model-based development. The students acquire in-depth subject-specific and interdisciplinary knowledge and skills, for example, from hardware-related computer science, software engineering, and the underlying driving physics and mathematics. They are able to develop concepts, methods, procedures, techniques, and technologies of the mentioned field in research projects and are able to apply innovative approaches in solving problems. This enables them to link up with international research and make their scientific contribution to the field. In addition, students have the teamwork and communication skills, the ability to research literature and the scientific methodology to discuss problems in the area, define intermediate goals, and critically evaluate, classify, combine, present and document intermediate results and innovative ideas understandably. Key qualification: Ability to think logically, analytically, and conceptually; Independent work with English-language specialist literature; Understandable, confident, and convincing presentation of ideas, concepts, and results; Quality awareness; Communication skills; Ability to work in teams and understand team processes; Project management skills.			
Remarks: The practical course is offered alternately by the two chairs mentioned above.			
Workload: Total: 300 h 150 h internship / practical course (attendance) 150 h studying of course content through exercises / case studies (self-study)			
Conditions: Participation in one of the two seminars is recommended. Module Seminar Basics of Software Engineering for Automotive Systems (BA) (INF-0027) - recommended Module Seminar Basics of Software Engineering for Automotive Systems (MA) (INF-0040) - recommended			
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]	
Contact Hours: 10	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Praktikum Autonomes Fahren **Mode of Instruction:** internship **Language:** German / English **Contact Hours:** 10

Contents:

In this practical course, the participants learn how various selected partial aspects of autonomous driving can be implemented, simulated, and analyzed.

In addition, the participants will get to know, among other things, development tools frequently used in the automotive environment.

After an introductory course, the participants will implement autonomous driving functions in small groups with the help of the tools mentioned.

The developed results are finally demonstrated and evaluated.

Assigned Courses:

Praktikum über Autonomes Fahren (internship)

Examination

Praktikum Autonomes Fahren

portfolio exam

Module INF-0227: Seminar Database Systems Master *Seminar Datenbanksysteme für Master*		4 ECTS/LP
Version 1.0.0 (since SoSe16) Person responsible for module: Prof. Dr. Peter Michael Fischer		

Learning Outcomes / Competences:
After attending the seminar, students are able to independently develop, analyze and evaluate advanced problems, concepts, methods, procedures, techniques and technologies in the field of database systems in relation to the individual seminar topic from the mentioned field.
They have the scientific methodology, communication skills and ability to use appropriate media to present a specific topic in a clear and understandable manner, both verbally and in writing, and to critically and argumentatively discuss and evaluate scientifically challenging topics from the named field. They will also be able to recognize the logical structures of reasoning and argumentation and use them in a goal-oriented manner.
The participants can formulate clearly and comprehensibly and present specialist content freely. They understand how to structure a lecture in a clear and comprehensible way and how to focus the lecture on essential messages and convey them in a comprehensible way, even in the case of complex content. They skilfully apply chains of argumentation and solution strategies in the event of disruptions.
The students understand how to present themselves and how to deal confidently with common presentation media and to use them interactively. They manage to gear a lecture to a specific target group and to motivate the listener even during longer lecture durations and to apply various moderation techniques.
Key qualifications: Literature research; Independent work with English-language specialist literature; Analytical-methodical competence; Scientific methodology; Principles of good scientific practice; Skill in the comprehensible, confident and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts and results and for their documentation; Skill in logical, abstract, analytical and conceptual thinking and formal argumentation; Quality awareness, meticulousness; Communication skills; Time management; Evaluation of approaches, procedures, techniques and technologies from different points of view.

Workload:
Total: 120 h
90 h preparation of written term papers (self-study)
30 h seminar (attendance)

Conditions: Module Database Systems (INF-0073) - recommended		
Frequency: irregular (usu. summer semester)	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Datenbanksysteme für Master
Mode of Instruction: seminar
Language: German / English
Contact Hours: 2

Contents:
Current research contributions from the field of "Databases and Information Systems".

Literature:
Current research contributions

Assigned Courses:

Seminar Datenbanksysteme für Master (seminar)

Examination

lecture and written elaboration

seminar

Module INF-0232: Seminar Medical Information Sciences (MA) *Seminar Medical Information Sciences (MA)*		4 ECTS/LP
Version 1.0.0 (since WS16/17) Person responsible for module: Prof. Dr. Bernhard Bauer		
Learning Outcomes / Competences: After attending the seminar, the students are able to independently work out, analyze and evaluate advanced problems, concepts, methods, procedures, techniques, and technologies in the field of Medical Information Sciences concerning the particular seminar topic from the named field. They have the scientific methodology, communication skills, and ability to use appropriate media to present a specific case clearly and comprehensibly in speech and writing and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively. Furthermore, they can recognize the logical structures of thinking and argumentation and use them goal-oriented. The participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a lecture clearly and understandably, focus the study on important messages, and convey them in a comprehensible way, even with complex content. They skillfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to present themselves and confidently deal with joint presentation media and use them interactively. They manage to gear a lecture to a specific target group, motivate the listener even during longer lecture durations, and apply various moderation techniques. Key qualifications: Literature research; independent work with English-language specialist literature; analytical-methodical competence; scientific methodology; principles of good scientific practice; skills in the understandable, confident, and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts, and results and in documenting them; skills in logical, abstract, analytical and conceptual thinking and formal argumentation; quality awareness, meticulousness; communication skills; time management; evaluation of approaches, procedures, techniques, and technologies from different points of view. Translated with www.DeepL.com/Translator (free version)		
Workload: Total: 120 h 90 h preparation of written term papers (self-study) 30 h seminar (attendance)		
Conditions: none		
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Medical Information Sciences (Seminar) **Mode of Instruction:** seminar **Language:** German **Contact Hours:** 2
Contents: This seminar will cover the basics of Medical Information Sciences. Various topics are to be worked on, which are to serve as a basis for a subsequent practical course.
Literature: Will be presented at the respective kick-off event.
Assigned Courses: **Seminar Medical Information Sciences (Master)** (seminar)

Examination

Presentation and written paper

seminar

Module INF-0240: Seminar Information Systems Master *Seminar Informationssysteme für Master*		4 ECTS/LP
Version 1.0.0 (since WS16/17) Person responsible for module: Prof. Dr. Peter Michael Fischer		
Learning Outcomes / Competences: After attending the seminar, students are able to independently develop, analyze and evaluate advanced problems, concepts, methods, procedures, techniques and technologies in the field of information systems related to the individual seminar topic from the mentioned field. They have the scientific methodology, communication skills and ability to use appropriate media to present a specific topic in a clear and comprehensible manner, both verbally and in writing, and to critically and argumentatively discuss and evaluate scientifically challenging topics from the named field. They will also be able to recognize the logical structures of reasoning and argumentation and use them in a goal-oriented manner. The participants can formulate clearly and comprehensibly and present specialist content freely. They understand how to structure a lecture in a clear and comprehensible way and how to focus the lecture on essential messages and convey them in a comprehensible way, even in the case of complex content. They skilfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to present themselves and how to deal confidently with common presentation media and to use them interactively. They manage to gear a lecture to a specific target group and to motivate the listener even during longer lecture durations and to apply various moderation techniques. **Key qualifications:** Literature research; Independent work with English-language specialist literature; Analytical-methodical competence; Scientific methodology; Principles of good scientific practice; Skill in the comprehensible, confident and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts and results and for their documentation; Skill in logical, abstract, analytical and conceptual thinking and formal argumentation; Quality awareness, meticulousness; Communication skills; Time management; Evaluation of approaches, procedures, techniques and technologies from different points of view.		
Workload: Total: 120 h 30 h seminar (attendance) 90 h preparation of written term papers (self-study)		
Conditions: Module Database Systems (INF-0073) - recommended		
Frequency: irregular (usu. winter semester)	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Seminar Informationssysteme für Master **Mode of Instruction:** seminar **Language:** German / English **Contact Hours:** 2
Contents: Current research contributions from the field of "Databases and Information Systems".
Literature: Current research contributions

Examination

Lecture and written elaboration

seminar

Module INF-0247: Practical Module on Digital Manufacturing *Praktikum für Produktionsinformatik (Vertiefung)*		6 ECTS/LP
Version 1.0.0 (since SoSe17) Person responsible for module: Prof. Dr.-Ing. Johannes Schilp		

Learning Outcomes / Competences:
Students work through the digital product development process in small groups using an industry-related example. They are able to independently analyze engineering tasks and develop solution concepts. The knowledge from the engineering fundamentals is deepened by application examples. You will be able to use selected CAx programs (CATIA V5, PlantSim, FreeCAD) for the development of a product. The practical course provides an introduction to the following topics:
1. CAD design
2. FEM analysis
3. topology optimization
4. production planning
5. mathematical optimization
Key qualifications: Teamwork and communication skills, structured and conscientious work, application-oriented problem solving, result evaluation and
-documentation, weighing of solutions, ability to think logically, analytically and conceptually, ability to think abstractly.

Workload:
Total: 180 h
10 h preparation of presentations (self-study)
40 h preparation of written term papers (self-study)
10 h lecture (attendance)
60 h internship / practical course (attendance)
60 h studying of course content through exercises / case studies (self-study)

Conditions: Grundkenntnisse in CATIA V5 empfehlenswert		
Frequency: each winter semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Praktikum für Produktionsinformatik (Vertiefung)
Mode of Instruction: internship
Language: German
Contact Hours: 4
ECTS Credits: 6.0

Contents:
Students work in small groups on application-oriented tasks on topics in the industrial environment.
The time schedule of this internship will be announced in Digicampus.

Examination
Praktikum für Produktionsinformatik (Vertiefung)
internship

Module INF-0250: Practical Module Reinforcement Learning *Praktikum Reinforcement Learning*		8 ECTS/LP
Version 1.3.0 (since SoSe17) Person responsible for module: Prof. Dr. Elisabeth André		
Learning Outcomes / Competences: After successful participation in this module, students understand the essential concepts of reinforcement learning. They are able to plan larger project tasks in small teams, to solve them according to a self-developed project plan and to discuss and present the results appropriately in plenary sessions. You are able to translate technical solution concepts into programs and models and are proficient in the selection and confident application of appropriate methods. They have the knowledge of the way of thinking and the language of application-relevant disciplines. During the internship, they learn to evaluate learning components in a scientifically meaningful way using suitable methods, to develop the methods and algorithms independently and to implement them technically. The skills of confident and convincing presentation of ideas and concepts, comprehensible presentation and documentation of results, as well as logical, analytical and conceptual thinking are also particularly promoted in this context. **Key qualifications:** Skill in confident and persuasive presentation of ideas and concepts; knowledge of the thinking and language of application-relevant disciplines; understanding of team processes; skill in working in teams; ability to lead teams; skill in comprehensible presentation and documentation of results; ability to expand existing knowledge independently; ability to contribute to science; competence in recognizing significant technical developments; quality awareness, meticulousness.		
Workload: Total: 240 h 150 h studying of course content through exercises / case studies (self-study) 90 h internship / practical course (attendance)		
Conditions: Programming experience Module Reinforcement Learning (INF-0207) - recommended		
Frequency: each summer semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Practical Module Reinforcement Learning **Mode of Instruction:** internship **Language:** German **Contact Hours:** 6
Contents: The specific task from the field of "reinforcement learning" is designed anew each semester.
Assigned Courses: **Praktikum Reinforcement Learning** (internship)

Examination
Practical Module Reinforcement Learning practical exam **Description:** Exception summer term 2020: practical exam

Module INF-0251: Seminar Artificial Intelligence *Seminar Artificial Intelligence*			4 ECTS/LP
Version 1.0.0 (since SoSe17) Person responsible for module: PD Dr. Jonghwa Kim			
Contents: The seminar will take place as a block seminar at the end of June for summer term or mid-December for winter term. The topic area for this seminar will be redefined annually, taking into account new trends in "Artificial Intelligence and Intelligent Systems".			
Learning Outcomes / Competences: After attending the seminar, students are able to independently develop, analyze and evaluate advanced problems, concepts, methods, procedures, techniques and technologies in the field of "Artificial Intelligence and Intelligent Systems" in relation to the individual seminar topic from the mentioned field. They have the scientific methodology, communication skills and ability to use appropriate media to present a specific topic clearly and comprehensibly, both verbally and in writing, and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively. They will also be able to recognize the logical structures of reasoning and argumentation and use them in a goal-oriented manner. The participants can formulate clearly and comprehensibly and present specialist content freely. They understand how to structure a lecture in a clear and comprehensible way and how to focus the lecture on essential messages and convey them in a comprehensible way, even in the case of complex content. They skilfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to present themselves and how to deal confidently with common presentation media and to use them interactively. They manage to gear a lecture to a specific target group and to motivate the listener even during longer lecture durations and to apply various moderation techniques. **Key qualifications:** Evaluation of approaches, procedures, techniques and technologies from different points of view; literature research; independent work with English-language technical literature; analytical-methodical competence; scientific methodology; principles of good scientific practice; skill in the comprehensible, confident and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts and results and in documenting them; skill in logical, abstract, analytical and conceptual thinking and formal argumentation; quality awareness, meticulousness; communication skills; time management.			
Workload: Total: 120 h 30 h seminar (attendance) 90 h preparation of written term papers (self-study)			
Conditions: none		**Credit Requirements:** Passing the module exam	
Frequency: usu. at least once per acad. year	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]	
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Seminar Artificial Intelligence **Mode of Instruction:** seminar **Language:** German / English **Contact Hours:** 2 **ECTS Credits:** 4.0

Contents:

The seminar will take place as a block seminar at the end of June for summer term or mid-December for winter term. The topic area for this seminar will be redefined annually, taking into account new trends in "Artificial Intelligence and Intelligent Systems".

Literature:

current research literature

Assigned Courses:

Seminar Artificial Intelligence (Master) (seminar)

Examination

Seminar Artificial Intelligence

written/oral exam

Module INF-0272: Intelligent Signal Analysis in Medicine *Intelligente Signalanalyse in der Medizin*		5 ECTS/LP
Version 1.1.0 (since WS17/18) Person responsible for module: Prof. Dr. Björn Schuller		
Learning Outcomes / Competences: **Knowledge:** The students learn the principal concepts of sequential signal processing, signal source separation, and feature extraction and information reduction exemplified by medically relevant audio and bio signals. They further gain insight into machine learning principles such as learning dynamics and context as is needed for many intelligent signal analysis tasks. They will learn about different problems and solutions in the analysis of a variety of signals relevant in the context of health care, wellbeing, and general medical signals analysis. Students will get to know the mindset of modern machine learning, computer-aided health care, and get to know ethical implications. **Skills:** The students will be able to choose appropriate algorithms of signal processing and machine intelligence, further develop these, design new solutions, and apply these to a broad range of medical signal analysis problems. They will practice to think logically and conceptionally in order to select appropriate solutions to a given task. Students will be able to recognise important technical developments in the field of signal processing, machine learning and e-Health/m-Health. **Competences:** The students are able to characterise, judge on the quality and suitability, and design suited algorithmic solutions for intelligent signal analysis with a focus on medical signals. They are further able to realise the learnt concepts in programs and machine learning models. Participants will be able to analyse and structure complex and practice-oriented problems in the field of m-Health and e-Health and to find suitable and state-of-the-art solutions. They know how to make scientifically meaningful evaluations of proposed systems. They will further learn how to document and present results in a reasonable and meaningful way. **Key skills:** Formal methods; Knowledge of advantages and disadvantages of different design alternatives; Systematical advancement of design tools; Ability to work in teams; Knowledge of workflows and processes; Ability to find solutions for practical problems; Ability to work autonomously; Quality awareness; Scientific working; Literature research.		
Workload: Total: 150 h 30 h exercise course (attendance) 30 h lecture (attendance) 60 h studying of course content through exercises / case studies (self-study) 15 h studying of course content using literarture (self-study) 15 h studying of course content using provided materials (self-study)		
Conditions: Knowledge of basic mathematic lectures should be present.		
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Intelligente Signalanalyse in der Medizin (Vorlesung) **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 2

Contents:

Topics: Basics of Signal Processing, Signal Source Separation, Data Acquisition and Annotation, Audio-Visual Feature Extraction, Machine Learning, e-Health, m-Health, Ethics, Python, Machine Learning Toolkits.

Literature:

Björn Schuller: "*Intelligent Audio Analysis",* Signals and Communication Technology, Springer, ISBN: 978-3642368059, 2013.

Part of the Module: Intelligente Signalanalyse in der Medizin (Übung)

Mode of Instruction: exercise course

Language: English

Frequency: irregular (usu. summer semester)

Contact Hours: 2

Examination

Intelligente Signalanalyse in der Medizin (Klausur)

written exam / length of examination: 90 minutes

Module INF-0273: Practical Module Sensing for Fitness and Wellbeing *Praktikum Mobile Sensing for Fitness and Wellbeing*		5 ECTS/LP
Version 1.0.0 (since WS17/18) Person responsible for module: Prof. Dr. Björn Schuller		
Learning Outcomes / Competences: Students learn to realise concepts and models of sensing health- and fitness-related parameters on smart devices. They learn how to acquire signals from different modalities and sensors and to implement algorithms of pattern recognition on mobile devices. After participation in the Praktikum, students know how to analyse and structure complex problems in the field and to select suitable and state-of-the-art approaches to their solution. Participants are trained in their analytical and conceptional skills as well as in practical programming skills to transfer their knowledge to a practical task. They learn how to make scientifically meaningful assessments of their system using appropriate methods. They will know the mindset of two different fields, software development and machine learning. All knowledged obtained during the Praktikum is applied in practice-oriented tasks. Furthermore, after participation, students will be able to recognise important technical evolution in the field of sensors, mobile apps and related tools, and intelligent signal analysis. Students will work in teams and organise their work and task distribution in an autonomous way. They will learn how to summarise, present and document results in a reasonable way **Key skills:** Formal methods; Methods for software development and abstraction; Versioning tools; Knowledge of advantages and disadvantages of different design alternatives; Systematical advancement of design tools; Ability to work in teams, Understanding of team management; Knowledge of workflows and processes; Ability to find solutions for practical problems; Ability to work autonomously; Quality Awareness.		
Workload: Total: 150 h 60 h internship / practical course (attendance) 90 h studying of course content through exercises / case studies (self-study)		
Conditions: none		
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Practical Module Sensing for Fitness and Wellbeing **Mode of Instruction:** internship **Language:** English **Frequency:** each winter semester **Contact Hours:** 4

Contents:

Research in the field of m-Health is focussed on the design and development of sensors, systems, and applications to recognise, interpret and simulate human states w.r.t. fitness, health, and wellbeing.
In this Praktikum, students will experience in designing relevant systems, which are using modalities originating from different sensors, such as, vital signs, audio, speech, and video. In small teams, they will implement and evaluate an application running on a smart device.

Literature:

To be announced by the lecturer

Examination

Practical Module Sensing for Fitness and Wellbeing

internship

Module INF-0274: Seminar Embedded Intelligence for Health Care and Wellbeing (Master) *Seminar Embedded Intelligence for Health Care and Wellbeing (Master)*		4 ECTS/LP
Version 1.0.0 (since WS17/18) Person responsible for module: Prof. Dr. Björn Schuller		
Learning Outcomes / Competences: After attending the seminar, students will be able to autonomously acquire and understand advanced problem statements, concepts, methods, approaches, techniques, and technologies in the field of Embedded Intelligence for Health Care and Wellbeing. They possess the scientific techniques, communication skills, and the ability to employ suitable media, to present understandingly a special topic in spoken and written, and to discuss and evaluate scientifically challenging themes from the field in a critical way. Furthermore, they can recognise logical structures of thinking and debating and employ them constructively. Participants can express themselves in a clear and understandable way and present scientific topics. They understand how to structure a talk, to focus it - also given a complex content - on the essential messages, and to communicate them in a suitable way. The lines of arguments and strategies in case of disturbances are applied by the students. Students know how to perform energetically, to cope with the presentation media and to use them interactively. They manage to orient a talk toward a certain audience, to motivate the listeners also over a longer duration, and to employ different methods of moderation. **Key skills:** Fundamentals of good scientific practice; Analytical-methodological competency; Time management; Literature research; Self-contained work with English technical literature; Communication skills; Ability to present (in written and spoken) practical and theoretical ideas in an understandable, confident, and convincing way; Writing a report in the markup language LaTeX; Evaluation of methods, technologies, and solutions w.r.t. different aspects; Quality awareness.		
Workload: Total: 120 h 90 h preparation of written term papers (self-study) 30 h seminar (attendance)		
Conditions: none		
Frequency: irregular	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Embedded Intelligence for Health Care and Wellbeing (Master)
Mode of Instruction: seminar
Language: German / English
Contact Hours: 2

Contents:

In the seminar Embedded Intelligence for Health Care and Wellbeing, recent research works in this field are going to be discussed. This comprises both the acquisition of data through sensors and (e.g., microphones or electrodes) and the analysis and the modelling of the data. One important aspect is also the practicability of modern deep learning methods. Health Care and Wellbeing applications reach from tracking of health states (e.g., epilepsy or depression) to personal assistance services.
The participating students will work on a certain aspect, supervised by a research associate of the chair. They will summarise their results in a written report and an oral presentation.

Topics: E-Health, M-Health, Sensor Signal Analysis, Vital Signs, Big Data.

Literature:

Wird vom Dozenten oder der Dozentin bekannt gegeben

Examination

Vortrag und schriftliche Ausarbeitung

seminar

Module INF-0275: Project Module Embedded Intelligence for Health Care and Wellbeing *Projektmodul Embedded Intelligence for Health Care and Wellbeing*		10 ECTS/LP
Version 1.1.0 (since WS17/18) Person responsible for module: Prof. Dr. Björn Schuller		
Learning Outcomes / Competences: After participating in the project module, the students understand problems of higher complexity in the field of embedded systems and intelligent signal analysis, especially for applications in medical and sports informatics, and have in-depth specialist knowledge and skills there. They can develop concepts, methods, procedures, techniques and technologies in the area mentioned in research projects and are able to apply innovative methods to solve problems. This enables them to tie in with international research and make their own scientific contribution in this field. In addition, the students have the team and communication skills, the ability to research literature and the scientific methodology to discuss problems in the field, to define intermediate goals, as well as to critically evaluate, classify, combine and present intermediate results and innovative ideas. **Key Qualifications:** Ability to think logically, analytically and conceptually; Independent work with English-language specialist literature; understandable and convincing presentation of ideas, concepts and results; quality awareness; communication skills; team collaboration skills and understanding of team processes; principles of good scientific practice; project management skills; scientific methodology; software development and testing.		
Workload: Total: 300 h 285 h internship / practical course (self-study) 15 h seminar (attendance)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Projektmodul Embedded Intelligence for Health Care and Wellbeing

Mode of Instruction: internship

Language: German / English

Contact Hours: 1

Contents:

Autonomous collaboration on current research topics.

Literature:

Scientific publications; manuals; is provided by the chair.

Assigned Courses:

Oberseminar Embedded Intelligence for Health Care and Wellbeing

Examination

Vortrag und schriftliche Ausarbeitung

internship

Module INF-0277: Analyzing Massive Data Sets *Analyzing Massive Data Sets*	8 ECTS/LP

Version 1.2.0 (since SoSe18)
Person responsible for module: Prof. Dr. Peter Michael Fischer

Learning Outcomes / Competences:
After attending the course, students will be able to understand and evaluate the concepts and methods, procedures, techniques, and technologies for analyzing massively large data sets. Possible content includes:

- Fundamentals of information retrieval
- Similarity search and clustering
- Analysis of data streams and temporal data
- Web graphs: Link analysis and social networks
- Dynamic networks and information diffusion
- Recommender systems and online advertising
- Computational methods for massive data sets

Students will also be able to implement technical solution concepts for analyzing large data sets in programs.
Key Skills: Ability to think logically, analytically and conceptually, weigh up approaches to solutions, acquire abstraction skills; subject-specific in-depth knowledge; implement subject-specific solution concepts in programs and models; knowledge of the advantages/disadvantages of design alternatives and evaluation in the respective application context; selection and confident application of suitable methods; ability to make scientifically meaningful evaluations using suitable methods; ability to solve problems under practical boundary conditions; competence in recognizing significant technical developments;

Workload:
Total: 240 h
30 h studying of course content using literarture (self-study)
90 h studying of course content through exercises / case studies (self-study)
30 h studying of course content using provided materials (self-study)
60 h lecture (attendance)
30 h exercise course (attendance)

Conditions:
Module Database Systems (INF-0073) - recommended
Module Discrete structures for computer science (INF-0109) - recommended
Module Computer Science 3 (INF-0111) - recommended

Frequency: irregular (usu. summer semester)	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Analyzing Massive Data Sets (Vorlesung)
Mode of Instruction: lecture
Language: English
Contact Hours: 4

Contents:
The lecture covers basic concepts for the analysis of massively large data sets
such as information extraction, similarity search, clustering, link and network analysis
as well as their implementation.

Literature:

• Mining of Massive Datasets. J. Leskovec, A. Rajaraman, J.D. Ullman. Cambridge UniversityPress, 2014
• D. Easley, J. Kleinberg.Networks, Crowds, and Markets: Reasoning About a Highly Connected World.Cambridge University Press, 2010.
• R. Baeza-Yates, B. Ribeiro-Neto: Modern Information Retrieval

Weitere Literatur wird in der Vorlesung bekannt gegeben

Part of the Module: Analyzing Massive Data Sets (Übung)

Mode of Instruction: exercise course
Language: English / German
Contact Hours: 2

Examination

Analyzing Massive Data Sets
written exam / length of examination: 90 minutes

Module INF-0279: Music Informatics *Music Informatics*	5 ECTS/LP
Version 1.3.0 (since SoSe18) Person responsible for module: Prof. Dr. Björn Schuller	

Learning Outcomes / Competences:

Knowledge: The course Music Informatics presents the fundamental concepts of music theory and the music language and its representation in the visual, symbolic, and acoustic domain. Several digital formats for music symbolic representation, such as Music XML, MEI, Kern**, and MIDI protocol, as well as open source tools such as LilyPond and Csound will be introduced. Machine learning principles and techniques with applications in music information retrieval and computational musicology will be practically applied. Students will learn about different problems and solutions in the analysis of symbolic and acoustic music data. Students will get to know the mindset from both sides, the musicological and the computer scientist perspective.

Skills: The students will understand the basic principles of music theory and its representation in digital language, being able to analyse, interpret, and create musical samples in a variety of symbolic formats and programming languages. They will learn to apply machine learning procedures, such as feature extraction and pattern recognition, to music information retrieval problems, such as key detection and music-score synchronisation, amongst other. After participation, students will know how to advance existing concepts and approaches in the field of music informatics and data analysis. Furthermore, they will be able to recognise important technical developments in the field of data science and signal processing.

Competences: By integrating basic principles of music theory, its representation in digital language, and machine learning techniques, the students will be able to identify new problems and solutions in the field of music information retrieval considering a variety of musical styles and genres. The students are able to characterise, judge on the quality and suitability, and design suited algorithmic solutions for music data analysis in both the symbolic and the audio domain.
Participants will be able to analyse and structure complex and practice-oriented problems in the field of music informatics and to find suitable solutions, by using state-of-the-art tools and complementary methods, if needed. They know how to make scientifically meaningful evaluations of proposed systems. They will further learn how to document and present results in a reasonable and meaningful way.

Key skills: Computational musicology, Music theory, Digital Music Representation, Basics of Signal Processing, Machine Learning, Music Information Retrieval, Knowledge of advantages and disadvantages of different design alternatives; Systematical advancement of design tools; Ability to work in teams; Knowledge of workflows and processes; Ability to find solutions for practical problems; Ability to work autonomously; Quality awareness; Scientific working; Literature research.

Workload:
Total: 150 h
15 h studying of course content using provided materials (self-study)
60 h studying of course content through exercises / case studies (self-study)
15 h studying of course content using literarture (self-study)
30 h exercise course (attendance)
30 h lecture (attendance)

Conditions: Knowledge of basic mathematic lectures should be present		
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]

Contact Hours: 4	Repeat Exams Permitted: according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Music Informatics (Lecture)
Mode of Instruction: lecture
Language: English
Frequency: each summer semester
Contact Hours: 2

Contents:

In Music Informatics, the basic principles of music theory will be presented from both the traditional and computational point of view. Music will be evaluated in three domains: visual, symbolic, and acoustic; and for each of them: formats, programming languages, and machine learning tools will be studied. This course will give a basic introduction to music information retrieval and computational musicology by identify problems and solutions for different kinds of musical genres and styles.

Literature:

- Meinard Müller: *"Fundamentals of Music Processing: Audio, Analysis, Algorithms,* Applications." Springer, ISBN: 978-3-319-21944-8. 2015.
- Björn Schuller: *"Intelligent Audio Analysis",* Signals and Communication Technology, Springer, ISBN: 978-3642368059, 2013.

Part of the Module: Music Informatics (Tutorial)
Mode of Instruction: exercise course
Language: English
Frequency: each summer semester
Contact Hours: 2

Examination
Music Informatics (Exam)

written exam / length of examination: 90 minutes

Module INF-0284: Practical Module Mobile Application Development *Praktikum Mobile Application Development*		5 ECTS/LP
Version 1.0.0 (since SoSe18) Person responsible for module: Prof. Dr. Björn Schuller		
Learning Outcomes / Competences: Students learn to realise concepts and models of mobile application development on the Android platform. They learn how to acquire data and signals from different sensors and to implement algorithms of pattern recognition and data/ signal analysis on mobile devices. After participation in the Praktikum, students know how to analyse and structure complex problems in the field and to select suitable and state-of-the-art approaches to their solution. Participants are trained in their analytical and conceptional skills as well as in practical programming skills to transfer their knowledge to a practical task. They learn how to make scientifically meaningful assessments of their system using appropriate methods. They will know the mindset and thinking of application development and software engineering. All knowledged obtained during the Praktikum is applied in practice-oriented tasks. Furthermore, after participation, students will be able to recognise important technical evolution in the field of sensors, mobile apps and related tools, and smart devices. Students will work in teams and organise their work and task distribution in an autonomous way. They will learn how to summarise, present and document results in a reasonable way. **Key skills:** Formal methods; Methods for software development and abstraction; Versioning tools; Knowledge of advantages and disadvantages of different design alternatives; Systematical advancement of design tools; Ability to work in teams, Understanding of team management; Knowledge of workflows and processes; Ability to find solutions for practical problems; Ability to work autonomously; Quality Awareness.		
Workload: Total: 150 h 60 h internship / practical course (attendance) 90 h studying of course content through exercises / case studies (self-study)		
Conditions: Programming skills in Java are required.		
Frequency: irregular (usu. summer semester)	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Praktikum Mobile Application Development **Mode of Instruction:** internship **Language:** English **Contact Hours:** 4

Contents:

In the Praktikum Mobile Application Development, students will develop software for the Android platform in groups of 2-4 students.

Students will get to know and to program several groups of Android devices, e.g., mobiles and wearables, and respective sensors. They will familiarise with the Android Studio IDE, the according toolchain and the code management tool Gi.

Topics: Java, Android, App development, UI design, Audio Player, Map and Location, Camera control, Mobile devices, Intelligent signal processing, Wearables.

Literature:

The literature is going to be announced by the lecturers during the course.

Examination

Praktikum Mobile Application Development

internship

Module INF-0291: Practical Module Self-Learning Systems *Praktikum Selbstlernende Systeme*	8 ECTS/LP

Version 1.2.0 (since WS18/19)
Person responsible for module: Prof. Dr. Jörg Hähner

Learning Outcomes / Competences:
After participating in the practical course, the students are able to understand and solve problems (of higher complexity) in the field of "machine learning methods". They can compare and classify different methods and apply them independently to concrete examples from practice. Students can evaluate intelligent systems in terms of the algorithmic solution and are further familiar with procedures for evaluating the performance of an intelligent system. They are also able to plan larger project tasks (development of software modules) in small teams, to solve them according to a self-developed project plan and to discuss the results appropriately in the plenum and present them as a team. Furthermore, they can recognise and classify significant technical developments in the field of "machine learning".

Key qualifications:

- Skill in analysing and structuring complex computer science problems, skills in developing and implementing solution strategies.
- Competence to combine different subject areas
- Presentation and documentation of (own) results
- Analytical methodical competence
- Ability to work productively and purposefully in a team
- Meticulous work
- Interdisciplinary knowledge
- Systematic further development of design models
- Time management skills
- Independent literature research on related topics
- Principles of good scientific practice

Workload:
Total: 240 h
225 h internship / practical course (self-study)
15 h (attendance)

Conditions: Recommended: Module Organic Computing II (INF-0066), programming experience, ability to work in a team Module Organic Computing II (INF-0066) - recommended		**Credit Requirements:** Passing the module exam
Frequency: each semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Praktikum Selbstlernende Systeme **Mode of Instruction:** internship **Lecturers:** Prof. Dr. Jörg Hähner **Language:** German **Contact Hours:** 2 **ECTS Credits:** 8.0
Contents: In the practical module Self-Learning Systems, students learn about different methods from the field of machine learning and, above all, implement them themselves. The necessary theoretical foundations are laid in an introductory course and then applied in small groups to concrete practical examples.
Literature: current scientific papers
Assigned Courses: **Praktikum zu Selbstlernende Systeme** (internship)
Examination **Praktikum Selbstlernende Systeme** portfolio exam, combination of practical and written-oral exam **Description:** written submission, software acceptance, final presentation

Module INF-0293: Advanced Deep Learning *Advanced Deep Learning*		8 ECTS/LP
Version 1.0.0 (since WS18/19) Person responsible for module: Prof. Dr. Rainer Lienhart		
Learning Outcomes / Competences: After participating in the practical module, students have detailed and up-to-date knowledge in the field of machine learning, can identify significant technical developments and can implement a complete pipeline for multimodal data processing with deep neural networks. They can precisely describe and discuss problems and results in the field and apply learned concepts and methods to similar problems in machine learning. In addition, the students analyse advanced concepts, methods, procedures, techniques and technologies from the field of machine learning to apply them in research projects, transfer them to current industry-related tasks and actively participate in them. The students learn to transfer scientifically challenging topics in the field of machine learning to other research questions and, building on this, to work out a complex project in group work. They also have the teamwork and communication skills to discuss problems in the field, to discuss, describe and present questions and interim results. In addition, students can conduct detailed experiments and assess, compare and check results for plausibility. **Key qualifications:** Advanced mathematical-formal methodology; Translating subject-specific solution concepts into programs and models; Methods for developing larger software systems, construction of abstractions and architectures; Interdisciplinary knowledge; Systematic further development of design methods; Skill of confident and convincing presentation of ideas and concepts; Understanding of team processes; Skill of working in teams; Ability to lead teams; Familiarity with procedures and processes in the application environment of computer science; Skill of solving problems under practical boundary conditions; Self-reflection; Responsible action against the background of inadequacy and conflicting interests; Ability to expand existing knowledge independently; Quality awareness, meticulousness		
Workload: Total: 240 h 30 h studying of course content using provided materials (self-study) 30 h studying of course content using literarture (self-study) 120 h studying of course content through exercises / case studies (self-study) 20 h lecture (attendance) 40 h exercise course (attendance)		
Conditions: Fundamental knowledge in computer vision (basic studies lectures "Multimedia Grundlagen 1", "Grundlagen der Signalverarbeitung und des Maschinellen Lernens", "Multimedia Grundlagen 2" as well as master's lectures "Multimedia 2" and "Machine Learning and Computer Vision")		**Credit Requirements:** Passing the portfolio examination
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Advanced Deep Learning (Lecture) **Mode of Instruction:** lecture **Language:** German **Contact Hours:** 2

Contents:

- Deep Learning in general
- Deep Convolutional Neural Networks
- Transfer Learning
- Recurrent Neural Networks / LSTM Networks
- Natural Language Processing
- Multimodal Fusion (Vision+Language)
- Application: Image Captioning

Part of the Module: Advanced Deep Learning (Tutorial)

Mode of Instruction: exercise course

Language: German

Contact Hours: 4

Examination

Advanced Deep Learning

portfolio exam, The final grade is made up of assessed exercise sheets and an assessed team project.

Module INF-0294: Speech Pathology *Speech Pathology*	5 ECTS/LP
Version 1.1.0 (since WS18/19) Person responsible for module: Prof. Dr. Björn Schuller	

Learning Outcomes / Competences:

Knowledge: The students learn concepts relating to signal processing, speech production, phonetics, speech and language pathology, speech analysis, feature extraction, denoising and information reduction as exemplified through the analysis of automated voice pathology detection. They further gain insight into machine learning principles, with a particular focus on deep learning solutions, as is needed to diagnose a range of different voice pathologies. They will learn about different problems and solutions in the analysis of a variety of speech, relevant in the context of health care and wellbeing.

Skills: The students will be able to choose appropriate algorithms of signal processing and machine intelligence, further develop these, design new solutions, and apply these to the task of voice pathology detection. They will know how to analyse and structure complex problems in the field, to employ suitable approaches to solve them, and to transfer knowledge to similar tasks. After participation in the course, they will be able to implement approaches and models into programs. Students will be able to assess developed systems in a scientific way. Important technical evolution and novelties in the fields of speech analysis and medical machine learning will be recognised by them.

Competences: The students are able to characterise, judge on the quality and suitability, and design suited algorithmic solutions for intelligent signal analysis with a focus on voice pathology detection. They are further able to present and document results in a reasonable and meaningful way.

Key skills: Formal methods; Knowledge of advantages and disadvantages of different design alternatives; Systematical advancement of design tools; Ability to work in teams; Knowledge of workflows and processes; Ability to find solutions for practical problems; Ability to work autonomously; Quality awareness; Scientific working; Literature research.

Workload:
Total: 150 h
60 h studying of course content through exercises / case studies (self-study)
15 h studying of course content using literarture (self-study)
15 h studying of course content using provided materials (self-study)
30 h exercise course (attendance)
30 h lecture (attendance)

Conditions: Knowledge of basic mathematic lectures should be present.		
Frequency: irregular (usu. summer semester)	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Speech Pathology (Vorlesung)
Mode of Instruction: lecture
Language: English
Frequency: each winter semester
Contact Hours: 2

Contents:

The course "Pathological Speech" will give an introduction to models of speech production (e.g., source-filter models) with a focus on aspects that are relevant to pathologies and their recognition using automated methods of signal processing and machine learning. Moreover, students learn about robust feature extraction, modern methods of machine learning and machine intelligence, and implementation of such systems on devices

Topics: Speech production; Phonetics; Speech and language pathology; Signal processing; Natural language processing; Speech analysis; Feature extraction; Machine learning; Deep learning; Denoising; Information reduction; Healthcare.

Literature:

- Björn Schuller, Anton Batliner: "Computational Paralinguistics: Emotion, Affect and Personality in Speech and Language Processing", Wiley, ISBN: 978-1119971368, 2013.
- Further literature is going to be announced during the lecture.

Part of the Module: Speech Pathology (Übung)

Mode of Instruction: exercise course

Language: English

Frequency: each winter semester

Contact Hours: 2

Examination

Speech Pathology

written exam / length of examination: 90 minutes

Module INF-0296: Practical Module Interactive Machine Learning *Praktikum Interactive Machine Learning*			8 ECTS/LP
Version 1.0.0 (since WS18/19) Person responsible for module: Prof. Dr. Elisabeth André			
Learning Outcomes / Competences: After successful participation in this module, students are familiar with basic concepts of interactive machine learning. They are able to translate domain-specific solution concepts into models and master the selection and safe application of suitable methods. In addition, they will gain an insight into current work in the research area. Furthermore, competencies in the areas of teamwork and communication skills as well as self-organization are taught through the processing of project tasks and their independent project planning. In the context of these project tasks, knowledge of the mindset and language of the research field is fostered through the discussion and presentation of project results. **Key qualifications:** Conversion of technical solution concepts into programs and models; subject-specific consolidation; interdisciplinary knowledge; ability to make scientifically meaningful evaluations using suitable methods; knowledge of the mindset and language of application-relevant disciplines; ability to work in teams; knowledge of practice-relevant tasks; familiarity with procedures and processes in the application environment of computer science; ability to present and document results in a comprehensible manner; ability to expand existing knowledge independently; competence in recognizing significant technical developments.			
Workload: Total: 240 h 90 h internship / practical course (attendance) 150 h studying of course content through exercises / case studies (self-study)			
Conditions: Programming experience			
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]	
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: Practical Module Interactive Machine Learning
Mode of Instruction: internship
Language: German
Contact Hours: 6

Examination
Practical Module Interactive Machine Learning
practical exam

Module INF-0297: Practical Module Processor Design *Praktikum Prozessorbau*		5 ECTS/LP
Version 2.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Sebastian Altmeyer Dr. Martin Frieb		

Learning Outcomes / Competences:

Students acquire competencies in the following areas at an advanced, practical but scientific level: design process for digital circuits, circuit logic and gates, physical principles of electronic components, description of hardware with a hardware description language.

First, students learn how to link logic gates and build a half-adder and a full-adder. They understand the digital circuit design process and apply it directly in a practical way by designing their own RISC-V processor. They model and implement it independently using the hardware description language VHDL. To do this, they learn the advantages and disadvantages of schematic and textual hardware description and can decide when it makes sense to use which variant. Furthermore, they combine synchronous and asynchronous processes to achieve a good interaction of the components of their self-built microprocessor. Finally, students evaluate the efficiency of their implementation based on the clock frequency achieved and the hardware effort required. In a final project phase, they learn to plan a complex task, to solve it according to a self-developed sound project plan and to discuss and present the results appropriately in a plenary session.

Key qualifications: Skill in presenting and documenting ideas, concepts and results in a comprehensible manner; quality awareness, meticulousness; project-bound work and time management; selection and confident use of appropriate methods; ability to expand existing knowledge independently; self-reflection.

Workload:

Total: 150 h

90 h studying of course content through exercises / case studies (self-study)

60 h internship / practical course (attendance)

Conditions: Module Foundations of Technical Computer Science (INF-0138) - recommended Module Processor Architecture (INF-0147) - recommended		
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Praktikum Prozessorbau

Mode of Instruction: internship

Language: German / English

Contact Hours: 4

Contents:

The course "Processor Design" presents methods of logical design of digital circuits, starting with the abstract description in a hardware description language (such as VHDL) up to the physical implementation on transistor level. In the practical part of the course, hardware design is illustrated using the example of a five-stage processor pipeline. The result is an executable processor developed in VHDL for an FPGA prototype board.

Literature:

- Uwe Brinkschulte, Theo Ungerer, Mikrocontroller und Mikroprozessoren, Springer Verlag, Heidelberg, dritte Auflage 2010
- John L. Hennessy, David A. Patterson, Computer Architecture: A Quantitative Approach, Morgan Kaufmann, 5. Auflage, 2011

Assigned Courses:

Praktikum Prozessorbau (internship)

Examination

Praktikum Prozessorbau

practical exam

Module INF-0307: Model-Based Development and Analysis of Software Systems *Modellbasierte Entwicklung und Analyse von Software Systemen*		6 ECTS/LP
Version 1.1.0 (since SoSe19) Person responsible for module: Prof. Dr. Bernhard Bauer		
Learning Outcomes / Competences: Model-based development and analysis of software systems deal with increasing software production efficiency through automation and reuse. In the course, participants learn to apply and compare methods for the model-driven development of software systems. They develop in-depth, subject-specific solution concepts for MDSD. They can evaluate current technologies and standards for MDSD and analyze their applicability in practice-relevant tasks. The participants build up skills for analyzing and structuring complex IT problems in the generation of infrastructure code, subsystems, configurations, or entire applications from models. In doing so, they develop logical, analytical, and conceptual thinking skills and can systematically develop and assess solutions to problems. Key qualification: Interdisciplinary knowledge; competence in networking different subject areas; teamwork and communication skills; ability to expand existing knowledge independently; quality awareness; familiarity with procedures and processes in the application environment of computer science; knowing and understanding formal quantitative principles; ability to present and document results in an understandable way.		
Workload: Total: 180 h 23 h studying of course content using literarture (self-study) 22 h studying of course content using provided materials (self-study) 30 h exercise course (attendance) 45 h lecture (attendance) 60 h studying of course content through exercises / case studies (self-study)		
Conditions: Due to overlaps, the previous course "Model-Driven Software Development" must not have been taken.		
Frequency: each summer semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 5	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Modellbasierte Entwicklung und Analyse von Software Systemen (Vorlesung)

Mode of Instruction: lecture

Language: German

Contact Hours: 3

Contents:

Model-based development and analysis of software systems are concerned with increasing software production efficiency through automation and reuse. Infrastructure code, subsystems, configurations, or entire applications are generated from models.

Literature:

- slides
- Pohl et al. Software Product Line Engineering: Foundations, Principles, and Techniques
- Kleppe et al: MDA explained
- Hitz et al: UML@Work
- Further literature in the lecture

Assigned Courses:

Modellbasierte Entwicklung und Analyse von Software Systemen (lecture)

Part of the Module: Modellbasierte Entwicklung und Analyse von Software Systemen (Übung)

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

Assigned Courses:

Übung zu Modellbasierte Entwicklung und Analyse von Software Systemen (exercise course)

Examination

Modellbasierte Entwicklung und Analyse von Software Systemen

oral exam / length of examination: 30 minutes

Module INF-0308: Software-intensive Systems *Software-intensive Systeme*		6 ECTS/LP
Version 1.2.0 (since SoSe19) Person responsible for module: Prof. Dr. Bernhard Bauer		
Learning Outcomes / Competences: Students can create (K3), evaluate (K6), and document software architectures. For this purpose, they can transfer technical solution concepts into models and know methods for developing such abstractions and architectures. They can describe the advantages and disadvantages of design alternatives (K4) and evaluate them in the respective application context (K6). Problems can be identified independently (K4), and solutions can be designed systematically (K5) and realized (K3). Furthermore, they have developed skills for the analysis and structuring of problems in enterprise architectures and know the concepts and procedures for creating such architectures. The students can name practice-relevant issues in enterprise architectures (K1). They can select and confidently apply suitable methods for architecture creation and evaluation. The students know modeling languages and patterns to create software and enterprise architectures. They have the competence to recognize significant technical developments. Key qualification: Competence to network different subject areas; ability to work in a team and communicate; ability to expand existing knowledge independently; quality awareness; skill to present and document results in an understandable way; practical experience and professional qualification.		
Workload: Total: 180 h 22 h studying of course content using provided materials (self-study) 23 h studying of course content using literarture (self-study) 45 h lecture (attendance) 60 h studying of course content through exercises / case studies (self-study) 30 h exercise course (attendance)		
Conditions: The previous course "Software Architectures and Enterprise Architecture Management" and the course "Software-intensive Systems and Medical Devices" must not have been taken due to overlaps.		
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 5	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Software-intensive Systeme (Vorlesung)

Mode of Instruction: lecture

Language: German

Contact Hours: 3

Contents:

The lecture content includes patterns, modelling techniques and the evaluation of software architectures. Furthermore, the area of enterprise architecture management is addressed.

Literature:

- Bass et al: Software Architecture in Practice
- Clements et al: Documenting Software Architectures
- Clements et al: Evaluation of Software Architectures
- Kopetz: Real-Time Systems

Part of the Module: Software-intensive Systeme (Übung)
Mode of Instruction: exercise course
Language: German
Contact Hours: 2

Examination
Software-intensive Systeme
oral exam / length of examination: 30 minutes

Module INF-0309: Real-Time Systems *Echtzeitsysteme*		8 ECTS/LP
Version 1.5.0 (since WS19/20) Person responsible for module: Prof. Dr. Sebastian Altmeyer		

Learning Outcomes / Competences:

The lecture imparts basic and advanced knowledge of real-time systems as they occur in almost all embedded systems, but especially in the areas of automotive, aerospace and robotics. The theoretical foundations will be based on the current state of research and will enable students to further engage with the topic of embedded real-time systems at a scientific level.

The lecture will provide students with the ability to distinguish and classify different embedded systems based on their real-time requirements. Students will learn to apply, compare, and critically analyze current methods for validation of timing behavior with respect to possible certification of timing behavior. This includes the optimization and selection of real-time schedules and their verification. The lecture will also cover different processor types, and will go into more detail about the specifics of single-core and multi-core processors in the real-time domain. Students will be able to classify processors based on their suitability for real-time systems and to investigate the impact of design decisions on real-time behavior and real-time behavior analysis.

The course material will be exemplified by case studies from the automotive and aerospace fields and applied by the students using a simple real-time system.

Key qualifications: Analytical-methodical competence, consideration of approaches to solutions, presentation of solutions to exercise problems; skill in presenting and documenting results in a comprehensible manner; ability to expand existing knowledge independently; quality awareness, meticulousness; self-reflection; responsible action against a background of inadequacy and conflicting interests.

Workload:

Total: 240 h

30 h studying of course content using literarture (self-study)

90 h studying of course content through exercises / case studies (self-study)

30 h studying of course content using provided materials (self-study)

60 h lecture (attendance)

30 h exercise course (attendance)

Conditions: none		
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Echtzeitsysteme (Vorlesung)

Mode of Instruction: lecture

Language: German / English

Contact Hours: 4

Contents:

- WCET Analysis
- Scheduling Analysis
- Programming of real-time systems
- Processors for real-time systems
- Real-time operating systems
- Certification of real-time systems

Literature:

- Sanjoy Baruah, Marko Bertogna, Giorgio Buttazzo, Multiprocessor Scheduling for Real-Time Systems, Springer, 2015.
- Giorgio Buttazzo, Hard Real-Time Computing Systems: Predictable Scheduling Algorithms and Applications, Springer, 2011.
- Heinz Wörn, Uwe Brinkschulte, Echtzeitsysteme, Springer Verlag, Berlin/Heidelberg, 2005
- Uwe Brinkschulte, Theo Ungerer, Mikrocontroller und Mikroprozessoren, Springer Verlag, Heidelberg, dritte Auflage 2010

Part of the Module: Echtzeitsysteme (Übung)

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

Examination

Echtzeitsysteme

individual oral exam / length of examination: 20 minutes

Module INF-0314: Seminar IT Infrastructure in Medical Information Systems for Master Students *Seminar IT-Infrastrukturen in der Medizin für Master*		4 ECTS/LP
Version 1.0.0 (since SoSe19) Person responsible for module: Prof. Dr. Frank Kramer		

Learning Outcomes / Competences:

After attending the seminar, students are able to independently develop, analyze and evaluate advanced problems, concepts, methods, procedures, techniques and technologies in the field of IT infrastructures for translational medical research in relation to the individual seminar topic from the mentioned field. They have the scientific methodology, communication skills and ability to use appropriate media to present a specific topic in a clear and comprehensible manner, both verbally and in writing, and to critically and argumentatively discuss and evaluate scientifically challenging topics from the named field. They will also be able to recognize the logical structures of reasoning and argumentation and use them in a goal-oriented manner. The participants can formulate clearly and comprehensibly and present specialist content freely. They understand how to structure a lecture in a clear and comprehensible way and how to focus the lecture on essential messages and convey them in a comprehensible way, even in the case of complex content. They skilfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to present themselves and how to deal confidently with common presentation media and to use them interactively. They manage to gear a lecture to a specific target group and to motivate the listener even during longer lecture durations and to apply various moderation techniques.

Key Skills: Literature research; Independent work with English-language specialist literature; Analytical-methodical competence; Scientific methodology; Principles of good scientific practice; Skill in the comprehensible, confident and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts and results and for their documentation; Skill in logical, abstract, analytical and conceptual thinking and formal argumentation; Quality awareness, meticulousness; Communication skills; Time management; Evaluation of approaches, procedures, techniques and technologies from different points of view.

Workload:

Total: 120 h

90 h preparation of written term papers (self-study)

30 h seminar (attendance)

Conditions: none		**Credit Requirements:** Passing the module examination
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar IT Infrastructure in Medical Information Systems for Master Students

Mode of Instruction: seminar

Language: German / English

Contact Hours: 2

Contents:

Current topics of IT infrastructures in medicine

Literature:

will be presented in the respective kickoff event.

Assigned Courses:

Seminar IT-Infrastrukturen in der Medizin für Master (seminar)

Examination

Seminar IT Infrastructure in Medical Information Systems for Master Students

written/oral exam

Module INF-0315: Deep Learning *Deep Learning*		5 ECTS/LP
Version 1.2.0 (since SoSe19) Person responsible for module: Prof. Dr. Björn Schuller		
Learning Outcomes / Competences: The course Deep Learning covers the historical and formal fundamentals of Neural Networks, as well as the core principles of Machine Learning and data modelling. Upon completing the course, students will have the skills and knowledge to be able to choose suitable approaches and network architectures for specific tasks and know the pros and cons of design alternatives, as assessed in the respective application context. They will be able to apply and implement the discussed technical concepts in programs and systems. Furthermore, they will have the ability to analyse Deep Neural Network-based models and to design novel architectures and training methods. During the course, the participants will improve their skills in logical, analytical, and conceptual thinking. Students will gain the ability to make scientifically meaningful assessments in the field of machine learning and data science using appropriate methods. They will get used to the way of thinking and the language of relevant disciplines. Moreover, students will gain the ability to, convincingly, present their developed ideas and concepts. They will be able to apply their new knowledge to practical tasks and solve many real-life problems through the appropriate application of machine learning. They will also develop the competence to identify significant technical developments in the field. **Key qualifications:** analytical skills, data science cross-disciplinary knowledge, procedures and processes in creating practical systems, ability to present and document results in a comprehensible way, skill to solve problems under practical conditions, self-reflection, quality awareness, meticulousness, teamwork		
Workload: Total: 150 h 15 h studying of course content using provided materials (self-study) 15 h studying of course content using literarture (self-study) 60 h studying of course content through exercises / case studies (self-study) 30 h lecture (attendance) 30 h exercise course (attendance)		
Conditions: Knowledge of basic mathematic lectures should be present.		
Frequency: usu. at least once per acad. year	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Deep Learning (Vorlesung) **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 2
Contents: Perceptron, Feed-forward Neural Networks, Gradient-based Learning, Backpropagation, Recurrent Neural Networks, Convolutional Neural Networks, Autoencoders, Transfer Learning, Generative Adversarial Nets, Attention, Connectionist Temporal Classification, Data Preprocessing, Evaluation, Audio Classification, Object Detection, Natural Language Processing

Literature:

Ian Goodfellow; Yoshua Bengio; Aaron Courville (2016). *Deep Learning*. Cambridge, Massachusetts: MIT Press.

Further literature is going to be announced during the lecture.

Assigned Courses:

Deep Learning (lecture)

Part of the Module: Übung zu Deep Learning

Mode of Instruction: exercise course

Language: English

Contact Hours: 2

Assigned Courses:

Übung zu Deep Learning (exercise course)

Examination

Deep Learning

written exam / length of examination: 90 minutes

Module INF-0316: Machine Learning and Computer Vision *Machine Learning and Computer Vision*		8 ECTS/LP
Version 1.0.0 (since SoSe19) Person responsible for module: Prof. Dr. Rainer Lienhart		
Learning Outcomes / Competences: After successful participation in this module, students possess advanced knowledge of machine learning (decision trees, neural networks and deep neural networks, hypothesis evaluation, instance-based learning, Bayesian learning, learning theory), data reduction (e.g. principal component analysis), advanced image processing and machine vision and are able to apply them. They can analyse, understand and programmatically implement scientifically complex procedures in the field of multimedia data processing, as well as to appropriately apply the principles learned to new problems. They develop skills in logical, analytical and conceptual thinking in the field of digital signal processing and multimedia data processing. **Key qualifications**: advanced mathematical-formal logic; implementation of subject-specific solution concepts; interdisciplinary knowledge; development and implementation of solution strategies for complex problems; systematic further development of design methods; ability to solve problems under practical boundary conditions.		
Workload: Total: 240 h 30 h exercise course (attendance) 60 h lecture (attendance) 30 h studying of course content using provided materials (self-study) 90 h studying of course content through exercises / case studies (self-study) 30 h studying of course content using literarture (self-study)		
Conditions: none		
Frequency: each summer semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Machine Learning and Computer Vision (Lecture)
Mode of Instruction: lecture
Language: German
Contact Hours: 4

Contents:

The lecture gives a good overview of all aspects of machine learning and machine extraction of information from multimedia data (e.g. "Google Image Search", "Google Goggles"). The learned concepts will be practised, analysed, and evaluated in the exercises using successful examples from practice. At the end of the semester, advanced topics such as object detection and object recognition of faces and people will be covered. The contents of the lecture include: Machine Learning (Decision Tree Learning, Artificial Neural Networks, Bayesian Learning, Discrete Adaboot), Data Reduction (Quantization (K-Means Clustering, Affinity Propagation), Dimensionality Reduction Techniques (PCA, NMF, Random Projection, MDS)) and Image Processing & Computer Vision (Salient Feature Points and Feature Descriptors, Object Detection (Face/Car/People Detection), Object Recognition (Face Recognition), Image Search with pLSA).

Literature:

Literature references will be announced at the beginning of the semester.

Assigned Courses:

Machine Learning and Computer Vision (lecture)

Part of the Module: Machine Learning and Computer Vision (Tutorial)

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

Assigned Courses:

Übung zu Machine Learning and Computer Vision (exercise course)

Examination

Machine Learning and Computer Vision (Exam)

written exam / length of examination: 120 minutes

Description:

The examination can be taken every semester during the examination period.

Module INF-0318: Practice Module on Simulation of Autonomous Vehicles *Praktikum Simulation von autonomen Fahrzeugen (Vertiefung)*		8 ECTS/LP
Version 1.0.0 (since WS19/20) Person responsible for module: Prof. Dr. Lars Mikelsons		

Learning Outcomes / Competences:
Subject-related competencies:
After participating in the internship, students understand problems of higher complexity in the field of simulation of autonomous vehicles and have deeper technical knowledge and skills there. They are able to develop concepts, methods, procedures, techniques and technologies of the mentioned field in small groups and are able to apply innovative methods in solving problems. This enables them to connect to international research and implement existing concepts. In addition, students have the teamwork and communication skills, the ability to research literature and the scientific methodology to discuss problems in the field, define intermediate objectives, and critically evaluate, classify, combine and present intermediate results and innovative ideas.

Key Competencies:
Skill in logical, analytical, and conceptual thinking; Validation of simulation results and software modules; Independent work with English-language literature; Intelligible, confident, and persuasive presentation of ideas, concepts, and results; Quality awareness; Communication skills; Skill in collaborating in teams and understanding team processes; Principles of good scientific practice; Project management skills; Scientific methodology;

Workload:
Total: 240 h
90 h internship / practical course (attendance)
150 h studying of course content through exercises / case studies (self-study)

Conditions: Good programming skills Helpful: Python, C++, ROS, Game Engines		**Credit Requirements:** Passing the module exam
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Practice Model on Simulation of Autonomous Vehicles (Advanced)
Mode of Instruction: internship
Language: German / English
Contact Hours: 6
ECTS Credits: 8.0

Contents:
In the practical course, students work in small groups on application-oriented tasks for the simulation of autonomous vehicles. They are allowed to implement and validate individual software modules of a virtual vehicle themselves.

Examination
Practice Model on Simulation of Autonomous Vehicles
portfolio exam

Module INF-0319: Interdisciplinary Project Engineering Informatics *Praktikum Interdisziplinäres Projekt Ingenieurinformatik*		6 ECTS/LP
Version 1.0.0 (since WS19/20) Person responsible for module: Prof. Dr.-Ing. Johannes Schilp Prof. Dr.-Ing. Lars Mikelsons, Prof. Dr.-Ing. Christoph Ament		
Learning Outcomes / Competences: The students deal with an interdisciplinary task from the field of production informatics, control engineering and mechatronics. They use complex processes and techniques, some of which have already been covered theoretically in the individual lectures. The practical project is based on a student challenge, such as the Sioux Mechatronics Trophy or the James Dyson Award, and is worked on in small groups. The use case requires the evaluation and transfer of concepts and methods as well as their interdisciplinary combination. The timeline for this practicum will be announced in Digicampus, as will the specific challenge assignment, including prerequisites and faculty participation. Key Qualifications: Teamwork and communication skills, structured and conscientious work, application-oriented problem solving, result evaluation and -documentation, consideration of solutions, ability to think logically, analytically and conceptually, ability to think abstractly.		
Workload: Total: 180 h 120 h studying of course content through exercises / case studies (self-study) 60 h internship / practical course (attendance)		
Conditions: none		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Interdisciplinary Project Engineering Informatics

Mode of Instruction: internship
Language: German
Contact Hours: 4
ECTS Credits: 6.0

Contents:

Students work in small groups on application-oriented tasks on topics in the industrial environment.

Literature:

Will be announced in the respective semester.

Examination

Interdisciplinary Project Engineering Informatics

practical exam

Module INF-0320: Seminar Process Mining *Seminar Process Mining*	4 ECTS/LP
Version 1.0.0 (since WS19/20) Person responsible for module: Prof. Dr. Robert Lorenz	

Learning Outcomes / Competences:

After attending the seminar, the students can independently work out and analyse advanced problems, concepts, methods, procedures, techniques, and technologies from the field of process mining and evaluate them in relation to the individual seminar topic.

Participants possess scientific methodology, communication skills, and the ability to present a special topic clearly and comprehensibly in speech and writing and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively.

Furthermore, they learn to recognise logical structures of thinking and argumentation and use them in a goal-oriented manner. The participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a talk that is clear and easy to follow. Additionally, the students know how to focus on essential messages and convey them in a comprehensible way, even with complex content. They skilfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to confidently deal with common presentation media and use them interactively. They manage to gear a talk to a specific target group, apply various moderation techniques, and keep their audience engaged even over a longer period.

Key qualifications: Presentation techniques; literature research; principles of good scientific practice; evaluating solution approaches, procedures, techniques, and technologies from different points of view.

Workload:

Total: 120 h

45 h preparation of presentations (self-study)

45 h preparation of written term papers (self-study)

30 h seminar (attendance)

Conditions: Module Process Mining (INF-0243) - required		**Credit Requirements:** Passing the module examination
Frequency: irregular	**Recommended Semester:** from 3.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Process Mining

Mode of Instruction: seminar

Language: German / English

Contact Hours: 2

ECTS Credits: 4.0

Contents:

Current Research Topics in the Field of Process Mining: Process Discovery, Conformance Checking, Enhancement, Preprocessing of logs (clustering, filtering), Handling of Noise, Synthesis based methods, Process Mining and Data Mining, Statistical methods in Process Mining, case studies, tooling.

Das Seminar eignet sich zur Vorbereitung auf Abschlussarbeiten und Projektmodule.

Literature:

Literature depends on the chosen topic

Examination

Seminar Process Mining

written/oral exam / length of examination: 60 minutes

work period for assignment: 2 months

Module INF-0328: Project Module IT Infrastructure in Medical Information Systems *Projektmodul IT-Infrastrukturen in der Medizin*		10 ECTS/LP
Version 1.0.0 (since WS19/20) Person responsible for module: Prof. Dr. Frank Kramer		
Learning Outcomes / Competences: After participating in the project module, students understand problems of higher complexity in the field of IT infrastructures in translational medical research and have deeper expertise and skills there. They are able to develop concepts, methods, procedures, techniques and technologies of the mentioned field in research projects and are able to apply innovative methods in solving problems. This enables them to connect to international research and make their own scientific contribution to the field. In addition, students have the teamwork and communication skills, the ability to research literature and the scientific methodology to discuss problems in the field, define intermediate goals, and critically evaluate, classify, combine and present intermediate results and innovative ideas. Key Skills: Skill in logical, analytical, and conceptual thinking; Independent work with English-language literature; Intelligible, confident, and persuasive presentation of ideas, concepts, and results; Quality awareness; Communication skills; Skill in working in teams and understanding team processes; Principles of good scientific practice; Project management skills; Scientific methodology.		
Workload: Total: 300 h 285 h internship / practical course (self-study) 15 h seminar (attendance)		
Conditions: none		**Credit Requirements:** Passing the module examination
Frequency: each semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Project Module IT Infrastructure in Medical Information Systems

Mode of Instruction: internship

Language: German / English

Contact Hours: 1

ECTS Credits: 10.0

Contents:

Current research topics in the field of IT infrastructures in translational medical research.

Literature:

scientific essays, manuals

Assigned Courses:

Oberseminar IT-Infrastrukturen für die Translationale Medizinische Forschung

Examination

Project Module IT Infrastructure in Medical Information Systems

practical exam

Module INF-0331: Seminar Computational Intelligence (Master) *Seminar Computational Intelligence (Master)*	4 ECTS/LP

Version 1.0.0 (since SoSe20)
Person responsible for module: Prof. Dr. Björn Schuller

Learning Outcomes / Competences:
After attending the seminar, students will be able to autonomously acquire and understand advanced problem statements, concepts, methods, approaches, techniques, and technologies in the field of Computational Intelligence. They possess the scientific techniques, communication skills, and the ability to employ suitable media, to present understandingly a special topic in spoken and written, and to discuss and evaluate scientifically challenging themes from the field in a critical way. Furthermore, they can recognise logical structures of thinking and debating and employ them constructively.
Participants can express themselves in a clear and understandable way and present scientific topics. They understand how to structure a talk, to focus it - also given a complex content - on the essential messages, and to communicate them in a suitable way. The lines of arguments and strategies in case of disturbances are applied by the students. Students know how to perform energetically, to cope with the presentation media and to use them interactively. They manage to orient a talk toward a certain audience, to motivate the listeners also over a longer duration, and to employ different methods of moderation.

Key qualifications: Fundamentals of good scientific practice; Analytical-methodological competency; Time management; Literature research; Self-contained work with English technical literature; Communication skills; Ability to present (in written and spoken) practical and theoretical ideas in an understandable, confident, and convincing way; Writing a report in the markup language LaTeX; Evaluation of methods, technologies, and solutions w.r.t. different aspects; Quality awareness.

Workload:
Total: 120 h
30 h seminar (attendance)
90 h preparation of written term papers (self-study)

Conditions: none		
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Computational Intelligence (Master)
Mode of Instruction: seminar
Language: German / English
Contact Hours: 2

Contents:
Fuzzy Logic, Neural Networks, Evolutionary Computation, Learning Theory, Probabilistic Methods

Literature:
To be announced by the lecturers.

Assigned Courses:

Seminar Computational Intelligence (Bachelor & Master) (seminar)

Examination

Seminar Computational Intelligence (Master)

written/oral exam

Module INF-0337: Seminar Embedded Systems (Master) *Seminar Embedded Systems (Master)*	4 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Sebastian Altmeyer	

Learning Outcomes / Competences:

After attending the seminar, students are able to independently develop, analyze and evaluate advanced problems, concepts, methods, procedures, techniques and technologies in the field of embedded systems in relation to the individual seminar topic from the named field.

They have the scientific methodology, communication skills and ability to use appropriate media to present a specific topic in a clear and comprehensible manner, both verbally and in writing, and to discuss and evaluate scientifically challenging topics from the aforementioned field in a critical and argumentative manner. They will also be able to recognize the logical structures of reasoning and argumentation and use them in a goal-oriented manner.

The participants can formulate clearly and comprehensibly and present specialist content freely. They understand how to structure a scientific presentation in a clear and comprehensible way and how to focus the presentation on essential messages and convey them in a comprehensible way, even in the case of complex content. They skilfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to present themselves and how to deal confidently with common presentation media and to use them interactively. They manage to gear a presentation to a specific target group and to motivate the listener even during longer presentation durations and to apply various moderation techniques.

Key qualifications: Literature research; Independent work with English-language specialist literature; Analytical-methodical competence; Scientific methodology; Principles of good scientific practice; Skill in the comprehensible, confident and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts and results and for their documentation; Skill in logical, abstract, analytical and conceptual thinking and formal argumentation; Quality awareness, meticulousness; Communication skills; Time management; Evaluation of approaches, procedures, techniques and technologies from different points of view.

Workload:

Total: 120 h

30 h seminar (attendance)

90 h preparation of written term papers (self-study)

Conditions: none		
Frequency: each semester	**Recommended Semester:** 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Embedded Systems (Master)

Mode of Instruction: seminar

Language: German / English

Contact Hours: 2

Contents:

In the seminar, topics from the field of embedded systems will be covered. Each seminar participant receives individual literature references, which are then to be supplemented in the course of the seminar by further independently compiled references. The seminar will end with a written paper and a presentation on the topic covered.

Literature:
given individually and self research

Assigned Courses:

Seminar Embedded Systems (Master) (seminar)

Examination

Seminar Embedded Systems (Master)
written/oral exam

Module INF-0340: Project Module Embedded Systems *Projektmodul Embedded Systems*		10 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Sebastian Altmeyer		
Learning Outcomes / Competences: After participating in the project module, students understand problems of higher complexity in the field of embedded systems and have more in-depth specialist knowledge and skills there. They are able to develop concepts, methods, procedures, techniques and technologies of the mentioned field in research projects and are able to apply innovative methods in solving problems. This enables them to connect to international research and make their own scientific contribution to the field. In addition, students have the teamwork and communication skills, the ability to research literature and the scientific methodology to discuss problems in the field, define intermediate goals, and critically evaluate, classify, combine and present intermediate results and innovative ideas. **Key qualifications:** Skill in logical, analytical, and conceptual thinking; Independent work with English-language literature; Intelligible, confident, and persuasive presentation of ideas, concepts, and results; Quality awareness; Communication skills; Skill in working in teams and understanding team processes; Principles of good scientific practice; Project management skills; Scientific methodology.		
Workload: Total: 300 h 285 h internship / practical course (self-study) 15 h seminar (attendance)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Projektmodul Embedded Systems **Mode of Instruction:** internship **Language:** German / English **Contact Hours:** 1
Contents: Autonomous collaboration on current research topics.
Literature: scientific papers, handbooks
Assigned Courses: **Oberseminar Embedded Systems**

Examination
Projektmodul Embedded Systems practical exam

Module INF-0342: Seminar Digital Health (Master) *Seminar Digital Health (Master)*		4 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Björn Schuller		
Learning Outcomes / Competences: After attending the seminar, students will be able to autonomously acquire and understand advanced problem statements, concepts, methods, approaches, techniques, and technologies in the field of Digital Health. They possess the scientific techniques, communication skills, and the ability to employ suitable media, to present understandingly a special topic in spoken and written, and to discuss and evaluate scientifically challenging themes from the field in a critical way. Furthermore, they can recognise logical structures of thinking and debating and employ them constructively. Participants can express themselves in a clear and understandable way and present scientific topics. They understand how to structure a talk, to focus it - also given a complex content - on the essential messages, and to communicate them in a suitable way. The lines of arguments and strategies in case of disturbances are applied by the students. Students know how to perform energetically, to cope with the presentation media and to use them interactively. They manage to orient a talk toward a certain audience, to motivate the listeners also over a longer duration, and to employ different methods of moderation. **Key skills:** Fundamentals of good scientific practice; Analytical-methodological competency; Time management; Literature research; Self-contained work with English technical literature; Communication skills; Ability to present (in written and spoken) practical and theoretical ideas in an understandable, confident, and convincing way; Writing a report in the markup language LaTeX; Evaluation of methods, technologies, and solutions w.r.t. different aspects; Quality awareness.		
Workload: Total: 120 h 30 h seminar (attendance) 90 h preparation of written term papers (self-study)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** from 5.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Seminar Digital Health (Master) **Mode of Instruction:** seminar **Language:** German / English **Contact Hours:** 2
Contents: In the seminar Digital Health, recent research works in this field are going to be discussed. This comprises both the acquisition of data through sensors and (e.g., microphones or electrodes) and the analysis and the modelling of the data. One important aspect is also the practicability of modern deep learning methods. Digital Health applications reach from tracking of health states (e.g., epilepsy or depression) to personal assistance services. The participating students will work on a certain aspect, supervised by a research associate of the chair. They will summarise their results in a written report and an oral presentation. **Topics:** E-Health, M-Health, Sensor Signal Analysis, Vital Signs, Big Data.

Literature:
To be announced by the lecturer

Assigned Courses:

Seminar Digital Health (Bachelor & Master) (seminar)

Examination

Seminar Digital Health (Master)
written/oral exam

Module INF-0344: Seminar Software Engineering of Distributed Systems (MA) *Seminar Software Engineering verteilter Systeme (MA)*		4 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Bernhard Bauer		

Learning Outcomes / Competences:

After attending the seminar, students can independently develop, analyze and evaluate advanced problems, concepts, methods, procedures, techniques, and technologies in software engineering for distributed systems about the particular seminar topic from the named field. They have the scientific methodology, communication skills, and ability to use appropriate media to present a specific case clearly and comprehensibly in speech and writing and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively. Furthermore, they can recognize the logical structures of thinking and argumentation and use them goal-oriented. The participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a lecture clearly and understandably, focus the study on essential messages, and understandably convey them, even with complex content. They skillfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to present themselves and confidently deal with joint presentation media and use them interactively. They manage to gear a lecture to a specific target group, motivate the listener even during longer lecture durations, and apply various moderation techniques.

Key qualifications: Literature research; independent work with English-language specialist literature; analytical-methodical competence; scientific methodology; principles of good scientific practice; skills in the understandable, confident, and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts, and results and in documenting them; skills in logical, abstract, analytical and conceptual thinking and formal argumentation; quality awareness, meticulousness; communication skills; time management; evaluation of approaches, procedures, techniques, and technologies from different points of view. Translated with www.DeepL.com/Translator (free version)

Workload:

Total: 120 h

90 h preparation of written term papers (self-study)

30 h seminar (attendance)

Conditions: The previous course "Seminar on Software Engineering of Distributed Systems (MA)" (INF-0039) must not have been taken due to overlaps.		
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Software Engineering verteilter Systeme (MA)

Mode of Instruction: seminar

Language: German

Contact Hours: 2

Contents:

Current software engineering topics from industry and research.

Literature:

Will be presented in the respective kick-off event.

Assigned Courses:

Seminar Software Engineering verteilter Systeme (Master) (seminar)

Examination

Seminar Software Engineering verteilter Systeme (MA)

written/oral exam

Module INF-0346: Seminar Automotive Software and Systems Engineering (MA) *Seminar Automotive Software and Systems Engineering (MA)*	4 ECTS/LP

Version 1.0.0 (since SoSe20)
Person responsible for module: Prof. Dr. Bernhard Bauer

Learning Outcomes / Competences:
After attending the seminar, students can independently analyze and evaluate advanced problems, concepts, methods, procedures, techniques, and technologies in Automotive Software & Systems Engineering about the particular seminar topic from the named area. They have the scientific methodology, communication skills, and ability to use appropriate media to present a specific case clearly and comprehensibly in speech and writing and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively. Furthermore, they can recognize the logical structures of thinking and argumentation and use them goal-oriented. The participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a lecture clearly and understandably, focus the study on important messages, and understandably convey them, even with complex content. They skillfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to present themselves and confidently deal with joint presentation media and use them interactively. They manage to gear a lecture to a specific target group, motivate the listener even during longer lecture durations, and apply various moderation techniques.

Key qualifications: Literature research; independent work with English-language specialist literature; analytical-methodical competence; scientific methodology; principles of good scientific practice; skills in the understandable, confident, and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts, and results and in documenting them; skills in logical, abstract, analytical and conceptual thinking and formal argumentation; quality awareness, meticulousness; communication skills; time management; evaluation of approaches, procedures, techniques, and technologies from different points of view. Translated with www.DeepL.com/Translator (free version)

Workload:
Total: 120 h
90 h preparation of written term papers (self-study)
30 h seminar (attendance)

Conditions:
The previous course "Seminar Fundamentals of Software Engineering for Automotive Systems (MA)" (INF-0040) must not have been taken due to overlaps.

Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Automotive Software and Systems Engineering (MA)
Mode of Instruction: seminar
Language: German
Contact Hours: 2

Contents:
Current software engineering topics from industry and research.

Literature:
Will be presented in the respective kick-off event.

Examination

Seminar Automotive Software and Systems Engineering (MA)

written/oral exam

Module INF-0348: Seminar Avionic Software and Systems Engineering (MA) *Seminar Avionic Software and Systems Engineering (MA)*		4 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Bernhard Bauer		
Learning Outcomes / Competences: After attending the seminar, students can independently analyze and evaluate advanced problems, concepts, methods, procedures, techniques, and technologies in Avionic Software & Systems Engineering about the particular seminar topic from the named field. They have the scientific methodology, communication skills, and ability to use appropriate media to present a specific case clearly and comprehensibly in speech and writing and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively. Furthermore, they can recognize the logical structures of thinking and argumentation and use them goal-oriented. The participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a lecture clearly and understandably focus the study on important messages and understandably convey them, even in the case of complex content. They skillfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to present themselves and confidently deal with joint presentation media and use them interactively. They manage to gear a lecture to a specific target group, motivate the listener even during longer lecture durations, and apply various moderation techniques. Key qualifications: Literature research; independent work with English-language specialist literature; analytical-methodical competence; scientific methodology; principles of good scientific practice; skills in the understandable, confident, and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts, and results and in documenting them; skills in logical, abstract, analytical and conceptual thinking and formal argumentation; quality awareness, meticulousness; communication skills; time management; evaluation of approaches, procedures, techniques, and technologies from different points of view. Translated with www.DeepL.com/Translator (free version)		
Workload: Total: 120 h 90 h preparation of written term papers (self-study) 30 h seminar (attendance)		
Conditions: The previous course "Seminar Grundlagen des Software Engineering für Avionic Systems (MA)" (INF-0041) must not have been taken due to overlaps.		
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Seminar Avionic Software and Systems Engineering (MA) **Mode of Instruction:** seminar **Language:** German **Contact Hours:** 2
Contents: Current software engineering topics from industry and research.
Literature: Will be presented in the respective kick-off event.

Examination

Seminar Avionic Software and Systems Engineering (MA)

written/oral exam

Module INF-0349: Seminar Human-Centered Artificial Intelligence *Seminar Menschzentrierte Künstliche Intelligenz*		4 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Elisabeth André		
Learning Outcomes / Competences: After attending the seminar, students are able to independently work out, analyze and evaluate advanced problems, concepts, methods, procedures, techniques and technologies in the field of "human-centered artificial intelligence" related to the individual seminar topic from the mentioned field. They have the scientific methodology, communication skills and ability to use appropriate media to present a specific topic in a clear and comprehensible manner, both verbally and in writing, and to critically and argumentatively discuss and evaluate scientifically challenging topics from the named field. They will also be able to recognize the logical structures of reasoning and argumentation and use them in a goal-oriented manner. The participants can formulate clearly and comprehensibly and present specialist content freely. They understand how to structure a lecture in a clear and comprehensible way and how to focus the lecture on essential messages and convey them in a comprehensible way, even in the case of complex content. They skilfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to present themselves and how to deal confidently with common presentation media and to use them interactively. They manage to gear a lecture to a specific target group and to motivate the listener even during longer lecture durations and to apply various moderation techniques. **Key qualifications:** Literature research; Independent work with English-language specialist literature; Analytical-methodical competence; Scientific methodology; Principles of good scientific practice; Skill in the comprehensible, confident and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts and results and for their documentation; Skill in logical, abstract, analytical and conceptual thinking and formal argumentation; Quality awareness, meticulousness; Communication skills; Time management.		
Workload: Total: 120 h 90 h preparation of written term papers (self-study) 30 h seminar (attendance)		
Conditions: none		
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Seminar Human-Centered Artificial Intelligence **Mode of Instruction:** seminar **Language:** German **Contact Hours:** 2
Contents: Topics in the field of "Human-Centered Artificial Intelligence"
Literature: References will be announced at the preliminary meeting.
Assigned Courses: **Seminar zu Menschzentrierte Künstliche Intelligenz** (seminar)

Examination

Seminar Human-Centered Artificial Intelligence

written/oral exam

Module INF-0353: Practical Module Biomedical Programming (Master) *Praktikum Programmieren in der biomedizinischen Informatik (Master)*		6 ECTS/LP
Version 1.0.0 (since SoSe20) Person responsible for module: Prof. Dr. Frank Kramer		
Learning Outcomes / Competences: After participation in the practical course Programming in Biomed. Informatics, students will understand practical problems of higher complexity in the field of software development and evaluations in the application areas of biomedical informatics. Students will gain in-depth subject-specific as well as cross-disciplinary knowledge and skills, for example bioinformatics, medical informatics and statistics. They are able to develop concepts, methods, techniques and technologies of the mentioned field in research projects and are able to apply innovative methods in solving problems. This enables them to link up with international research and to make their own scientific contribution in this field. In addition, students have the teamwork and communication skills, the ability to research the literature and the scientific methodology to discuss problems in the field, define intermediate goals, and critically evaluate, classify, combine, present and document intermediate results and innovative ideas in an understandable way. Key Skills: Ability to think logically, analytically, and conceptually; Work independently with English-language literature; Present ideas, concepts, and results in an understandable, confident, and persuasive manner; Quality awareness; Communication skills; Ability to work in teams and understand team processes; Project management skills.		
Remarks: If you have already taken the module "INF-0326: Practical Programming in Biomedical Informatics (Advanced)", you **cannot** take this module!		
Workload: Total: 180 h 30 h studying of course content using provided materials (self-study) 30 h studying of course content using literarture (self-study) 90 h internship / practical course (attendance) 30 h studying of course content through exercises / case studies (self-study)		
Conditions: none		**Credit Requirements:** Passing the module examination
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Practical Module Biomedical Programming (Master)
Mode of Instruction: internship
Language: German / English
Frequency: each semester
Contact Hours: 6

Contents:

Participants of the Bio-/Medical Informatics Programming Internship will learn how to implement small application and infrastructure programs in a biological and medical context.

The goal of the internship is for students to develop various small programs in Python related to medical issues.

Through daily work assignments, students will acquire basic knowledge of:

- Python programming
- Use of biological/medical databases
- Data transformation in a biological and medical context
- Disease research in bio/medical informatics
- High throughput data analysis

The internship is offered as a 2-week block course during the semester break, consists of a short daily introduction to the current work tasks and subsequent independent implementation by the students.

During independent work, a supervisor will be present at designated times for assistance and questions.

There will be a one-time meeting during the semester for organizational reasons.

Examination

Practical Module Biomedical Programming (Master)

practical exam / length of examination: 30 minutes

Module INF-0364: Seminar Software Engineering in Safety- and Security-Critical Systems (MA) *Seminar Software Engineering in sicherheitskritischen Systemen (MA)*		4 ECTS/LP
Version 1.0.0 (since WS20/21) Person responsible for module: Prof. Dr. Bernhard Bauer		

Learning Outcomes / Competences:

After attending the seminar, students can independently develop, analyze and evaluate advanced problems, concepts, methods, procedures, techniques, and technologies in software engineering in safety-critical systems and related disciplines about the particular seminar topic from the named field. They have the scientific methodology, communication skills, and ability to use appropriate media to present a specific case clearly and comprehensibly in speech and writing and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively. Furthermore, they can recognize the logical structures of thinking and argumentation and use them goal-oriented. The participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a lecture clearly and understandably, focus on essential messages, and coherently convey them, even with complex content. They skillfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to present themselves and confidently deal with joint presentation media and use them interactively. They manage to gear a lecture to a specific target group, motivate the listener even during longer lecture durations, and apply various moderation techniques.

Key qualifications: Literature research; independent work with English-language specialist literature; analytical-methodical competence; scientific methodology; principles of good scientific practice; skills in the understandable, confident, and convincing (written and oral) presentation of (practical or theoretical) ideas, concepts, and results and in documenting them; skills in logical, abstract, analytical and conceptual thinking and formal argumentation; quality awareness, meticulousness; communication skills; time management; evaluation of approaches, procedures, techniques, and technologies from different points of view. Translated with www.DeepL.com/Translator (free version)

Workload:

Total: 120 h

30 h seminar (attendance)

90 h preparation of written term papers (self-study)

Conditions: none		
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Software Engineering in sicherheitskritischen Systemen (MA)

Mode of Instruction: seminar

Language: German

Contact Hours: 2

Contents:

Current software engineering topics from industry and research.

Literature:

Will be presented in the respective kick-off event.

Assigned Courses:

Seminar Software Engineering in sicherheitskritischen Systemen (Master) (seminar)

Examination

Seminar Software Engineering in sicherheitskritischen Systemen (MA)

written/oral exam

Module INF-0367: Advanced Machine Learning and Computer Vision		5 ECTS/LP
Version 1.0.0 (since WS20/21) Person responsible for module: Prof. Dr. Rainer Lienhart		
Learning Outcomes / Competences: After successful participation in this module, students have in-depth advanced knowledge of machine learning (support vector machines and deep neural networks and their basic building blocks) and machine vision (deep neural network architectures and systems) and can apply these. They can analyse, understand and programmatically implement scientifically complex procedures in the field of image, text, video and signal processing, as well as to appropriately apply the principles learned to new problems. They develop skills in logical, analytical and conceptual thinking in the field of machine learning and vision. **Key qualifications**: advanced mathematical-formal logic; critical reading and analysis of scientific publications; implementation of technical solution concepts; interdisciplinary knowledge; development and implementation of solution strategies of complex problems; systematic further development of design methods; skills in solving problems under practical boundary conditions		
Workload: Total: 150 h 30 h lecture (attendance) 60 h studying of course content through exercises / case studies (self-study) 30 h exercise course (attendance) 15 h studying of course content using literarture (self-study) 15 h studying of course content using provided materials (self-study)		
Conditions: Kenntnisse in maschinellem Lernen und maschinellem Sehen (Master-Vorlesung INF-0092 "Multimedia II" bzw. INF-0316 "Machine Learning and Computer Vision")		**Credit Requirements:** Bestehen der Modulprüfung
Frequency: each winter semester	**Recommended Semester:** from 2.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Advanced Machine Learning and Computer Vision (Lecture)
Mode of Instruction: lecture
Language: German
Contact Hours: 2

Contents:

The lecture gives an in-depth insight into all aspects of machine learning and machine vision. The concepts learned will be practiced, analyzed and evaluated in the exercises using successful real-world examples. The contents of the lecture include: support vector machines, basic building blocks of deep neural networks (layer structures, normalization, attention mechanisms), as well as current reference architectures and systems for image, text, video processing and their combination with further sensor signals.

Literature:

Will be announced at the beginning of the semester.

Part of the Module: Advanced Machine Learning and Computer Vision (Tutorial)
Mode of Instruction: exercise course
Language: German
Contact Hours: 2

Examination

Advanced Machine Learning and Computer Vision (Examination)
written exam / length of examination: 90 minutes

Description:
The examination can be taken every semester during the examination period.

Module INF-0371: Approximation Algorithms *Approximation Algorithms*		5 ECTS/LP
Version 1.2.0 (since WS20/21) Person responsible for module: Prof. Dr. Tobias Mömke		
Learning Outcomes / Competences: Developing an understanding of central topics in the field of approximation algorithms; acquiring powerful mathematical tools to analyze algorithms; improve the ability to abstract and systematically solve optimization problems. **Key Skills:** Ability to build intuitive understanding of mathematical formalisms; ability to identify core properties of optimization problems; deep understanding of powerful mathematical tools		
Workload: Total: 150 h 30 h exercise course (attendance) 30 h lecture (attendance) 60 h studying of course content through exercises / case studies (self-study) 15 h studying of course content using literarture (self-study) 15 h studying of course content using provided materials (self-study)		
Conditions: Basic knowledge of Algorithms and Data Structures (e.g., "INF-0111: Informatik 3") and Theoretical Computer Science (e.g., "INF-0110: Einführung in die Theoretische Informatik").		
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Approximation Algorithms (Vorlesung)
Mode of Instruction: lecture
Language: German / English
Contact Hours: 2

Contents:

Given an NP-hard optimization problem, how well can it be approximated in polynomial time? It is exciting and challenging to understand the approximability of fundamental optimization problems. This course mainly focuses on upper bounds, i.e., designing efficient approximation algorithms.

In this course, we will study several classes of problems, such as packing problems, network design, and graph problems. We will cover central algorithmic techniques for designing approximation algorithms, including greedy algorithms, dynamic programming, linear and semi-definite programming, and randomization.

Literature:

- David P. Williamson and David B. Shmoys, The Design of Approximation Algorithms, Cambridge University Press.
- Vijay V. Vazirani, Approximation Algorithms, Springer.

Part of the Module: Approximation Algorithms (Übung)
Mode of Instruction: exercise course
Language: English / German
Contact Hours: 2

Examination

Approximation Algorithms

written exam / length of examination: 120 minutes

Module INF-0374: Project Module Resource Aware Algorithmics *Projektmodul Resource Aware Algorithmics*	10 ECTS/LP
Version 1.0.0 (since WS20/21) Person responsible for module: Prof. Dr. Tobias Mömke	

Learning Outcomes / Competences:
After attending this research module, the students are able to understand algorithmic problems and solutions of medium difficulty in the area of resource aware algorithmics.They have acquired a detailed understanding of up-to-date topics within the area and can actively participate in research projects. Furthermore, they understand some deep concepts, methods, tools and technologies and can apply the acquired knowledge in research projects. Besides the technical abilities, they train their team and communication skills, the ability to perform literature research and to discurss and present technical topics.

Key Qualifications: Ability to perform analytical and logic thinking; self-sufficient work with scientific literature in English language; ability to present results and ideas in form of understandable and inspiring presentations; aim for high-quality results; communication skills; ability to work with a team and to understand team processes; respect for clean scientific practices

Workload:
Total: 300 h
285 h internship / practical course (self-study)
15 h seminar (attendance)

Conditions: none		
Frequency: each semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 1	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Projekt Module Resource Aware Algorithmics
Mode of Instruction: internship
Language: German / English
Contact Hours: 1

Contents:
Autonome Mitarbeit an aktuelle Forschungsthemen.

Literature:
wissenschaftliche Papiere, Handbücher

Assigned Courses:

Oberseminar Resource Aware Algorithmics

Examination
Projekt Module Resource Aware Algorithmics
portfolio exam

Module INF-0379: Practical Module Simulation of Cyber-Physical Systems *Praktikum Simulation cyber-physischer Systeme*		6 ECTS/LP
Version 1.0.0 (since SoSe21) Person responsible for module: Prof. Dr. Lars Mikelsons		
Learning Outcomes / Competences: **Subject-related competences:** After successful participation in this module, students will be able to apply advanced methods of simulation to use virtual prototypes for model-based development of mechatronic systems. They know methods for different application areas along the development process and interpret their result. **Methodological competencies:** Students are able to evaluate different simulation methods for different application areas. They are also able to select and independently apply suitable simulation methods depending on the simulation purpose. **Interdisciplinary competencies:** Students are able to solve certain engineering problems with the help of information technology. They can use abstractions of physical systems and apply them in combination with information technology methods for the development of mechatronic systems. **Key Competencies:** Advanced skill in answering engineering questions, particularly in the area of mechatronic systems design, using virtual prototypes; selection and application of advanced simulation methods; assessment and analysis of mathematical models.		
Workload: Total: 180 h 90 h internship / practical course (attendance) 90 h studying of course content through exercises / case studies (self-study)		
Conditions: Attendance of the course Mechatronics and/or object-oriented methods of modeling and simulation.		**Credit Requirements:** Passing the module exam
Frequency: each summer semester	**Recommended Semester:** from 4.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Praktical Module Simulation of Cyber-Physical Systems **Mode of Instruction:** internship **Lecturers:** Prof. Dr. Lars Mikelsons **Language:** German / English **Contact Hours:** 6

Contents:

Nowadays, the development of mechatronic systems is generally model-based. In doing so, the application of simulation in practice often encounters the following challenges:

- How do I improve a physical model when measurements become available?
- How do I know how much I can trust my model?
- How do I combine simulation of physical systems with virtual control units?
- How can I even use simulation to investigate the safety of the real system?

In this lab, students will learn methods for answering these (and other) questions and apply what they learn through hands-on exercises. Experts from industrial practice are brought in for some parts of the course.

Assigned Courses:

Praktikum Simulation cyber-physischer Systeme (internship)

Examination

Praktical Module Simulation of Cyber-Physical Systems

portfolio exam / length of examination: 30 minutes

Module INF-0380: Digital Health *Digital Health*		5 ECTS/LP
Version 1.0.0 (since SoSe21) Person responsible for module: Prof. Dr. Björn Schuller		
Learning Outcomes / Competences: **Knowledge:** Digital health is the use of information and communication technology for disease prevention and treatment. Students will get to know the key concepts, definitions, and technologies in the field of digital health. They will get insights into acceptability and usability of digital health applications in the context of various diseases such as depression, multiple sclerosis, and autism spectrum disorder. They will learn strategies for collecting medically-relevant data of various modalities, e.g., recording speech data using microphones or tracking heart rate via wearables. They will then learn about principal concepts of intelligent biosignal processing and analysis including feature extraction and machine learning in the context of healthcare applications. Finally, students will be made familiar with current and potential future implications of intelligent biosignal analysis to the health sector as well as sensitised to related ethical and data privacy aspects. **Skills:** Students will be familiar with the basic concepts of digital health and its fields of application in modern healthcare. Students will be able to select appropriate methodology or design new approaches to be applied to a broad range of health-related signal processing and analysis tasks. Moreover, they will practice logical and conceptual thinking and combine knowledge of state-of-the-art technology and medical requirements in order to develop solutions for real-world scenarios in a healthcare context. **Competences:** Students are prepared to work closely with healthcare professionals in interdisciplinary research and intervention projects. Students are able to plan and carry out medical data collections for health-related biosignal analysis tasks under consideration of ethical principles and data privacy regulations. They can cope with tools to extract meaningful information from the collected data. Furthermore, they know how to characterise and judge on the quality and suitability of existing approaches as well as design new intelligent biosignal processing and analysis solutions for healthcare applications. They are further able to realise the learnt concepts in programs and know how to make scientifically meaningful performance evaluations of the proposed systems. **Key skills:** Formal methods; Knowledge of advantages and disadvantages of different design alternatives; Systematical advancement of design tools; Ability to work in teams; Knowledge of workflows and processes; Ability to find solutions for practical problems; Ability to work autonomously; Quality awareness; Scientific working; Literature research.		
Workload: Total: 150 h 30 h exercise course (attendance) 60 h studying of course content through exercises / case studies (self-study) 30 h lecture (attendance) 15 h studying of course content using literarture (self-study) 15 h studying of course content using provided materials (self-study)		
Conditions: *Basic knowledge of mathematics as well as interest in healthcare applications should be present.*		
Frequency: irregular (usu. summer semester)	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Digital Health (Vorlesung) **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 2
Contents: Public health, personalised medicine, usability, Internet of Things, digital health interventions, self-tracking, digital biomarker, medical data acquisition, wearables, digital signal processing, signal enhancement, feature extraction, machine learning, ethics, and data privacy.
Literature: *Panesar, A (2019): Machine Learning and AI for Healthcare: Big Data for Improved Health Outcomes. Coventry, UK: Apress.*
Part of the Module: Digital Health (Übung) **Mode of Instruction:** exercise course **Language:** English **Contact Hours:** 2

Examination
Digital Health written exam / length of examination: 90 minutes

Module INF-0383: Algorithms for Big Data *Algorithmen für Big Data*		5 ECTS/LP
Version 1.0.0 (since SoSe21) Person responsible for module: Prof. Dr. Tobias Mömke		
Learning Outcomes / Competences: Development and understanding of central copetences in algorithm design for situations, where there are large amounts of data such that not all of them can be accessed without restrictions; aquisition of knowledge of mathematical tools to analyze algorithms; improvement of copetences in abstract thinking and analyzing problems in a systematic manner. **Key Qualifications:** Ability to develop an intuitive understanding of mathematical formalisms; ability to identify the core properties of algirthmic problems; deep understanding of useful mathematical tools		
Workload: Total: 150 h 30 h exercise course (attendance) 30 h lecture (attendance) 15 h studying of course content using provided materials (self-study) 60 h studying of course content through exercises / case studies (self-study) 15 h studying of course content using literarture (self-study)		
Conditions: Basic knowledge in algorithms and data structures (for example Informatik 3 (INF-0111)) and in probability theory (for example Stochastik für Informatiker (MTH-6040)).		
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Algorithms for Big Data (lecture)
Mode of Instruction: lecture
Language: German / English
Contact Hours: 2

Contents:

In modern data processing, we increasingly have the problem that there are large quantities of data whcih con only be stored on cheap and slow mass storage media. Algorithmically, this poses the problem that at each point in time, we can only access a snapshot of the data, for example in a sequential manner. In the course, we study algorithms that despite such limitations provably yield high quality results.

Literature:

Wissenschaftliche Papiere, Surveys, Skripte

Assigned Courses:

Algorithmen für Big Data (lecture)

Part of the Module: Algorithms for Big Data (exercise)
Mode of Instruction: exercise course
Language: English / German
Contact Hours: 2

Assigned Courses:

Übung zu Algorithmen für Big Data (exercise course)

Examination

Algorithms for Big Data

written exam / length of examination: 90 minutes

Module INF-0385: Seminar Resource Aware Algorithmics (Master) *Seminar Resource Aware Algorithmics (Master)*		4 ECTS/LP
Version 1.0.0 (since SoSe21) Person responsible for module: Prof. Dr. Tobias Mömke		
Learning Outcomes / Competences: After attending the seminar, the students are able to understand basic algorithmic concepts, methods, tools and techniques in a self-sufficient manner. They have acquired communication skills, knowledge about work processes and the use of media to present a specific scientific topic both as a talk and in writte form. The participants have learned to express techical contents in a sturctured, understandable and inspiring manner. They have learned to confidently stand in front of the audience, using state of the art presentation tools and media. They are able to tailor the talk to the respective audience. **Key Qualifications:** Literature research; work with scientific literature in English language; analytic copetences; clean scientific practice; ability to present techincal content in confident, understandable and structured manner (both in written and spoken form); abstract, logical and analytical thinking; ability to argue formally; aim for high quality; communication skills; time management.		
Workload: Total: 120 h 30 h seminar (attendance) 90 h preparation of written term papers (self-study)		
Conditions: Good knowledge of content taught in mathematical Bachelor classes such as "Mathematik für Informatiker 1" and "Diskrete Strukturen und Logik." Knowledge about algorithms and data structures (Informatik 3) is useful.		**Credit Requirements:** Passing of the module exam
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Resource Aware Algorithmics (Master)

Mode of Instruction: seminar

Language: German / English

Contact Hours: 2

Contents:

The topics of the seminar are related to research in resource aware algorithmics. The precise topics change over time, in order to reflect up-to-date developments.

Literature:

Depending on the topic of the seminar.

Assigned Courses:

Seminar Resource Aware Algorithmics (Master) (seminar)

Examination

Seminar Resource Aware Algorithmics (Master)

written/oral exam

Module INF-0398: Software-intensive Systems and Medical Products *Software-intensive Systeme und Medizinprodukte*		6 ECTS/LP
Version 1.0.0 (since WS21/22) Person responsible for module: Prof. Dr. Bernhard Bauer		
Learning Outcomes / Competences: Students can create (K3), evaluate (K6), and document software architectures. To this end, they can transfer technical solution concepts into models and know methods for developing such abstractions and architectures. Such abstractions and architectures. They can describe the advantages and disadvantages of design alternatives (K4). (K4) and can evaluate them in the respective application context (K6). Problems can be identified independently (K4), and solutions can be designed systematically (K5) and realized (K3). Furthermore, they have basic knowledge of creating medical software according to the particular requirements for conformity assessment. Based on the European Medical Device Regulation (MDR), students learn how to implement the required software life cycle process according to IEC 62304 and IEC 82304, the requirements for software requirement management, the link between (agile) software development and the documentation obligation, requirements regarding safety and security. Key qualifications: Competence in networking different specialist areas; teamwork and communication skills; ability to expand existing knowledge independently; quality awareness; ability to present and document results in an understandable way; practical experience and professional qualifications.		
Workload: Total: 180 h 23 h studying of course content using literarture (self-study) 22 h studying of course content using provided materials (self-study) 60 h studying of course content through exercises / case studies (self-study) 45 h lecture (attendance) 30 h exercise course (attendance)		
Conditions: The previous course "Software Architectures and Enterprise Architecture Management" and the course "Software-intensive Systems" must not have been taken due to overlaps.		
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 5	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Software-intensive Systeme und Medizinprodukte (Vorlesung) **Mode of Instruction:** lecture **Language:** German **Contact Hours:** 3
Contents: The lecture content includes patterns, modelling techniques and the evaluation of software architectures. Furthermore, the development of medical devices is dealt with.

Literature:

- Bass et al: Software Architecture in Practice
- Clements et al: Documenting Software Architectures
- Clements et al: Evaluation of Software Architectures
- Richard N. Taylor, Nenad Medvidovic, and Eric M. Dashofy; Software Architecture: Foundations, Theory, and Practice
- BSI Empfehlungen für Medizinprodukte
- ZVE Empfehlungen für Medizinprodukte

Part of the Module: Software-intensive Systeme und Medizinprodukte (Übung)

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

Examination

Software-intensive Systeme

oral exam / length of examination: 30 minutes

Module INF-0400: Knowledge Representation in Biomedicine *Knowledge Representation in Biomedicine*		5 ECTS/LP
Version 1.1.0 (since WS21/22) Person responsible for module: Prof. Dr. Frank Kramer Dr. Zaynab Hammoud		
Learning Outcomes / Competences: analytical and logical thinking, skill to solve complex problems under practical conditions, ability to present and document results in a comprehensible way, procedures and processes in creating practical systems, individual work with books and scientific literature, teamwork		
Workload: Total: 150 h 30 h (self-study) 30 h studying of course content through exercises / case studies (self-study) 30 h studying of course content using literarture (self-study) 30 h exercise course (attendance) 30 h lecture (attendance)		
Conditions: none		**Credit Requirements:** Passing the module exam
Frequency: each winter semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Knowledge Representation in Biomedicine

Mode of Instruction: lecture
Language: English
Contact Hours: 2
ECTS Credits: 3.0

Contents:

The course Knowledge representation in Biomedicine covers the different aspects and forms used to model biomedical knowledge. During this course, students will acquire logical and analytical skills. They will study different forms of knowledge such as terminologies, ontologies, controlled vocabulary, thesaurus and much more. Furthermore, they will learn the different between these types and will be able to develop new solutions and implement them using RDF, XML or UMLS formats. They will inspect practical examples of knowledge forms used in biomedicine.

Literature:

- Handbuch der Medizinischen Informatik, Thomas M. Lehmann, 2. Auflage, 2014
- Biomedizinische Ontologie: Wissen strukturieren für den Informatik-Einsatz, Ludger Jamsem, Barry Smith (Hrsg.), 2008

Part of the Module: Übung zu Knowledge Representation in Biomedicine

Mode of Instruction: exercise course
Language: English
Frequency: each semester
Contact Hours: 2
ECTS Credits: 2.0

Examination

Knowledge Representation in Biomedicine

portfolio exam

Module INF-0407: Seminar Digital Ethics (Master) *Seminar Digitale Ethik (Master)*	4 ECTS/LP

Version 1.0.0 (since WS21/22)
Person responsible for module: Prof. Dr. Robert Lorenz

Learning Outcomes / Competences:
After attending the seminar, the students can independently work out and analyse advanced problems, concepts, methods, procedures, techniques, and technologies from the field of digital ethics and evaluate them in relation to the individual seminar topic.

Participants possess scientific methodology, communication skills, and the ability to present a special topic clearly and comprehensibly in speech and writing and to discuss and evaluate scientifically challenging topics from the named field critically and argumentatively.

Furthermore, they learn to recognise logical structures of thinking and argumentation and use them in a goal-oriented manner. The participants can formulate clearly and comprehensibly and present subject content freely. They understand how to structure a talk that is clear and easy to follow. Additionally, the students know how to focus on essential messages and convey them in a comprehensible way, even with complex content. They skilfully apply chains of argumentation and solution strategies in the event of disruptions. The students understand how to confidently deal with common presentation media and use them interactively. They manage to gear a talk to a specific target group, apply various moderation techniques, and keep their audience engaged even over a longer period.

Key qualifications: Presentation techniques; literature research; principles of good scientific practice; evaluating solution approaches, procedures, techniques, and technologies from different points of view.

Workload:
Total: 120 h
30 h seminar (attendance)
90 h preparation of presentations (self-study)

Conditions: none		**Credit Requirements:** Passing the module examination
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Seminar Digital Ethics (Master)
Mode of Instruction: seminar
Language: English / German
Contact Hours: 2
ECTS Credits: 4.0

Contents:
The topics of the seminar change over time, in order to reflect up-to-date developments

Literature:
Literature depends on the chosen topic

Examination
Seminar Digital Ethics (Master)
presentation / length of examination: 45 minutes

Module INF-0408: Extremal Combinatorics *Extremal Combinatorics*		5 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Prof. Dr. Tobias Mömke		
Learning Outcomes / Competences: Being able to prove mathematical claims using counting, pigeonhole princple and the probabilistic method; improving the skills of analyzing performance of algorithms; enhancing the skills of mathematical thinking		
Workload: Total: 150 h 30 h exercise course (attendance) 15 h studying of course content using provided materials (self-study) 15 h studying of course content using literarture (self-study) 60 h studying of course content through exercises / case studies (self-study) 30 h lecture (attendance)		
Conditions: Basic knowledge in mathematics, in particular linear algebra is necessary. Basic knowledge in graph theory is recommended.		
Frequency: irregular	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Extremal Combinatorics (Vorlesung) **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 2
Contents: How many people do you need to invite for your party, in order to have 3 strangers or a group of 3 friends? If 10 people have keys to a safe, how many locks are necessary to make sure any 5 of them can open it? What is the dictator paradox, and should you be worried about it? This course provides an introduction to extremal combinatorics, which helps us to find answers to the questions above.
Literature:
Assigned Courses: **Extremal Combinatorics** (lecture)
Part of the Module: Extremal Combinatorics (Übung) **Mode of Instruction:** exercise course **Language:** English **Contact Hours:** 2
Assigned Courses: **Übung zu Extremal Combinatorics** (exercise course)

Examination

Extremal Combinatorics

oral exam / length of examination: 45 minutes

Module INF-0409: Cyber Security *Cyber Security*		6 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Prof. Dr. Bernhard Bauer		
Learning Outcomes / Competences: Students can create (K3), evaluate (K6), and document security aspects in the software development process and software architectures. To this end, they can transfer technical solution concepts into development processes and IT architectures and know methods for developing secure software. They can describe the advantages and disadvantages of security alternatives (K4) and evaluate them in the respective application context (K6). Problems can be identified independently (K4) and solutions systematically designed (K5) and implemented (K3). Furthermore, they have developed skills for analyzing and structuring the problems of security architectures and know the concepts and procedures for creating such architectures. Students can name practice-relevant issues in security architectures and secure software development processes (K1). They can select suitable methods for They can select and safely apply suitable methods for creating and evaluating security architectures. The students know concepts and technologies for developing secure software and security architectures. They have the competence to recognize significant technical developments. Key qualification: Competence to network different subject areas; team and ability to communicate; ability to expand existing knowledge independently; quality awareness; ability to present and document results understandably; practical experience and professional aptitude.		
Workload: Total: 180 h 23 h studying of course content using literarture (self-study) 22 h studying of course content using provided materials (self-study) 60 h studying of course content through exercises / case studies (self-study) 45 h lecture (attendance) 30 h exercise course (attendance)		
Conditions: none		
Frequency: each summer semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 5	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Cyber Security (Vorlesung)

Mode of Instruction: lecture

Language: German

Contact Hours: 3

Contents:

The lecture content includes security standards, secure software development lifecycles, as well as security architectures, and their evaluation in respective technology contexts. and the evaluation of security architectures.

Literature:

- Slides
- A. Deane, A. Kraus: The Official (ISC)2 CISSP CBK Reference
- Further literature in the lecture on specific topics

Assigned Courses:

Cyber Security (lecture)

Part of the Module: Cyber Security (Übung)

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

Assigned Courses:

Übung zu Cyber Security (exercise course)

Examination

Cyber Security

oral exam / length of examination: 30 minutes

Module INF-0410: Gesture-Based Communication in Human-Computer Interaction *Gesture-Based Communication in Human-Computer Interaction*		8 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Prof. Dr. Elisabeth André		
Learning Outcomes / Competences: After successful participation in this module, students understand the essential concepts of gesture-based communication in human-computer interaction. They are able to translate technical solution concepts into programs and models and master the selection and application of suitable methods. They have the knowledge of the way of thinking and the language of application-relevant disciplines. Within the framework of the lecture, they learn to evaluate learning components in a scientifically meaningful way using suitable methods, to develop the methods and algorithms independently and to implement them technically. Particularly promoted in this framework are also the skills for confident and convincing presentation of ideas and concepts, comprehensible presentation and documentation of results, as well as logical, analytical and conceptual thinking. **Key qualifications:** Advanced mathematical formal methodology, skill in analyzing and structuring complex computer science problems, skill in developing and implementing solution strategies for complex problems, understanding of team processes, skill in collaborating in teams, self-reflection; acting responsibly in the face of inadequacy and conflicting interests, quality awareness, meticulousness.		
Workload: Total: 240 h 120 h studying of course content through exercises / case studies (self-study) 15 h studying of course content using literarture (self-study) 15 h studying of course content using provided materials (self-study) 60 h exercise course (attendance) 30 h lecture (attendance)		
Conditions: none		
Frequency: each summer semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 6	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Gesture-Based Communication in Human-Computer Interaction (Lecture) **Mode of Instruction:** lecture **Language:** English **Contact Hours:** 2
Contents: HCI methods and principles, Interaction design, Nonverbal communication, Gestures, Gesture recognition systems, Collaboration, Applied computer vision, Ubiquitous computing
Assigned Courses: **Gesture-Based Communication in Human-Computer Interaction** (lecture)
Part of the Module: Gesture-Based Communication in Human-Computer Interaction (Exercise Course) **Mode of Instruction:** exercise course **Language:** English **Contact Hours:** 4

Assigned Courses:

Übung zu Gesture-Based Communication in Human-Computer Interaction (exercise course)

Examination

Gesture-Based Communication in Human-Computer Interaction

portfolio exam

Module INF-0418: Practical Module Conversational AI: Virtual Assistants and Chatbots *Praktikum Conversational AI: Virtual Assistants and Chatbots*		5 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Prof. Dr. Elisabeth André		
Learning Outcomes / Competences: Students are familiar with methods and techniques of interaction design and engineering for health care applications. After successful participation, they will have the necessary knowledge to analyze application scenarios according to the guidelines of the user-centered design process and to design software solutions tailored to the target group. They are able to translate current interaction paradigms and design guidelines into models and programs for novel interaction devices, as well as to independently familiarize themselves with the necessary technologies. Furthermore, they are able to apply practice-relevant evaluation methods to assess the quality of the created software prototype. They are able to plan larger project tasks in small teams, solve them according to a self-developed project plan and discuss the results appropriately in plenary sessions and present them as a team. **Key qualifications:** Skill in confident and persuasive presentation of ideas and concepts; knowledge of the mindset and language of application-relevant disciplines; understanding of team processes; skill in collaborating in teams; skill in leading teams; skill in presenting and documenting results in a comprehensible manner; ability to expand existing knowledge independently; ability to contribute to science; competence in recognizing significant technical developments; quality awareness, meticulousness.		
Workload: Total: 150 h 90 h studying of course content through exercises / case studies (self-study) 60 h internship / practical course (attendance)		
Conditions: none		
Frequency: each summer semester	**Recommended Semester:** from 1.	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Practical Module Interaction Design and Engineering for Health Care Applications **Mode of Instruction:** internship **Language:** English **Contact Hours:** 4
Contents: The specific assignment for student projects is designed each year.
Literature: Literature references will be announced at the beginning of the semester depending on the topic.
Assigned Courses: **Praktikum Conversational AI: Virtual Assistants and Chatbots** (internship)

Examination
Practical Module Interaction Design and Engineering for Health Care Applications practical exam

Module SZD-0224: German, partial completion of A1 CEFR: Four Skills *Deutsch als Fremdsprache A1: Stufe 1 (6 LP)*		6 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele		
Contents: Very basic language skills for absolute beginners		
Learning Outcomes / Competences: Partial completion of level A1 (CEFR); attendance of further courses on this level is recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache A1: Stufe 1

Mode of Instruction: exercise course

Language: German

Contact Hours: 4

ECTS Credits: 6.0

Assigned Courses:

Deutsch als Fremdsprache A1: Stufe 1 (exercise course)

Examination

Deutsch als Fremdsprache A1: Stufe 1

written exam

Description:

As a rule, the examination is given in the last week of the semester.

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0225: German A1 CEFR: Four Skills *Deutsch als Fremdsprache A1: Stufe 2 (6 LP)*			6 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele			
Contents: Language skills (reading, listening, writing, speaking) for the basic user aimed at the satisfaction of needs of a concrete type			
Learning Outcomes / Competences: Level A1 (CEFR); attendance of further courses on this level is recommended.			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)			
Conditions: • Proof of very basic language skills in German, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German			**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Deutsch als Fremdsprache A1: Stufe 2 **Mode of Instruction:** exercise course **Language:** German **Contact Hours:** 4 **ECTS Credits:** 6.0
Assigned Courses: **Deutsch als Fremdsprache A1: Stufe 2** (exercise course)
Examination **Deutsch als Fremdsprache A1: Stufe 2** written exam **Description:** As a rule, the examination is given in the last week of the semester. Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0226: German A1 CEFR: Listening and Pronunciation *Deutsch als Fremdsprache A1: Hörverständnis und Aussprache (3 LP)*		3 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele		
Contents: Listening and pronunciation skills for the basic user aimed at the satisfaction of needs of a concrete type		
Learning Outcomes / Competences: Partial completion of level A1 (CEFR); attendance of further courses on this level is strongly recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 90 h 30 h (attendance) 60 h (self-study)		
Conditions: Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Deutsch als Fremdsprache A1: Hörverständnis und Aussprache **Mode of Instruction:** exercise course **Language:** German **Contact Hours:** 2 **ECTS Credits:** 3.0
Assigned Courses: **Deutsch als Fremdsprache A1: Hörverständnis und Aussprache** (exercise course)
Examination **Deutsch als Fremdsprache A1: Hörverständnis und Aussprache** portfolio exam **Description:** Assignments to be submitted by the due dates set by the examiner

<table>
<tr><td colspan="2">Module SZD-0227: German A1 CEFR: Communication and Vocabulary
Deutsch als Fremdsprache A1: Kommunikation und Wortschatz (3 LP)</td><td>3 ECTS/LP</td></tr>
<tr><td colspan="3">Version 1.0.0 (since SoSe22)
Person responsible for module: Dr. Michaela Negele</td></tr>
<tr><td colspan="3">Contents:
Communicative skills and vocabulary for the basic user aimed at the satisfaction of needs of a concrete type</td></tr>
<tr><td colspan="3">Learning Outcomes / Competences:
Partial completion of level A1 (CEFR); attendance of further courses on this level is strongly recommended.</td></tr>
<tr><td colspan="3">Remarks:
Course registration on Digicampus, exam registration on STUDIS</td></tr>
<tr><td colspan="3">Workload:
Total: 90 h
30 h (attendance)
60 h (self-study)</td></tr>
<tr><td colspan="2">Conditions:
Only for students whose native language is not German</td><td>Credit Requirements:
Passing grade on the examination</td></tr>
<tr><td>Frequency: each semester (as a rule)</td><td>Recommended Semester:</td><td>Minimal Duration of the Module:
1 semester[s]</td></tr>
<tr><td>Contact Hours:
2</td><td>Repeat Exams Permitted:
according to the examination regulations of the study program</td><td></td></tr>
</table>

<table>
<tr><td>Parts of the Module</td></tr>
<tr><td>Part of the Module: Deutsch als Fremdsprache A1: Kommunikation und Wortschatz
Mode of Instruction: exercise course
Language: German
Contact Hours: 2
ECTS Credits: 3.0</td></tr>
<tr><td>Assigned Courses:

Deutsch als Fremdsprache A1: Kommunikation und Wortschatz (exercise course)</td></tr>
<tr><td>Examination
Deutsch als Fremdsprache A1: Kommunikation und Wortschatz
oral exam
Description:
As a rule, the examination is given in the last week of the semester.</td></tr>
</table>

Module SZD-0228: German, partial completion of A2 CEFR: Four Skills *Deutsch als Fremdsprache A2: Stufe 1 (6 LP)*		6 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the basic user's communication in areas of most immediate relevance		
Learning Outcomes / Competences: Partial completion of level A2 (CEFR); attendance of further courses on this level is recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: • Proof of level A1 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Deutsch als Fremdsprache A2: Stufe 1 **Mode of Instruction:** exercise course **Language:** German **Contact Hours:** 4 **ECTS Credits:** 6.0
Examination **Deutsch als Fremdsprache A2: Stufe 1** written exam **Description:** Only in the winter semester As a rule, the examination is given in the last week of the semester. Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0229: German A2 CEFR: Four Skills *Deutsch als Fremdsprache A2: Stufe 2 (6 LP)*		6 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the basic user's communication in areas of most immediate relevance		
Learning Outcomes / Competences: Level A2 (CEFR); attendance of further courses on this level is recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: • Proof of level A1 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache A2: Stufe 2
Mode of Instruction: exercise course
Language: German
Contact Hours: 4
ECTS Credits: 6.0

Assigned Courses:

Deutsch als Fremdsprache A2: Stufe 2 (exercise course)

Examination
Deutsch als Fremdsprache A2: Stufe 2
written exam
Description:
Only in the summer semester

As a rule, the examination is given in the last week of the semester.

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0230: German A2 CEFR: Listening and Pronunciation *Deutsch als Fremdsprache A2: Hörverständnis und Aussprache (3 LP)*		3 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele		
Contents: Listening and pronunciation skills for the basic user's communication in areas of most immediate relevance		
Learning Outcomes / Competences: Partial completion of level A2 (CEFR); attendance of further courses on this level is strongly recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 90 h 60 h (self-study) 30 h (attendance)		
Conditions: • Proof of level A1 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache A2: Hörverständnis und Aussprache

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

ECTS Credits: 3.0

Assigned Courses:

Deutsch als Fremdsprache A2: Hörverständnis und Aussprache (exercise course)

Examination

Deutsch als Fremdsprache A2: Hörverständnis und Aussprache

portfolio exam

Description:

Assignments to be submitted by the due dates set by the examiner

Module SZD-0231: German A2 CEFR: Writing and Vocabulary *Deutsch als Fremdsprache A2: Schreiben und Wortschatz (3 LP)*			3 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele			
Contents: Writing skills and vocabulary for the basic user's communication in areas of most immediate relevance			
Learning Outcomes / Competences: Partial completion of level A2 (CEFR); attendance of further courses on this level is strongly recommended			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 90 h 60 h (self-study) 30 h (attendance)			
Conditions: • Proof of level A1 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German			**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: Deutsch als Fremdsprache A2: Schreiben und Wortschatz

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

ECTS Credits: 3.0

Assigned Courses:

Deutsch als Fremdsprache A2: Schreiben und Wortschatz (exercise course)

Examination

Deutsch als Fremdsprache A2: Schreiben und Wortschatz

written exam

Description:

As a rule, the examination is given in the last week of the semester.

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0232: German, partial completion of B1 CEFR: Four Skills *Deutsch als Fremdsprache B1: Stufe 1 (6 LP)*		6 ECTS/LP
Version 1.10.0 (since SoSe18) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on familiar topics		
Learning Outcomes / Competences: Partial completion of level B1 (CEFR); attendance of further courses on this level is recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: • Proof of level A2 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache B1: Stufe 1

Mode of Instruction: exercise course

Language: German

Contact Hours: 4

ECTS Credits: 6.0

Examination

Deutsch als Fremdsprache B1: Stufe 1

written exam

Description:

Only in the winter semester

As a rule, the examination is given in the last week of the semester.

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0233: German B1 CEFR: Four Skills *Deutsch als Fremdsprache B1: Stufe 2 (6 LP)*		6 ECTS/LP
Version 1.9.0 (since SoSe18) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on familiar topics		
Learning Outcomes / Competences: Level B1 (CEFR); attendance of further courses on this level is recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: • Proof of level A2 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Deutsch als Fremdsprache B1: Stufe 2 **Mode of Instruction:** exercise course **Language:** German **Contact Hours:** 4 **ECTS Credits:** 6.0
Assigned Courses: **Deutsch als Fremdsprache B1: Stufe 2** (exercise course)
Examination **Deutsch als Fremdsprache B1: Stufe 2** written exam **Description:** Only in the summer semester As a rule, the examination is given in the last week of the semester. Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0234: German B1 CEFR: Listening *Deutsch als Fremdsprache B1: Hörverständnis (3 LP)*		3 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele		
Contents: Listening skills for the independent user's communication on familiar topics		
Learning Outcomes / Competences: Partial completion of level B1 (CEFR); attendance of further courses on this level is strongly recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 90 h 30 h (attendance) 60 h (self-study)		
Conditions: • Proof of level A2 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache B1: Hörverständnis

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

ECTS Credits: 3.0

Assigned Courses:

Deutsch als Fremdsprache B1: Hörverständnis (exercise course)

Examination

Deutsch als Fremdsprache B1: Hörverständnis

written exam

Description:

As a rule, the examination is given in the last week of the semester.

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0235: German B1 CEFR: Conversation and Pronunciation *Deutsch als Fremdsprache B1: Konversation und Aussprache (3 LP)*		3 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele		
Contents: Conversation and pronunciation skills for the independent user's communication on familiar topics		
Learning Outcomes / Competences: Partial completion of level B1 (CEFR); attendance of further courses on this level is strongly recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 90 h 60 h (self-study) 30 h (attendance)		
Conditions: • Proof of level A2 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache B1: Konversation und Aussprache

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

ECTS Credits: 3.0

Assigned Courses:

Deutsch als Fremdsprache B1: Konversation und Aussprache (exercise course)

Examination

Deutsch als Fremdsprache B1: Konversation und Aussprache

oral exam

Description:

As a rule, the examination is given in the last week of the semester.

Module SZD-0236: German B1 CEFR: Reading and Vocabulary *Deutsch als Fremdsprache B1: Leseverstehen und Wortschatz (3 LP)*		3 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele		
Contents: Reading skills and vocabulary for the independent user's communication on familiar topics		
Learning Outcomes / Competences: Partial completion of level B1 (CEFR); attendance of further courses on this level is strongly recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 90 h 60 h (self-study) 30 h (attendance)		
Conditions: • Proof of level A2 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache B1: Leseverstehen und Wortschatz

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

ECTS Credits: 3.0

Assigned Courses:

Deutsch als Fremdsprache B1: Leseverstehen und Wortschatz (exercise course)

Examination

Deutsch als Fremdsprache B1: Leseverstehen und Wortschatz

written exam

Description:

As a rule, the examination is given in the last week of the semester.

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

<table>
<tr><td colspan="2">Module SZD-0237: German B1 CEFR: Writing
Deutsch als Fremdsprache B1: Schreiben (3 LP)</td><td>3 ECTS/LP</td></tr>
<tr><td colspan="3">Version 1.0.0 (since SoSe22)
Person responsible for module: Dr. Michaela Negele</td></tr>
<tr><td colspan="3">Contents:
Writing and self-correcting skills for the independent user's communication on familiar topics</td></tr>
<tr><td colspan="3">Learning Outcomes / Competences:
Partial completion of level B1 (CEFR); attendance of further courses on this level is strongly recommended</td></tr>
<tr><td colspan="3">Remarks:
Course registration on Digicampus, exam registration on STUDIS</td></tr>
<tr><td colspan="3">Workload:
Total: 90 h
30 h (attendance)
60 h (self-study)</td></tr>
<tr><td colspan="2">Conditions:
Proof of level A2 (CEFR) language competence, e.g. through placement test (hthttps://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/)
Only for students whose native language is not German</td><td>Credit Requirements:
Passing grade on the examination</td></tr>
<tr><td>Frequency: each semester (as a rule)</td><td>Recommended Semester:</td><td>Minimal Duration of the Module:
1 semester[s]</td></tr>
<tr><td>Contact Hours:
2</td><td>Repeat Exams Permitted:
according to the examination regulations of the study program</td><td></td></tr>
</table>

<table>
<tr><td>Parts of the Module</td></tr>
<tr><td>Part of the Module: Deutsch als Fremdsprache B1: Schreiben
Mode of Instruction: exercise course
Language: German
Contact Hours: 2
ECTS Credits: 3.0</td></tr>
<tr><td>Assigned Courses:
Deutsch als Fremdsprache B1: Schreiben (exercise course)</td></tr>
<tr><td>Examination
Deutsch als Fremdsprache B1: Schreiben
written exam
Description:
As a rule, the examination is given in the last week of the semester.
Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner</td></tr>
</table>

Module SZD-0238: German, partial completion of B2 CEFR: Four Skills *Deutsch als Fremdsprache B2: Stufe 1 (6 LP)*		6 ECTS/LP
Version 1.8.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on both concrete and abstract topics		
Learning Outcomes / Competences: Partial completion of level B2 (CEFR); attendance of further courses on this level is recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: • Proof of level B1 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache B2: Stufe 1

Mode of Instruction: exercise course

Language: German

Contact Hours: 4

ECTS Credits: 6.0

Examination

Deutsch als Fremdsprache B2: Stufe 1

written exam

Description:

Only in the winter semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0239: German B2 CEFR: Four Skills *Deutsch als Fremdsprache B2: Stufe 2 (6 LP)*		6 ECTS/LP
Version 1.9.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on both concrete and abstract topics		
Learning Outcomes / Competences: Level B2 (CEFR); attendance of further courses on this level is recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: • Proof of level B1 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Deutsch als Fremdsprache B2: Stufe 2 **Mode of Instruction:** exercise course **Language:** German **Contact Hours:** 4 **ECTS Credits:** 6.0
Assigned Courses: **Deutsch als Fremdsprache B2: Stufe 2** (exercise course)
Examination **Deutsch als Fremdsprache B2: Stufe 2** written exam **Description:** Only in the summer semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0242: German B2 CEFR: Pronunciation *Deutsch als Fremdsprache B2: Aussprache (3 LP)*		3 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele		
Contents: Phonetic an remedial pronunciation skills for the independent user's communication on both concrete and abstract topics		
Learning Outcomes / Competences: Partial completion of level B2 (CEFR); attendance of further courses on this level is strongly recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 90 h 30 h (attendance) 60 h (self-study)		
Conditions: • Proof of level B1 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache B2: Aussprache
Mode of Instruction: exercise course
Language: German
Contact Hours: 2
ECTS Credits: 3.0

Assigned Courses:

Deutsch als Fremdsprache B2: Aussprache (exercise course)

Examination
Deutsch als Fremdsprache B2: Aussprache
oral exam
Description:
As a rule, the examination is given in the last week of the semester.

Module SZD-0240: German B2 CEFR: Grammar and Vocabulary *Deutsch als Fremdsprache B2: Grammatik und Wortschatz (6 LP)*		6 ECTS/LP
Version 1.6.0 (since SoSe18) Person responsible for module: Dr. Michaela Negele		
Contents: Grammar skills and vocabulary for the independent user's communication on both concrete and abstract topics		
Learning Outcomes / Competences: Partial completion of level B2 (CEFR); attendance of further courses on this level is recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: • Proof of level B1 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Deutsch als Fremdsprache B2: Grammatik und Wortschatz **Mode of Instruction:** exercise course **Language:** German **Contact Hours:** 4 **ECTS Credits:** 6.0
Assigned Courses: **Deutsch als Fremdsprache B2: Grammatik und Wortschatz** (exercise course)
Examination **Deutsch als Fremdsprache B2: Grammatik und Wortschatz** written exam **Description:** Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0241: German B2 CEFR: Listening *Deutsch als Fremdsprache B2: Hörverständnis (3 LP)*		3 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele		
Contents: Listening skills for the independent user's communication on both concrete and abstract topics		
Learning Outcomes / Competences: Partial completion of level B2 (CEFR); attendance of further courses on this level is strongly recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 90 h 30 h (attendance) 60 h (self-study)		
Conditions: • Proof of level B1 (CEFR) language competence, e.g. through placement test (https://https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache B2: Hörverständnis

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

ECTS Credits: 3.0

Assigned Courses:

Deutsch als Fremdsprache B2: Hörverständnis (exercise course)

Examination

Deutsch als Fremdsprache B2: Hörverständnis

written exam

Description:

As a rule, the examination is given in the last week of the semester.

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0205: German B2 CEFR: Cultural Studies *Deutsch als Fremdsprache B2: Landeskunde (3 LP)*		3 ECTS/LP
Version 1.3.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele		
Contents: General knowledge of Germany's social, economic, political and cultural life and language skills for the independent user's communication on both concrete and abstract topics		
Learning Outcomes / Competences: Partial completion of level B2 (CEFR); attendance of further courses on this level is strongly recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 90 h 30 h (attendance) 60 h (self-study)		
Conditions: • Proof of level B1 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Deutsch als Fremdsprache B2: Landeskunde **Mode of Instruction:** exercise course **Language:** German **Contact Hours:** 2 **ECTS Credits:** 3.0
Assigned Courses: **Deutsch als Fremdsprache B2: Landeskunde** (exercise course)
Examination **Deutsch als Fremdsprache B2: Landeskunde** written exam **Description:** As a rule, the examination is given in the last week of the semester. Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0206: German B2 CEFR: Reading and Discussion *Deutsch als Fremdsprache B2: Lesen und Diskutieren (3 LP)*		3 ECTS/LP
Version 1.5.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele		
Contents: Reading and oral skills for the independent user's communication on both concrete and abstract topics		
Learning Outcomes / Competences: Partial completion of level B2 (CEFR); attendance of further courses on this level is strongly recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 90 h 30 h (attendance) 60 h (self-study)		
Conditions: • Proof of level B1 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache B2: Lesen und Diskutieren

Mode of Instruction: exercise course

Language: German

Contact Hours: 2

ECTS Credits: 3.0

Assigned Courses:

Deutsch als Fremdsprache B2: Lesen und Diskutieren (exercise course)

Examination

Deutsch als Fremdsprache B2: Lesen und Diskutieren

written exam

Description:

As a rule, the examination is given in the last week of the semester.

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0208: German B2 CEFR: Text Production *Deutsch als Fremdsprache B2: Textproduktion (3 LP)*		3 ECTS/LP
Version 1.3.0 (since SoSe22) Person responsible for module: Dr. Michaela Negele		
Contents: Writing and self-correcting skills for the independent user's communication on both concrete and abstract topics		
Learning Outcomes / Competences: Partial completion of level B2 (CEFR); attendance of further courses on this level is strongly recommended.		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 90 h 30 h (attendance) 60 h (self-study)		
Conditions: • Proof of level B1 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache B2: Textproduktion
Mode of Instruction: exercise course
Language: German
Contact Hours: 2
ECTS Credits: 3.0

Assigned Courses:

Deutsch als Fremdsprache B2: Textproduktion (exercise course)

Examination

Deutsch als Fremdsprache B2: Textproduktion
written exam

Description:

As a rule, the examination is given in the last week of the semester.

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0210: German C1 CEFR: Grammar and Writing Skills 1 *Deutsch als Fremdsprache C1: Grammatik und schriftlicher Ausdruck 1 (6 LP)*		6 ECTS/LP
Version 2.2.0 (since SoSe21) Person responsible for module: Dr. Michaela Negele		
Contents: Grammatical skills for the proficient user communicating fluently and effectively in a wide range of situations		
Learning Outcomes / Competences: Level C1 (CEFR) grammatical competence		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: • Proof of level B2 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache C1: Grammatik und schriftlicher Ausdruck 1
Mode of Instruction: exercise course
Language: German
Contact Hours: 4
ECTS Credits: 6.0

Assigned Courses:

Deutsch als Fremdsprache C1: Grammatik und schriftlicher Ausdruck 1 (exercise course)

Examination
Deutsch als Fremdsprache C1: Grammatik und schriftlicher Ausdruck 1
written exam / length of examination: 90 minutes
Description:
Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0212: German C1 CEFR: Grammar and Writing Skills 2 *Deutsch als Fremdsprache C1: Grammatik und schriftlicher Ausdruck 2 (6 LP)*		6 ECTS/LP
Version 2.2.0 (since SoSe21) Person responsible for module: Dr. Michaela Negele		
Contents: Grammatical skills for the proficient user communicating fluently and effectively in a wide range of situations		
Learning Outcomes / Competences: Level C1 (CEFR) grammatical competence		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: • Proof of level B2 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache C1: Grammatik und schriftlicher Ausdruck 2

Mode of Instruction: exercise course

Language: German

Contact Hours: 4

ECTS Credits: 6.0

Assigned Courses:

Deutsch als Fremdsprache C1: Grammatik und schriftlicher Ausdruck 2 (exercise course)

Examination

Deutsch als Fremdsprache C1: Grammatik und schriftlicher Ausdruck 2

written exam / length of examination: 90 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0214: German C1 CEFR: Listening and Phonetic Skills *Deutsch als Fremdsprache C1: Hörverständnis und Phonetik (6 LP)*		6 ECTS/LP
Version 1.6.0 (since SoSe15) Person responsible for module: Dr. Michaela Negele		
Contents: Listening and phonetic skills for the proficient user communicating fluently and effectively in a wide range of situations		
Learning Outcomes / Competences: Level C1 (CEFR) competences in the areas of listening comprehension and phonetics		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: • Proof of level B2 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache C1: Hörverständnis und Phonetik
Mode of Instruction: exercise course
Language: German
Contact Hours: 4
ECTS Credits: 6.0

Assigned Courses:

Deutsch als Fremdsprache C1: Hörverständnis und Phonetik (exercise course)

Examination
Deutsch als Fremdsprache C1: Hörverständnis und Phonetik
written exam / length of examination: 90 minutes
Description:
Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0216: German C1 CEFR: Cultural Competence in Communication *Deutsch als Fremdsprache C1: Kulturell-kommunikative Kompetenz (6 LP)*		6 ECTS/LP
Version 1.6.0 (since SoSe15) Person responsible for module: Dr. Michaela Negele		
Contents: Cultural and communicative skills for the proficient user communicating fluently and effectively in a wide range of situations		
Learning Outcomes / Competences: Level C1 (CEFR) competences in the areas of cultural and communicative skills		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: • Proof of level B2 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache C1: Kulturell-kommunikative Kompetenz

Mode of Instruction: exercise course

Language: German

Contact Hours: 4

ECTS Credits: 6.0

Assigned Courses:

Deutsch als Fremdsprache C1: Kulturell-kommunikative Kompetenz (exercise course)

Examination

Deutsch als Fremdsprache C1: Kulturell-kommunikative Kompetenz

written exam / length of examination: 90 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0219: German C1 CEFR: Vocabulary and Text Production *Deutsch als Fremdsprache C1: Wortschatz und Textproduktion (6 LP)*		6 ECTS/LP
Version 1.6.0 (since SoSe15) Person responsible for module: Dr. Michaela Negele		
Contents: Writing skills and vocabulary for the proficient user communicating fluently and effectively in a wide range of situations		
Learning Outcomes / Competences: Level C1 (CEFR) competences in the areas of writing and vocabulary		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: • Proof of level B2 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Deutsch als Fremdsprache C1: Wortschatz und Textproduktion

Mode of Instruction: exercise course

Language: German

Contact Hours: 4

ECTS Credits: 6.0

Assigned Courses:

Deutsch als Fremdsprache C1: Wortschatz und Textproduktion (exercise course)

Examination

Deutsch als Fremdsprache C1: Wortschatz und Textproduktion

written exam / length of examination: 90 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0221: German C2 CEFR: Academic Language 1 *Deutsch als Fremdsprache C2: Wissenschaftssprache 1 (6 LP)*		6 ECTS/LP
Version 1.7.0 (since SoSe15) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills for the proficient user communicating very fluently and effectively in academic contexts		
Learning Outcomes / Competences: Partial completion of level C2 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: • Proof of level C1 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Deutsch als Fremdsprache C2: Wissenschaftssprache 1 **Mode of Instruction:** exercise course **Language:** German **Contact Hours:** 4 **ECTS Credits:** 6.0

Examination

Deutsch als Fremdsprache C2: Wissenschaftssprache 1

written exam / length of examination: 90 minutes

Description:

Only in the winter semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZD-0223: German C2 CEFR: Academic Language 2 *Deutsch als Fremdsprache C2: Wissenschaftssprache 2 (6 LP)*		6 ECTS/LP
Version 1.8.0 (since SoSe15) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills for the proficient user communicating very fluently and effectively in academic contexts		
Learning Outcomes / Competences: Partial completion of level C2 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: • Proof of level C1 (CEFR) language competence, e.g. through placement test (https://www.uni-augsburg.de/en/organisation/einrichtungen/sz/fremdsprachenangebot/deutsch-als-fremdsprache/) • Only for students whose native language is not German		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Deutsch als Fremdsprache C2: Wissenschaftssprache 2 **Mode of Instruction:** exercise course **Language:** German **Contact Hours:** 4 **ECTS Credits:** 6.0
Assigned Courses: **Deutsch als Fremdsprache C2: Wissenschaftssprache 2** (exercise course)
Examination **Deutsch als Fremdsprache C2: Wissenschaftssprache 2** written exam / length of examination: 90 minutes **Description:** Only in the summer semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZA-0202: Arabic 1 *Arabisch 1 (6 LP)*		6 ECTS/LP
Version 1.4.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele		
Contents: Very basic language skills for absolute beginners		
Learning Outcomes / Competences: Partial completion of level A1 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: None		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Arabisch 1
Mode of Instruction: exercise course
Language: Arabic / German
Contact Hours: 4
ECTS Credits: 6.0

Contents:
See above

Examination
Arabisch 1
written exam / length of examination: 90 minutes
Description:
Only in the winter semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZA-0205: Arabic 2 *Arabisch 2 (6 LP)*			6 ECTS/LP
Version 1.5.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele			
Contents: Language skills (reading, listening, writing, speaking) for the basic user aimed at the satisfaction of needs of a concrete type			
Learning Outcomes / Competences: Level A1 (CEFR)			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)			
Conditions: Very basic language skills in Arabic			**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Arabisch 2 **Mode of Instruction:** exercise course **Language:** Arabic / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Arabisch 2** (exercise course)
Examination **Arabisch 2** written exam / length of examination: 90 minutes **Description:** Only in the summer semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZA-0208: Arabic 3 *Arabisch 3 (6 LP)*			6 ECTS/LP
Version 1.4.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele			
Contents: Language skills (reading, listening, writing, speaking) for the basic user geared towards communication in areas of most immediate relevance			
Learning Outcomes / Competences: Level A1+ (CEFR)			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)			
Conditions: Level A1 (CEFR) language competence in Arabic			**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: Arabisch 3

Mode of Instruction: exercise course

Language: Arabic / German

Contact Hours: 4

ECTS Credits: 6.0

Contents:

See above

Examination

Arabisch 3

written exam / length of examination: 90 minutes

Description:

Only in the winter semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZA-0211: Arabic 4 *Arabisch 4 (6 LP)*			6 ECTS/LP
Version 1.5.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele			
Contents: Language skills (reading, listening, writing, speaking) for the basic user's communication in areas of most immediate relevance			
Learning Outcomes / Competences: Level A2 (CEFR)			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)			
Conditions: Level A1+ (CEFR) language competence in Arabic			**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: Arabisch 4

Mode of Instruction: exercise course

Language: Arabic / German

Contact Hours: 4

ECTS Credits: 6.0

Contents:

See above

Assigned Courses:

Arabisch 4 (exercise course)

Examination

Arabisch 4

written exam / length of examination: 90 minutes

Description:

Only in the summer semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZC-0202: Chinese 1 *Chinesisch 1 (6 LP)*		6 ECTS/LP
Version 2.8.0 (since SoSe18) Person responsible for module: Dr. Michaela Negele		
Contents: Very basic language skills for absolute beginners		
Learning Outcomes / Competences: Partial completion of level A1 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: None		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Chinesisch 1 **Mode of Instruction:** exercise course **Language:** Chinese / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Examination **Chinesisch 1** written exam / length of examination: 90 minutes **Description:** Only in the winter semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZC-0205: Chinese 2 *Chinesisch 2 (6 LP)*		6 ECTS/LP
Version 2.5.0 (since SoSe18) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the basic user aimed at the satisfaction of needs of a concrete type		
Learning Outcomes / Competences: Level A1 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: Very basic language skills in Chinese		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Chinesisch 2
Mode of Instruction: exercise course
Language: Chinese / German
Contact Hours: 4
ECTS Credits: 6.0

Contents:
See above

Assigned Courses:

Chinesisch 2 / Gruppe A (exercise course)

Chinesisch 2 / Gruppe B (exercise course)

Examination
Chinesisch 2
written exam / length of examination: 90 minutes
Description:
Only in the summer semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZC-0208: Chinese 3 *Chinesisch 3 (6 LP)*		6 ECTS/LP
Version 2.5.0 (since SoSe18) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the basic user geared towards communication in areas of most immediate relevance		
Learning Outcomes / Competences: Level A1+ (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: Level A1 (CEFR) language competence in Chinese		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Chinesisch 3

Mode of Instruction: exercise course

Language: Chinese / German

Contact Hours: 4

ECTS Credits: 6.0

Contents:

See above

Examination

Chinesisch 3

written exam / length of examination: 90 minutes

Description:

Only in the winter semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZC-0211: Chinese 4 *Chinesisch 4 (6 LP)*		6 ECTS/LP
Version 2.5.0 (since SoSe18) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the basic user's communication in areas of most immediate relevance		
Learning Outcomes / Competences: Level A2 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: Level A1+ (CEFR) language competence in Chinese		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rulel)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Chinesisch 4 **Mode of Instruction:** exercise course **Language:** Chinese / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Chinesisch 4** (exercise course)
Examination **Chinesisch 4** written exam / length of examination: 90 minutes **Description:** Only in the summer semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZE-0801: English for Exchange Students *English for Exchange Students (6 LP)*		6 ECTS/LP
Version 1.0.0 (since SoSe22) Person responsible for module: M.A. Drew Collins		
Contents: Listening and reading comprehension; oral communication and written text production; exploration of central grammatical issues using authentic material; vocabulary expansion; current cultural issues in the English-speaking world		
Learning Outcomes / Competences: Development of English language and cultural competences at the B1 (CEFR) level		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: None		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: English for exchange students **Mode of Instruction:** exercise course **Language:** English **Contact Hours:** 4 **ECTS Credits:** 6.0
Assigned Courses: **English for exchange students** (exercise course)
Examination **English for exchange students** portfolio exam **Description:** Assignments to be submitted by the due dates set by the examiner

<table>
<tr><td colspan="2">Module SZE-0602: Academic and Professional English 1
Academic and Professional English 1 (6 LP)</td><td>6 ECTS/LP</td></tr>
<tr><td colspan="3">Version 1.1.0 (since SoSe15)
Person responsible for module: M.A. Drew Collins</td></tr>
<tr><td colspan="3">Contents:
Linguistic structures and techniques for English presentations and negotiations</td></tr>
<tr><td colspan="3">Learning Outcomes / Competences:
Development of language competences for presentations and negotiations in English; starting from level B1+ (CEFR) language competence</td></tr>
<tr><td colspan="3">Remarks:
Course registration on Digicampus, exam registration on STUDIS</td></tr>
<tr><td colspan="3">Workload:
Total: 180 h
120 h (self-study)
60 h (attendance)</td></tr>
<tr><td colspan="2">Conditions:
Level B1+ (CEFR) language competence in English</td><td>Credit Requirements:
Passing grade on the examination</td></tr>
<tr><td>Frequency: each semester (as a rule)</td><td>Recommended Semester:</td><td>Minimal Duration of the Module:
1 semester[s]</td></tr>
<tr><td>Contact Hours:
4</td><td>Repeat Exams Permitted:
according to the examination regulations of the study program</td><td></td></tr>
</table>

<table>
<tr><td>Parts of the Module</td></tr>
<tr><td>Part of the Module: Academic and Professional English 1
Mode of Instruction: exercise course
Language: English
Contact Hours: 4
ECTS Credits: 6.0</td></tr>
<tr><td>Contents:
See above</td></tr>
<tr><td>Assigned Courses:

Academic and Professional English 1 (exercise course)</td></tr>
<tr><td>Examination
Academic and Professional English 1
portfolio exam
Description:
Assignments to be submitted by the due dates set by the examiner</td></tr>
</table>

Module SZE-0604: Academic and Professional English 2 *Academic and Professional English 2 (6 LP)*		6 ECTS/LP
Version 1.3.0 (since SoSe15) Person responsible for module: M.A. Drew Collins		
Contents: Writing skills for academic and professional purposes; intercultural communication in English		
Learning Outcomes / Competences: Ability to produce clear, detailed texts for academic and professional purposes; ability to handle communication in intercultural settings appropriately and effectively; starting from level B1+ (CEFR) language competence		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: Level B1+ (CEFR) language competence in English		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Academic and Professional English 2

Mode of Instruction: exercise course

Language: English

Contact Hours: 4

ECTS Credits: 6.0

Contents:

See above

Assigned Courses:

Academic and Professional English 2 (exercise course)

Examination

Academic and Professional English 2

written exam / length of examination: 90 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZE-0101: English: Grammar and Pronunciation *Grundstufe Sprachpraxis Englisch (6 LP)*		6 ECTS/LP
Version 1.0.0 (since WS14/15) Person responsible for module: Dr. phil. Christine Haunz		
Contents: Further development of English language skills starting from B2 (CEFR) level competence, with specific focus on grammar and pronunciation • Grammar 1 • Effective Pronunciation		
Learning Outcomes / Competences: Effective use of language competences in the areas of grammar and pronunciation geared towards a proficient user's communicative skills; ability to take a contrastive approach towards English linguistic structures against the background of one's own native language; target level B2+ (CEFR)		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: • Level B2 (CEFR) language competence in English • Only for students enrolled in English/American language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Effective Pronunciation **Mode of Instruction:** exercise course **Language:** English **Contact Hours:** 2
Assigned Courses: **Effective Pronunciation (Am) / Gruppe A** (exercise course) **Effective Pronunciation (Am) / Gruppe C** (exercise course) **Effective Pronunciation (Am) / Gruppe D** (exercise course) **Effective Pronunciation (Br) / Gruppe B** (exercise course) **Effective Pronunciation (Br) / Gruppe E** (exercise course) **Effective Pronunciation (Br) / Gruppe F** (exercise course) **Effective Pronunciation (Br) / Gruppe G** (exercise course)

Part of the Module: Grammar 1
Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Assigned Courses:

Grammar 1 / Gruppe A (exercise course)

Grammar 1 / Gruppe B (kompakt, hybrid) (exercise course)

Grammar 1 / Gruppe C (exercise course)

Grammar 1 / Gruppe D (exercise course)

Grammar 1 / Gruppe E (exercise course)

Grammar 1 / Gruppe F (exercise course)

Examination
Grundstufe Sprachpraxis Englisch (6 LP)
oral exam / length of examination: 15 minutes

Module SZE-0103: British and American Cultural Studies *Cultural Studies (8 LP)*			8 ECTS/LP
Version 1.6.0 (since SoSe15) Person responsible for module: Dr. phil. Christine Haunz			
Contents: British and American regional studies • British Cultural Studies 1 • American Cultural Studies 1			
Learning Outcomes / Competences: Cultural and intercultural competence based on the comprehension of the main social, economic, political and cultural characteristics of anglophone countries			
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 240 h 180 h (self-study) 60 h (attendance)			
Conditions: • Level B2 (CEFR) language competence in English • Only for students enrolled in English/American language and literature degree programmes			**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**		**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: British Cultural Studies 1 **Mode of Instruction:** exercise course **Language:** English **Contact Hours:** 2
Assigned Courses: **British Cultural Studies 1 / Gruppe A** (exercise course) **British Cultural Studies 1 / Gruppe B** (exercise course) **British Cultural Studies 1 / Gruppe C** (exercise course) **British Cultural Studies 1 / Gruppe D** (exercise course) **British Cultural Studies 1 / Gruppe E** (exercise course)
Part of the Module: American Cultural Studies 1 **Mode of Instruction:** exercise course **Language:** English **Contact Hours:** 2
Assigned Courses:

American Cultural Studies 1 / Gruppe A (exercise course)

American Cultural Studies 1 / Gruppe B (exercise course)

American Cultural Studies 1 / Gruppe C (exercise course)

American Cultural Studies 1 / Gruppe D (exercise course)

American Cultural Studies 1 / Gruppe E (exercise course)

Examination

Cultural Studies (8 LP)

written exam / length of examination: 120 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZE-0105: English: Text Production and Translation 1 *Aufbaustufe Sprachpraxis Englisch (6 LP)*		6 ECTS/LP
Version 1.5.0 (since SoSe15) Person responsible for module: Dr. phil. Christine Haunz		
Contents: Further development of oral and written English language skills for the proficient user, with specific focus on text production and translation • Effective Writing 1 • Übersetzung Englisch-Deutsch 1		
Learning Outcomes / Competences: Correct and effective use of English on complex subjects; ability to take a contrastive approach towards English linguistic structures against the background of one's own native language; target level C1 (CEFR)		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: • Level B2+ (CEFR) language competence in English • Only for students enrolled in English/American language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Effective Writing 1
Mode of Instruction: exercise course
Language: English
Contact Hours: 2

Assigned Courses:

Effective Writing 1 / Gruppe A (exercise course)

Effective Writing 1 / Gruppe B (kompakt, hybrid) (exercise course)

Effective Writing 1 / Gruppe C (exercise course)

Effective Writing 1 / Gruppe D (exercise course)

Part of the Module: Übersetzung Englisch-Deutsch 1
Mode of Instruction: exercise course
Language: English / German
Contact Hours: 2

Assigned Courses:

Übersetzung Englisch - Deutsch 1 / Gruppe A (exercise course)

Übersetzung Englisch - Deutsch 1 / Gruppe B (exercise course)

Übersetzung Englisch - Deutsch 1 / Gruppe C (exercise course)

Examination

Aufbaustufe Sprachpraxis Englisch (6 LP)

written exam / length of examination: 120 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZE-0107: English: Text Production and Translation 2 *Vertiefungsstufe Sprachpraxis Englisch (6 LP)*		6 ECTS/LP
Version 1.5.0 (since SoSe15) Person responsible for module: Dr. phil. Christine Haunz		
Contents: Oral and written language skills for the proficient user geared towards very fluent and effective communication in virtually every communicative context • Effective Writing 2 • Übersetzung Englisch-Deutsch 2		
Learning Outcomes / Competences: Ability to communicate spontaneously, fluently and precisely even in complex situations and to produce clear, well-structured and idiomatic texts; high degree of language awareness; target level C1+ (CEFR), approaching native speaker proficiency		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: • Level C1 (CEFR) language competence in English • Only for students enrolled in English/American language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Effective Writing 2 **Mode of Instruction:** exercise course **Language:** English **Contact Hours:** 2
Assigned Courses: **Effective Writing 2 / Gruppe A** (exercise course) **Effective Writing 2 / Gruppe B** (exercise course) **Effective Writing 2 / Gruppe C** (exercise course)
Part of the Module: Übersetzung Englisch-Deutsch 2 **Mode of Instruction:** exercise course **Language:** English / German **Contact Hours:** 2
Assigned Courses:

Übersetzung Englisch - Deutsch 2 / Gruppe A (exercise course)

Übersetzung Englisch - Deutsch 2 / Gruppe B (exercise course)

Examination

Vertiefungsstufe Sprachpraxis Englisch (6 LP)

written exam / length of examination: 120 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZE-0112: English: Grammar and Vocabulary *Spezialisierung Sprachpraxis Englisch Grammatik und Wortschatz (4 LP)*		4 ECTS/LP
Version 1.2.0 (since SoSe15) Person responsible for module: Dr. phil. Christine Haunz		
Contents: Review and further exploration of important grammatical and lexical phenomena observed in authentic texts • Grammar and Vocabulary		
Learning Outcomes / Competences: Ability to describe, comment on and evaluate contrastively important grammatical and lexical phenomena observed in authentic texts; starting from level C1+ (CEFR) language competence		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 120 h 30 h (attendance) 90 h (self-study)		
Conditions: • Level C1+ (CEFR) language competence in English • Only for students enrolled in English/American language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: usu. at least once per acad. year	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Grammar and Vocabulary **Mode of Instruction:** exercise course **Language:** English **Contact Hours:** 2 **ECTS Credits:** 4.0
Assigned Courses: **Grammar & Vocabulary** (exercise course)
Examination **Spezialisierung Sprachpraxis Englisch Grammatik und Wortschatz** written exam, or oral exam **Description:** Exceptional regulation (under corona virus conditions): homework assignment, to be submitted by the due date set by the examiner

Module SZE-0301: Business English 1 *Business English 1 (5 LP)*			5 ECTS/LP
Version 1.3.0 (since WS13/14) Person responsible for module: M.A. Drew Collins			
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on both concrete and abstract topics in Business English			
Learning Outcomes / Competences: Partial completion of level B2 (CEFR) in Business English			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 150 h 42 h (attendance) 108 h (self-study)			
Conditions: • Level B2 (CEFR) language competence in English • Only for students enrolled in the Faculty of Business and Economics			**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: Business English 1
Mode of Instruction: exercise course
Language: English
Contact Hours: 4
ECTS Credits: 5.0

Contents:
See above

Assigned Courses:

Business English 1 / Gruppe A (exercise course)

Business English 1 / Gruppe B (exercise course)

Business English 1 / Gruppe C (exercise course)

Examination
Business English 1
written exam / length of examination: 60 minutes
Description:
Exceptional regulation (under corona virus conditions): homework assignment, to be submitted by the due date set by the examiner

Module SZE-0303: Business English 2 *Business English 2 (5 LP)*		5 ECTS/LP
Version 1.3.0 (since WS13/14) Person responsible for module: M.A. Drew Collins		
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on both concrete and abstract topics in Business English		
Learning Outcomes / Competences: Partial completion of level B2 (CEFR) in Business English		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 150 h 108 h (self-study) 42 h (attendance)		
Conditions: • Level B2+ (CEFR) language competence in English • Only for students enrolled in the Faculty of Business and Economics		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Business English 2 **Mode of Instruction:** exercise course **Language:** English **Contact Hours:** 4 **ECTS Credits:** 5.0
Contents: See above
Assigned Courses: **Business English 2 / Gruppe A** (exercise course) **Business English 2 / Gruppe B** (exercise course) **Business English 2 / Gruppe C** (exercise course)
Examination **Business English 2** written exam / length of examination: 60 minutes **Description:** Exceptional regulation (under corona virus conditions): homework assignment, to be submitted by the due date set by the examiner

Module SZE-0305: Business English 3 *Business English 3 (5 LP)*		5 ECTS/LP
Version 1.3.0 (since WS13/14) Person responsible for module: M.A. Drew Collins		
Contents: Language skills (reading, listening, writing, speaking) for the proficient user communicating fluently and effectively in a wide range of situations in Business English		
Learning Outcomes / Competences: Partial completion of level C1 (CEFR) in Business English		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 150 h 42 h (attendance) 108 h (self-study)		
Conditions: • Level C1 (CEFR) language competence in English • Only for students enrolled in the Faculty of Business and Economics		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Business English 3 **Mode of Instruction:** exercise course **Language:** English **Contact Hours:** 4 **ECTS Credits:** 5.0
Contents: See above
Assigned Courses: **Business English 3 / Gruppe A** (exercise course) **Business English 3 / Gruppe B** (exercise course) **Business English 3 / Gruppe C** (exercise course)
Examination **Business English 3** written exam / length of examination: 60 minutes **Description:** Exceptional regulation (under corona virus conditions): homework assignment, to be submitted by the due date set by the examiner

Module SZE-0307: Business English 4 *Business English 4 (5 LP)*	5 ECTS/LP
Version 1.3.0 (since SoSe14) Person responsible for module: M.A. Drew Collins	
Contents: Language skills (reading, listening, writing, speaking) for the proficient user communicating fluently and effectively in a wide range of situations in Business English	
Learning Outcomes / Competences: Partial completion of level C1 (CEFR) in Business English	
Remarks: Course registration on Digicampus, exam registration on STUDIS	
Workload: Total: 150 h 108 h (self-study) 42 h (attendance)	
Conditions: • Level C1+ (CEFR) language competence in English • Only for students enrolled in the Faculty of Business and Economics	**Credit Requirements:** Passing grade on the examination

Frequency: usu. at least once per acad. year	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Business English 4
Mode of Instruction: exercise course
Language: English
Contact Hours: 4
ECTS Credits: 5.0

Contents:
See above

Assigned Courses:

Business English 4 (exercise course)

Examination
Business English 4
written exam / length of examination: 60 minutes
Description:
Exceptional regulation (under corona virus conditions): homework assignment, to be submitted by the due date set by the examiner

Module SZF-0201: French 1 *Français 1 (6 LP)*		6 ECTS/LP
Version 1.3.0 (since WS15/16) Person responsible for module: M.A. Catherine Gagnon		
Contents: Language skills (reading, listening, writing, speaking) for the basic user aimed at the satisfaction of needs of a concrete type		
Learning Outcomes / Competences: Level A1 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: None		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Français 1 **Mode of Instruction:** exercise course **Language:** French / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Français 1** (exercise course)
Examination **Français 1** written exam / length of examination: 90 minutes **Description:** Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZF-0202: French 2 *Français 2 (6 LP)*		6 ECTS/LP
Version 1.3.0 (since WS15/16) Person responsible for module: M.A. Catherine Gagnon		
Contents: Language skills (reading, listening, writing, speaking) for the basic user's communication in areas of most immediate relevance		
Learning Outcomes / Competences: Level A2 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: Level A1 (CEFR) language competence in French		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Français 2 **Mode of Instruction:** exercise course **Language:** French / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Français 2** (exercise course)
Examination **Français 2** written exam / length of examination: 90 minutes **Description:** Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZF-0204: French 3 *Français 3 (6 LP)*			6 ECTS/LP
Version 1.3.0 (since WS15/16) Person responsible for module: M.A. Catherine Gagnon			
Contents: Language skills (reading, listening, writing, speaking) geared towards an independent user's communicative skills			
Learning Outcomes / Competences: Level A2+ (CEFR)			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)			
Conditions: Level A2 (CEFR) language competence in French			**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rulel)	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Français 3 **Mode of Instruction:** exercise course **Language:** French / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Français 3** (exercise course)
Examination **Français 3** written exam / length of examination: 90 minutes **Description:** Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZF-0205: French 4 *Français 4 (6 LP)*		6 ECTS/LP
Version 1.3.0 (since WS15/16) Person responsible for module: M.A. Catherine Gagnon		
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on familiar topics		
Learning Outcomes / Competences: Level B1 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: Level A2+ (CEFR) language competence in French		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Français 4
Mode of Instruction: exercise course
Language: French / German
Contact Hours: 4
ECTS Credits: 6.0

Contents:
See above

Assigned Courses:

Français 4 (exercise course)

Examination
Français 4
written exam / length of examination: 90 minutes
Description:
Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZF-0206: French 5 *Français 5 (6 LP)*		6 ECTS/LP
Version 1.3.0 (since WS15/16) Person responsible for module: M.A. Catherine Gagnon		
Contents: Language skills (reading, listening, writing, speaking) for the independent user geared towards communication on both concrete and abstract topics		
Learning Outcomes / Competences: Level B1+ (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: Level B1 (CEFR) language competence in French		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rulel)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Français 5 **Mode of Instruction:** exercise course **Language:** French / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Français 5** (exercise course)
Examination **Français 5** written exam / length of examination: 90 minutes **Description:** Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZF-0207: French 6 *Français 6 (6 LP)*		6 ECTS/LP
Version 1.3.0 (since WS15/16) Person responsible for module: M.A. Catherine Gagnon		
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on both concrete and abstract topics		
Learning Outcomes / Competences: Level B2 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: Level B1+ (CEFR) language competence in French		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rulel)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Français 6 **Mode of Instruction:** exercise course **Language:** French / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Français 6** (exercise course)
Examination **Français 6** written exam / length of examination: 90 minutes **Description:** Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZF-0101: French: Oral Skills *Compétences orales (5 LP)*		5 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: M.A. Catherine Gagnon		
Contents: • Prononciation • Expression orale *or* Analyse de textes de presse		
Learning Outcomes / Competences: Language skills geared towards a proficient user's communicative skills with specific focus on pronunciation, speaking and understanding texts; starting from level B2 (CEFR) language competence, leading up to level B2+ (CEFR)		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 150 h 90 h (self-study) 60 h (attendance)		
Conditions: • Level B2 (CEFR) language competence in French • Only for students enrolled in French language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Prononciation **Mode of Instruction:** exercise course **Language:** French **Contact Hours:** 2
Assigned Courses: **Prononciation** (exercise course)

Part of the Module: Expression orale / Analyse de textes de presse **Mode of Instruction:** exercise course **Language:** French **Contact Hours:** 2
Assigned Courses: **Analyse de textes de presse** (exercise course) **Expression orale** (exercise course)

Examination

Compétences orales

oral exam, 15 Minuten Vorbereitungszeit / length of examination: 15 minutes

Module SZF-0103: French: Grammar and Analytical Skills *Structures linguistiques (5 LP)*			5 ECTS/LP
Version 1.4.0 (since SoSe15) Person responsible for module: M.A. Catherine Gagnon			
Contents: • Structures grammaticales • Exercices contrastifs			
Learning Outcomes / Competences: Language skills geared towards a proficient user's communicative skills with specific focus on grammatical and contrastive competences; starting from level B2 (CEFR) language competence, leading up to level B2+ (CEFR)			
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 150 h 60 h (attendance) 90 h (self-study)			
Conditions: • Level B2 (CEFR) language competence in French • Only for students enrolled in French language and literature degree programmes			**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**		**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Structures grammaticales **Mode of Instruction:** exercise course **Language:** French **Contact Hours:** 2
Assigned Courses: **Structures grammaticales** (exercise course)
Part of the Module: Exercices contrastifs **Mode of Instruction:** exercise course **Language:** French **Contact Hours:** 2
Assigned Courses: **Exercices contrastifs** (exercise course)

Examination

Structures linguistiques

written exam / length of examination: 120 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZF-0104: French: Text Production and Grammar *Communication écrite (6 LP)*		6 ECTS/LP
Version 1.4.0 (since SoSe15) Person responsible for module: M.A. Catherine Gagnon		
Contents: • Approfondissement des connaissances grammaticales • Expression écrite		
Learning Outcomes / Competences: Writing skills for the proficient user; starting from level B2+ (CEFR) language competence, leading up to level C1 (CEFR)		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: • Level B2+ (CEFR) language competence in French • Only for students enrolled in French language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Approfondissement des connaissances grammaticales **Mode of Instruction:** exercise course **Language:** French **Contact Hours:** 2
Assigned Courses: **Approfondissement des connaissances grammaticales** (exercise course)
Part of the Module: Expression écrite **Mode of Instruction:** exercise course **Language:** French **Contact Hours:** 2
Assigned Courses: **Expression écrite / Gruppe A** (exercise course) **Expression écrite / Gruppe B** (exercise course)

Examination

Communication écrite

written exam / length of examination: 150 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZF-0105: French Cultural Studies *La France et la Francophonie (8 LP)*			8 ECTS/LP
Version 1.4.0 (since SoSe15) Person responsible for module: M.A. Catherine Gagnon			
Contents: • Civilisation 1 • Civilisation 2			
Learning Outcomes / Competences: Cultural and intercultural competences based on a general knowledge of the social, economic, political and cultural life in France and the francophone world			
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 240 h 180 h (self-study) 60 h (attendance)			
Conditions: • Level B2+ (CEFR) language competence in French • Only for students enrolled in French language and literature degree programmes			**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**		**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: Civilisation 1
Mode of Instruction: exercise course
Language: French
Contact Hours: 2

Assigned Courses:

Civilisation 1 (exercise course)

Part of the Module: Civilisation 2
Mode of Instruction: exercise course
Language: French
Contact Hours: 2

Assigned Courses:

Civilisation 2 (exercise course)

Examination
La France et la Francophonie
written exam / length of examination: 120 minutes
Description:
Exceptional regulation (under corona virus conditions): oral examination

Module SZF-0106: French: Text Production and Translation *Production de textes et traduction (6 LP)*			6 ECTS/LP
Version 1.4.0 (since SoSe15) Person responsible for module: M.A. Catherine Gagnon			
Contents: • Version • Production de textes			
Learning Outcomes / Competences: Writing and translation skills for the proficient user; starting from level C1 (CEFR) language competence, leading up to level C1+ (CEFR)			
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)			
Conditions: • Level C1 (CEFR) language competence in French • Only for students enrolled in French language and literature degree programmes			**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**		**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Version **Mode of Instruction:** exercise course **Language:** French / German **Contact Hours:** 2
Assigned Courses: **Version** (exercise course)
Part of the Module: Production de textes **Mode of Instruction:** exercise course **Language:** French **Contact Hours:** 2
Assigned Courses: **Production de textes** (exercise course)

Examination

Production de textes et traduction

written exam / length of examination: 150 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZF-0108: French: Oral Communication *Présentation orale et discussion (5 LP)*		5 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: M.A. Catherine Gagnon		
Contents: • Communication orale		
Learning Outcomes / Competences: Oral language skills for the proficient user geared towards very fluent and effective communication in virtually every communicative context; starting from level C1 (CEFR) language competence, leading up to level C1+ (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 150 h 120 h (self-study) 30 h (attendance)		
Conditions: • Level C1 (CEFR) language competence in French • Only for students enrolled in French language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Communication orale **Mode of Instruction:** exercise course **Language:** French **Contact Hours:** 2
Assigned Courses: **Communication orale** (exercise course)
Examination **Présentation orale et discussion (5 LP)** oral exam, 15 Minuten Vorbereitungszeit / length of examination: 15 minutes

Module SZF-0109: French: Oral and Intercultural Communication *Présentation orale et discussion (7 LP)*		7 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: M.A. Catherine Gagnon		
Contents: • Communication orale • Communication interculturelle		
Learning Outcomes / Competences: Oral language skills for the proficient user geared towards very fluent and effective communication in virtually every communicative context and taking into account culturally relevant features of the francophone world; starting from level C1 (CEFR) language competence, leading up to level C1+ (CEFR)		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 210 h 150 h (self-study) 60 h (attendance)		
Conditions: • Level C1 (CEFR) language competence in French • Only for students enrolled in French language degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Communication orale **Mode of Instruction:** exercise course **Language:** French **Contact Hours:** 2
Assigned Courses: **Communication orale** (exercise course)
Part of the Module: Communication interculturelle **Mode of Instruction:** exercise course **Language:** French **Contact Hours:** 2
Assigned Courses: **Communication interculturelle** (exercise course)
Examination **Présentation orale et discussion (7 LP)** oral exam, 15 Minuten Vorbereitungszeit / length of examination: 20 minutes

Module SZF-0301: Business French 1 *Français économique 1 (5 LP)*		5 ECTS/LP
Version 2.5.0 (since WS13/14) Person responsible for module: M.A. Catherine Gagnon		
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on both concrete and abstract topics in Business French		
Learning Outcomes / Competences: Partial completion of level B2 (CEFR) in Business French		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 150 h 42 h (attendance) 108 h (self-study)		
Conditions: • Level B2 (CEFR) language competence in French • Only for students enrolled in the Faculty of Business and Economics		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Français économique 1 **Mode of Instruction:** exercise course **Language:** French **Contact Hours:** 4 **ECTS Credits:** 5.0
Contents: See above
Examination **Français économique 1** written exam / length of examination: 60 minutes **Description:** Only in the winter semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

<table>
<tr><td colspan="2">Module SZF-0303: Business French 2
Français économique 2 (5 LP)</td><td>5 ECTS/LP</td></tr>
<tr><td colspan="3">Version 1.4.0 (since WS13/14)
Person responsible for module: M.A. Catherine Gagnon</td></tr>
<tr><td colspan="3">Contents:
Language skills (reading, listening, writing, speaking) for the independent user's communication on both concrete and abstract topics in Business French</td></tr>
<tr><td colspan="3">Learning Outcomes / Competences:
Partial completion of level B2 (CEFR) in Business French</td></tr>
<tr><td colspan="3">Remarks:
Course registration on Digicampus, exam registration on STUDIS</td></tr>
<tr><td colspan="3">Workload:
Total: 150 h
108 h (self-study)
42 h (attendance)</td></tr>
<tr><td colspan="2">Conditions:
• Level B2+ (CEFR) language competence in French
• Only for students enrolled in the Faculty of Business and Economics

Module Français économique 1 (5 LP) (SZF-0301) - required</td><td>Credit Requirements:
Passing grade on the examination</td></tr>
<tr><td>Frequency: each summer semester (as a rule)</td><td>Recommended Semester:</td><td>Minimal Duration of the Module:
1 semester[s]</td></tr>
<tr><td>Contact Hours:
4</td><td>Repeat Exams Permitted:
according to the examination regulations of the study program</td><td></td></tr>
</table>

Parts of the Module

Part of the Module: Français économique 2

Mode of Instruction: exercise course

Language: French

Contact Hours: 4

ECTS Credits: 5.0

Contents:

See above

Assigned Courses:

Français économique 2 (exercise course)

Examination

Français économique 2

portfolio exam

Description:

Only in the summer semester

Assignments to be submitted by the due dates set by the examiner

Module SZF-0305: Business French 3 *Français économique 3 (5 LP)*		5 ECTS/LP
Version 1.5.0 (since WS13/14) Person responsible for module: M.A. Catherine Gagnon		
Contents: Language skills (reading, listening, writing, speaking) for the proficient user communicating fluently and effectively in a wide range of situations in Business French		
Learning Outcomes / Competences: Partial completion of level C1 (CEFR) in Business French		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 150 h 108 h (self-study) 42 h (attendance)		
Conditions: • Level B2 (CEFR) language competence in Business French • Only for students enrolled in the Faculty of Business and Economics		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Français économique 3

Mode of Instruction: exercise course
Language: French
Contact Hours: 4
ECTS Credits: 5.0

Contents:

See above

Examination

Français économique 3

written exam / length of examination: 60 minutes

Description:

Only in the winter semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZF-0307: Business French 4 *Français économique 4 (5 LP)*		5 ECTS/LP
Version 1.5.0 (since WS13/14) Person responsible for module: M.A. Catherine Gagnon		
Contents: Language skills (reading, listening, writing, speaking) for the proficient user communicating fluently and effectively in a wide range of situations in Business French		
Learning Outcomes / Competences: Partial completion of level C1 (CEFR) in Business French		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 150 h 42 h (attendance) 108 h (self-study)		
Conditions: • Level B2 (CEFR) language competence in Business French • Only for students enrolled in the Faculty of Business and Economics		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Français économique 4

Mode of Instruction: exercise course
Language: French
Contact Hours: 4
ECTS Credits: 5.0

Contents:

See above

Assigned Courses:

Français économique 4 (exercise course)

Examination

Français économique 4

portfolio exam

Description:

Only in the summer semester

Assignments to be submitted by the due dates set by the examiner

Module SZI-0201: Italian 1 *Italiano 1 (6 LP)*		6 ECTS/LP
Version 1.3.0 (since WS13/14) Person responsible for module: Maria Balì		
Contents: Language skills (reading, listening, writing, speaking) for the basic user aimed at the satisfaction of needs of a concrete type		
Learning Outcomes / Competences: Level A1 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: None		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Italiano 1 **Mode of Instruction:** exercise course **Language:** Italian / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Italiano 1 / Gruppe A** (exercise course) **Italiano 1 / Gruppe B** (exercise course) **Italiano 1 / Gruppe C** (exercise course) **Italiano 1 / Gruppe D** (exercise course)
Examination **Italiano 1** written exam / length of examination: 90 minutes **Description:** Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZI-0204: Italian 2 *Italiano 2 (6 LP)*		6 ECTS/LP
Version 1.3.0 (since WS13/14) Person responsible for module: Maria Balì		
Contents: Language skills (reading, listening, writing, speaking) for the basic user's communication in areas of most immediate relevance		
Learning Outcomes / Competences: Level A2 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: Level A1 (CEFR) language competence in Italian		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Italiano 2 **Mode of Instruction:** exercise course **Language:** Italian / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Italiano 2 / Gruppe A** (exercise course) **Italiano 2 / Gruppe B** (exercise course) **Italiano 2 / Gruppe C** (exercise course)
Examination **Italiano 2** written exam / length of examination: 90 minutes **Description:** Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZI-0207: Italian 3 *Italiano 3 (6 LP)*			6 ECTS/LP
Version 1.3.0 (since WS13/14) Person responsible for module: Maria Balì			
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on familiar topics			
Learning Outcomes / Competences: Level B1 (CEFR)			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)			
Conditions: Level A2 (CEFR) language competence in Italian		**Credit Requirements:** Passing grade on the examination	
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]	
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: Italiano 3

Mode of Instruction: exercise course

Language: Italian / German

Contact Hours: 4

ECTS Credits: 6.0

Contents:

See above

Assigned Courses:

Italiano 3 / Gruppe A (exercise course)

Italiano 3 / Gruppe B (exercise course)

Examination

Italiano 3

written exam / length of examination: 90 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZI-0210: Italian 4 *Italiano 4 (6 LP)*		6 ECTS/LP
Version 1.3.0 (since WS13/14) Person responsible for module: Maria Balì		
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on both concrete and abstract topics		
Learning Outcomes / Competences: Level B2 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: Level B1 (CEFR) language competence in Italian		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Italiano 4 **Mode of Instruction:** exercise course **Language:** Italian / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Italiano 4** (exercise course)
Examination **Italiano 4** written exam / length of examination: 90 minutes **Description:** Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZI-0101: Italian: Oral Skills *Competenza orale (5 LP)*		5 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Maria Balì		
Contents: • Pronuncia e intonazione • Espressione orale		
Learning Outcomes / Competences: Language skills geared towards a proficient user's communicative skills with specific focus on pronunciation, speaking and understanding texts; starting from level B2 (CEFR) language competence, leading up to level B2+ (CEFR)		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 150 h 90 h (self-study) 60 h (attendance)		
Conditions: • Level B2 (CEFR) language competence in Italian • Only for students enrolled in Italian language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Pronuncia e intonazione **Mode of Instruction:** exercise course **Language:** Italian **Contact Hours:** 2
Assigned Courses: **Pronuncia e intonazione** (exercise course)
Part of the Module: Espressione orale **Mode of Instruction:** exercise course **Language:** Italian **Contact Hours:** 2
Assigned Courses: **Espressione orale** (exercise course)
Examination **Competenza orale** oral exam, 15 Minuten Vorbereitungszeit / length of examination: 15 minutes

Module SZI-0103: Italian: Grammar and Analytical Skills *Strutture linguistiche (5 LP)*		5 ECTS/LP
Version 1.5.0 (since SoSe15) Person responsible for module: Maria Balì		
Contents: • Strutture grammaticali • Esercizi contrastivi		
Learning Outcomes / Competences: Language skills geared towards a proficient user's communicative skills with specific focus on grammatical and contrastive competences; starting from level B2 (CEFR) language competence, leading up to level B2+ (CEFR)		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 150 h 90 h (self-study) 60 h (attendance)		
Conditions: • Level B2 (CEFR) language competence in Italian • Only for students enrolled in Italian language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Strutture grammaticali **Mode of Instruction:** exercise course **Language:** Italian **Contact Hours:** 2
Assigned Courses: **Strutture grammaticali** (exercise course)
Part of the Module: Esercizi contrastivi **Mode of Instruction:** exercise course **Language:** Italian **Contact Hours:** 2
Assigned Courses: **Esercizi contrastivi** (exercise course)

Examination

Strutture linguistiche

written exam / length of examination: 120 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZI-0104: Italian: Text Production and Grammar *Comunicazione scritta (6 LP)*		6 ECTS/LP
Version 1.4.0 (since SoSe15) Person responsible for module: Maria Balì		
Contents: • Approfondimenti grammaticali • Esercitazione scritta		
Learning Outcomes / Competences: Writing skills for the proficient user; starting from level B2+ (CEFR) language competence, leading up to level C1 (CEFR)		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: • Level B2+ (CEFR) language competence in Italian • Only for students enrolled in Italian language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Approfondimenti grammaticali **Mode of Instruction:** exercise course **Language:** Italian **Contact Hours:** 2
Assigned Courses: **Approfondimenti grammaticali** (exercise course)
Part of the Module: Esercitazione scritta **Mode of Instruction:** exercise course **Language:** Italian **Contact Hours:** 2
Assigned Courses: **Esercitazione scritta** (exercise course)

Examination

Comunicazione scritta

written exam / length of examination: 150 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZI-0105: Italian Cultural Studies *Cultura italiana (8 LP)*		8 ECTS/LP
Version 1.4.0 (since SoSe15) Person responsible for module: Maria Balì		
Contents: • Cultura italiana 1 • Cultura italiana 2		
Learning Outcomes / Competences: Cultural and intercultural competences based on a general knowledge of the social, economic, political and cultural life in Italy		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 240 h 180 h (self-study) 60 h (attendance)		
Conditions: • Level B2+ (CEFR) language competence in Italian • Only for students enrolled in Italian language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Cultura italiana 1
Mode of Instruction: exercise course
Language: Italian
Contact Hours: 2

Assigned Courses:

Cultura italiana 1 (exercise course)

Part of the Module: Cultura italiana 2
Mode of Instruction: exercise course
Language: Italian
Contact Hours: 2

Assigned Courses:

Cultura italiana 2 (exercise course)

Examination

Cultura italiana
written exam / length of examination: 120 minutes

Description:
Exceptional regulation (under corona virus conditions): oral examination

Module SZI-0106: Italian: Text Production and Translation *Produzione di testi e traduzione (6 LP)*		6 ECTS/LP
Version 1.4.0 (since SoSe15) Person responsible for module: Maria Balì		
Contents: • Traduzione italiano-tedesco • Produzione scritta		
Learning Outcomes / Competences: Writing and translation skills for the proficient user; starting from level C1 (CEFR) language competence, leading up to level C1+ (CEFR)		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: • Level C1 (CEFR) language competence in Italian • Only for students enrolled in Italian language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Traduzione italiano-tedesco **Mode of Instruction:** exercise course **Language:** Italian / German **Contact Hours:** 2
Assigned Courses: **Traduzione italiano - tedesco** (exercise course)
Part of the Module: Produzione scritta **Mode of Instruction:** exercise course **Language:** Italian **Contact Hours:** 2
Assigned Courses: **Produzione scritta** (exercise course)

Examination

Produzione di testi e traduzione

written exam / length of examination: 150 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZI-0108: Italian: Oral Communication *Presentazione orale e discussione (5 LP)*			5 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Maria Balì			
Contents: • Comunicazione orale			
Learning Outcomes / Competences: Oral language skills for the proficient user geared towards very fluent and effective communication in virtually every communicative context; starting from level C1 (CEFR) language competence, leading up to level C1+ (CEFR)			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 150 h 30 h (attendance) 120 h (self-study)			
Conditions: • Level C1 (CEFR) language competence in Italian • Only for students enrolled in Italian language and literature degree programmes		**Credit Requirements:** Passing grade on the examination	
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]	
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Comunicazione orale **Mode of Instruction:** exercise course **Language:** Italian **Contact Hours:** 2
Assigned Courses: **Comunicazione orale** (exercise course)
Examination **Presentazione orale e discussione (5 LP)** oral exam, 15 Minuten Vorbereitungszeit / length of examination: 15 minutes

Module SZI-0109: Italian: Oral Communication and Cultural Studies *Presentazione orale e discussione (7 LP)*		7 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Maria Balì		
Contents: • Comunicazione orale • Cultura italiana 3		
Learning Outcomes / Competences: Oral language skills for the proficient user geared towards very fluent and effective communication in virtually every communicative context and taking into account culturally relevant factors; starting from level C1 (CEFR) language competence, leading up to level C1+ (CEFR)		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 210 h 60 h (attendance) 150 h (self-study)		
Conditions: • Level C1 (CEFR) language competence in Italian • Only for students enrolled in Italian language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency:	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Comunicazione orale **Mode of Instruction:** exercise course **Language:** Italian **Frequency:** each semester (as a rule) **Contact Hours:** 2
Assigned Courses: **Comunicazione orale** (exercise course)
Part of the Module: Cultura italiana 3 (früher: Corso monografico) **Mode of Instruction:** exercise course **Language:** Italian **Frequency:** usu. at least once per acad. year **Contact Hours:** 2
Assigned Courses: **Cultura italiana 3** (exercise course)

Examination

Presentazione orale e discussione (7 LP)

oral exam, 15 Minuten Vorbereitungszeit / length of examination: 20 minutes

Module SZX-0202: Japanese 1 *Japanisch 1 (6 LP)*		6 ECTS/LP
Version 1.4.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele		
Contents: Very basic language skills for absolute beginners		
Learning Outcomes / Competences: Partial completion of level A1 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: None		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Japanisch 1 **Mode of Instruction:** exercise course **Language:** Japanese / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Examination **Japanisch 1** written exam / length of examination: 90 minutes **Description:** Only in the winter semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZX-0205: Japanese 2 *Japanisch 2 (6 LP)*		6 ECTS/LP
Version 1.5.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the basic user aimed at the satisfaction of needs of a concrete type		
Learning Outcomes / Competences: Level A1 (CEFR) / N5 Japanese Language Proficiency Test		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: Very basic language skills in Japanese		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Japanisch 2
Mode of Instruction: exercise course
Language: Japanese / German
Contact Hours: 4
ECTS Credits: 6.0

Contents:
See above

Assigned Courses:

Japanisch 2 / Gruppe A (exercise course)

Japanisch 2 / Gruppe B (exercise course)

Examination
Japanisch 2
written exam / length of examination: 90 minutes
Description:
Only in the summer semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZX-0208: Japanese 3 *Japanisch 3 (6 LP)*		6 ECTS/LP
Version 1.4.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the basic user geared towards communication in areas of most immediate relevance		
Learning Outcomes / Competences: Level A1+ (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: Level A1 (CEFR) language competence in Japanese		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Japanisch 3 **Mode of Instruction:** exercise course **Language:** Japanese / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Examination **Japanisch 3** written exam / length of examination: 90 minutes **Description:** Only in the winter semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZX-0211: Japanese 4 *Japanisch 4 (6 LP)*		6 ECTS/LP
Version 1.5.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the basic user's communication in areas of most immediate relevance		
Learning Outcomes / Competences: Level A2 (CEFR) / N4 Japanese Language Proficiency Test		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: Level A1+ (CEFR) language competence in Japanese		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Japanisch 4 **Mode of Instruction:** exercise course **Language:** Japanese / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Japanisch 4** (exercise course)
Examination **Japanisch 4** written exam / length of examination: 90 minutes **Description:** Only in the summer semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZP-0201: Portuguese 1 *Português 1 (6 LP)*			6 ECTS/LP
Version 1.4.0 (since WS13/14) Person responsible for module: Ainoa Hagspiel			
Contents: Language skills (reading, listening, writing, speaking) for the basic user aimed at the satisfaction of needs of a concrete type			
Learning Outcomes / Competences: Level A1 (CEFR)			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)			
Conditions: None			**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Português 1 **Mode of Instruction:** exercise course **Language:** Portuguese / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Examination **Português 1** written exam / length of examination: 90 minutes **Description:** Only in the winter semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZP-0204: Portuguese 2 *Português 2 (6 LP)*			6 ECTS/LP
Version 1.4.0 (since WS13/14) Person responsible for module: Ainoa Hagspiel			
Contents: Language skills (reading, listening, writing, speaking) for the basic user's communication in areas of most immediate relevance			
Learning Outcomes / Competences: Level A2 (CEFR)			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)			
Conditions: Level A1 (CEFR) language competence in Portuguese		**Credit Requirements:** Passing grade on the examination	
Frequency: each summer semester (as a rulel)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]	
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Português 2 **Mode of Instruction:** exercise course **Language:** Portuguese / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Português 2** (exercise course)
Examination **Português 2** written exam / length of examination: 90 minutes **Description:** Only in the summer semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZP-0207: Portuguese 3 *Português 3 (6 LP)*		6 ECTS/LP
Version 1.4.0 (since WS13/14) Person responsible for module: Ainoa Hagspiel		
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on familiar topics		
Learning Outcomes / Competences: Level B1 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: Level A2 (CEFR) language competence in Portuguese		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Português 3 **Mode of Instruction:** exercise course **Language:** Portuguese / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Examination **Português 3** written exam / length of examination: 90 minutes **Description:** Only in the winter semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZP-0210: Portuguese 4 *Português 4 (6 LP)*			6 ECTS/LP
Version 1.4.0 (since WS13/14) Person responsible for module: Ainoa Hagspiel			
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on both concrete and abstract topics			
Learning Outcomes / Competences: Level B2 (CEFR)			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)			
Conditions: Level B1 (CEFR) language competence in Portuguese			**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Português 4 **Mode of Instruction:** exercise course **Language:** Portuguese / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Português 4** (exercise course)
Examination **Português 4** written exam / length of examination: 90 minutes **Description:** Only in the summer semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZQ-0201: Romanian 1 *Rumänisch 1 (6 LP)*		6 ECTS/LP
Version 1.4.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the basic user aimed at the satisfaction of needs of a concrete type		
Learning Outcomes / Competences: Level A1 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: None		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Rumänisch 1 **Mode of Instruction:** exercise course **Language:** Romanian / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Examination **Rumänisch 1** written exam / length of examination: 90 minutes **Description:** Only in the winter semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZQ-0204: Romanian 2 *Rumänisch 2 (6 LP)*		6 ECTS/LP
Version 1.5.0 (since SoSe14) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the basic user's communication in areas of most immediate relevance		
Learning Outcomes / Competences: Level A2 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: Level A1 (CEFR) language competence in Romanian		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Rumänisch 2 **Mode of Instruction:** exercise course **Language:** Romanian / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Rumänisch 2** (exercise course)
Examination **Rumänisch 2** written exam / length of examination: 90 minutes **Description:** Only in the summer semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZQ-0207: Romanian 3 *Rumänisch 3 (6 LP)*		6 ECTS/LP
Version 1.4.0 (since WS14/15) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on familiar topics		
Learning Outcomes / Competences: Level B1 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: Level A2 (CEFR) language competence in Romanian		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rulel)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Rumänisch 3

Mode of Instruction: exercise course

Language: Romanian / German

Contact Hours: 4

ECTS Credits: 6.0

Contents:

See above

Examination

Rumänisch 3

written exam / length of examination: 90 minutes

Description:

Only in the winter semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZQ-0210: Romanian 4 *Rumänisch 4 (6 LP)*		6 ECTS/LP
Version 1.5.0 (since SoSe15) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the independent user geared towards communication on both concrete and abstract topics		
Learning Outcomes / Competences: Level B1+ (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: Level B1 (CEFR) language competence in Romanian		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rulel)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Rumänisch 4

Mode of Instruction: exercise course

Language: Romanian / German

Contact Hours: 4

ECTS Credits: 6.0

Contents:

See above

Assigned Courses:

Rumänisch 4 (exercise course)

Examination

Rumänisch 4

written exam / length of examination: 90 minutes

Description:

Only in the summer semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZR-0202: Russian 1 *Russisch 1 (6 LP)*		6 ECTS/LP
Version 1.4.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the basic user aimed at the satisfaction of needs of a concrete type		
Learning Outcomes / Competences: Level A1 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: None		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Russisch 1 **Mode of Instruction:** exercise course **Language:** Russian / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Examination **Russisch 1** written exam / length of examination: 90 minutes **Description:** Only in the winter semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZR-0205: Russian 2 *Russisch 2 (6 LP)*	6 ECTS/LP
Version 1.5.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele	
Contents: Language skills (reading, listening, writing, speaking) for the basic user's communication in areas of most immediate relevance	
Learning Outcomes / Competences: Level A2 (CEFR)	
Remarks: Course registration on Digicampus, exam registration on STUDIS	
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)	
Conditions: Level A1 (CEFR) language competence in Russian	**Credit Requirements:** Passing grade on the examination

Frequency: each summer semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Russisch 2

Mode of Instruction: exercise course

Language: Russian / German

Contact Hours: 4

ECTS Credits: 6.0

Contents:

See above

Assigned Courses:

Russisch 2 / Gruppe A (exercise course)

Russisch 2 / Gruppe B (exercise course)

Examination

Russisch 2

written exam / length of examination: 90 minutes

Description:

Only in the summer semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZR-0208: Russian 3 *Russisch 3 (6 LP)*			6 ECTS/LP
Version 1.4.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele			
Contents: Language skills (reading, listening, writing, speaking) geared towards an independent user's communicative skills			
Learning Outcomes / Competences: Level A2+ (CEFR)			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)			
Conditions: Level A2 (CEFR) language competence in Russian		**Credit Requirements:** Passing grade on the examination	
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]	
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Russisch 3 **Mode of Instruction:** exercise course **Language:** Russian / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Examination **Russisch 3** written exam / length of examination: 90 minutes **Description:** Only in the winter semester Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZR-0211: Russian 4 *Russisch 4 (6 LP)*		6 ECTS/LP
Version 1.5.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on familiar topics		
Learning Outcomes / Competences: Level B1 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: Level A2+ (CEFR) language competence in Russian		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Russisch 4

Mode of Instruction: exercise course

Language: Russian / German

Contact Hours: 4

ECTS Credits: 6.0

Contents:

See above

Assigned Courses:

Russisch 4 (exercise course)

Examination

Russisch 4

written exam / length of examination: 90 minutes

Description:

Only in the summer semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZS-0201: Spanish 1 *Español 1 (6 LP)*		6 ECTS/LP
Version 1.3.0 (since WS13/14) Person responsible for module: Ainoa Hagspiel		
Contents: Language skills (reading, listening, writing, speaking) for the basic user aimed at the satisfaction of needs of a concrete type		
Learning Outcomes / Competences: Level A1 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: None		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Español 1

Mode of Instruction: exercise course

Language: Spanish / German

Contact Hours: 4

ECTS Credits: 6.0

Contents:

See above

Assigned Courses:

Español 1 / Gruppe A (exercise course)

Español 1 / Gruppe B (exercise course)

Español 1 / Gruppe C (exercise course)

Español 1 / Gruppe D (exercise course)

Español 1 / Gruppe E (exercise course)

Español 1 / Gruppe F (exercise course)

Examination

Español 1

written exam / length of examination: 90 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZS-0204: Spanish 2 *Español 2 (6 LP)*			6 ECTS/LP
Version 1.3.0 (since WS13/14) Person responsible for module: Ainoa Hagspiel			
Contents: Language skills (reading, listening, writing, speaking) for the basic user's communication in areas of most immediate relevance			
Learning Outcomes / Competences: Level A2 (CEFR)			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)			
Conditions: Level A1 (CEFR) language competence in Spanish		**Credit Requirements:** Passing grade on the examination	
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]	
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: Español 2
Mode of Instruction: exercise course
Language: Spanish / German
Contact Hours: 4
ECTS Credits: 6.0

Contents:
See above

Assigned Courses:

Español 2 / Gruppe A (exercise course)

Español 2 / Gruppe B (exercise course)

Español 2 / Gruppe C (exercise course)

Español 2 / Gruppe D (exercise course)

Español 2 / Gruppe E (exercise course)

Examination
Español 2
written exam / length of examination: 90 minutes
Description:
Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZS-0207: Spanish 3 *Español 3 (6 LP)*		6 ECTS/LP
Version 1.3.0 (since WS13/14) Person responsible for module: Ainoa Hagspiel		
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on familiar topics		
Learning Outcomes / Competences: Level B1 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: Level A2 (CEFR) language competence in Spanish		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rulel)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Español 3 **Mode of Instruction:** exercise course **Language:** Spanish / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Español 3 / Gruppe A** (exercise course) **Español 3 / Gruppe B** (exercise course) **Español 3 / Gruppe C** (exercise course)
Examination **Español 3** written exam / length of examination: 90 minutes **Description:** Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZS-0210: Spanish 4 *Español 4 (6 LP)*			6 ECTS/LP
Version 1.3.0 (since WS13/14) Person responsible for module: Ainoa Hagspiel			
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on both concrete and abstract topics			
Learning Outcomes / Competences: Level B2 (CEFR)			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)			
Conditions: Level B1 (CEFR) language competence in Spanish			**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module
Part of the Module: Español 4 **Mode of Instruction:** exercise course **Language:** Spanish / German **Contact Hours:** 4 **ECTS Credits:** 6.0
Contents: See above
Assigned Courses: **Español 4 / Gruppe A** (exercise course) **Español 4 / Gruppe B** (exercise course)
Examination **Español 4** written exam / length of examination: 90 minutes **Description:** Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZS-0101: Spanish: Oral Skills *Destrezas orales (5 LP)*		5 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Ainoa Hagspiel		
Contents: • Pronunciación y entonación • Expresión oral *or* Análisis de textos de actualidad		
Learning Outcomes / Competences: Language skills geared towards a proficient user's communicative skills with specific focus on pronunciation, speaking and understanding texts; starting from level B2 (CEFR) language competence, leading up to level B2+ (CEFR)		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 150 h 60 h (attendance) 90 h (self-study)		
Conditions: • Level B2 (CEFR) language competence in Spanish • Only for students enrolled in Spanish language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Pronunciación y entonación
Mode of Instruction: exercise course
Language: Spanish
Contact Hours: 2

Assigned Courses:

Pronunciación y entonación (exercise course)

Part of the Module: Expresión oral / Análisis de textos de actualidad
Mode of Instruction: exercise course
Language: Spanish
Contact Hours: 2

Assigned Courses:

Análisis de textos de actualidad (exercise course)

Expresión oral (exercise course)

Examination
Destrezas orales
oral exam, 15 Minuten Vorbereitungszeit / length of examination: 15 minutes

Module SZS-0103: Spanish: Grammar and Analytical Skills *Estructuras lingüísticas (5 LP)*		5 ECTS/LP
Version 1.4.0 (since SoSe15) Person responsible for module: Ainoa Hagspiel		
Contents: • Estructuras gramaticales • Ejercicios contrastivos		
Learning Outcomes / Competences: Language skills geared towards a proficient user's communicative skills with specific focus on grammatical and contrastive competences; starting from level B2 (CEFR) language competence, leading up to level B2+ (CEFR)		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 150 h 60 h (attendance) 90 h (self-study)		
Conditions: • Level B2 (CEFR) language competence in Spanish • Only for students enrolled in Spanish language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Estructuras gramaticales **Mode of Instruction:** exercise course **Language:** Spanish **Contact Hours:** 2
Assigned Courses: **Estructuras gramaticales** (exercise course)
Part of the Module: Ejercicios contrastivos **Mode of Instruction:** exercise course **Language:** Spanish **Contact Hours:** 2
Assigned Courses: **Ejercicios contrastivos** (exercise course)

Examination

Estructuras lingüísticas

written exam / length of examination: 120 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZS-0104: Spanish: Text Production and Grammar *Comunicación escrita (6 LP)*		6 ECTS/LP
Version 1.4.0 (since SoSe15) Person responsible for module: Ainoa Hagspiel		
Contents: • Gramática comunicativa • Expresión escrita		
Learning Outcomes / Competences: Writing skills for the proficient user; starting from level B2+ (CEFR) language competence, leading up to level C1 (CEFR)		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: • Level B2+ (CEFR) language competence in Spanish • Only for students enrolled in Spanish language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Gramática comunicativa **Mode of Instruction:** exercise course **Language:** Spanish **Contact Hours:** 2
Assigned Courses: **Gramática comunicativa** (exercise course)
Part of the Module: Expresión escrita **Mode of Instruction:** exercise course **Language:** Spanish **Contact Hours:** 2
Assigned Courses: **Expresión escrita** (exercise course)

Examination

Comunicación escrita

written exam / length of examination: 150 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZS-0105: Spanish Cultural Studies *Estructuras sociopolíticas de los países hispanohablantes (8 LP)*		8 ECTS/LP
Version 1.4.0 (since SoSe15) Person responsible for module: Ainoa Hagspiel		
Contents: • Estructuras sociopolíticas de España • Estructuras sociopolíticas de Hispanoamérica		
Learning Outcomes / Competences: Cultural and intercultural competences based on a general knowledge of the social, economic, political and cultural life in Spanish-speaking countries		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 240 h 60 h (attendance) 180 h (self-study)		
Conditions: • Level B2+ (CEFR) language competence in Spanish • Only for students enrolled in Spanish languageand literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Estructuras sociopolíticas de España **Mode of Instruction:** exercise course **Language:** Spanish **Contact Hours:** 2
Assigned Courses: **Estructuras sociopolíticas de España (PO 2012) / Estructuras socioeconómicas y políticas de España (BaPO 2009 + LPO 2008)** (exercise course)
Part of the Module: Estructuras sociopolíticas de Hispanoamérica **Mode of Instruction:** exercise course **Language:** Spanish **Contact Hours:** 2
Assigned Courses: **Estructuras sociopolíticas de Hispanoamérica (PO 2012) / Estructuras socioeconómicas y políticas de los países latinoamericanos (BaPO 2009 + LPO 2008)** (exercise course)

Examination

Estructuras sociopolíticas de los países hispanohablantes

written exam / length of examination: 120 minutes

Description:

Exceptional regulation (under corona virus conditions): oral examination

Module SZS-0106: Spanish: Text Production and Translation *Redacción y traducción (6 LP)*		6 ECTS/LP
Version 1.4.0 (since SoSe15) Person responsible for module: Ainoa Hagspiel		
Contents: • Traducción español-alemán • Producción de textos		
Learning Outcomes / Competences: Writing and translation skills for the proficient user; starting from level C1 (CEFR) language competence, leading up to level C1+ (CEFR)		
Remarks: Attendance of one course for each part of the module given below is mandatory. Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: • Level C1 (CEFR) language competence in Spanish • Only for students enrolled in Spanish language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Traducción español-alemán **Mode of Instruction:** exercise course **Language:** Spanish / German **Contact Hours:** 2
Assigned Courses: **Traducción español - alemán** (exercise course)
Part of the Module: Producción de textos **Mode of Instruction:** exercise course **Language:** Spanish **Contact Hours:** 2
Assigned Courses: **Producción de textos** (exercise course)

Examination

Redacción y traducción

written exam / length of examination: 150 minutes

Description:

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZS-0108: Spanish: Oral Communication *Presentación oral y discusión (5 LP)*		5 ECTS/LP
Version 1.0.0 (since SoSe15) Person responsible for module: Ainoa Hagspiel		
Contents: • Comunicación oral		
Learning Outcomes / Competences: Oral language skills for the proficient user geared towards very fluent and effective communication in virtually every communicative context; starting from level C1 (CEFR) language competence, leading up to level C1+ (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 150 h 120 h (self-study) 30 h (attendance)		
Conditions: • Level C1 (CEFR) language competence in Spanish • Only for students enrolled in Spanish language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 2	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Comunicación oral **Mode of Instruction:** exercise course **Language:** Spanish **Contact Hours:** 2
Assigned Courses: **Comunicación oral** (exercise course)
Examination **Presentación oral y discusión (5 LP)** oral exam, 15 Minuten Vorbereitungszeit / length of examination: 15 minutes

Module SZS-0109: Spanish: Oral Communication and Cultural Studies *Presentación oral y discusión (7 LP)*		7 ECTS/LP

Version 1.0.0 (since SoSe15)
Person responsible for module: Ainoa Hagspiel

Contents:

- Comunicación oral
- Curso monográfico

Learning Outcomes / Competences:
Oral language skills for the proficient user geared towards very fluent and effective communication in virtually every communicative context and taking into account culturally relevant factors; starting from level C1 (CEFR) language competence, leading up to level C1+ (CEFR)

Remarks:
Attendance of one course for each part of the module given below is mandatory.
Course registration on Digicampus, exam registration on STUDIS

Workload:
Total: 210 h
150 h (self-study)
60 h (attendance)

Conditions: • Level C1 (CEFR) language competence in Spanish • Only for students enrolled in Spanish language and literature degree programmes		**Credit Requirements:** Passing grade on the examination
Frequency: each semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1-2 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Comunicación oral
Mode of Instruction: exercise course
Language: Spanish
Contact Hours: 2

Assigned Courses:

Comunicación oral (exercise course)

Part of the Module: Curso monográfico
Mode of Instruction: exercise course
Language: Spanish
Contact Hours: 2

Assigned Courses:

Curso monográfico (exercise course)

Examination
Presentación oral y discusión (7 LP)
oral exam, 15 Minuten Vorbereitungszeit / length of examination: 20 minutes

Module SZS-0301: Business Spanish A *Español de la Economía Modul A (5 LP)*			5 ECTS/LP
Version 1.5.0 (since WS13/14) Person responsible for module: Ainoa Hagspiel			
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on both concrete and abstract topics in Business Spanish			
Learning Outcomes / Competences: Partial completion of level B2 (CEFR) in Business Spanish			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 150 h 108 h (self-study) 42 h (attendance)			
Conditions: • Level B2 (CEFR) language competence in Spanish • Only for students enrolled in the Faculty of Business and Economics			**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: Español de la Economía Modul A
Mode of Instruction: exercise course
Language: Spanish
Contact Hours: 4
ECTS Credits: 5.0

Contents:
See above

Examination
Español de la Economía Modul A
written exam / length of examination: 60 minutes
Description:
Only in the winter semester

Exceptional regulation (under corona virus conditions): homework assignment, to be submitted by the due date set by the examiner

Module SZS-0303: Business Spanish B *Español de la Economía Modul B (5 LP)*		5 ECTS/LP
Version 1.5.0 (since WS13/14) Person responsible for module: Ainoa Hagspiel		
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on both concrete and abstract topics in Business Spanish		
Learning Outcomes / Competences: Partial completion of level B2 (CEFR) in Business Spanish		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 150 h 42 h (attendance) 108 h (self-study)		
Conditions: • Level B2 (CEFR) language competence in Spanish • Only for students enrolled in the Faculty of Business and Economics		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module
Part of the Module: Español de la Economía Modul B **Mode of Instruction:** exercise course **Language:** Spanish **Contact Hours:** 4 **ECTS Credits:** 5.0
Contents: See above
Assigned Courses: **Español de la economía Modul B** (exercise course)
Examination **Español de la Economía Modul B** written exam / length of examination: 60 minutes **Description:** Only in the summer semester Exceptional regulation (under corona virus conditions): homework assignment, to be submitted by the due date set by the examiner

<table>
<tr><td colspan="2">Module SZW-0201: Swedish 1
Schwedisch 1 (6 LP)</td><td>6 ECTS/LP</td></tr>
<tr><td colspan="3">Version 1.4.0 (since WS13/14)
Person responsible for module: Dr. Michaela Negele</td></tr>
<tr><td colspan="3">Contents:
Language skills (reading, listening, writing, speaking) for the basic user aimed at the satisfaction of needs of a concrete type</td></tr>
<tr><td colspan="3">Learning Outcomes / Competences:
Level A1 (CEFR)</td></tr>
<tr><td colspan="3">Remarks:
Course registration on Digicampus, exam registration on STUDIS</td></tr>
<tr><td colspan="3">Workload:
Total: 180 h
120 h (self-study)
60 h (attendance)</td></tr>
<tr><td colspan="2">Conditions:
None</td><td>Credit Requirements:
Passing grade on the examination</td></tr>
<tr><td>Frequency: each winter semester (as a rule)</td><td>Recommended Semester:</td><td>Minimal Duration of the Module:
1 semester[s]</td></tr>
<tr><td>Contact Hours:
4</td><td>Repeat Exams Permitted:
according to the examination regulations of the study program</td><td></td></tr>
</table>

Parts of the Module

Part of the Module: Schwedisch 1

Mode of Instruction: exercise course

Language: Swedish / German

Contact Hours: 4

ECTS Credits: 6.0

Contents:

See above

Examination

Schwedisch 1

written exam / length of examination: 90 minutes

Description:

Only in the winter semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZW-0204: Swedish 2 *Schwedisch 2 (6 LP)*		6 ECTS/LP
Version 1.5.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the basic user's communication in areas of most immediate relevance		
Learning Outcomes / Competences: Level A2 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: Level A1 (CEFR) language competence in Swedish		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Schwedisch 2
Mode of Instruction: exercise course
Language: Swedish / German
Contact Hours: 4
ECTS Credits: 6.0

Contents:

See above

Assigned Courses:

Schwedisch 2 (exercise course)

Examination

Schwedisch 2

written exam / length of examination: 90 minutes

Description:

Only in the summer semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZW-0207: Swedish 3 *Schwedisch 3 (6 LP)*		6 ECTS/LP
Version 1.4.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the independent user's communication on familiar topics		
Learning Outcomes / Competences: Level B1 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: Level A2 (CEFR) language competence in Swedish		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Schwedisch 3
Mode of Instruction: exercise course
Language: Swedish / German
Contact Hours: 4
ECTS Credits: 6.0

Contents:
See above

Examination
Schwedisch 3
written exam / length of examination: 90 minutes
Description:
Only in the winter semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZW-0210: Swedish 4 *Schwedisch 4 (6 LP)*		6 ECTS/LP
Version 1.6.0 (since WS13/14) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the independent user geared towards communication on both concrete and abstract topics		
Learning Outcomes / Competences: Level B1+ (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)		
Conditions: Level B1 (CEFR) language competence in Swedisch		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Schwedisch 4

Mode of Instruction: exercise course

Language: Swedish / German

Contact Hours: 4

ECTS Credits: 6.0

Contents:

See above

Assigned Courses:

Schwedisch 4 (exercise course)

Examination

Schwedisch 4

written exam / length of examination: 90 minutes

Description:

Only in the summer semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

<table>
<tr><td colspan="2">Module SZT-0202: Turkish 1
Türkisch 1 (6 LP)</td><td>6 ECTS/LP</td></tr>
<tr><td colspan="3">Version 2.7.0 (since SoSe18)
Person responsible for module: Dr. Michaela Negele</td></tr>
<tr><td colspan="3">Contents:
Very basic language skills for absolute beginners</td></tr>
<tr><td colspan="3">Learning Outcomes / Competences:
Partial completion of level A1 (CEFR)</td></tr>
<tr><td colspan="3">Remarks:
Course registration on Digicampus, exam registration on STUDIS</td></tr>
<tr><td colspan="3">Workload:
Total: 180 h
120 h (self-study)
60 h (attendance)</td></tr>
<tr><td colspan="2">Conditions:
None</td><td>Credit Requirements:
Passing grade on the examination</td></tr>
<tr><td>Frequency: each winter semester (as a rule)</td><td>Recommended Semester:</td><td>Minimal Duration of the Module:
1 semester[s]</td></tr>
<tr><td>Contact Hours:
4</td><td>Repeat Exams Permitted:
according to the examination regulations of the study program</td><td></td></tr>
</table>

Parts of the Module

Part of the Module: Türkisch 1
Mode of Instruction: exercise course
Language: Turkish / German
Contact Hours: 4
ECTS Credits: 6.0

Contents:

See above

Examination

Türkisch 1

written exam / length of examination: 90 minutes

Description:

Only in the winter semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZT-0205: Turkish 2 *Türkisch 2 (6 LP)*			6 ECTS/LP
Version 2.5.0 (since SoSe18) Person responsible for module: Dr. Michaela Negele			
Contents: Language skills (reading, listening, writing, speaking) for the basic user aimed at the satisfaction of needs of a concrete type			
Learning Outcomes / Competences: Level A1 (CEFR)			
Remarks: Course registration on Digicampus, exam registration on STUDIS			
Workload: Total: 180 h 60 h (attendance) 120 h (self-study)			
Conditions: Very basic language skills in Turkish			**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**		**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program		

Parts of the Module

Part of the Module: Türkisch 2

Mode of Instruction: exercise course

Language: Turkish / German

Contact Hours: 4

ECTS Credits: 6.0

Contents:

See above

Assigned Courses:

Türkisch 2 / Gruppe A (exercise course)

Türkisch 2 / Gruppe B (exercise course)

Examination

Türkisch 2

written exam / length of examination: 90 minutes

Description:

Only in the summer semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZT-0208: Turkish 3 *Türkisch 3 (6 LP)*		6 ECTS/LP
Version 2.5.0 (since SoSe18) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) for the basic user's communication in areas of most immediate relevance		
Learning Outcomes / Competences: Level A2 (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: Level A1 (CEFR) language competence in Turkish		**Credit Requirements:** Passing grade on the examination
Frequency: each winter semester (as a rulel)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Türkisch 3
Mode of Instruction: exercise course
Language: Turkish / German
Contact Hours: 4
ECTS Credits: 6.0

Contents:
See above

Examination
Türkisch 3
written exam / length of examination: 90 minutes
Description:
Only in the winter semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module SZT-0211: Turkish 4 *Türkisch 4 (6 LP)*		6 ECTS/LP
Version 2.5.0 (since SoSe18) Person responsible for module: Dr. Michaela Negele		
Contents: Language skills (reading, listening, writing, speaking) geared towards an independent user's communicative skills		
Learning Outcomes / Competences: Level A2+ (CEFR)		
Remarks: Course registration on Digicampus, exam registration on STUDIS		
Workload: Total: 180 h 120 h (self-study) 60 h (attendance)		
Conditions: Level A2 (CEFR) language competence in Turkish		**Credit Requirements:** Passing grade on the examination
Frequency: each summer semester (as a rule)	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
Contact Hours: 4	**Repeat Exams Permitted:** according to the examination regulations of the study program	

Parts of the Module

Part of the Module: Türkisch 4

Mode of Instruction: exercise course

Language: Turkish / German

Contact Hours: 4

ECTS Credits: 6.0

Contents:

See above

Assigned Courses:

Türkisch 4 (exercise course)

Examination

Türkisch 4

written exam / length of examination: 90 minutes

Description:

Only in the summer semester

Exceptional regulation (under corona virus conditions): portfolio examination; assignments to be submitted by the due dates set by the examiner

Module AAA-0001: "Understanding the Germans" - Intercultural Communication and Awareness *"Die Deutschen verstehen" - Interkulturelle Kommunikation und Sensibilisierung*		4 ECTS/LP
Version 1.0.0 Person responsible for module: Anne Hanik		
Contents: The participants get an insight into the German culture and a possibility to exchange their experiences. The basis for this are theoretical topics (e.g. culture) and their definitions, communication and its types. Furthermore, cultural styles of communication are discussed and compared with different countries using modern media. In addition, different areas such as stereotypes, everyday life, taboo and regional differences will be discussed. The course offers a lot of room for exchange and discussion, which should lead to questioning one's own attitude towards other cultural circles.		
Learning Outcomes / Competences: The aim of this course is to provide the exchange students with the knowledge of cultural differences in communication and to sensitize them interculturally. The basis for this is the German culture and the initial cultures of the participants. During the course, students will have an opportunity to think about their own culture and compare it with the German one. This will lead to a better understanding of both. The course is not only based on theoretical content, but also on practical exercises from the field of intercultural training. Students are expected to actively participate and to actively exchange their experiences.		
Conditions: German language skills at least level B2		
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
	Repeat Exams Permitted: none	

Parts of the Module
Part of the Module: "Understanding the Germans" - Intercultural Communication and Awareness **Mode of Instruction:** seminar **Language:** German **Contact Hours:** 2
Assigned Courses: **"Die Deutschen verstehen" - Interkulturelle Kommunikation und Sensibilisierung** (course)

Examination
"Understanding the Germans" - Intercultural Communication and Awareness presentation, Active participation is expected

Module AAA-0002: Germany from an Intercultural Perspective *Deutschland aus interkultureller Perspektive*		4 ECTS/LP
Version 1.0.0 Person responsible for module: Anne Hanik		
Contents: • University in Germany • People and Culture(s) in Germany • History and Politics in Germany • Geography of Germany • German media landscape		
Learning Outcomes / Competences: The seminar is designed for exchange students at the University of Augsburg. The seminar will cover the culture of Germany, for example festivals and customs, media, music and advertising. Historical, geographical and political content will also be part of the seminar. The aim of the course is to give exchange students a first insight into their host country Germany, to impart important basic knowledge and to work out and reflect on cultural differences to other cultures. Students are expected to actively participate, as an intercultural seminar thrives on discussion and exchange of experiences. In the case of a virtual event, this active participation is made possible through video conferences, chat discussions and contributions in the forum of the event.		
Conditions: German language skills at least level B2		
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
	Repeat Exams Permitted: none	

Parts of the Module
Part of the Module: Germany from an intercultural perspective **Mode of Instruction:** seminar **Language:** German **Contact Hours:** 2
Assigned Courses: **Deutschland aus interkultureller Perspektive** (course)

Examination
Germany from an intercultural perspective presentation, active participation is expected

Module AAA-0003: Exploring German Culture *Erkundung der deutschen Kultur*		4 ECTS/LP
Version 1.0.0 Person responsible for module: Anne Hanik		
Contents: Students receive an overview of German culture, its society, education and business world, including media, music, politics, sustainability and the UNESCO World Heritage status of the city of Augsburg. In addition, active discussions about each topic and the exchange of personal intercultural experiences are a big part of this class. Furthermore this module includes two city tours in the city of Augsburg and lots of opportunities to explore a student's creativity on each topic agenda.		
Learning Outcomes / Competences: The goal of this seminar is to provide the students with essential knowledge about the host country Germany and to facilitate their curiosity to examine the differences and similarities between their native culture or cultures and the German one. Student will learn how to do group work and how to introduce a topic in a presentation, as both techniques are valuable and essential for studying at a German university. Practicing empathy and ambiguity deepen an understanding of their own culture, perception and values, being aware of the so called "cultural glasses".		
Conditions: English language skills at least level B2		
Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
	Repeat Exams Permitted: none	

Parts of the Module
Part of the Module: Exploring German Culture **Mode of Instruction:** seminar **Language:** English **Contact Hours:** 2
Assigned Courses: **"Exploring the German Culture"** (course)

Examination

Exploring German Culture

presentation, active participation is expected

Module AAA-0004: "Studying and Living in Germany" - Intercultural Competence for Exchange Students *"Studieren und Leben in Deutschland" - Interkulturelle Kompetenz für Austauschstudierende*	4 ECTS/LP

Version 1.0.0
Person responsible for module: Anne Hanik

Contents:

- Living in Germany / Augsburg
- Definition of Culture
- German (Academic) Cultural Standards / Values
- Cultural Dimensions
- Stereotypes and Prejudices
- Communication (Verbal – Non-Verbal)

Learning Outcomes / Competences:

This seminar is for exchange students at the University of Augsburg. Its main aim is to explore the German (academic) culture. This course will help the students find out how to deal with the challenges they might face in Germany. Reading materials will be provided, and the students can try out (interactive) tasks and develop their own ways of coping with the new and unfamiliar. They will have contact with other international students and will have the opportunity to share their experiences with them and learn from each other. Mutual feedback and discussions also help the students gain interesting insights into German culture and the way the others experience it. It is important to develop their own strategies which are useful to master intercultural encounters and misunderstandings.

Seminar participants are expected to participate actively, as this seminar course thrives on rich discussions and exchange of personal intercultural experiences.

Conditions:
English language skills at least level B2

Frequency: each semester	**Recommended Semester:**	**Minimal Duration of the Module:** 1 semester[s]
	Repeat Exams Permitted: none	

Parts of the Module

Part of the Module: "Studying and Living in Germany" - Intercultural Competence for Exchange Students
Mode of Instruction: seminar
Language: English
Contact Hours: 2

Assigned Courses:

Studying and Living in Germany – Intercultural Competence for Exchange Students (course)

Examination
"Studying and Living in Germany" - Intercultural Competence for Exchange Students
presentation, active participation is expected