Appendix A: Course Schedule

for the study programme Engineering Computer Sciences B.Eng.

Please note: The German version of this document is the legally binding version. The English translation provided here is for information purposes only.

| Module number ID | First sem | nester | | L | ST | E | P/S | SSS | СР |
|---|-----------|----------------------------------|--------|---|----|---|------|-------|----|
| Introduction to Engineering Computer Sciences | | Module title | | | | | | | |
| Computer Sciences | | | | | | | | | |
| 1105 | 1052 | | EII | 2 | 2 | 0 | 0 | 0 | 5 |
| 1147 Mathematics A | 1105 | | INF1 | 2 | 1 | 0 | 1 | 0 | 5 |
| Technical English 1 | 1147 | | MA A | 4 | 4 | 0 | 0 | 0 | 10 |
| Notable | 1195 | Physics 1 | PH1 | 2 | 1 | 0 | 1 | 0 | 5 |
| Module Module title Module ID | 1085 | Technical English 1 | FSE1 | 0 | 4 | 0 | 0 | 0 | 5 |
| Module number Module lib Module ID | | | | | | | Tota | I CP: | 30 |
| Module number Module lib Modu | Second s | emester | | L | ST | Ε | P/S | SSS | СР |
| 1001 Algorithms and Data Structures | Module | Module title | Module | | | | | | |
| 1001 Algorithms and Data Structures | number | | ID | | | | | | |
| 1109 | | Algorithms and Data Structures | AUDS | 2 | 2 | 0 | 0 | 0 | 5 |
| 1153 Mathematics B | 1325 | Electrotechnical basics | GE | 2 | 1 | 0 | 1 | 0 | 5 |
| 1158 | 1109 | Computer Science 2 | INF2 | 2 | 1 | 0 | 1 | 0 | 5 |
| Third semester | 1153 | Mathematics B | MA B | 2 | 2 | 0 | 0 | 0 | 5 |
| Total CP: 30 Third semester | 1158 | Mathematics C | MA C | 2 | 2 | 0 | 0 | 0 | 5 |
| Third semester | 1200 | Physics 2 | PH2 | 2 | 1 | 0 | 1 | 0 | 5 |
| Module number Module title Module ID | | , , | | 1 | 1 | 1 | Tota | I CP: | 30 |
| Module number Module title Module ID | Third ser | nester | | L | ST | Ε | P/S | SSS | СР |
| Number Numerical Mathematics ID ID ID ID ID ID ID I | | | Module | | | | | | |
| 1024 Business Administration BW 3 | number | | | | | | | | |
| 1024 Business Administration BW 3 | 1015 | Automation Technology | AT | 2 | 1 | 0 | 1 | 0 | 5 |
| Network Technology | 1024 | | BW | 3 | 1 | 0 | 0 | 0 | 5 |
| 1245 Software Engineering SWE 2 1 0 1 0 5 1218 Team Project: Engineering Computer Sciences PINI 0 0 0 0 2 0 5 | 1070 | Digital Electronics I | DEL1 | 2 | 1 | 0 | 1 | 0 | 5 |
| Team Project: Engineering Computer PINI 0 0 0 0 2 0 5 | 1181 | Network Technology | NW | 2 | 1 | 0 | 1 | 0 | 5 |
| Sciences Sciences | 1245 | Software Engineering | SWE | 2 | 1 | 0 | 1 | 0 | 5 |
| Fourth semesterLSTEP/SSSSCPModule numberModule titleModule IDSTEP/SSSSCP1028Digital Image Processing and Pattern MatchingBVM2101051045Digital Electronics IIDEL22101051314Machine Learning and Data MiningMLDM2101051007Numerical MathematicsNM2020051233Feedback Control EngineeringRT2101059001Elective ModuleWM005 | 1218 | | PINI | 0 | 0 | 0 | 2 | 0 | 5 |
| Module numberModule titleModule IDModule ID1028Digital Image Processing and Pattern MatchingBVM2101051045Digital Electronics IIDEL22101051314Machine Learning and Data MiningMLDM2101051007Numerical MathematicsNM2020051233Feedback Control EngineeringRT2101059001Elective ModuleWM005 | | | | | | | Tota | I CP: | 30 |
| number ID ID <th< td=""><td>Fourth se</td><td>emester</td><td></td><td>L</td><td>ST</td><td>Ε</td><td>P/S</td><td>SSS</td><td>CP</td></th<> | Fourth se | emester | | L | ST | Ε | P/S | SSS | CP |
| 1028 Digital Image Processing and Pattern Matching BVM 2 1 0 1 0 5 1045 Digital Electronics II DEL2 2 1 0 1 0 5 1314 Machine Learning and Data Mining MLDM 2 1 0 1 0 5 1007 Numerical Mathematics NM 2 0 2 0 0 5 1233 Feedback Control Engineering RT 2 1 0 1 0 5 9001 Elective Module WM 0 0 5 | Module | Module title | Module | | | | | | |
| Matching DEL2 2 1 0 1 0 5 1314 Machine Learning and Data Mining MLDM 2 1 0 1 0 5 1007 Numerical Mathematics NM 2 0 2 0 0 5 1233 Feedback Control Engineering RT 2 1 0 1 0 5 9001 Elective Module WM 0 0 5 | number | | ID | | | | | | |
| 1045 Digital Electronics II DEL2 2 1 0 1 0 5 1314 Machine Learning and Data Mining MLDM 2 1 0 1 0 5 1007 Numerical Mathematics NM 2 0 2 0 0 5 1233 Feedback Control Engineering RT 2 1 0 1 0 5 9001 Elective Module WM 0 0 5 | 1028 | | BVM | 2 | 1 | 0 | 1 | 0 | 5 |
| 1007 Numerical Mathematics NM 2 0 2 0 0 5 1233 Feedback Control Engineering RT 2 1 0 1 0 5 9001 Elective Module WM 0 0 5 | 1045 | | DEL2 | 2 | 1 | 0 | 1 | 0 | 5 |
| 1233 Feedback Control Engineering RT 2 1 0 1 0 5 9001 Elective Module WM 0 0 5 | 1314 | Machine Learning and Data Mining | MLDM | 2 | 1 | 0 | 1 | 0 | 5 |
| 1233 Feedback Control Engineering RT 2 1 0 1 0 5 9001 Elective Module WM 0 0 5 | 1007 | Numerical Mathematics | NM | 2 | 0 | 2 | 0 | 0 | 5 |
| 9001 Elective Module WM 0 0 5 | 1233 | Feedback Control Engineering | RT | 2 | 1 | 0 | 1 | 0 | 5 |
| Total CP: 30 | 9001 | Elective Module | WM | | | 0 | 0 | | 5 |
| | | | | • | • | • | Tota | I CP: | 30 |

| Fifth sem | nester | | L | ST | Ε | P/S | SSS | CP |
|------------------|--------------------------------------|--------------|---|----|------|-------|-------|----|
| Module number | Module title | Module ID | | | | | | |
| 1173 | Microcontrollers | MC | 2 | 1 | 0 | 1 | 0 | 5 |
| 1008 | Numerical Simulation | NSI | 2 | 0 | 1 | 1 | 0 | 5 |
| 1231 | Computer Architectures | RA | 2 | 1 | 0 | 1 | 0 | 5 |
| 1244 | Simulation Technology | SIM | 2 | 1 | 0 | 1 | 0 | 5 |
| 1219 | Student Research Project (Project 2) | STA | 0 | 0 | 0 | 2 | 0 | 5 |
| 9001 | Elective Module | WM | | | 0 | 0 | | 5 |
| | | | - | | | Tota | I CP: | 30 |
| Sixth ser | nester | | L | ST | Ε | P/S | SSS | СР |
| Module | Module title | Module | | | | | | |
| number | | ID | | | | | | |
| 1023 | Operating Systems | BS | 2 | 1 | 0 | 1 | 0 | 5 |
| 1041 | Database Applications | DBA | 2 | 1 | 0 | 1 | 0 | 5 |
| 1079 | Embedded Systems | ESYS | 2 | 1 | 0 | 1 | 0 | 5 |
| 1006 | High-Performance Computing | HPC | 2 | 0 | 1 | 1 | 0 | 5 |
| 9001 | Elective Module | WM | | | 0 | 0 | | 5 |
| 9001 | Elective Module | WM | | | 0 | 0 | | 5 |
| | | | | | | Tota | I CP: | 30 |
| Seventh | semester | | L | ST | Е | P/S | SSS | СР |
| Module | Module title | Module | | | | | | |
| number | | ID | | | | | | |
| 1291 | Bachelor Thesis | BA | 0 | 0 | 0 | 0 | 0 | 12 |
| 1290 | Colloquium | KOL | 0 | 0 | 0 | 0 | 0 | 3 |
| 1292 | Practical Project / Internship | PRA | 0 | 0 | 0 | 0 | 0 | 15 |
| | | | • | • | Tota | I CP: | 30 | |

Abbreviations of the teaching forms: L = lecture, ST = tuition in seminars, E = exercise, S = seminar, P = practical, SSS = supervised self-study (all data in semester credit hours);

CP = credit points W/S = winter/summer semester

The practical project can optionally be replaced by a semester abroad.

| Elective I | Modules Engineering Computer Sci | ences | | | | | | | |
|------------------|---|--------------|---------|---|----|---|-----|-----|----|
| Module number | Module title | Module ID | W/ S | L | ST | Е | P/S | SSS | СР |
| 3349 | Assistance Systems | ASY | S | 2 | 0 | 1 | 1 | 1.5 | 5 |
| 3344 | Cluster Computing | CLC | W | 2 | 0 | 1 | 1 | 1 | 5 |
| 3341 | Data Mining | DM | S | 2 | 0 | 1 | 1 | 1 | 5 |
| 1095 | Building Automation | GAT | S | 2 | 2 | 0 | 0 | 0 | 5 |
| 3135 | Gender and Diversity: Success Factors for Companies | GUD | W | 2 | 2 | 0 | 0 | 0 | 5 |
| 3210 | Business Process Modelling and IT Systems | GPM | W | 2 | 0 | 1 | 1 | 1 | 5 |
| 1101 | High-Frequency Electronics | HFE | W | 2 | 1 | 0 | 1 | 0 | 5 |
| 3211 | Innovation and Project Management | IPM | W | 2 | 0 | 2 | 0 | 1 | 5 |

| 1232 | Integrated Product Development | IP | S | 2 | 2 | 0 | 0 | 0 | 5 |
|------|--|--------|---|---|---|---|---|-----|---|
| 1311 | Sensors and Actuators | ISS | S | 2 | 1 | 0 | 1 | 0 | 5 |
| 1115 | International Management/Marketing | IMM | S | 2 | 2 | 0 | 0 | 0 | 5 |
| 1118 | Investment and Financing | FIN | S | 3 | 1 | 0 | 0 | 0 | 5 |
| 1130 | Cost and Performance Accounting | KUL | W | 2 | 2 | 0 | 0 | 0 | 5 |
| 1133 | Cryptography | KRY | W | 0 | 4 | 0 | 0 | 0 | 8 |
| 3123 | Power Electronics | LE | W | 2 | 0 | 1 | 1 | 1.5 | 5 |
| 3355 | Marketing and Technical Sales | MUV | S | 2 | 0 | 2 | 0 | 1 | 5 |
| 1169 | Metrology | MT | W | 2 | 1 | 0 | 1 | 0 | 5 |
| 1174 | Microsystems Technology | MST | S | 2 | 0 | 0 | 2 | 0 | 5 |
| 1180 | Networks and Bus Systems | NBS | W | 2 | 2 | 0 | 0 | 0 | 5 |
| 1300 | Optical Systems Engineering | OST | S | 2 | 1 | 0 | 1 | 0 | 5 |
| 1190 | Optoelectronics | OPT | W | 2 | 1 | 0 | 1 | 0 | 5 |
| 1192 | Personnel and Organisation | PUO | S | 3 | 1 | 0 | 0 | 0 | 5 |
| 1229 | Quality Management | QM | S | 2 | 2 | 0 | 0 | 0 | 5 |
| 1240 | Robotics | ROB | W | 2 | 1 | 0 | 1 | 0 | 5 |
| 1242 | Sensors | SEN | S | 2 | 1 | 0 | 1 | 0 | 5 |
| 1121 | Signals and Systems | SigSys | S | 2 | 1 | 0 | 1 | 0 | 5 |
| 3351 | Social Media and Natural Language Processing | SMNLP | W | 2 | 0 | 2 | 0 | 1 | 5 |
| 3224 | Statistics | STAT | W | 2 | 0 | 2 | 0 | 1 | 5 |
| 1086 | Technical English 2 | FSE2 | S | 0 | 4 | 0 | 0 | 0 | 5 |
| 1299 | Theoretical Computer Science | TI | S | 0 | 4 | 0 | 0 | 0 | 5 |

Appendix B: Module catalogue

for the study programme Engineering Computer Sciences B.Eng.

| Algorithms and Data Structures | 19 |
|---|----|
| Assistance Systems | 21 |
| Automation Technology | 23 |
| Bachelor Thesis | 25 |
| Operating Systems | 26 |
| Business Administration | 28 |
| Digital Image Processing and Pattern Matching | 30 |
| Cluster Computing | 32 |
| Data Mining | 34 |
| Database Applications | 36 |
| Digital Electronics I* | 38 |
| Digital Electronics II* | 40 |
| Introduction to Engineering Computer Sciences | 42 |
| Electrical Engineering Basics* | 44 |
| Embedded Systems | 46 |
| Building Automation | 48 |
| Gender and Diversity: Success Factors for Companies | 50 |
| Business Process Modelling and IT Systems | 52 |
| High-Performance Computing | 54 |
| High-Frequency Electronics | 56 |
| Computer Science 1 | 58 |
| Computer Science 2 | 60 |
| Innovation and Project Management | 62 |
| Integrated Product Development | 64 |
| Sensors and Actuators | 65 |
| International Management/Marketing | 67 |
| Investment and Financing | 69 |
| Colloquium | 71 |
| Cost and Performance Accounting | 72 |

| Cryptography | 74 |
|--|-----|
| Power Electronics | 75 |
| Marketing and Technical Sales | 77 |
| Machine Learning and Data Mining | 79 |
| Mathematics A | 81 |
| Mathematics B | 83 |
| Mathematics C | 85 |
| Metrology | 87 |
| Microcontrollers* | 88 |
| Microsystems Technology | 90 |
| Networks and Bus Systems | 91 |
| Network Technology | 92 |
| Numerical Mathematics | 94 |
| Numerical Simulation | 95 |
| Optical Systems Technology | 96 |
| Optoelectronics | 98 |
| Personnel and Organisation | 100 |
| Physics 1 | 102 |
| Physics 2 | 104 |
| Practical Project / Internship | 106 |
| Quality Management | 107 |
| Computer Architectures | 109 |
| Feedback Control Engineering | 111 |
| Robotics | 113 |
| Sensors | 115 |
| Signals and Systems | 117 |
| Simulation Technology | 119 |
| Social Media and Natural Language Processing | 121 |
| Software Engineering | 123 |
| Statistics | 124 |
| Student Research Project (Project 2) | 126 |
| Team Project: Engineering Computer Sciences | 128 |
| Technical English 1 | 130 |
| Technical English 2 | 132 |

| Theoretical Computer Science | 134 |
|------------------------------|-----|
| Elective Module | 136 |

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^{*}Translations of these module descriptions are currently not available.

| Idani | ification | Workload: | | Credits: Study semester: Frequency of the offer | | | | | Durati | Duration: | | |
|-------|-------------------------|-----------------------|----|---|-------|----------|------|--|----------------|------------|--------|--|
| numl | | Workload. | | Ciedits. | Study | Scillesi | .01. | rrequenc | y of the offer | Duran | on. | |
| 1001 | 001 150 h | | | 5 | 2nd s | sem. | | Annual (Summe | er) | 1 sem | 1 sem. | |
| 1 | Course: | | Pl | anned group siz | zes | Scope | e | Actual contact time / classroom teaching | | Self-study | | |
| | Lecture | | 60 | 60 students | | 2 | SCH | 30 | h | 45 | h | |
| | Tuition in | Tuition in seminars 3 | | 30 students | | 2 | SCH | 30 | h | 45 | h | |
| | Exercise | | 20 |) students | | 0 | SCH | 0 | h | 0 | h | |
| | Practical | or seminar | 15 | 15 students | | 0 | SCH | 0 | h | 0 | h | |
| | Supervised self-study 6 | | 60 | 60 students | | 0 | SCH | 0 | h | 0 | h | |

Students:

- are familiar with the possibilities of formal description of algorithms and discuss interface agreements as a basis for the reusability of implemented functions.
- are able to name basic search and sorting algorithms as well as fast sorting algorithms, write them down as pseudo code and explain them.
- programme basic algorithms as functions in a scripting language (e.g. Python) and apply the implemented algorithms to given problems.
- write programme scripts for the numerical evaluation of the algorithm runtime and test their selfimplemented algorithms with regard to their runtime as a function of the problem size.
- determine and compare the runtime complexity (efficiency) of different algorithms by analysing the algorithm structure and can thus classify the previously numerically determined runtime behaviour into runtime classes.
- develop and implement backtracking algorithms and fast sorting methods in a scripting language.
- implement their own data structures and data types and test them within the framework of given problems.

3 Contents:

- Basics and terms for the formal description of algorithms
- Formalisation of interface agreements (burdens, obligations, agreement on data formats, agreement on behaviour in case of rules and errors)
- hardware-independent evaluation of the complexity of algorithms (in particular runtime complexity, memory complexity, concept of the register machine [random access machine], Onotation)
- Simple search and sorting algorithms
- Divide-and-conquer strategies, backtracking problems
- Comparison of iterative and recursive programming methods for algorithm implementation
- Fast sorting algorithms
- Abstract and concrete data types
- Graphs and trees
- Hashing

Forms of teaching:

| | Lecture, semina | r-based teaching and programming exercises | | | | | | |
|----|----------------------|--|--|--|--|--|--|--|
| 5 | Participation requ | irements: | | | | | | |
| | Formal: None | | | | | | | |
| | Content: | Basic programming knowledge | | | | | | |
| 6 | Forms of assessment: | | | | | | | |
| | Written examina | ation, combination examination or oral examination | | | | | | |
| 7 | Prerequisite for th | e award of credit points: | | | | | | |
| | Module examina | ation pass and course assessment | | | | | | |
| 8 | * * | e module (in the following study programmes) | | | | | | |
| | | mputer Sciences B.Eng. | | | | | | |
| 9 | • | grade for the final grade: | | | | | | |
| | according to BR | LPO | | | | | | |
| 10 | Module Coordina | tor: | | | | | | |
| | Prof. Dr. rer. na | t. Axel Schneider | | | | | | |
| 11 | Other information | | | | | | | |
| | Literature will b | e announced at the beginning of the course. | | | | | | |
| 12 | Language: | | | | | | | |
| | German | | | | | | | |

| Assis | Assistance Systems | | | | | | | | | | |
|----------------------------------|-------------------------|--------------|----------|-----------------|---------|-------|-----------|-----------------|----------|------------|-----|
| Identification Workload: number: | | | Credits: | Study | semeste | er: | Frequency | of the offer | Duration | : | |
| 3349 | | 150 h | | 5 | 6th se | em. | | Annual (Summer) | | 1 semes | ter |
| 1 | Course: | | Pl | anned group siz | es | Scope | ; | Actual co | | Self-study | |
| | Lecture | | 60 | students | 2 | | SCH | 0 | h | 56 | h |
| | Tuition in seminars | | 30 | students | | 0 | SCH | 0 | h | 0 | h |
| | Exercise 2 | | 20 | students | | 1 | SCH | 8 | h | 46 | h |
| | Practical or seminar 1: | | 15 | students | | 1 | SCH | 16 | h | 0 | h |
| | Supervise | d self-study | 60 | 60 students | | 1.5 | SCH | 24 | h | 0 | h |

2 Learning outcomes/competences:

- The students know the basics of human-machine systems.
- They explain the design rules of ergonomic human-machine interfaces.
- They know the basics of robotics both in the field of robot manipulators and in the field of mobile robotics.
- They calculate kinematic chains for robot manipulators and motion kinematics for mobile robots.
- They compare robotics applications from the fields of industry, service and care, especially from the point of view of interaction between assistive robots and human operators/users.
- They know the basis of "Computer Vision" and can explain simple algorithms for threedimensional object recognition; they apply ready-made software implementations of such algorithms to simple visual scenes.
- They know the basics of computer graphics, especially for the presentation of threedimensional scenes and objects; they can use a 3D graphics API to programme the visualisation of simple 3D scenes.
- They explain the basics of augmented and virtual reality.
- They will implement the representation of 3D objects in a virtual reality environment and the representation of 2D and 3D objects in an augmented reality setup.
- They explain the basics of the voice control of technical systems.

3 Contents:

Human-machine systems:

- Human models
- Ergonomic design
- Design rules of human-machine interfaces

Robotics Basics:

- Robot manipulators (kinematics, elastic drives and manipulators)
- Mobile robotics (kinematics, sensor technology)
- Robotics applications (industrial robots, service and care robots)

Computer Vision: Principles Three-dimensional object recognition Computer graphics Basics of 3D representation Augmented Reality Virtual Reality Voice control of technical systems: Basics and application examples Forms of teaching: Learning units for self-study, classroom events in the form of exercises and practicals Participation requirements: 5 Formal: Content: In-depth computer science knowledge Knowledge of machine learning incl. speech and image recognition Module "HMI and User Interfaces" Forms of assessment: 6 Written examination or oral examination Prerequisite for the award of credit points: Module examination pass and course assessment 8 Application of the module (in the following study programmes) Digital Technologies (work-integrated) B.Eng. Importance of the grade for the final grade: 9 according to BRPO Module Coordinator: 10 N. N. 11 Other information: Language: 12 German

| Auto | omation Te | echnology | | | | | | | AT | | |
|-------------|--|--|--|--|--|---|--|--------------|-------------|------------|--|
| Iden num | tification ber: | Workload: | Credits: | Study | semes | ter: | Frequency | of the offer | Duratio | n: | |
| 1015 150 h | | | 5 | 5 3rd se | | | Annual (Winter) | | 1 sem. | | |
| 1 | Course: | 1 | Planned group s | sizes | Scop | e | actual co time / cla teaching | | Self-stud | Self-study | |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h | |
| | Tuition in | n seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h | |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h | |
| | | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h | |
| 2 | | ed self-study outcomes/com | 60 students | | 0 | SCH | 0 | h | 0 | h | |
| | analydesig | e discrete eve vse discrete ev n feedforwar | | | | ıd non-de | eterministic | automata | and Petri | Nets. | |
| 3 | - imple | ement sequen | tial controls and t | | | | | | | | |
| 3 | Contents: - Basic - Produ - Introd - Engin - Type - Solut - Desce - Analy | ement sequen e principles ar uct automatio duction to pro neering view s of control serion of automation of discovering view | nd objectives of and plant auton ogrammable logic of systems, proce | utomation nation control (esses and | on a reching the control of the cont | nology s ad non-domata ar | eterministion | is. | | | |
| | Contents: - Basic - Produ - Introd - Engin - Type - Solut - Desc: - Analy - Contr | ement sequen c principles ar uct automatio duction to pro neering view s of control s cion of automa ription of disc ysis of determ roller design a | nd objectives of and objectives of an and plant auton ogrammable logic of systems, procesystems ation tasks crete systems by coninistic and nonder | utomation nation control (esses and determinis | on a reching (PLC) signal istic autic autic control | nology s ad non-do omata ar ol law e. | eterministion | is. | | | |
| 4 | Contents: - Basic - Produ - Introc - Engin - Type - Solut - Desc: - Analy - Contr | ement sequen c principles ar uct automatio duction to pro neering view s of control s cion of automa ription of disc ysis of determ roller design a | and objectives of an and plant automogrammable logic of systems, procesystems ation tasks crete systems by coninistic and nonder and implementation | utomation nation control (esses and determinis | on a reching (PLC) signal istic autic autic control | nology s ad non-do omata ar ol law e. | eterministion | is. | | | |
| 4 | Contents: - Basic - Produ - Introd - Engin - Type - Solut - Desc - Analy - Contr Forms of Lecture Participal Formal: Content: | ement sequen ement sequen e principles ar uct automatio duction to pro neering view s of control s ion of automa ription of disc ysis of determ roller design a teaching: with accompation requirement Nor Mod 114 115 115 | and objectives of an and plant automogrammable logic of systems, procesystems ation tasks crete systems by coninistic and nonder and implementation | utomation acontrol (ssses and deterministion of the sercises a | on a reching (PLC) signal istic autic autic control | nology s ad non-do omata ar ol law e. | eterministion | is. | | | |
| 4 5 | Contents: - Basic - Produ - Introd - Engin - Type - Solut - Desc - Analy - Contr Forms of Lecture Participal Formal: Content: | ement sequen ement sequen e principles ar uct automatio duction to pro neering view s of control s cion of automa ription of disc ysis of determ roller design a teaching: with accompation requirement Nor Mod 114 115 115 | and objectives of an and plant automogrammable logic of systems, procesystems ation tasks crete systems by coninistic and nonder and implementation and implementation tasks are systems by coninistic and nonder and implementation tasks are systems by coninistic and nonder and implementation tasks are systems by coninistic and nonder and implementation tasks are systems by coninistic and nonder and implementation tasks are systems by coninistic and nonder and implementation tasks are systems as a system of the system | utomation a control (ssses and deterministermi | on a reconstruction technical sistic artical autocontrol | nology s ad non-doomata ar ol law e.s | eterministic nd Petri Ne g. by means | s of sequen | itial contr | | |
| 4 5 | Contents: - Basic - Produ - Introd - Engin - Type - Solut - Desc - Analy - Contr Forms of Lecture Participat Formal: Content: | ement sequen exprinciples are uct automation duction to promeering view sof control spinon of automation of discretion of determinents of determinents of teaching: with accompation requirements of the promote of th | and objectives of an and plant automogrammable logic of systems, procesystems ation tasks crete systems by coninistic and nonder and implementation anying seminar expenses to the control of the control | utomation a control (ssses and deterministermi | on a reconstruction technical sistic artical autocontrol | nology s ad non-doomata ar ol law e.s | eterministic nd Petri Ne g. by means | s of sequen | itial contr | | |
| 4 5 | Contents: - Basic - Produ - Introd - Engin - Type - Solut - Desc: - Analy - Contr Forms of Lecture Participat Formal: Content: Forms of Written Prerequis Module | ement sequen exprinciples are act automation duction to proper to precipe and the comparition of automatic action of automati | and objectives of an and plant automogrammable logic of systems, procesystems ation tasks crete systems by coninistic and nonder and implementation and implementation tasks. The definition of the control of the cont | utomation acontrol (control of the seercises and seercises and seercises and seercises acceptance). | on a reconstruction technology (PLC) signal istic artic autocontrology and prainting mination of the contrology and prainting mination of the contrology and prainting mination of the contrology and prainting mination of the control | nology s ad non-decomata are of law e.s | eterministic nd Petri Ne g. by means | s of sequen | itial contr | | |
| 4 5 | Contents: - Basic - Produ - Introd - Engin - Type - Solut - Desc: - Analy - Contr Forms of Lecture Participat Formal: Content: Forms of Written Prerequis Module | ement sequen exprinciples are act automation duction to proper to precipe and the comparition of automatic action of automati | and objectives of an and plant automogrammable logic of systems, procesystems ation tasks crete systems by coninistic and nondeand implementation and implementation tasks. The dules: Mathematics A Mathematics A Mathematics C mation; in each card of credit points: | utomation acontrol (control of the seercises and seercises and seercises and seercises acceptance). | on a reconstruction technology (PLC) signal istic artic autocontrology and prainting mination of the contrology and prainting mination of the contrology and prainting mination of the contrology and prainting mination of the control | nology s ad non-decomata are of law e.s | eterministic nd Petri Ne g. by means | s of sequen | itial contr | | |

| 9 | Importance of the grade for the final grade: |
|----|--|
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. DrIng. Martin Kohlhase |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| Вас | helor Thesi | is | | | | | | | BA | | |
|------------|---|---|--|--|-------------------------------|------------------------------|------------------------|-----------|-----------|-----|--|
| | tification | Workload: | Credits: | Study semester: | | | Frequency of the offer | | Duration: | | |
| num 129 | 1291 360 h | | 12 | 6thor | 6thor 7th sem. | | each semester | | 12 we | eks | |
| 1 | Course: | | Planned group siz | zes | Scope | e | Actual co | | Self-stud | dy | |
| | Lecture | | 60 students | | 0 | SCH | 0 | h | 360 | h | |
| | Tuition in | n seminars | 30 students | | 0 | SCH | 0 | h | 0 | h | |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h | |
| | Practical | or seminar | 15 students | | 0 | SCH | 0 | h | 0 | h | |
| | Supervise | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h | |
| 3 | The back | in the interdisciplinary contexts, working independently and according to scientific methods. Contents: The bachelor thesis is usually an independent investigation with an engineering science or engineering | | | | | | | | | |
| | technology task. It should deal with the subject matter in detailed descriptions and explanations and be prepared as written paper. | | | | | | | | | | |
| 4 | _ | teaching: | | | | | | | | | |
| 5 | Participat | Participation requirements: | | | | | | | | | |
| | Formal: | | | | | | | | | | |
| | Content: Coordinated topic from the student's special subject area | | | | | | | | | | |
| | Forms of assessment: | | | | | | | a | | | |
| 6 | Forms of | Coor | | n the stu | udent's | special | subject are | a | | | |
| 6 7 | | Coor assessment: | | ı the stu | udent's | special | subject are | a | | | |
| 7 | Applicati Apparati B.Eng., | Coor assessment: ite for the awar on of the modulive Biotechnol Mechanical E | dinated topic from | study pro cal Eng | ogramn | nes) | g., Enginee | ring Comp | | | |
| 7 8 | Applicati Apparati B.Eng., Industria | Coor assessment: ite for the awar on of the modulive Biotechnol Mechanical Engineering ce of the grade | dinated topic from d of credit points: e (in the following sogy B.Sc., Electringineering B.Eng. | study pro cal Eng | ogramn | nes) | g., Enginee | ring Comp | | | |
| 7 8 | Applicati Apparati B.Eng., Industria Important accordin Module C | Coordinator: Coordinator: | dinated topic from d of credit points: e (in the following stogy B.Sc., Electringineering B.Eng. and Management for the final grade: | study pro cal Eng | ogramn | nes) | g., Enginee | ring Comp | | | |
| 7 8 9 10 | Applicati Apparati B.Eng., Industria Important accordin Module C | Coordinator:Ing. Anton K | dinated topic from d of credit points: e (in the following stogy B.Sc., Electringineering B.Eng. and Management for the final grade: | study pro cal Eng | ogramn | nes) | g., Enginee | ring Comp | | | |
| 7 8 9 10 | Application Apparation Apparation B.Eng., Industria Important accordin Module C Prof. Dr. Other info | Coor assessment: ite for the awar on of the modulive Biotechnology Mechanical Engineering to BRPO Coordinator: Ing. Anton Kormation: | dinated topic from d of credit points: e (in the following stogy B.Sc., Electringineering B.Eng. and Management for the final grade: | study pro cal Eng , Mecha B.Sc. | ogramn gineerii atronic | nes) ng B.En, s B.Sc., | g., Enginee | ring Comp | | | |
| 7 8 | Application Apparation Apparation B.Eng., Industria Important accordin Module C Prof. Dr. Other info | Coordinator:Ing. Anton Kormation: re will be annoted. | dinated topic from d of credit points: le (in the following stogy B.Sc., Electringineering B.Eng. and Management for the final grade: | study pro cal Eng , Mecha B.Sc. | ogramn gineerii atronic | nes) ng B.En, s B.Sc., | g., Enginee | ring Comp | | | |

| iucil | tification | Workload: | Credits: | Study | y semes | ter: | Frequenc | y of the offer | Duration: | |
|-----------------|------------|--|--|----------------------------------|------------------------------|-------------------------------------|-----------------------------------|----------------------|------------|----|
| number: 1023 | | 150 h | | | em. | | Annual (Summer) | | 1 semester | |
| 1 | Course: | | Planned group s | izes | Scop | pe | | contact classroom | Self-stud | dy |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition is | n seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Supervis | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| | • | They compare and evaluate synchronisation mechanisms and apply them in a targeted and measured way to avoid race conditions. They analyse situations of deadlock. They illustrate how the file management and the input/output management are realised in unixoid operating systems. They master basic system calls, e.g. for process handling, and apply them in programming close to the operating system. | | | | | | | | |
| 3 | • | General introd Practical hand Necessary had Process mana Memory man Synchronisati | duction to operation of Linux rdware support in gement and sche agement (includion mechanisms) | u process duling (ng page | sors for incl. m manag | r modern ulti-threa gement an | operating ading) nd virtual | g systems memory) | y) | |
| | • | File managem Input/output i | | oorving | | | | | | |

| | Formal: | None | | | | | |
|----|--|--|--|--|--|--|--|
| | Content: | Basic computer science and programming skills (especially in C) | | | | | |
| | | Basic knowledge of computer architectures | | | | | |
| | | Modules: | | | | | |
| | 1105 Computer Science 1; | | | | | | |
| | | 1109 Computer Science 2; | | | | | |
| | | 1231 Computer Architectures; | | | | | |
| | Г | | | | | | |
| 6 | Forms of assessment: | | | | | | |
| | *************************************** | Written examination or oral examination | | | | | |
| 7 | Prerequisite for the award of credit points: | | | | | | |
| | Module examin | ation pass and course assessment | | | | | |
| 8 | Application of the | e module (in the following study programmes) | | | | | |
| | Engineering Co | mputer Sciences B.Eng. and Industrial Engineering and Management B.Sc. | | | | | |
| 9 | Importance of the | grade for the final grade: | | | | | |
| | according to BR | PPO PPO | | | | | |
| 10 | Module Coordina | tor: | | | | | |
| | Prof. DrIng. W | Volfram Schenck | | | | | |
| 11 | Other information | 1: | | | | | |
| | Literature will b | be announced at the beginning of the course. | | | | | |
| 12 | Language: | | | | | | |
| | German | | | | | | |

| | | inistration | | | | | | | BW | | |
|------------------|--|--|---|---|---|-------------------------|-----------------------------------|-------------|------------|-------------|--|
| | tification ber: | Workload: | Credits: | Study | Study semester: | | Frequency of the offer | | Duratio | Duration: | |
| 102 | | 150 h | 5 | 5 3rd c | | em. | Annual (Winter) | | 1 semester | | |
| 1 | Course: | | Planned group s | izes | Scop | e | Actual c time / cl teaching | assroom | Self-stuc | ly | |
| | Lecture | | 60 students | | 3 | SCH | 45 | h | 67.5 | h | |
| | Tuition is | n seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h | |
| | Exercise | | 20 students | | 0 | CCII | 0 | 1- | 0 | 1- | |
| | | or seminar | 15 students | | 0 | SCH SCH | 0 | h h | 0 | h h | |
| | Tractical | or seminar | 13 students | | 0 | SCII | | 11 | U | 11 | |
| | Supervis | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h | |
| | manage | ment instrume | nts and calculation | on metno | ods in a | a target-c | oriented m | anner and a | issess the | ir effects. | |
| 3 | • | Basic concept Overview of and informati Corporate goa | ts of business adnuthe entrepreneuria on economy levenals and corporate ts of private and corporate law | al functi l key figu | onal ar ıres / k | eas of the | e goods ec | | | onomy | |
| 4 | Forms of Lecture, | Basic concept Overview of and informati Corporate goa Basic concept Forms of corp | the entrepreneuria on economy leve als and corporate ts of private and corate law | al functi l key figu commerc | onal ar | eas of the | e goods ec | onomy, fin | | onomy | |
| | Forms of Lecture, | Basic concept Overview of the and informatic Corporate goal Basic concept Forms of corporate freaching: | the entrepreneuria on economy leve als and corporate ts of private and corate law | al functi l key figu commerc | onal ar | eas of the | e goods ec | onomy, fin | | onomy | |
| 4 | Forms of Lecture, Participa Formal: | Basic concept Overview of the and informati Corporate good Basic concept Forms of corporate so corporate good Basic concept Forms of corporate goo | the entrepreneuria on economy leve als and corporate ts of private and corate law | al functi l key figu commerc | onal ar | eas of the | e goods ec | onomy, fin | | onomy | |
| 4 5 | Forms of Lecture, Participa Formal: Content: | Basic concept Overview of the and informati Corporate good Basic concept Forms of corporate so corporate good Basic concept Forms of corporate goo | the entrepreneuria on economy leve als and corporate ts of private and corate law | al functi l key figu commerc | onal ar | eas of the | e goods ec | onomy, fin | | onomy | |
| 4 | Forms of Lecture, Participa Formal: Content: Forms of | Basic concept Overview of the and informatic Corporate good Basic concept Forms of corporate some some some some some some some som | the entrepreneuria on economy leve als and corporate ts of private and corate law | al functi l key figu commerc | onal ar | eas of the | e goods ec | ees | ancial ec | | |
| 4 5 | Forms of Lecture, Participa Formal: Content: Forms of Written Prerequise | Basic concept Overview of the and informatic and informatic corporate good Basic concept. Forms of corporate good Basic concept. For some good Basic con | the entrepreneuria on economy leve als and corporate ts of private and coorate law d teaching with conts: combination exard of credit points: | al functi l key figu commerc | onal ar | eas of the | e goods ec | ees | ancial ec | | |
| 5 6 | Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module | Basic concept Overview of the and informatic and informatic corporate good Basic concept. Forms of corporate good Basic concept. For some good Basic concept. For | the entrepreneuria on economy leve als and corporate ts of private and coorate law d teaching with continue ts: | al functi l key figu commerce case stud | onal arures / k cial lav | eas of the ey figure v | e goods ec | ees | ancial ec | | |
| 5 6 | Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicati | Basic concept Overview of the and informatic and informatic corporate good Basic concept. Forms of corporate good Basic concept. For several good Basic concept | the entrepreneuria on economy leve als and corporate ts of private and coorate law d teaching with cours: combination example of credit points: pass le (in the following | al functi l key figu commerce case stud mination | onal arures / k cial lav lies / ca | reas of the ey figure w | e goods ec | ees | xaminatio | on | |
| 5 6 7 | Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicati | Basic concept Overview of the and informatic and informatic corporate good Basic concept Forms of corporate good Basic concept forms of corporate good Basic concept forms of corporate good forms of teaching: It is seminar-base tion requirement for the aware examination, site for the aware examination properties of the modulation of t | the entrepreneuria on economy leve als and corporate ts of private and o porate law d teaching with c ats: combination exart d of credit points: bass le (in the following g B.Eng., Enginee | al functi l key figu commerce case stud mination | onal arures / k cial lav lies / ca | reas of the ey figure w | e goods ec | ees | xaminatio | on | |
| 5 6 7 | Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicati Electricati Renewa | Basic concept Overview of the and informatic and informatic corporate good Basic concept Forms of the available Forms of the modulation of the | the entrepreneuria on economy leve als and corporate ts of private and o porate law d teaching with c ats: combination exart d of credit points: bass le (in the following g B.Eng., Enginee | al functi l key figu commerce case stud mination g study prering Inf | onal arures / k cial lav lies / ca | reas of the ey figure w | e goods ec | ees | xaminatio | on | |
| 4 5 7 8 | Forms of Lecture, Participa Formal: Content: Forms of Written Prerequise Module Applicati Electricate Renewa Important according | Basic concept Overview of the and informatic and informatic corporate good Basic concept. Forms of corporate good Basic concept. For assessment: examination, site for the aware examination prior of the modulate all Engineering good Basic g | the entrepreneuria on economy leve als and corporate ts of private and o porate law d teaching with c ats: combination exam d of credit points: bass le (in the following g B.Eng., Enginee B.Eng. | al functi l key figu commerce case stud mination g study prering Inf | onal arures / k cial lav lies / ca | reas of the ey figure w | e goods ec | ees | xaminatio | on | |
| 4 5 7 8 | Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicati Electric: Renewa Importan accordir Module 0 | Basic concept Overview of the and informatic and informatic corporate gosts assic concept. Forms of corporate gosts are assessment: If teaching: If | the entrepreneuria on economy leve als and corporate ts of private and o porate law d teaching with c ats: combination exam d of credit points: bass le (in the following g B.Eng., Enginee B.Eng. | al functi l key figu commerce case stud mination g study prepring Inf | onal arures / k cial lav lies / ca n, perfo | reas of the ey figure w | e goods ec | ees | xaminatio | on | |

| Ī | | Literature will be announced at the beginning of the course. |
|---|----|--|
| ſ | 12 | Language: |
| | | German |

| Digi | Digital Image Processing and Pattern Matching | | | | | | | | | | |
|------------|---|---------------|----------------------------------|---------------------|----------|---------|-----|--|--------------|------------|----|
| | Identification Workload: | | | Credits: | Study | semeste | er: | Frequency | of the offer | Duratio | n: |
| 1028 150 h | | 150 h | | 5 | 4th sem. | | | Annual (Summer) | | 1 semester | |
| 1 | Course: | | Pl | Planned group sizes | | Scope | | Actual contact time / classroom teaching | | Self-study | |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h | |
| | Tuition in seminars Exercise Practical or seminar | | seminars 30 students 20 students | | | 1 | SCH | 15 | h | 22.5 | h |
| | | | | | | 0 | SCH | 0 | h | 0 | h |
| | | | 15 | 15 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Supervised self-study 60 | | 60 | 60 students | | 0 | SCH | 0 | h | 0 | h |
| _ | T: | outoomas/aomn | | | | ļ | l | | | | - |

2 Learning outcomes/competences:

Students have basic technical knowledge of image acquisition, grey value operations, local filter operations (convolutions) as well as simple segmentation and classification procedures and apply these in a well-founded manner. They independently solve simple problems and applications in image processing and pattern recognition. In doing so, they select suitable procedures, analyse the advantages and disadvantages of the procedures, apply them correctly and develop appropriate programs in suitable programming languages, which they then test on practical examples. Simple problems from the application are implemented and solved by the students independently and creatively. They plan, structure and develop their own simple procedures, programme them and justify, test and evaluate them. Students organise themselves effectively in working groups and take responsibility for themselves and the group.

They assess their own strengths and weaknesses appropriately and develop a picture of their own development beyond their studies.

3 Contents:

- Basic principle of image processing and pattern recognition, applications.
- Image capture: Rasterisation, quantisation
- Design of camera, lens, lighting for the application
- Elementary image processing: Grey value histogram, dot operators.
- Local operations with greyscale images: Smoothing operators, edge operators, sharpness operators.
- Simple segmentation algorithms.
- Feature extraction and simple classification procedures.
- Applications of image processing/pattern recognition using practical examples

Lab practicals:

- Image acquisition with different image acquisition units
- Programming of image processing operators according to the content of the event by means of suitable software
- Planning, structuring, developing, programming, testing and evaluating simple own procedures for solving application-oriented problems

Image processing and/or pattern recognition tasks

4 Forms of teaching:

Lecture, seminar-based teaching, group work within the framework of the practical course

5 Participation requirements:

| Tarticipation requirements. | | | | | | |
|-----------------------------|----------------------|--|--|--|--|--|
| Formal: | None | | | | | |
| Content: | C programming skills | | | | | |

| 6 | Forms of assessment: |
|----|---|
| | Written examination |
| 7 | Prerequisite for the award of credit points: |
| | Module examination pass and course assessment |
| 8 | Application of the module (in the following study programmes) |
| | Engineering Computer Sciences B.Eng. |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. Dr. rer. nat. Antje Ohlhoff |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| Clus | ster Compu | ıting | | | | | | | CLC | | |
|---|--|--|--|---------------------|-------------------------------|-------------|------------------------------|------------------------|-----------|------------|--|
| Iden num | tification | Workload: | Credits: | Credits: Study | | y semester: | | Frequency of the offer | | Duration: | |
| 334 | | 150 h | 5 | 5 3rd s | | | Annual (Winter) | | 1 sem | 1 semester | |
| 1 | Course: | | Planned group s | Planned group sizes | | | Actual of time / conteaching | lassroom | Self-stud | dy | |
| | Lecture | | 60 students | | 2 | SCH | 0 | h | 56 | h | |
| | Tuition in | n seminars | 30 students | | 0 | SCH | 0 | h | 0 | h | |
| | Exercise | | 20 students | | 1 | SCH | 8 | h | 54 | h | |
| | | or seminar | 15 students | | 1 | SCH | 16 | h | 0 | h | |
| | | ed self-study | 60 students | | 1 | SCH | 16 | h | 0 | h | |
| 2 | Learning | outcomes/comp | netences: | | | | | | | | |
| | • | They implement simple data analyses on a Hadoop cluster. They know the theoretical basics of cloud computing and compare the possibilities of different commercial platforms. | | | | | | different | | | |
| 3 | | Theoretical fo | oundations of pa | | | | | _ | ectures, | Amdahl's | |
| | | | | | for parallel computing, etc.) | | | | | | |
| | | | omputing with M | | P systems (e.g. with OpenMP) | | | | | | |
| | | | uting on Hadoop | | | | | | | | |
| | | _ | ting in theory and | | _ | rtodaco, | , c.c., | | | | |
| 4 | | teaching: | - , | | | | | | | | |
| | | | -study, classroor | n events | in the | form of | exercises | and practica | ıls | | |
| 5 | _ | tion requiremen | ts: | | | | | | | | |
| | Formal: Content: | | Modules "F | Foundati | ons of | Comp | uter Scie | ence" and | "Object- | -Oriented | |
| | Content: • Modules "Foundations of Computer Science" and Programming" | | | | | | | | | | |
| 6 | Forms of | assessment: | Basic knowle | edge of | databas | es | | | | | |
| 6 | | | or oral examination | on | | | | | | | |
| 7 | | | d of credit points: | | | | | | | | |
| | | | bass and course a | | | | | | | | |
| 8 | | | le (in the following | | _ | nes) | | | | | |
| 9 | | | (work-integrated) for the final grade: | | • | | | | | | |
| _ | _ | | Sauce. | | | | | | | | |
| according to BRPO 10 Module Coordinator: | | | | | | | | | | | |
| 10 | N. N. | Coordinator: | | | | | | | | | |

| 11 | Other information: |
|----|--------------------|
| | |
| 12 | Language: |
| | German |

| Data | Mining | | | | | | | | DM | | | |
|---------------|---|---|---|----------|-----------------|----------|------------------------|--------------------|-----------|------------|--|--|
| Ident numb | ification | Workload | : Credits: | Study | Study semester: | | Frequency of the offer | | Durat | Duration: | | |
| 3341 | | 150 h | 5 | 5 4th so | | J111. | | Annual (Summer) | | 1 semester | | |
| 1 | Course: | | Planned group s. | izes | Scope | e | Actual of time / cl | assroom | Self-stu | ıdy | | |
| | Lecture | | 60 students | | 2 | SCH | 0 | h | 56 | h | | |
| | Tuition in | n seminars | 30 students | | 0 | SCH | 0 | h | 0 | h | | |
| | Exercise | | 20 students | | 1 | SCH | 8 | h | 54 | h | | |
| | Practical | or seminar | 15 students | | 1 | SCH | 16 | h | 0 | h | | |
| | Supervise | ed self-study | 60 students | | 1 | SCH | 16 | h | 0 | h | | |
| 2 | Learning | outcomes/co | ompetences: | | | 1 | | | | | | |
| | Learning outcomes/competences: The students explain the history and basis of data mining and establish the relationship to a practical application possibilities. They apply appropriate procedures to visualise both small and large data sets and the interrelationships within them in an instructive way ("Visual Analytics"). They use correlation analysis and regression to detect relationships between data series multidimensional data sets. They are proficient in common dimensional reduction techniques. They can find clusters of related data points in multi-dimensional data sets and assess the quality. They detect common patterns in data sets and use graph-based methods. They have basic knowledge of time series analysis and apply simple procedures from this are in a targeted manner. | | | | | | | s and the | | | | |
| | should be used in which application scenarios. They design data mining workflows. | | | | | | | | | | | |
| 3 | • | Basics of d Visualisation "Visual An Correlation Dimension Clustering Frequent pa Graph-base Basics of ti Data minin | on of data (especiall halytics") hanalysis and regrest reduction methods attern mining | | or the v | isualisa | tion of ver | y large an | nounts of | data; | | |
| 4 | | teaching: ng units for | self-study, classroom | m event | s in the | form of | f exercises | and pract | icals | | | |
| | | | • | | | | | | | | | |
| 5 | | tion requiren | nents: | | | | | | | | | |
| | Formal: | | | | | | | | | | | |

| 6 | Forms of assessment: |
|----|---|
| | Written examination or oral examination |
| 7 | Prerequisite for the award of credit points: |
| | Module examination pass and course assessment |
| 8 | Application of the module (in the following study programmes) |
| | Digital Technologies (work-integrated) B.Eng. |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | N. N. |
| 11 | Other information: |
| | |
| 12 | Language: |
| | German |

| | abase Appl | | | T | | | | | DBA | |
|-------------|--|---|--|--|---|---|--|--|--|--|
| Iden num | tification | Workload: | Credits: | Study | semes | ter: | Frequency | y of the offer | Duratio | n: |
| 104 | | 150 h | 5 | 6th s | em. | | Annual Summer | | 1 sem. | |
| 1 | Course: | | Planned group s | izes | Scop | e | Actual of time / cl | lassroom | Self-stuc | ly |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | | n seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h |
| 2 | • | ed self-study outcomes/com | 60 students | | 0 | SCH | 0 | h | 0 | h |
| 3 | map - Stude giver objec (JPA - The s group datab - Stude bank Contents - Know - Basic - Intro | them practical ents insert new oriteria and just-relational-m.). In students apply power accordance and to inserts will be all applications a series will be all applications are concepts of induction to SQ | dependently designed and are factorized applied to the Modert and query it vole to compare, count will be able to architecture, functive techniques and object. (Structured Query Land and object.) | abase. tional dating to clifamiliar eb served del-Vi ia a web combine to plan an tioning ect-relat ery Lan | er prog ew-Co o interf and even and use ional di guage) | e, perform ntegrity intandard ramming ntroller-sace. aluate spelop data | n complex rules. The interfaces g (e.g. Java Software-l becific men base trans | queries of y understan of the Jav aEE) and pl Pattern to thods and to actions. | data according data a | ording to ciples of the concernity of the concer |
| | - Intro - Intro - Conr | duction to JDI duction to pro nection of data | ate, delete, modify BC and JPA, gramming dynam bases in web app | nic web | pages (| (e.g. Java | aEE) using | | JI framev | vorks, |
| 4 | | teaching: , seminar-base | d teaching, projec | ct and g | roup w | ork with | in the fran | nework of t | he interns | ship |
| 5 | | tion requiremen | | | | | | | | |
| | Formal: | Non | | C | c 1: | | 1 | | | |
| | Content: | Mod 1109 | d knowledge in the lules: O Computer Scient | ice 2; | of obje | ct-orient | ed progra | mming | | |
| | | 124. | Software Engine | eering | | | | | | |
| 6 | Forms - 4 | assessment: | Software Engine | eering | | | | | | |

| 7 | Prerequisite for the award of credit points: |
|----|---|
| | Module examination pass and course assessment |
| 8 | Application of the module (in the following study programmes) |
| | Engineering Computer Sciences (B.Eng.) and Mechatronics (B.Sc.) |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. DrIng. Lutz Grünwoldt |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. A script will be provided. |
| | |
| 12 | Language: |
| | German |

| Intr | oduction to | Engineering | Computer Science | ces | | | | | EII | |
|------|--|--|---|--|--|--|---|----------------|-----------|------------|
| | ntification nber: | Workload: | Credits: | Study | semes | ter: | Frequenc | y of the offer | Duratio | on: |
| 105 | | 150 h | 5 | 1st se | em. | | Annual (Winter) | | 1 sem | ester |
| 1 | Course: | | Planned group s | sizes | Scop | e | Actual time / c teachin | lassroom | Self-stud | dy |
| | Lecture | | 60 students | | 2 | SCH | 30 | h h | 45 | h |
| | | n seminars | 30 students | | 2 | SCH | 30 | h | 45 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | | or seminar | 15 students | | 0 | SCH | 0 | h | 0 | h |
| | Supervis | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| 2 | Learning | outcomes/com | netences: | | | | | | | |
| 3 | - le - re in - p st - u Contents - E - C - P - R - P - S - In | earn the basics esearch and even the field of to repare and production to the field of to repare and production of the field of the fie | mputer science coe day-to-day wor research and devork with scientific professional type e management in | ompared over the source of the source of the source over the s | I to other project in endits seems to seem the seems to see the seems to s | nd thus a mation to becialized er complering IT sects as pangineerings | d scientifi uter scien specialist | and engine | eering to | opics in a |
| 4 | Forms of | f teaching: | | | | | | | | |
| | | and seminar t | | | | | | | | |
| 5 | | tion requiremen | | | | | | | | |
| 5 | Formal: | Non | e | | | | | | | |
| J | - |) T | _ | | | | | | | |
| | Content: | | e | | | | | | | |
| | Content: Forms of | f assessment: | | nn. | | | | | | |
| 6 | Content: Forms of Term pa | f assessment: aper or combir | nation examinatio | on | | | | | | |
| 6 | Content: Forms of Term pa Prerequis | f assessment: aper or combir site for the awar | nation examination of credit points: | on | | | | | | |
| 6 | Content: Forms of Term pa Prerequis Module | f assessment: apper or combinate for the aware examination parts. | nation examination of credit points: | | ogramı | mes) | | | | |

| 9 | Importance of the grade for the final grade: |
|----|--|
| | |
| 10 | Module Coordinator: |
| | Prof. Dr. rer. nat. Axel Schneider |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| edded Syst | ems | | | | | | | | ESYS | |
|-----------------|--|--|--|---|---|--|--|---|---|---|
| fication er: | Workload: | | Credits: | Study | semeste | er: | Frequency | of the offer | Duration | |
| | 150 | | 5 | 6th se | emester | • | Annual (Summer) | | 1 semes | ter |
| Course: | | Planned group size | | es Scope | | actual contact time / classroom teaching | | Self-study | | |
| Lecture | | 60 | students | | 2 | SCH | 30 | h | 45 | h |
| Tuition in | seminars | 30 | students | | 1 | SCH | 15 | h | 22.5 | h |
| Exercise | | 20 | students | | 0 | SCH | 0 | h | 0 | h |
| Practical of | or seminar | 15 | students | | 1 | SCH | 15 | h | 22.5 | h |
| Supervise study | d self | 60 | students | | 0 | SCH | 0 | h | 0 | h |
| | fication er: Course: Lecture Tuition in Exercise Practical of Supervise study | Course: Lecture Tuition in seminars Exercise Practical or seminar Supervised self study | fication er: 150 Course: Pl. Lecture 60 Tuition in seminars 30 Exercise 20 Practical or seminar 15 Supervised self study 60 | fication er: Workload: Credits: 150 5 Course: Planned group size | fication er: Study er: 150 5 6th set | fication er: Study semester | fication er: Workload: Credits: Study semester: 150 5 6th semester Course: Planned group sizes Scope Lecture 60 students 2 SCH Tuition in seminars 30 students 1 SCH Exercise 20 students 0 SCH Practical or seminar 15 students 1 SCH Supervised self study 60 students 0 SCH | fication er: Workload: Credits: Study semester: Frequency of the semester 150 5 6th semester Annual (Summer) Course: Planned group sizes Scope actual contime / clasteaching Lecture 60 students 2 SCH 30 Tuition in seminars 30 students 1 SCH 15 Exercise 20 students 0 SCH 0 Practical or seminar 15 students 1 SCH 15 Supervised self study 60 students 0 SCH 0 | fication er: Study semester: Frequency of the offer er: 150 5 6th semester Annual (Summer) | fication er: Workload: Credits: Study semester: Frequency of the offer (Summer) Duration of the offer (Summer) Course: Planned group sizes Scope (Summer) actual contact time / classroom teaching Self-study Lecture 60 students 2 SCH 30 h 45 Tuition in seminars 30 students 1 SCH 15 h 22.5 Exercise 20 students 0 SCH 0 h 0 Practical or seminar 15 students 1 SCH 15 h 22.5 Supervised self study 60 students 0 SCH 0 h 0 |

2 Learning outcomes/competences:

Students:

- name and explain the different hardware concepts on which common embedded systems are based.
- explain the underlying hardware technologies, name advantages and disadvantages and evaluate the applicability for various practical problems.
- implement combinatorial and sequential function blocks in a synthesis language (e.g. VHDL) and use common toolchains to bring the synthesised functions to a target hardware (e.g. FPGA).
- develop a complex logic component according to specifications based on the previously developed function modules.
- evaluate algorithms with regard to their implementability in hardware or software (hardware/software co-design).
- explain design concepts for the hardware-related processing of discrete and continuous signals.
- distinguish the parallel design of algorithms for the hardware synthesis from conventional programming.
- compare their synthesis results with those of the other students and discuss differences in small groups.

3 Contents:

- Introduction to the topic of embedded systems (reactive, transforming systems, etc.)
- Classification of embedded hardware (microcontrollers, microprocessors, FPGAs, SoCs, etc.)
- Hardware technologies for the implementation of digital logic (SPLDs, CPLDs, FPGAs, ASICs)
- Repetition of combinatorial and sequential logic (pipelining etc.)
- Concepts of reliability, efficiency, hard and soft real time
- Hardware description languages (synthesis languages such as VHDL, VERILOG) compared to programming languages
- Introduction to VHDL
- Implementation of combinatorial and sequential logic components such as adders, multiplexers, automata, etc. in VHDL and their synthesis for an FPGA
- Synchronisation of the communication of asynchronous systems (synchronisation, metastability)
- Implementation of simple bus systems

| | - Aspects of | of hardware/software co-design |
|----|---------------------|---|
| | - Control o | of mechatronic systems such as robots |
| 4 | Forms of teaching | g; |
| | | r-based teaching, practical course |
| 5 | Participation requ | irements: |
| | Formal: | None |
| | Content: | Basic knowledge in the fields of digital technology, programming and computer architectures Modules: |
| | | 1045 Digital Electronics II; |
| | | 1043 Digital Electronics II, 1070 Digital Electronics I; |
| | | 1104 Computer Science 1 |
| 6 | Forms of assessm | |
| | Written examin | ation, combination examination or oral examination |
| 7 | Prerequisite for th | ne award of credit points: |
| | Module examin | ation pass and course assessment |
| 8 | Application of the | e module (in the following study programmes) |
| | Electrical Engir | neering B.Eng., Engineering Computer Sciences B.Eng., Mechatronics B.Sc. and |
| | | neering and Management B.Sc. |
| 9 | | grade for the final grade: |
| | according to BR | |
| 10 | Module Coordina | |
| | | t. Axel Schneider |
| 11 | Other information | |
| | | be announced at the beginning of the course. |
| 12 | Language: | |
| | German | |

| | lding Autoi | mation | | | | | | | GAT | |
|-----|--|--|--|---|---|---|---|--|-----------|----------|
| | tification ber: | Workload: | Credits: | Study | semes | ter: | Frequency | of the offer | Duratio | on: |
| 109 | | 150 h | 5 | 4th o | r 6th s | em. | Annual (Summer | ·) | 1 seme | ester |
| 1 | Course: | | Planned group s | sizes | Scop | e | Actual of time / cl | assroom | Self-stud | ly |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in | n seminars | 30 students | | 2 | SCH | 30 | h | 45 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical | or seminar | 15 students | | 0 | SCH | 0 | h | 0 | h |
| | Supervise | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| | | | | | | | | | | |
| 3 | Pe R H pl U C B U A | definition and ossibilities and equirements for the deating, ventiled hysical principal for the deating of the | structure of build d limits of energy for human use: co ation, air condition ples, characteristic and actuators; ub iller types, optimic rotocols, network , usability imbient assisted I pics: Standards, § | y efficient omfort, poning: basic curves oriquitous/ isation of cing, com- | ollutarisic dev /pervas f energ nputer | ough sm ats, etc. vices (als sive com y use systems, mes | so for the uputing | use of renew | t systems | S |
| 4 | • D • Pe • R • H pl • U • C • B • U • A • O | definition and ossibilities and equirements for the deating, ventilarly and principles of sensors on trol, control us systems, professional serion in the deating to the de | d limits of energy for human use: contain, air conditional ples, characteristic and actuators; ubuller types, optimic rotocols, network, usability ambient assisted lipics: Standards, gottes: | y efficient omfort, poning: basic curves oriquitous/ isation of cing, com- | ollutarisic dev /pervas f energ nputer | ough sm ats, etc. vices (als sive com y use systems, mes | so for the uputing | use of renew | t systems | S |
| 1 | • D • Pe • R • H pl • U • C • B • U • A • O | definition and ossibilities and equirements for the deating, ventilarly seeds of sensors control, control us systems, profeser interfaces, accessibility, adverarching to the deathing: Teaching: Seminar tion requirement Non Com | d limits of energy for human use: contain, air conditional ples, characteristic and actuators; ubuller types, optimic rotocols, network, usability ambient assisted lipics: Standards, gottes: | y efficient omfort, poning: basic curves oriquitous, isation of cing, com- iving, sn guideline | /pervas f energ nputer nart hoes, stan | ough sm ats, etc. vices (also sive com y use systems, mes dard dia | so for the unputing building programs for | nse of renew managemen planning an | t systems | entation |
| 1 | • D • Po • R • H • pl • U • C • B • U • A • O Forms of Lecture, Participal Formal: Content: | definition and ossibilities and equirements for the equirements of the equirement of the equirement of the equirement of the equirement of the equirements of the equirement of the equirement of the equirements of the equir | d limits of energy for human use: contain, air condition ples, characteristic and actuators; ub ller types, optimi rotocols, network , usability umbient assisted I pics: Standards, g nts: e nputer Science 1 or gy Technology (| y efficient omfort, poning: basic curves oriquitous, disation of ting, com- iving, sn guideline | /pervas f energ nputer nart hoes, stan | ough sm ats, etc. vices (also sive com y use systems, mes dard dia | so for the unputing building programs for | nse of renew managemen planning an | t systems | entation |
| 4 5 | • D • Po • R • H pl • U • C • B • U • A • O Forms of Lecture, Participate Formal: Content: | definition and ossibilities and equirements for teating, ventilarly se of sensors control, control us systems, professional services interfaces accessibility, and everarching to teaching: Teaching: Seminar tion requirement Non Come Energiassessment: examination of | d limits of energy for human use: co- ation, air condition ples, characteristic and actuators; ub ller types, optimic rotocols, network , usability umbient assisted I pics: Standards, g atts: e nputer Science 1 or gy Technology (or oral examination | y efficient omfort, poning: basic curves oriquitous, disation of ting, com- iving, sn guideline | /pervas f energ nputer nart hoes, stan | ough sm ats, etc. vices (also sive com y use systems, mes dard dia | so for the unputing building programs for | nse of renew managemen planning an | t systems | entation |
| 1 | • D • Pe • R • H pl • U • C • B • U • A • O Forms of Lecture, Participal Formal: Content: Forms of Written Prerequis | definition and ossibilities and equirements for teating, ventilarly se of sensors control, control us systems, professional services interfaces accessibility, and everarching to teaching: Teaching: Seminar tion requirement Non Come Energiassessment: examination of | d limits of energy for human use: contaction, air conditional ples, characteristic and actuators; ubuller types, optimic rotocols, network, usability embient assisted lipics: Standards, gotto: ents: ents: ents: entry record examination or oral examination of oredit points: | y efficient omfort, poning: basic curves oriquitous, disation of ting, com- iving, sn guideline | /pervas f energ nputer nart hoes, stan | ough sm ats, etc. vices (also sive com y use systems, mes dard dia | so for the unputing building programs for | nse of renew managemen planning an | t systems | entatio |

| | Engineering Computer Sciences B.Eng. and Renewable Energies B.Eng. |
|----|--|
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. Dr. rer. nat. Jörn Loviscach |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| | tification | Workload: | Credits: | Stud | y semes | ter: | Frequenc | y of the offer | Duration: | | |
|------------|--|---|--|---------------------|---------|----------|--|----------------|------------|--------|--|
| num 313 | ber: 5 | 150 h | 5 | 5th s | sem. | | Annual (Winter) | | 1 semester | | |
| 1 | Course: | | Planned group s | Planned group sizes | | e | Actual contact time / classroom teaching | | Self-study | | |
| | Lecture | | 60 students | | 2 SCH | | 30 h | | 45 | h | |
| | Tuition in seminars | | 30 students | | 2 | SCH | 30 | h | 45 | h | |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h | |
| | Practical | or seminar | 15 students | | 0 | SCH | 0 | h | 0 | h | |
| | Supervis | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h | |
| 2 | _ | outcomes/comp | petences: | | 1 | | 1 | | | | |
| | The stud | | | | | | | | | | |
| | | diversity/dive | ns, history and di ersity management rinciples in the co | ıt. | | | | | | nation | |
| | Directive, General Equal Treatment Act) | | | | | | | | | | |
| | are sensitised to human heterogeneity in the corporate context. independently recognized the sense of the sense in the sense | | | | | | | | | | |
| | independently recognise stereotyping and can develop ideas for possible changes in the business environment. | | | | | | | | | | |
| | are able to independently collect relevant information on established concepts such as | | | | | | | | | | |
| | gender mainstreaming and diversity management and to assess their relevance for | | | | | | | | | | |
| | professional practice. | | | | | | | | | | |
| | are familiar with selected theories and approaches in the current discourse on diversity management and, building on this, are able to develop conceptual ideas for the implementation of holistic diversity management in a corporate context. | | | | | | | | | | |
| 3 | Contents | : | | | | | | | | | |
| | Definitions and delimitation of gender and diversity | | | | | | | | | | |
| | Concepts and approaches to equal opportunities (e.g. diversity management, gender) | | | | | | | | | | |
| | mainstreaming) Legal basis and political influences (e.g. EU Anti-Discrimination Directive, General Anti- | | | | | | | | | | |
| | Discrimination Directive, General Equal Treatment Act (German abbreviation: AGG)) | | | | | | | | | | |
| | Subjective and social values, attitudes and prejudices in the context of diversity Possible approaches for taking diversity characteristics (e.g. gender and age) into account in | | | | | | | | | | |
| | | Possible approaches for taking diversity characteristics (e.g. gender and age) into account in selected areas of business (marketing, product development, human resources) | | | | | | | | | |
| | • | Concept for the sustainable introduction of holistic diversity management | | | | | | | | | |
| | • | Case studies and application examples from business practice | | | | | | | | | |
| | | | | | | | | | | | |
| | Forms of teaching: | | | | | | | | | | |
| 4 | | | | | | | | _ | | | |
| 4 | | | d teaching, prese | ntation, | group | work, pr | esentation | of seminar | paper | | |
| 4 5 | Lecture, | | | ntation, | group | work, pr | esentation | of seminar | paper | | |

| 6 | Forms of assessment: |
|----|---|
| | Term paper, written examination, project work or oral examination |
| 7 | Prerequisite for the award of credit points: |
| | Module examination pass |
| 8 | Application of the module (in the following study programmes) |
| | Applied Mathematics B.Sc., Apparative Biotechnology B.Sc., Electrical Engineering B.Eng., Computer Engineering B.Eng., Mechanical Engineering B.Eng., Mechatronics B.Sc., Renewable Energies B.Eng. and Industrial Engineering and Management B.Sc. |
| | |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. DrIng. Andrea Kaimann |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| Bus | iness Proce | ess Modelling | g and IT Systems | | | | | | GPM | | |
|------|--|--|---------------------------------------|-----------------------|----------|-----------|--|----------------|------------|---------|--|
| Iden | tification | Workload: | Credits: | Stud | y semes | ter: | Frequenc | y of the offer | Duration: | | |
| 321 | | 150 h | 5 | 3rd | sem. | | Annual (Winter) | | 1 semester | | |
| 1 | Course: | | Planned group s | ned group sizes Scope | | e | Actual contact time / classroom teaching | | Self-study | | |
| | Lecture | | 60 students | | 2 | SCH | 0 h | | 64 | h | |
| | Tuition in seminars | | 30 students | | 0 | SCH | 0 | h | 0 | h | |
| | Exercise | | 20 students | | 1 | SCH | 8 | h | 46 | h | |
| | Practical | or seminar | 15 students | | 1 | SCH | 16 | h | 0 | h | |
| | Supervised self study | | 60 students | | 1 | SCH | 16 | h | 0 | h | |
| 2 | Learning | outcomes/com | npetences: | | , P | • | | ' | | • | |
| | Students | 3: | | | | | | | | | |
| | | structure and software). | l evaluate the spe | cific m | ode of | operatio | n of integr | rated standa | rd softw | are (ER | |
| | • | design and m | nodel with the hel | p of mo | odern so | oftware a | architectur | res (e.g. SO | A and Bl | PMS) th | |
| | processes in the company.analyse processes and requirements of companies for the use, operation and maintenance of | | | | | | | | | | |
| | | integrated software systems (adaptation options, interfaces to other IT systems, etc.) | | | | | | | | | |
| 3 | Contents: | | | | | | | | | | |
| | Process modelling and data modelling using modelling tools such as ARIS | | | | | | | | | | |
| | | | f concepts of integ | - | - | _ | | | | | |
| | Drafting reference models for designing the data, process and function models (e.g. Aachen PPS model) | | | | | | | | | | |
| | Analysis of ERP systems (architecture, structuring, database models, HANA) Overview of the core modules and applications of ERP systems in the process: e.g. order to cash process) | | | | | | | | | | |
| | Application-oriented use cases are used to demonstrate how business processes can be implemented | | | | | | | | | | |
| | | | | | onstrat | e how b | usiness pr | ocesses can | be imple | mented | |
| | consiste | ntly and acros | ss software modul | les. | | | | | | | |
| | | | | | | | | | | | |
| 4 | Forms of teaching: | | | | | | | | | | |
| | Learning | g units for sel | f-study, classroon | n event | s in the | form of | exercises | and practica | ls | | |
| 5 | Participa Formal: | tion requireme | nts: | | | | | | | | |
| | Content: | _ | | | | | | | | | |
| 6 | | assessment: | | | | | | | | | |
| | | | examination, proje | ct work | or oral | examin | ation | | | | |
| 7 | _ | | rd of credit points: | | | | | | | | |
| | | | pass and course as | | | \ | | | | | |
| ^ | Application of the module (in the following study programmes) | | | | | | | | | | |
| 8 | | | | | | | | | D E | | |
| 8 | Digital l | Logistics (wo | rk-integrated) B.F g and Managemei | Eng., Di | gital Te | chnolog | | integrated) | B.Eng. a | nd | |

| | according to BRPO |
|----|-----------------------------|
| 10 | Module Coordinator: |
| | Prof. DrIng. Jörg Nottmeyer |
| 11 | Other information: |
| | - |
| 12 | Language: |
| | German |

| High | High Performance Computing | | | | | | | | | НРС | НРС | |
|------|----------------------------------|--------------|--------------------------|----------|----------|------------------------|--|-----------|------------|------|-----|--|
| | Identification Workload: number: | | Credits: Study semester: | | | Frequency of the offer | | Duration: | | | | |
| 1006 | | 150 h | | oth sem. | | Annual (Summer) | 1 semester | | ter | | | |
| 1 | Course: | | Planned group sizes | | es Scope | | Actual contact time / classroom teaching | | Self-study | | | |
| | Lecture | | 60 | students | | 2 | SCH | 30 | h | 45 | h | |
| | Tuition in seminars 30 students | | students | | 0 | SCH | 0 | h | 0 | h | | |
| | Exercise | | 20 | students | | 1 | SCH | 15 | h | 22.5 | h | |
| | Practical of | or seminar | 15 | students | | 1 | SCH | 15 | h | 22.5 | h | |
| | Supervise | d self-study | 60 | students | | 0 | SCH | 0 | h | 0 | h | |

2 Learning outcomes/competences:

In addition to the theoretical basics, the common basic concepts of current architectures and strategies are presented. The internship focuses on practical work within a Beowulf teaching cluster. Students will be able to design and implement parallel algorithms. They will learn about frequently used libraries for parallelisation and know how to use them for given problems and apply them in practice.

Students:

- know the basic concepts of scientific and parallel (high-performance) computing,
- can select suitable parallelisation strategies and apply them,
- are also familiar with the essential characteristics of memory- or directionally-coupled parallel systems and their programming,
- are able to develop parallel algorithms to solve given problems,
- are proficient in the standard Message Passing Interface (MPI) for Distributed Computing,
- can convert given or self-developed parallel algorithms into efficient programs (MPI or OpenMP) on HPC systems,
- can identify and correct errors in an implementation, can compare and assess optimisation options and
- are proficient in the operation of high-performance computers and can adapt their self-written programmes to these and execute them there.

3 Contents:

Many questions in the natural sciences and engineering ultimately boil down to the solution of mathematical problems, such as solving systems of equations or minimising error functionals. For this purpose, parallelisation for distributed and shared memory architectures, such as HPC clusters and multi-core CPUs, is discussed.

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according to BRPO Module Coordinator:

Other information:

Language: German

Prof. Dr. rer. nat. Christian Schröder

General Introduction to High Performance Computing [https://hpc.ad.fh-bielefeld.de|HPC] (Tasks, basic architectures, history) Parallel computer and system architectures for HPC: Modern high-performance CPUs, symmetrical multiprocessor systems (SMPs), parallel computers with distributed memory, and clusters of PCs/workstations Programming parallel and distributed computer systems Practical handling of High Performance Computing Clusters Typical HPC applications Forms of teaching: Lecture, exercise, practical course, self-study Participation requirements: Formal: None Content: Sound computer science and programming skills (especially in C) Basic knowledge of operating systems Basic knowledge of networks and their architecture Basic knowledge of mathematics Modules: 1001 Algorithms and Data Structures; 1105 Computer Science 1; 1231 Computer architectures; Forms of assessment: Term paper, combination examination or project work Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade:

Literature will be announced in the course. Teaching language: German, original English literature

| J | h-Frequenc | cy Electroni | cs | | | | | | HFE | |
|------------------|---|--|--|--|--|--|--|--------------|------------|-----|
| Iden | tification | Workload | : Credits: | Study | semes | ter: | Frequency | of the offer | Duration: | |
| 110 | | 150 h | 5 | 5th s | em. | | Annual (Winter) | | 1 semester | |
| 1 | Course: | | Planned group s | iizes | Scope | | Actual contact time / classroom teaching | | Self-study | |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in seminars | | 30 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Supervised self-study | | 60 students | | 0 | SCH | 0 | h | 0 | h |
| 2 | _ | outcomes/completing th | ompetences: ne module, students | will be s | able to | | | | | |
| 3 | components in AC and high-frequency technology, - select and apply the measurement technique for determining four-pole parameters and evaluat the measurement results produced, - explain the state of wave matching of linear high-frequency systems and design the necessar system boundary conditions, - explain components of high-frequency electronics and select them for the specific application Contents: - Four-pole theory for the description of linear circuits - Theory of lines - Wave matching - Scattering parameters | | | | | | necessary | | | |
| | The Smith Chart Components of high-frequency electronics Laboratory practicals in small groups | | | | | | | | | |
| | | The Smith Components | rameters hart of high-frequency 6 | | cs | | | | | |
| 4 | - L | The Smith C Components aboratory p | rameters hart of high-frequency 6 | coups | | s in smal | l groups. | | | |
| 4 | - L Forms of Lecture, | The Smith C Components aboratory p Teaching: seminar-bation requiren | nrameters hart of high-frequency expracticals in small grants ased teaching, laborates: | coups | | s in smal | l groups. | | | |
| | - L Forms of Lecture, Participa Formal: | The Smith Components aboratory p Steaching: seminar-bation requiren | nrameters hart of high-frequency e racticals in small gr ased teaching, labora nents: one | atory pra | acticals | | | | | |
| | - L Forms of Lecture, Participa Formal: Content: | the Smith Components aboratory p teaching: seminar-bation requiren N M E | hart of high-frequency e racticals in small gr ased teaching, labora nents: one lathematics 1 (1146 lectrical Engineering | atory pra | acticals | 2 (1152 c | or 1153). | | | |
| 5 | - L Forms of Lecture, Participa Formal: Content: | the Smith Components aboratory p teaching: seminar-bation requiren N M El | hart of high-frequency of racticals in small grantsed teaching, laborates: one lathematics 1 (1146) | atory pra or 1147 g 1 (107 | acticals) and 2 1 or 10 | 2 (1152 c 072) and | or 1153). 2 (1075) | performanc | e | |
| 5 | - L Forms of Lecture, Participa Formal: Content: Forms of Written Prerequisi | the Smith Components aboratory p teaching: seminar-batton requiren N El assessment: or oral examination real examination | hart of high-frequency of racticals in small granets: one fathematics 1 (1146 lectrical Engineering mination; in each callward of credit points: | or 1147 g 1 (107 |) and 2 1 or 10 prelim | 2 (1152 c 172) and inary exa | or 1153). 2 (1075) | performanc | e | |
| 5 6 7 | - L Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module | the Smith Components aboratory p teaching: seminar-bation requiren N Electron Seminar-bation requiren N Electron Seminar-bation requiren Electron Seminar-b | hart of high-frequency e racticals in small gr ased teaching, labora nents: one (athematics 1 (1146 lectrical Engineering mination; in each ca ward of credit points: n pass with prelimin | or 1147 g 1 (107 ase with j | acticals) and 2 1 or 10 prelim | 2 (1152 c 172) and inary exa | or 1153). 2 (1075) | performanc | e | |
| 5 6 7 8 | Forms of Lecture, Participa Formal: Content: Forms of Written Prerequise Module Application Electrical | teaching: seminar-bation requiren N Eassessment: or oral examinatio ion of the moal Engineer | hart of high-frequency of racticals in small graneters ased teaching, laborates: one lathematics 1 (1146) lectrical Engineering mination; in each calloward of credit points: n pass with prelimination of the following ging B.Eng., Engineering | or 1147 g 1 (107 use with party exaugistudy prering Co | acticals) and 2 1 or 10 prelim minati | 2 (1152 c 072) and inary exa on nes) | or 1153). 2 (1075) amination | | | Sc. |
| 5 6 7 | Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Application Electricity Important | teaching: seminar-bation requiren N Eassessment: or oral examinatio ion of the moal Engineer | arameters hart of high-frequency of racticals in small grants ased teaching, laborated teaching, laborated teaching, laborated teaching as a second teach teaching as a second teach | or 1147 g 1 (107 use with party exaugistudy prering Co | acticals) and 2 1 or 10 prelim minati | 2 (1152 c 072) and inary exa on nes) | or 1153). 2 (1075) amination | | | Sc. |

| | Prof. DrIng. Rüdiger Schultheis |
|----|--|
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| Cor | nputer Scie | ence 1 | | | | | | | INF1 | | |
|-----|--|---|--|--|---|---|--|--|---|---------------------------------|--|
| | tification ber: | Workload: | Credits: | Study | semest | er: | Frequency | of the offer | Duratio | n: | |
| 110 | | 150 h | 5 | 1st se | em. | | Annual (Winter) | | 1 seme | 1 semester | |
| 1 | Course: | | Planned group s | group sizes Scope | | | Actual contact time / classroom teaching | | Self-study | | |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h | |
| | Tuition in seminars | | 30 students | | 1 | SCH | 15 | h | 22.5 | h | |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h | |
| | | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h | |
| | Supervised self-study Learning outcomes/compe | | 60 students | | 0 | SCH | 0 | h | 0 | h | |
| | • | They define a They master s language, usin In particular, They have ma editor, a comp | ow charts. e constructs of the constructs of the constructs of the construction of the construction of they apply functions of the construction o | nctions a mming a the C s ons fron ion of an | and cal and imp tandard the C in integr | I them in plement I library standare | a correctly small algor in a correct d library fo | y parameter rithms in the ct and purpo or reading a | rized forr e C progr oseful wa nd writin | n. ramming y. g files. | |
| 3 | Contents | | he basics and his | | | | | | | | |
| 4 5 | Forms of Lecture, course Participa | Conversion be Encoding of a Designing alg Programming Important fun Reading and verteaching: seminar-base tion requirement | ctions from the C writing files with d teaching, practi | digital c ystems (gs in the h structu C standar | ompute binary, e comp re diag | er , octal, d uter grams an | ecimal, he | me flow ch | arts) | ractical | |
| | Forms of Lecture, course | Conversion be Encoding of n Designing alg Programming Important fun Reading and v teaching: seminar-base | etween number synumbers and strin orithms (e.g. with in C ctions from the C writing files with d teaching, practicus: | digital c ystems (gs in the h structu C standar | ompute binary, e comp re diag | er , octal, d uter grams an | ecimal, he | me flow ch | arts) | ractical | |

| | Written or oral examination; in each case with preliminary examination performance |
|----|--|
| 7 | Prerequisite for the award of credit points: |
| | Module examination pass with preliminary examination |
| 8 | Application of the module (in the following study programmes) |
| | Engineering Computer Sciences B.Eng. |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. DrIng. Wolfram Schenck |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| | nputer Scie | ence 2 | | | | | | | INF2 | |
|-------------|------------------------------------|---|---|---|--|--|--|---|---------------------------------|----------------------|
| Iden num | tification | Workload: | Credits: | Study | semest | er: | Frequency of the offer | | Duration: | |
| 110 | | 150 h | 5 2nd s | | em. | | Annual (Summer) | | 1 semester | |
| 1 | Course: | | Planned group s | Planned group sizes | | e | Actual contact time / classroom teaching | | Self-study | |
| | Lecture | | 60 students | | 2 SCH | | 30 | h | 45 | h |
| | Tuition is | n seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Supervis | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| | • | They can expuse polymorpand appropria They name thin programmi They design different important | d Modeling Lang plain the central cohism, templates, ate way when proper central classes ing. and implement salementation approper and simple designent small application. | oncepts operatory of the Commall C+coaches con pattern. | and co r overl ng. C++ sta + prog ompara s of OC | nstructs oading a ndard lib rammes atively. OP and u | of the pro and except prary and on their of | gramming 1 ion handling their purpose own and are at C++. | anguage g in a pose se and ap | arposefu ply then |
| 3 | Contents | Basic concep (Unified Mod | ots of object-oriest deling Language) mentary class rela | and C++ | | ing (OC | OP) and th | neir implem | entation | in UMI |
| | • | Advanced top class template Frequently us Simple OOP | pics in OOP with es, exception hand sed classes from the design patterns (see Programming of | n C++: P dling he C++ s such as S | Polymo standar singleto | rphism, d library on, Facto | overloadin ory or Ob- | server) | | |
| 4 | Forms of Lecture, course | Advanced top class template Frequently us Simple OOP Digression: I C++) | pics in OOP with es, exception hand sed classes from t design patterns (s Programming of | n C++: P dling he C++ s such as S graphica | Polymo standar singleto al user | rphism, d library on, Facto interfac | overloading overloading or Obsees (event | server) -oriented p | rogramm | ing with |
| 4 | Forms of Lecture, course Participa | Advanced top class template Frequently us Simple OOP Digression: I C++) teaching: seminar-base tion requirement | pics in OOP with es, exception hand sed classes from t design patterns (s Programming of ed teaching, pract | n C++: P dling he C++ s such as S graphica | Polymo standar singleto al user | rphism, d library on, Facto interfac | overloading overloading or Obsees (event | server) -oriented p | rogramm | ing with |
| 4 | Forms of Lecture, course | Advanced top class templated Frequently us Simple OOP Digression: I C++) Teaching: seminar-base tion requirement Non Moo | pics in OOP with es, exception hand sed classes from t design patterns (s Programming of ed teaching, pract | n C++: P dling he C++ s such as S graphica | Polymo standar singleto al user | rphism, d library on, Facto interfac | overloading overloading or Obsees (event | server) -oriented p | rogramm | ing wit |

| | Written or oral examination; in each case with preliminary examination performance |
|----|--|
| 7 | Prerequisite for the award of credit points: |
| | Module examination pass with preliminary examination |
| 8 | Application of the module (in the following study programmes) |
| | Engineering Computer Sciences B.Eng. |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. DrIng. Wolfram Schenck |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| Inno | Innovation and Project Management | | | | | | | | | | | | |
|-------|-----------------------------------|-----------|---------------------|----------------------------|------------|----------|------------------------|--|-----------|------------|-----|--|--|
| Ident | ification er: | Workload: | | Credits: Study semester: F | | | Frequency of the offer | | Duration: | | | | |
| 3211 | | 150 h | | 5 | 3rd/4 sem. | th/5th/7 | 7th | each seme | ster | 1 semes | ter | | |
| 1 | Course: | | Planned group sizes | | | Scope | ; | Actual contact time / classroom teaching | | Self-study | | | |
| | Lecture | | 60 | students | | 2 | SCH | 0 | h | 56 | h | | |
| | Tuition in | seminars | 30 | students | | 0 | SCH | 0 | h | 0 | h | | |
| | Exercise | | 20 | students | | 2 | SCH | 16 | h | 62 | h | | |
| | Practical or seminar | | | 15 students | | 0 | SCH | 0 | h | 0 | h | | |
| | Supervised self-study | | | students | | 1 | SCH | 16 | h | 0 | h | | |
| _ | т . | | ٠ | | | | 1 | | | | | | |

2 Learning outcomes/competences:

Students:

- are prepared to lead product development and innovation projects and teams to success in terms of holistic and strategically oriented project management (also including agile methods).
- understand the basics of project management and can use the elementary technical vocabulary.
- can explain the most important instruments of project management.
- are able to lead/manage a project in a given process-organisational project organisation.
- are able to develop and specifically use control options for different project phases (controlling of the degree of completion, cost controlling).
- can explain the specifics of team building and project management.
- can carry out the moderation of team meetings projects.
- know instruments of IT-supported project management.
- can explain the importance of corporate objectives and are able to distinguish between different management cultures.
- can name essential aspects of industrial property protection.

3 Contents:

- Basics of project management (terms/methods/instruments)
- Project phase models and planning systems (project preparation, project planning, project implementation, project completion)
- Agile project management Forms of project organisation
- Innovation and change management, self-management
- Project planning (project structure plan/cost plan/resource plan/schedule)
- Project documentation/ project controlling Risk management
- Special features of use of methods in innovation projects

(Strategic preparation / initiation, planning, monitoring and control of innovation projects) Leading project and innovation teams (social structures, special communication situations in projects, real and virtual project work, problem analysis and concepts for action) Stakeholder management (factors influencing the successful management of projects) Methods of idea generation (creativity techniques etc.) Trainings and workshops on selected technical examples Basic aspects of industrial property protection Forms of teaching: 4 Learning units for self-study, classroom sessions in the form of exercises Participation requirements: Formal: Content: 6 Forms of assessment: Term paper, written examination, project work or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) 8 Digital Logistics (work-integrated) B.Eng., Digital Technologies (work-integrated) B.Eng., Mechatronics /Automation (work-integrated) B.Eng., Product Service Engineering work-integrated B.Eng. and Industrial Engineering (work-integrated) B.Eng. 9 Importance of the grade for the final grade: according to BRPO Module Coordinator: 10 Prof. Dr.-Ing. Michael Fahrig Other information: 11 Language: 12

German

| | grated Prod | luct Developm | ent | | | | | | IP | |
|------------------|---|--|--|---------------------------|---------------------------------|-------------------|--------------------------|----------------|------------|---------|
| Ident numb | ification per: | Workload: | Credits: | Stud | y semest | er: | Frequenc | y of the offer | Durat | ion: |
| 1232 | 2 | 150 h | 5 | 4th o | 4th or 6th sem. | | | r) | 1 semester | |
| I | Course: | | Planned group s | sizes | Scope | e | Actual time / c teachin | lassroom | Self-study | |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in | seminars | 30 students | | 2 | SCH | 30 | h | 45 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical or seminar | | 15 students | | 0 | SCH | 0 | h | 0 | h |
| | Supervised self-study | | 60 students | | 0 | SCH | 0 | h | 0 | h |
| 3 | The students distinguish between different product development processes and know different development methods and tools. They can select and apply these methods in a targeted manner. The are able to work methodically, systematically and purposefully on a technical problem area and apply guiding rules for methodical development. | | | | | | | | | |
| | Planning functions Idea gen evaluation | t, tasks, specifics, functional st neration/creation of alternativ | ent of products (lications/requirer cructure, vity process -> ve solutions, eva guidelines (e.g. | nents lis Overv luation j | it, devel riew of procedu | methoures. | structurin ds, discur | g -> Overall | I function | methods |
| 4 | Forms of | teaching: | | | | | | | | |
| | | | l teaching, pract | ical exe | rcises | | | | | |
| | - | ion requirement | | | | | | | | |
| 5 | Formal: | None | | | | | | | | |
| 5 | | | | | | | | | | |
| 5 | Content: | None | | | | | | | | |
| 6 | Forms of | assessment: | ; | | | | | | | |
| 6 | Forms of Written | assessment: examination, c | combination exa | minatio | ı, perfo | rmance | examinati | on or oral ex | caminati | ion |
| 6 | Forms of Written of Prerequis | assessment: examination, c ite for the award | combination example of credit points: | minatio | n, perfo | rmance | examinati | on or oral ex | caminat | ion |
| 6 7 | Forms of Written of Prerequis Module | assessment: examination, c ite for the award examination p | combination example of credit points: | | _ | | examinati | on or oral ex | caminat | ion |
| 6 7 | Forms of Written of Prerequis Module Application | assessment: examination, c ite for the award examination p on of the modul | combination example of credit points: ass e (in the following | g study p | rogramn | nes) | | | | |
| 6 7 | Forms of Written of Prerequis Module Application | assessment: examination, content for the award examination proposed for the module ve Biotechnol | combination example of credit points: ass ass e (in the following ogy B.Sc., Engine | g study p | rogramn | nes) | | | | |
| 6 7 8 | Forms of Written of Prerequis Module Application Apparation and Mec | assessment: examination, content for the award examination proposed for the moduling the Biotechnol hatronics B.So. | combination example of credit points: ass e (in the following ogy B.Sc., Engine). | g study pa | rogramn | nes) | | | | |
| 6 7 8 | Forms of Written of Prerequis Module Application Apparation and Meconomics Importance | assessment: examination, c ite for the award examination p on of the modul ve Biotechnol hatronics B.So ce of the grade f | combination example of credit points: ass ass e (in the following ogy B.Sc., Engine | g study pa | rogramn | nes) | | | | |
| 6 7 8 | Forms of Written of Prerequis Module Application Apparation and Mecondination Important accordination | assessment: examination, content for the award examination proposed for the modulation of the modulation of the modulation of the grade for th | combination example of credit points: ass e (in the following ogy B.Sc., Engine). | g study pa | rogramn | nes) | | | | |
| 6 7 8 | Forms of Written of Prerequis Module of Application Apparation and Mecondinum accordinum Module of | assessment: examination, content for the award examination proposed for the module we Biotechnol hatronics B.Son for the grade for the BRPO Coordinator: | combination examination examin | g study pa | rogramn | nes) | | | | |
| 6 7 8 9 | Forms of Written of Prerequis Module Application Apparatinand Mecondinum Importante accordinum Module Of Prof. Dr. | assessment: examination, content for the award examination proposed for the modulation of the modulation of the modulation of the grade for th | combination examination examin | g study pa | rogramn | nes) | | | | |
| 6 7 8 | Forms of Written of Prerequis Module of Application Apparation and Mecondinal Importance accordinal Module of Prof. Dr. Other info | assessment: examination, content for the award examination proposed for the modul ve Biotechnol hatronics B.So ee of the grade for the grade f | combination example of credit points: ass ass as (in the following ogy B.Sc., Engine) c. for the final grade: | g study p | rogramn | nes) atics B.I | | | | |
| 6 7 8 9 | Forms of Written of Prerequis Module of Application Apparation and Mecondinal Importance accordinal Module of Prof. Dr. Other info | assessment: examination, content for the award examination proportion of the modul examination proportion of the modul examination proportion of the grade for the grade f | combination examination examin | g study p | rogramn | nes) atics B.I | | | | |

| Sens | sors and A | ctuators | | | | | | | ISS | |
|------|--|--|---|--|--|--|---|--|-----------------------------|-------------------|
| Iden | tification | Workload: | Credits: | Study | semest | er: | Frequency | of the offer | Duratio | on: |
| 131 | | 150 h | 5 | 6th s | em. | | Annual (Summer) | | 1 seme | ester |
| 1 | Course: | | Planned group s | Planned group sizes | | e | actual contact time / classroom teaching | | Self-study | |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in | n seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Exercise | | 20 students | 0 | SCH | 0 | h | 0 | h | |
| | Practical | or seminar | 15 students | 15 students | | | 15 | h | 22.5 | h |
| | Supervised self-study | | 60 students | | 0 | SCH | 0 | h | 0 | h |
| | products. They confidently apply the necessary means and methods of describing sensor systems as ar essential step in overall system design. The students use the basic knowledge of signal processing in the field of sensor technology to design intelligent sensor systems. They analyse trends and current fields of application in the area of modern sensor technology and the associated development methodology. Contents: Sensors: Definition of terms, categorisation according to transducer technologies, categorisation according to applications, sensor characterisation (accuracy, resolution, sensitivity, linearity) Sensor signal chain: Signal processing and conditioning, design and realisation of analogue filters, ADU/DAU, sampling theorem Sensor signal processing: Sensor error correction, discrete-time processing of analogue signals, spectral analysis/FFT, windowing, design and implementation of digital filters Construction of technical sensor systems: Integration levels, intelligent sensors, indirect/virtual sensors, aspects of embedded systems (mC, DSP, FPGA), connectivity/network connection | | | | | | | | | |
| 3 | Sensors: Definition application Sensor s Signal p theorem Sensor s Sensor s window Construct Integration FPGA), | con of terms, coions, sensor claignal chain: processing and signal procession correction ing, design and ction of technion levels, interconnectivity/ | haracterisation (additioning, desting: n, discrete-time pad implementation ical sensor system billigent sensors, in | sign and rocessir of digitals: adirect/von | resolu l realisa ng of ar tal filte | tion, sen ation of a nalogue s | asitivity, lin analogue fil signals, spe | earity) ters, ADU ctral analy | //DAU, sa | ampling |
| 3 | Sensors: Definition application Sensor so Signal post- theorem Sensor so Sensor es window Construct Integration FPGA), Develop | con of terms, coions, sensor claignal chain: processing and signal procession of technical connectivity/poment methodof teaching: | haracterisation (ad conditioning, des ing: n, discrete-time p id implementation ical sensor system elligent sensors, in network connection ology and applica | rocessir n of digins: direct/v | resolu realisa ng of ar tal filte irtual s | tion, sen | asitivity, lin analogue fil signals, spe aspects of er | earity) ters, ADU ctral analy mbedded s | //DAU, sa | ampling |
| | Sensors: Definition application Sensor some solution sensor so | con of terms, coions, sensor claignal chain: processing and signal procession of technical connectivity/poment methodof teaching: | haracterisation (ad conditioning, des ing: n, discrete-time p id implementation ical sensor system elligent sensors, in network connection ology and applicated | rocessir n of digins: direct/v | resolu realisa ng of ar tal filte irtual s | tion, sen | asitivity, lin analogue fil signals, spe aspects of er | earity) ters, ADU ctral analy mbedded s | //DAU, sa | ampling |
| 4 | Sensors: Definition application Sensor so Signal post theorem Sensor so Sensor evaluation Window Construct Integration FPGA), Develop Forms of Lecture, | con of terms, coions, sensor claignal chain: processing and signal procession of technical connectivity/soment methodo Teaching: seminar-base tion requirement Electory Con (106) | haracterisation (ad conditioning, des ing: n, discrete-time p id implementation ical sensor system elligent sensors, in network connection ology and applicated | rocessir of diginas: direct/von tions g (1073 070 Ind 1067 an | resolul realisation of area realisation of a realisa | tion, sention of a malogue sensors, a malogue senso | asitivity, lin analogue fil signals, spe aspects of en ctical cours natronics. 1- ering and Mering Comp | earity) ters, ADU ctral analy mbedded s e 070 Engin anagemen uter Scien | eering t), Electroces, 1065 | ampling nC, DSP, |

| 7 | Prerequisite for the award of credit points: |
|----|---|
| | Module examination pass and course assessment |
| 8 | Application of the module (in the following study programmes) |
| | Electrical Engineering B.Eng., Engineering Computer Sciences B.Eng., Mechatronics B.Sc. and |
| | Industrial Engineering and Management B.Sc. |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. DrIng. Joachim Waßmuth |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| | | Management/M | | | | | | | IMM | |
|-------------|---|--|--|------------------------|----------|---------------------|------------------------------------|--|----------------------|----------|
| Iden num | tification ber: | Workload: | Credits: | Stud | y semes | ter: | Frequency | of the offer | Duratio | n: |
| 111 | | 150 h | 5 | 6th s | 6th sem. | | Annual (Summer) | | 1 semester | |
| 1 | Course: | | Planned group s | sizes | Scop | e | Actual c time / cla teaching | assroom | Self-study | |
| | Lecture | | 60 students | | 2 | SCH | 32 h | | 43 h | |
| | | n seminars | 30 students | | 2 | SCH | 32 | h | 43 | h |
| | Exercise | | | 20 students | | SCH | 0 | h | 0 | h |
| | Practical | or seminar | 15 students | | 0 | SCH | 0 | h | 0 | h |
| | Supervis | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| | company and the associated special features and tasks of international marketing in the classify the special features and tasks of international marketing in the knowledge of marketing basics acquired in other courses and identify different apply the special features and tasks of international marketing to selected and case studies and independently solve the associated tasks and present critically reflect on the special features and tasks of international marketinent recapitulate the course content independently and deepen their knowledge Ideally, they will form learning groups that last throughout the entire study | | | | | | | | ractical e | |
| | | - | | indeper | ndently | and dee | pen their k | nowledge tl | hrough se | lf-stud |
| 3 | Contents Introduce | : ction to Internate Coordination Environmenta Risk analysis Planning mark Market entry Marketing ins | ational Marketing in the context of al analysis | g groups | ional n | and deepast throug | pen their k | nowledge the study | hrough se | lf-stud |
| | Contents Introduce Forms of Lecture, | : ction to Internation Coordination Environmenta Risk analysis Planning mark Market entry Marketing ins teaching: , seminar-base | ational Marketing in the context of al analysis keting objectives decisions struments in inter | g groups g internat | ional n | and deepast through | pen their k | nowledge the nowle | hrough se | elf-stud |
| 3 4 5 | Contents Introduce Forms of Lecture, | : ction to Internation Coordination Environmenta Risk analysis Planning mark Market entry Marketing ins teaching: seminar-base | ational Marketing in the context of al analysis keting objectives decisions struments in interd teaching with eats: | g groups g internat | ional n | and deepast through | pen their k | nowledge the nowle | hrough se | lf-stud |
| 4 | Contents Introduce Forms of Lecture, | : ction to Internate Coordination Environmenta Risk analysis Planning mark Market entry Marketing insteaching: seminar-base tion requiremental | ational Marketing in the context of al analysis keting objectives decisions struments in interd teaching with eats: | g groups g internat | ional n | and deepast through | pen their k | nowledge the name of the study | hrough se period. | |
| 4 | Contents Introduce Forms of Lecture, Participa Formal: Content: | : ction to Internate Coordination Environmenta Risk analysis Planning mark Market entry Marketing insteaching: seminar-base tion requiremental | ational Marketing in the context of al analysis keting objectives decisions struments in interest deaching with eaching with eats: | g groups g internat | ional n | and deepast through | pen their k | nowledge the name of the study | hrough se period. | |

| | Module examination pass |
|----|---|
| 8 | Application of the module (in the following study programmes) |
| | Engineering Computer Sciences B.Eng., Mechatronics B.Sc. and Industrial Engineering B.Sc. |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. Dr. rer. oec. Klaus Rüdiger |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| 1 | t a | and I | ∃inanc | ing | | | | | | | | | FIN | | |
|--|---------------------|--------|---------|----------|----------|----------------|-----------|----------|---------|----|------------------|--------------|------------|------------|--|
| Sem. Course: Planned group sizes Scope Actual contact time / classroom teaching | on | | Work | oad: | | Credits: | Stud | y semest | er: |] | Frequency of | of the offer | Duration | n: | |
| Lecture 60 students 3 SCH 45 h 67.5 Tuition in seminars 30 students 1 SCH 15 h 22.5 Exercise 20 students 0 SCH 0 h 0 Practical or seminar 15 students 0 SCH 0 h 0 Supervised self-study 60 students 0 SCH 0 h 0 Supervised self-study 60 students 0 SCH 0 h 0 Learning outcomes/competences: The students gain knowledge of the methods of investment calculation and of the basic financing in their possibilities and limits. They can assess the importance of rational investing decisions for the success of a company. They are familiar with the various instrinvestment appraisal and can apply them to specific cases and evaluate the calculation result with regard to the practical implementation of investment decisions. Students know the basifinance and can classify them. Students can allocate the appropriate forms of financing tenancing occasions. They are able to calculate the financing costs and make justified regarding the suitability of the respective forms of financing. **Ontents:** **Ontents:** **Ontents:** **Ontents:** **Orms of external financing* **Forms of internal financing* **Porms of internal financing* **Porms of internal financing* **Porms of internal financing* **Porms of internal financing* **Participation requirements:* Formal:** Content:** Knowledge of the contents of the module General Business Administration or 1024) **Participation requirements:* Formal:* Content:** Knowledge of the contents of the module General Business Administration or 1024) **Participation requirements:* Formal:* Content:** Knowledge of the contents of the module General Business Administration or 1024) **Participation requirements:* Formal:* Content:** Knowledge of the contents of the module General Business Administration or 1024) **Participation requirements:* Formal:* Content:** Knowledge of the contents of the module General Business Administration or 1024) **Participation requirements:* Formal:* Content:** Knowledge of the contents of the module General Business Administration or 1024) * | | | 150 h | | | 5 | 1 | , i | | | | 1 semester | | | |
| Lecture | rs | e: | | | Pla | nned group s | sizes | Scope | e | | time / classroom | | Self-study | Self-study | |
| Tuition in seminars 30 students 1 SCH 15 h 22.5 Exercise 20 students 0 SCH 0 h 0 Practical or seminar 15 students 0 SCH 0 h 0 Supervised self-study 60 students 0 SCH 0 h 0 Supervised self-study 60 students 0 SCH 0 h 0 Supervised self-study 60 students 0 SCH 0 h 0 Learning outcomes/competences: The students gain knowledge of the methods of investment calculation and of the basic financing in their possibilities and limits. They can assess the importance of rational investing decisions for the success of a company. They are familiar with the various inst investment appraisal and can apply them to specific cases and evaluate the calculation result with regard to the practical implementation of investment decisions. Students know the basis finance and can classify them. Students can allocate the appropriate forms of financing to financing occasions. They are able to calculate the financing costs and make justified regarding the suitability of the respective forms of financing. • Methods of static investment calculation • Methods of dynamic investment calculation • Forms of external financing • Forms of internal financing • Forms of of eaching: Lecture, seminar-based teaching Participation requirements: Formal: Content: Knowledge of the contents of the module General Business Administration or 1024) • Forms of assessment: Written examination, combination examination, performance examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee according to BRPO 1 Module Coordinator: | uı | ·e | | | 60 | students | | 3 SCH | | | | h | 67.5 | h | |
| Practical or seminar 15 students 0 SCH 0 h 0 Supervised self-study 60 students 0 SCH 0 h 0 Learning outcomes/competences: The students gain knowledge of the methods of investment calculation and of the basic financing in their possibilities and limits. They can assess the importance of rational invest financing decisions for the success of a company. They are familiar with the various inini investment appraisal and can apply them to specific cases and evaluate the calculation resul with regard to the practical implementation of investment decisions. Students know the basis finance and can classify them. Students can allocate the appropriate forms of financing to financing occasions. They are able to calculate the financing costs and make justified regarding the suitability of the respective forms of financing. Contents: Basic concepts of investment and financing Methods of dynamic investment calculation Forms of external financing Forms of internal financing Forms of internal financing Porms of teaching: Lecture, seminar-based teaching Participation requirements: Formal: Content: Knowledge of the contents of the module General Business Administration or 1024) Forms of assessment: Written examination, combination examination, performance examination or oral examination pass Module examination pass Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee according to BRPO Module Coordinator: | Tuition in seminars | | | 30 | students | | 1 | SCH | | 15 | h | 22.5 | h | | |
| Supervised self-study 60 students 0 SCH 0 h 0 Learning outcomes/competences: The students gain knowledge of the methods of investment calculation and of the basic financing in their possibilities and limits. They can assess the importance of rational investinancing decisions for the success of a company. They are familiar with the various insin investment appraisal and can apply them to specific cases and evaluate the calculation resul with regard to the practical implementation of investment decisions. Students know the basi finance and can classify them. Students can allocate the appropriate forms of financing coasions. They are able to calculate the financing costs and make justified regarding the suitability of the respective forms of financing. Contents: • Basic concepts of investment and financing • Methods of dynamic investment calculation • Methods of dynamic investment calculation • Forms of external financing • Forms of internal financing • Forms of teaching: Lecture, seminar-based teaching Participation requirements: Formal: Content: Knowledge of the contents of the module General Business Administration or 1024) Forms of assessment: Written examination, combination examination, performance examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee according to BRPO Inportance of the grade for the final grade: according to BRPO | Exercise | | | 20 | students | | 0 | SCH | | 0 | h | 0 | h | | |
| 2 Learning outcomes/competences: The students gain knowledge of the methods of investment calculation and of the basic financing in their possibilities and limits. They can assess the importance of rational investinancing decisions for the success of a company. They are familiar with the various instrainvestment appraisal and can apply them to specific cases and evaluate the calculation result with regard to the practical implementation of investment decisions. Students know the basi finance and can classify them. Students can allocate the appropriate forms of financing to casions. They are able to calculate the financing costs and make justified regarding the suitability of the respective forms of financing. 3 Contents: • Basic concepts of investment and financing • Methods of static investment calculation • Methods of dynamic investment calculation • Forms of external financing • Forms of internal financing • Forms of internal financing 5 Porms of teaching: Lecture, seminar-based teaching 5 Participation requirements: Formal: Content: Knowledge of the contents of the module General Business Administration or 1024) 6 Forms of assessment: Written examination, combination examination, performance examination or oral examination Prerequisite for the award of credit points: Module examination pass 8 Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee according to BRPO 10 Module Coordinator: | tio | cal or | semin | ar | 15 | students | | 0 | SCH | | 0 | h | 0 | h | |
| The students gain knowledge of the methods of investment calculation and of the basic financing in their possibilities and limits. They can assess the importance of rational investinancing decisions for the success of a company. They are familiar with the various instrinvestment appraisal and can apply them to specific cases and evaluate the calculation resul with regard to the practical implementation of investment decisions. Students know the basi finance and can classify them. Students can allocate the appropriate forms of financing them. Students can allocate the appropriate forms of financing occasions. They are able to calculate the financing costs and make justified regarding the suitability of the respective forms of financing. Contents: Basic concepts of investment and financing Methods of static investment calculation Methods of dynamic investment calculation Methods of dynamic investment calculation Forms of external financing Forms of internal financing Forms of teaching: Lecture, seminar-based teaching Participation requirements: Formal: Content: Knowledge of the contents of the module General Business Administration or 1024) Forms of assessment: Written examination, combination examination, performance examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee Importance of the grade for the final grade: according to BRPO Module Coordinator: | Supervise | | self-st | udy | 60 | students | | 0 | SCH | | 0 | h | 0 | h | |
| Methods of dynamic investment calculation Forms of external financing Forms of internal financing Forms of teaching: Lecture, seminar-based teaching Participation requirements: Formal: Content: Knowledge of the contents of the module General Business Administration or 1024) Forms of assessment: Written examination, combination examination, performance examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee according to BRPO Module Coordinator: | | | asic co | oncepts | s of i | nvestment : | and fina | ncing | | | | | | | |
| Forms of external financing Forms of internal financing Forms of teaching: Lecture, seminar-based teaching Participation requirements: | • | | | | | | | | | | | | | | |
| Forms of internal financing Forms of teaching: Lecture, seminar-based teaching Participation requirements: Formal: Content: Knowledge of the contents of the module General Business Administration or 1024) Forms of assessment: Written examination, combination examination, performance examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee Importance of the grade for the final grade: according to BRPO Module Coordinator: | • | | | • | | | nt calcu | lation | | | | | | | |
| Forms of teaching: Lecture, seminar-based teaching Participation requirements: Formal: Content: Knowledge of the contents of the module General Business Administration or 1024) Forms of assessment: Written examination, combination examination, performance examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee Importance of the grade for the final grade: according to BRPO Module Coordinator: | • | | | | | _ | | | | | | | | | |
| Participation requirements: Formal: Content: Knowledge of the contents of the module General Business Administration or 1024) Forms of assessment: Written examination, combination examination, performance examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee Importance of the grade for the final grade: according to BRPO Module Coordinator: | | of te | aching | : | | | | | | | | | | | |
| Formal: Content: Knowledge of the contents of the module General Business Administration or 1024) Forms of assessment: Written examination, combination examination, performance examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee Importance of the grade for the final grade: according to BRPO Module Coordinator: | | | | | | ching | | | | | | | | | |
| Content: Knowledge of the contents of the module General Business Administration or 1024) Forms of assessment: Written examination, combination examination, performance examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee Importance of the grade for the final grade: according to BRPO Module Coordinator: | | _ | ni icqu | ircincin | э. | | | | | | | | | | |
| Forms of assessment: Written examination, combination examination, performance examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee Importance of the grade for the final grade: according to BRPO Module Coordinator: | | | | | | ge of the co | ntents o | f the mo | odule G | en | eral Busin | ess Admii | nistration | (1002 | |
| Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee Importance of the grade for the final grade: according to BRPO Module Coordinator: | | | | ent: | , | | | | | | | | | | |
| Module examination pass Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee Importance of the grade for the final grade: according to BRPO Module Coordinator: | | | | | | | minatio | n, perfo | rmance | ех | kamınatıon | or oral ex | xamınatıo | n | |
| Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee Importance of the grade for the final grade: according to BRPO Module Coordinator: | - | - | | | | redit points: | | | | | | | | | |
| Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Enginee Importance of the grade for the final grade: according to BRPO Module Coordinator: | | | | | | the following | g study p | rogramn | nes) | | | | | | |
| according to BRPO 10 Module Coordinator: | | | | | | | | | | В | .Eng. and | Industrial | Engineer | ing B.Sc | |
| 10 Module Coordinator: | | | | _ | or th | e final grade: | | | | | | | | | |
| Des C. Des and a LITTLE and M. C. 1. 1. | lu] | le Co | ordina | tor: | | | | | | | | | | | |
| Prof. Dr. rer. pol. Hildegard Manz-Schumacher | | | | | egaro | l Manz-Sch | umache | r | | | | | | | |
| Other information: Literature will be announced at the beginning of the course. | | | | | | | | 0.5 | | | | | | | |

| Ī | | Renewable Energies study programme: Elective module |
|---|----|---|
| ſ | 12 | Language: |
| | | German |

| Coll | oquium | | | | | | | | | | KOL | |
|-------|--|---|------------|---------------|------------|----------------|-----------|---------------|--------------|--------------|------------|------------|
| Ident | tification ber: | Workload: | (| Credits: | Study | semest | er: | I | Frequency of | of the offer | Duration | 1: |
| 1290 |) | 90 h | í | 3 | 6th o | th or 7th sem. | | each semester | | | | |
| 1 | Course: | | Plan | ned group siz | es | Scope | | | Actual co | | Self-study | |
| | Lecture | | 60 s | tudents | | 0 | SCH | | 0 | h | 90 | h |
| | Tuition in | seminars | 30 s | 30 students | | 0 | SCH | | 0 | h | 0 | h |
| | Exercise | | 20 s | tudents | | 0 | SCH | | 0 | h | 0 | h |
| | Practical of | or seminar | 15 s | tudents | | 0 | SCH | | 0 | h | 0 | h |
| | Supervise | d self-study | 60 s | tudents | | 0 | SCH | | 0 | h | 0 | h |
| | thesis, it reference | e is capable of as subject-rel es, as well as | ated fo | oundations, | its inte | erdiscij | olinary | co | onnections | and its | non-subjec | ct-related |
| 3 | Contents: | | | | | | | | | | | |
| | | tent of the th | | _ | _ | | | | | | | |
| | _ | putation on tl | - | edure in the | prepara | ation o | f the the | esi | s and the | questions | that arose | in the |
| | | text of the the | esis | | | | | | | | | |
| 4 | Forms of | • | 41 1 | .1 1 41 | | | | | | | | |
| 5 | | mination for ion requirement | | meior mesis | | | | | | | | |
| 3 | Formal: | Nor | | | | | | | | | | |
| | Content: | | | of the bache | lor the | sis | | | | | | |
| 6 | | assessment: | attificiti | or the outlie | 101 the | 315 | | | | | | |
| | Oral exa | mination | | | | | | | | | | |
| 7 | | ite for the awa | rd of cre | edit points: | | | | | | | | |
| 8 | Application of the module (in the following study programmes) Applied Mathematics B.Sc., Apparative Biotechnology B.Sc., Electrical Engineering B.Eng., Compute Engineering B.Eng., Mechanical Engineering B.Eng., Mechatronics B.Sc., Renewable Energies B.Eng and Industrial Engineering and Management B.Sc. | | | | | | | | | | | |
| 9 | _ | ce of the grade | for the | final grade: | | | | | | | | |
| 10 | | Coordinator: | | | | | | | | | | |
| 10 | | -Ing. Anton | Klar | | | | | | | | | |
| 11 | Other info | | n Kiai | | | | | | | | | |
| - | | ure will be announced at the beginning of the course. | | | | | | | | | | |
| 12 | Language: | | | <u> </u> | <i>U</i> . | | | | | | | |
| | | | | | | | | | | | | |

| | t and Perfo | ormance Accor | unting | | | | | | KUL | |
|------------------|--|--|--|------------------------------------|-----------------|---------------------|-----------------------------------|--------------------|-------------|------------|
| Ident | tification | Workload: | Credits: | Study | semes | ter: | Frequency | of the offer | Duratio | on: |
| 1130 | | 150 h | 5 | 3rd o | 3rd or 5th sem. | | | Annual (Winter) | | ester |
| 1 | Course: | | Planned group s | sizes | Scop | e | Actual c time / cl teaching | assroom | Self-study | |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in | n seminars | 30 students | | 2 | SCH | 30 | h | 45 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | | or seminar | 15 students | | 0 | SCH | 0 | h | 0 | h |
| | Supervised self-study | | 60 students | | 0 | SCH | 0 | h | 0 | h |
| | performance assessment and weigh up the advantages and disadvantages of different cost accounts systems against each other. Through the targeted promotion of analytical and networked thinking, the have a pronounced cost awareness. They are able to develop and present their own solutions for select decision-making situations. | | | | | | | | | |
| 3 | Contents | - | itions. | | | устор ап | au present t | neir own so | olutions fo | or selecte |
| 3 | - Basics - Cost u - Cost u - Cost u - Cost u | : s of cost and prype accounting accounting unit time accounting accounting systems. | performance acco | | | velop an | nu present t | neir own so | olutions fo | or selecte |
| 3 | - Basics - Cost t - Cost t - Cost t - Cost t - Cost a - Decisi | s of cost and p type accounting that accounting tosting that time accounting sys- that accounting sys- that accounting sys- that accounting sys- that accounting sys- | performance acco | | | velop an | nu present t | neir own so | olutions fo | or selecte |
| 4 | - Basics - Cost u - Unit c - Cost u - Cost a - Decisi Forms of Lecture, Participa Formal: | s of cost and proper accounting the accounting sosting and time accounting systion-oriented content of teaching: seminar-base tion requirement | performance according g unting stems ost accounting ed teaching nts: | unting | | | | | | |
| 4 5 | - Basics - Cost t - Cost a - Decisi Forms of Lecture, Participa Formal: Content: | s of cost and p type accounting tosting time accounting systion-oriented conting: seminar-base tion requirement Non The | performance acco | unting | s Admi | inistratio | on (1002) si | hould have | been con | npleted |
| 55 | - Basics - Cost t - Cost a - Decisi Forms of Lecture, Participa Formal: Content: Forms of Written | s of cost and prype accounting the accounting sosting anit time accounting systion-oriented creaching: seminar-base tion requirement Non The assessment: examination, | performance according granting stems ost accounting ed teaching ats: e module General combination examples according to the state of t | unting | s Admi | inistratio | on (1002) si | hould have | been con | npleted |
| 5 6 | - Basics - Cost t - Cost t - Cost a - Cost a - Decisi Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis | s of cost and prype accounting anit accounting system in time accounting system in requirement in time in ti | performance according g unting stems oost accounting ed teaching hts: e module General combination example of credit points: | unting | s Admi | inistratio | on (1002) si | hould have | been con | npleted |
| 4 5 6 7 | - Basics - Cost t - Cost t - Cost t - Cost a - Decisi Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module | s of cost and prype accounting anit accounting system in time in time accounting system in time accounting in time in ti | performance according granting stems ost accounting ed teaching ed teaching module General combination example of credit points: | unting Business mination | s Admi | nistratio | on (1002) si | hould have | been con | npleted |
| 4 5 6 | - Basics - Cost t - Cost t - Unit c - Cost t - Cost a - Decision - Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicati | s of cost and proper accounting the string and time accounting system in time accounting in time accounting system in time accounting in time accounting to a system in time accounting sy | performance according g unting stems ost accounting ed teaching its: e module General combination examined of credit points: pass ule (in the following | Business mination | s Admi | nistratio rmance | on (1002) si examinatio | hould have | been con | npleted |
| 4 5 7 8 8 | - Basics - Cost t - C | s of cost and prype accounting init accounting sosting init time accounting systion-oriented creaching: seminar-base tion requirement in the cassessment: examination, site for the awar examination proportion of the modularing Computer in the control of the grade | performance according granting stems ost accounting ed teaching ed teaching module General combination example of credit points: | Business mination g study pr | s Admi | nistratio rmance | on (1002) si examinatio | hould have | been con | npleted |
| | - Basics - Cost t - Cost t - Unit c - Cost a - Decisi Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicati Enginee Importan accordin | s of cost and prype accounting init accounting init time accounting system in time accounting in the information in the initial computer in th | performance according g unting stems ost accounting ed teaching hts: e module General combination example of credit points: pass le (in the following er Sciences B.Eng | Business mination g study pr | s Admi | nistratio rmance | on (1002) si examinatio | hould have | been con | npleted |
| 4 5 7 8 | - Basics - Cost t - Cost t - Unit c - Cost a - Decisi Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicati Enginee Importan accordir Module O | s of cost and prype accounting init accounting system in time in time in the interest in the interest in the interest in time in time in the interest in time in t | performance according g unting stems ost accounting ed teaching hts: e module General combination example of credit points: pass le (in the following er Sciences B.Eng | Business mination g study pr | s Admi | nistratio rmance | on (1002) si examinatio | hould have | been con | npleted |

| 11 | Other information: |
|----|--|
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| Cryp | tography | | | | | | | | | KRY | | |
|--|-----------------------|--------------|---------|------------------|----------|----------|-----------|--|----------------|------------|------------|--|
| Ident | ification | Workload: | | Credits: | Study | semest | er: | Frequenc | y of the offer | Durati | on: | |
| 1133 | | 240 h | | 8 | 5th o | r 6th se | em. | | | 1 sem | ester | |
| 1 | Course: | | P | lanned group si | zes | Scope | е | Actual contact time / classroom teaching | | Self-study | | |
| | Lecture | | 6 | 0 students | | 0 | SCH | 0 | h | 0 | h | |
| | Tuition in | seminars | | 0 students | | 4 | SCH | 60 | h | 180 | h | |
| | Exercise | | 20 | 20 students | | | SCH | 0 | h | 0 | h | |
| | Practical or seminar | | | 5 students | | 0 | SCH | 0 | h | 0 | h | |
| | | | 1. | | | U | | U | 11 | <u> </u> | " | |
| | Supervised self-study | | | 0 students | | 0 | SCH | 0 | h | 0 | h | |
| 2 | Learning | outcomes/co | mpeter | nces: | | ! | | | | | | |
| | | | | sic principles, | | | | | | ryptogr | aphy. They | |
| | are able | to understar | ıd and | implement pr | actical | algorit | hms fro | m number | theory | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 3 | Contents: | | | | | | | | | | | |
| | | | | of the Z and Z | | | | | | | | |
| | | | | sts and factoris | | nethod | S | | | | | |
| | | | | tems for encry | yption | | | | | | | |
| | | Public key | • • | • | | | | | | | | |
| | | | | plications of o | | | | | | | | |
| | | | | plications of o | discrete | quadra | atic equa | ations | | | | |
| | | | | sh functions | | | | | | | | |
| 4 | Forms of | Digital sign | lature | <u>s</u> | | | | | | | | |
| 4 | | based teach | ina | | | | | | | | | |
| 5 | | ion requirem | | | | | | | | | | |
| 3 | Formal: | lon requirem | ciits. | | | | | | | | | |
| | Content: | M | odules | | | | | | | | | |
| | Content. | | | alysis; | | | | | | | | |
| | | | | near Algebra; | | | | | | | | |
| 6 | Forms of | assessment: | | <i>6</i> | | | | | | | | |
| | Term pa | aper, writte | en ex | amination, co | ombina | tion e | xaminat | ion, cour | se assessm | ent, pei | formance | |
| | | | | , oral examina | | | | | | | | |
| | | 1 0 | | | | | | <u> </u> | | | | |
| 7 | _ | | | credit points: | | | | | | | | |
| | | examination | | | | | | | | | | |
| 8 | | | | n the following | | - | | | | | | |
| | | | | c. and Engine | ering In | format | ics B.Ei | ng. | | | | |
| 9 | _ | _ | e for t | he final grade: | | | | | | | | |
| 10 | | g to BRPO | | | | | | | | | | |
| 10 | | Ing. habil. | Kloue | Hofer | | | | | | | | |
| 11 | Other info | | Maus | 110161 | | | | | | | | |
| 11 | | | nous | and at the ba=: | nnin~ - | f the c | Ollroo. | | | | | |
| | | | | ed at the begi | | | | s the lecti | ıre | | | |
| The course material is summarised in a script that accompanies the lecture. Language: | | | | | | | | | | | | |
| 12 | German | | | | | | | | | | | |
| Ī | Commun | | | | | | | | | | | |

| | er Electroi | nics | | | | | | | LE | | |
|---------------|--|--|---|---------------------|-----------------|----------|--|------------------------|------------|------------|--|
| Ident numl | tification Workload: | | d: Credits: | | Study semester: | | | Frequency of the offer | | Duration: | |
| 3123 | | 150 h | 5 | 5th s | 5th sem. | | | Annual (Winter) | | 1 semester | |
| 1 | Course: | | Planned group s | Planned group sizes | | 2 | Actual contact time / classroom teaching | | Self-study | | |
| | Lecture | | 60 students | | 2 | SCH | 0 | h | 56 | h | |
| | Tuition in | n seminars | 30 students | | 0 | SCH | 0 | h | 0 | h | |
| | Exercise | | 20 students | | 1 | SCH | 8 | h | 46 | h | |
| | Practical | or seminar | 15 students | | 1 | SCH | 16 | h | 0 | h | |
| | Supervise | ed self-study | 60 students | | 1.5 | SCH | 24 | h | 0 | h | |
| 3 | Contents | | g and switching e | electrical | energy | · . | | | | | |
| 3 | | | | | | | | | | | |
| | General Switching of ohmic industive loads | | | | | | | | | | |
| | Switching of ohmic-inductive loads Introduction to power semiconductors | | | | | | | | | | |
| | Introduc | tion to power | semiconductors | | | | | | | | |
| | | | | | | | | | | | |
| | Thermal | conductivity | model | | | | | | | | |
| | | | model of power semicor | nductors | | | | | | | |
| | Switchin | | | nductors | | | | | | | |
| | Switchin Converte Single-p | ng behaviour er circuits oulse rectifier | | nductors | | | | | | | |
| | Switchin Convert Single-p Multi-pu | ng behaviour er circuits oulse rectifier ulse rectifier | of power semicor | nductors | | | | | | | |
| | Switchin Convert Single-p Multi-pu Boost/bu | ng behaviour er circuits oulse rectifier ulse rectifier uck converter | of power semicor | nductors | | | | | | | |
| | Switchin Convert Single-p Multi-pu Boost/bu H-Bridg | ng behaviour er circuits oulse rectifier ulse rectifier | of power semicor | nductors | | | | | | | |
| | Switchin Convert Single-p Multi-pi Boost/bi H-Bridg Three-pl | ng behaviour er circuits oulse rectifier ulse rectifier uck converter e inverter | of power semicor | nductors | | | | | | | |
| | Switchin Convert Single-p Multi-pu Boost/bu H-Bridg Three-pl Harmon Applicat | er circuits oulse rectifier ulse rectifier uck converter e inverter hase inverters ics and powe | of power semicor | nductors | | | | | | | |
| | Switchin Convert Single-p Multi-pu Boost/bu H-Bridg Three-pl Harmon Applicat Switchin | ng behaviour er circuits oulse rectifier ulse rectifier uck converter e inverter hase inverters ics and powe | of power semicor | nductors | | | | | | | |
| | Switchin Convert Single-p Multi-pi Boost/bi H-Bridg Three-pl Harmon Applicat Switchin Electron | er circuits oulse rectifier ulse rectifier uck converter e inverter hase inverters ics and powe tion circuits i ng power sup | of power semicor | nductors | | | | | | | |
| | Switchin Converts Single-p Multi-pt Boost/bt H-Bridg Three-pl Harmon Applicat Switchin Electron Electron | er circuits oulse rectifier ulse rectifier uck converter e inverter hase inverters ics and powe tion circuits i ng power sup uck switches uck converters | of power semicor | nductors | | | | | | | |
| 4 | Switchin Converts Single-p Multi-pu Boost/bt H-Bridg Three-pl Harmon Applicat Switchin Electron Electron | ng behaviour er circuits oulse rectifier ulse rectifier uck converter e inverter hase inverters ics and powe tion circuits i ng power sup tic switches tic actuators nagnetic com | of power semicor | nductors | | | | | | | |
| 4 | Switchin Convert Single-p Multi-pt Boost/bt H-Bridg Three-pl Harmon Applicat Switchin Electron Electron | er circuits oulse rectifier ulse rectifier ulse rectifier uck converter the inverter thase inverters ics and powe tion circuits i ng power sup tic switches tic actuators magnetic com teaching: | of power semicor | | ents in | the form | n of exerc | ises and pra | cticals | | |
| 4 5 | Switchin Convert Single-p Multi-pu Boost/bu H-Bridg Three-pl Harmon Applicat Switchin Electron Electron Electron | er circuits oulse rectifier ulse rectifier ulse rectifier uck converter the inverter thase inverters ics and powe tion circuits i ng power sup tic switches tic actuators magnetic com teaching: | of power semicor r automation plies patibility (EMC) r self-study, class | | ents in | the form | n of exerc | ises and pra | cticals | | |

| 6 | Forms of assessment: |
|----|--|
| | Term paper, written examination, project work or oral examination |
| 7 | Prerequisite for the award of credit points: |
| | Module examination pass and course assessment |
| 8 | Application of the module (in the following study programmes) |
| | Mechatronics/Automation (work-integrated) B.Eng. and Industrial Engineering and Management |
| | (work-integrated) B.Eng. |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. DrIng. Michael Leuer |
| 11 | Other information: |
| | Supplementary literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| Mar | keting and | Technic | cal Sales | | | | | | | MUV | |
|---|--|--|--|--|--|--|--|--|------------|------------|-----------|
| | tification Workload: | | Credits: Study | | y semester: | | Frequency of the offer | | Duration: | | |
| 3355 | | 150 h | | 5 | 6th sem. | | | Annual (Summer) | | 1 semester | |
| 1 | Course: | <u>I</u> | | Planned group sizes | | Scope | | Actual contact time / classroom teaching | | Self-study | |
| | Lecture | | | 60 students | | 2 | SCH | 0 | h | 56 | h |
| | Tuition in | seminar | | 30 students | | 0 | SCH | 0 | h | 0 | h |
| | Exercise | | | 20 students | | 2 | SCH | 16 | h | 62 | h |
| | Practical | or semin | ar | 15 students | | 0 | SCH | 0 | h | 0 | h |
| | Supervise | d self-st | udy | 60 students | | 1 | SCH | 16 | h | 0 | h |
| 2 | Learning | outcome | s/compet | ences: | | | 1 | | | | 1 |
| especially for the b2b business, and to react to market changes with alternative concepts. If functional analysis and planning skills that enable them to critically reflect on current mand developments and to shape them in a goal-oriented manner. Students have basic knowledge of the design options of product and price management, w basis for successful sales. Building on this, they acquire the competence to develop s concepts for the distribution of technical products and to be able to apply them through life cycle. | | | | | | ent, which | form the | | | | |
| | life cycle | for the | distribu | tion of technic | al produ | icts and | quire the | able to appl | ce to deve | roughout t | he entire |
| 3 | Contents: | Internal Product Instrume Basics a Forms of Sales and the structure of the | analysis policy in ents and and speci | s techniques and n the individua strategies of co ial features of b ution, distribut ner relationship | d marke I produc ontractin 2b distri | t researct life cong policibution | rch ycle pha cy/pricir n nd organ | ases ag policy aisation | y them thi | roughout t | he entire |
| 3 | Contents: | Internal Product Instrume Basics a Forms o Sales an | analysis policy in ents and und speci of distributed custon asis of di | s techniques and in the individua strategies of co ial features of b ution, distribut | d marked produce ontracting 2b distriction plane of manage of the growth | et researet life cong policioning argement contract | rch ycle pha cy/pricir nd organ | ases ag policy aisation | y them thi | roughout t | he entire |
| 3 | Contents: Contents: Forms of | Internal Product Instrume Basics a Forms of Sales and Legal basic in teaching | analysis policy in ents and and speci of distributed custon asis of di astrumen | s techniques and n the individua strategies of co ial features of b ution, distribut mer relationship istribution (dra ts/key figures of | d marked produce ontracting the produce of the prod | acts and t research life cong policibution ibution ming and gement contract | rch ycle pha cy/pricir nd organ ets, publ | ases ag policy aisation ic law, etc.) | y them thi | roughout t | he entire |
| | Contents: Contents: Forms of Lecture in Participat | Internal Product Instrume Basics and Legal basic in teaching notes, see | analysis policy in ents and and speci of distributed custon asis of di astrumen : eminar-b irements: | s techniques and n the individua strategies of co ial features of b ution, distribut mer relationship istribution (dra- ts/key figures of | d marked produce ontracting the produce of the prod | acts and t research life cong policibution ibution ming and gement contract | rch ycle pha cy/pricir nd organ ets, publ | ases ag policy aisation ic law, etc.) | y them thi | roughout t | he entire |
| 4 | Contents: Contents: Forms of Lecture in Participat Formal: | Internal Product Instrume Basics and Legal basic in teaching notes, see | analysis policy in ents and and speci of distribut asis of di astrumen : eminar-b irements: None | s techniques and n the individua strategies of co ial features of b ution, distribut mer relationship istribution (dra- ts/key figures of | d marked produce ontracting the produce of the prod | acts and t research life cong policibution ibution ming and gement contract | rch ycle pha cy/pricir nd organ ets, publ | ases ag policy aisation ic law, etc.) | y them thi | roughout t | he entire |
| 4 5 | Contents: Contents: Forms of Lecture in Participat | Internal Product Instrum Basics a Forms o Sales an Legal ba Basic in teaching notes, se ion requi | analysis policy in ents and and speci of distribut asis of di astrumen eminar-b irements: None | s techniques and n the individua strategies of co ial features of b ution, distribut mer relationship istribution (dra- ts/key figures of | d marked produce ontracting the produce of the prod | acts and t research life cong policibution ibution ming and gement contract | rch ycle pha cy/pricir nd organ ets, publ | ases ag policy aisation ic law, etc.) | y them thi | roughout t | he entire |
| 4 | Contents: Forms of Lecture in Participat Formal: Content: Forms of Written of | Internal Product Instrume Basics a Forms of Sales and Legal basic in teaching notes, so ion requiassessmeexam, p. | analysis policy in ents and and speci of distributed custom asis of di astrumen : eminar-b irements: None None ent: roject we | s techniques and n the individua strategies of co ial features of b ution, distributioner relationship istribution (dra- ts/key figures of pased teaching, | d marked produce ontracting 2b distriction plans of manage fiting of sales | acts and t research life cong policibution ibution ming and gement contract | rch ycle pha cy/pricir nd organ ets, publ | ases ag policy aisation ic law, etc.) | y them thi | roughout t | he entire |
| 4 5 | Contents: Forms of Lecture in Participat Formal: Content: Forms of Written of Prerequise | Internal Product Instrume Basics a Forms of Sales and Legal basic in teaching motes, seion requirements assessments assessments assessments are producted in the same assessments assessments are producted in the same | analysis policy in ents and and speci of distributed custom asis of di astrumen : eminar-b irements: None None ent: roject wo e award of | s techniques and the individual strategies of color distribution, distribution (dratts/key figures colors or oral example ork or oral example credit points: | d marked produce ontracting 2b distriction plans of manage fiting of sales | acts and t research life cong policibution ibution ming and gement contract | rch ycle pha cy/pricir nd organ ets, publ | ases ag policy aisation ic law, etc.) | y them thi | roughout t | he entire |
| 4 5 7 | Contents: Forms of Lecture in Participat Formal: Content: Forms of Written of Prerequising Module of the content in the conte | Internal Product Instrume Basics a Forms of Sales and Legal basic in teaching motes, seion requirements assessments assessments are for the examination of the control of t | analysis policy in ents and and speci of distributed custom asis of di astrumen : eminar-b irements: None None ent: roject wo e award of | s techniques and the individual strategies of color is the individual strategies of color | d marked produce ontracting 2b distriction plans of manage fiting of sales exercises | et researet life cong policeribution aning argement control | rch ycle pha cy/pricir nd organ cts, publ ling | ases ag policy aisation ic law, etc.) | y them thi | roughout t | he entire |
| 5 6 | Forms of Lecture of Participat Formal: Contents: Forms of Lecture of Participat Formal: Content: Forms of Written of Prerequising Module of Application Digital Tintegrate | Internal Product Instrume Basics a Forms of Sales and Legal basic in teaching motes, seion requires assessment assessment for the examination of the Pechnolod B.En | analysis policy in ents and and speci of distributed custom asis of di astrumen : eminar-b irements: None None ent: roject wo a award of ation pas module (ogies (wo | s techniques and the individual strategies of color in the individual | d marked produce the produce on tracting 2b distriction plans of manage fiting of sales dexercised marked produce the produce of the produce | et researet life cong policibution uning au gement contract control | rch ycle pha cy/pricir nd organ cts, publ ling | ases ag policy aisation ic law, etc.) | y them thi | roughout t | he entire |
| 4 5 7 | Forms of Lecture of Participat Formal: Contents: Forms of Lecture of Participat Formal: Content: Forms of Written of Prerequising Module of Application Digital Tintegrate | Internal Product Instrume Basics as Forms of Sales and Legal basic in teaching motes, seion requirements assessments and product for the examination of the Cechnolod B.Ence of the | analysis policy in ents and and speci of distributed custom asis of di astrumen : eminar-b irements: None None ent: roject wo e award of ation pas module (ogies (wo | s techniques and the individua strategies of color ial features of bution, distribution (drats/key figures color is teaching, assed teaching, ork or oral example credit points: | d marked produce the produce on tracting 2b distriction plans of manage fiting of sales dexercised marked produce the produce of the produce | et researet life cong policibution uning au gement contract control | rch ycle pha cy/pricir nd organ cts, publ ling | ases ag policy aisation ic law, etc.) | y them thi | roughout t | he entire |

| 10 | Module Coordinator: |
|----|--|
| | Prof. Dr. rer. pol. Hildegard Manz-Schumacher |
| 11 | Other information: |
| | Literature will be announced before the start of the course. |
| 12 | Language: |
| | German |

| | iiiic Deari | ning and Data | Mining | | | | | | MLDN | Л | |
|------------------------|-------------|--|--|---|-------------------------------|---|--|---|--|---------------------------------------|--|
| Identification number: | | Workload: | orkload: Credits: | | Study semester: | | | Frequency of the offer | | Duration: | |
| 1314 | | 150 h | 5 4th ser | | em. | | Annual (Summer) | | 1 semester | | |
| 1 | Course: | | Planned group sizes | | Scope | | Actual contact time / classroom teaching | | Self-study | | |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h | |
| | | n seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h | |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h | |
| | Practical | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h | |
| | Supervis | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h | |
| | • | to their practical apples They can find quality. They classify support vectoon They use artiful They have a second to their practical apple. | lain the history a cal applications. the use of comication. I clusters of related data using class remachines) and ficial neural netwo | mon dir ed data sificatio from the orks to le | points n meth field o earn ma | in multi nods fro f artifici appings hine lea | dimension statistical neural rebetween aurning and | Feature sele nal data set cal learning networks. rbitrary inpu data mining | ction me as and ass at theory ut and out | thods in sess their (such as put data | |
| 3 | Contents | | | | m winc | h applic | cation scen | arios. | | | |

| | Formal: | |
|----|-------------------|---|
| | Content: | Content of all mathematics modules in the bachelor's degree study programme in Engineering Computer Sciences |
| | | General advanced programming knowledge (from the Computer Science 1 and Computer Science 2 modules) |
| | | Advanced programming knowledge in Python (from the Algorithms and Data Structures module) |
| | | Modules: |
| | | 1001 Algorithms and Data Structures; |
| | | 1105 Computer Science 1; |
| | | 1109 Computer science 2; |
| | | 1147 Mathematics A; |
| | | 1153 Mathematics B; |
| | | 1158 Mathematics C |
| 6 | Forms of assessm | |
| | | on or examination accompanying the course |
| 7 | _ | ne award of credit points: |
| | Module examin | |
| 8 | | e module (in the following study programmes) |
| | | mputer Sciences B.Eng. |
| 9 | _ | grade for the final grade: |
| | according to BR | |
| 10 | Module Coordina | |
| | | Volfram Schenck |
| 11 | Other information | • |
| | ļ | be announced in the course. |
| 12 | Language: | |
| | German | |

| | hematics A | A | | | | | | | MA A | |
|--------------|--|--|---|---|----------------------------------|--|--|--------------|----------------------|----------|
| | ification Workload: | | Credits: | Study | semes | ter: | Frequency of the offer Annual (Winter) | | Duration: 1 semester | |
| numl 1147 | | 300 h | 10 | 1st se | 1st sem. | | | | | |
| 1 | Course: | | Planned group s | Planned group sizes | | e e | Actual contact time / classroom teaching | | Self-study | |
| | Lecture | | 60 students | | 4 | SCH | 60 h | | 90 | h |
| | Tuition in | n seminars | 30 students | | 4 | SCH | 60 | h | 90 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical | or seminar | 15 students | | 0 | SCH | 0 | h | 0 | h |
| | Supervis | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| 2 | Supervised self-study 60 students 0 SCH 0 h 0 h 0 h Learning outcomes/competences: Students safely transform elementary equations, solve them and determine solvability if necessary. They know the elementary functions and their properties and apply them confidently. Students understand the concept of limit and continuity and calculate both with a high degree of confidence. In doing so, they select suitable procedures with justification and apply them correctly. Students understand the basic concepts of derivative and integral and calculate both with a high degree of confidence. In doing so, they select suitable procedures and apply them correctly. Simple mathematical problems as well as applications from physics and electrical engineering are independently converted into formulas and solved by the students; logical conclusions are drawn and the reasonableness of the solution is checked. Students recognise connections and transfer their knowledge and skills to related tasks. They appropriately assess their own strengths and weaknesses and develop a picture of their own development in their studies. | | | | | | | | | |
| 3 | and dev | elop a pictur | | They ap | propri | ately ass | sess their o | | | |
| 3 | Contents - Set - Tra - Ele and - Lin - Dif - Ne - Hig - Into into - Ap | elop a pictur : s, union and ansforming a mentary fun I their proper nit value of s ferential calc wton's metho gher derivati egral calculu egration methologications of | average, number s nd solving equation ctions (power, root rties, inverse functi sequences, series ar culus, slope, deriva od ves, extreme value as, area and integr hods differential and integr | sets ons and in t, expone ions ond funct ative, tar tasks cal, mair | nequaliential a ions, a agent, o | ately asseir studie ities nd logari s well as differenti | ithm funct | ions, trigon | hs and w | unctions |
| | Contents - Set - Tra - Ele and - Lin - Dif - Ne - Hig - Into inte - Ap | elop a pictur : s, union and unsforming a ementary fun I their proper nit value of s ferential calc wton's metho gher derivative gral calculu egration methological | average, number s average, number s nd solving equation ctions (power, root rties, inverse functi sequences, series ar culus, slope, deriva od ves, extreme value as, area and integrands differential and integrands | sets ons and in t, expone ions ond funct ative, tar tasks cal, mair | nequaliential a ions, a agent, o | ately asseir studie ities nd logari s well as differenti | ithm funct | ions, trigon | hs and w | unctions |
| 4 | Contents - Set - Tra - Ele and - Lin - Dif - Ne - Hig - Inte inte - Ap Forms of Lecture, Participa Formal: | elop a pictur s, union and unsforming a ementary fund their proper it value of seferential calculusers along the derivative egral calculusers along the derivations of teaching: seminar-bastion requirem | average, number s nd solving equation ctions (power, root rties, inverse functi sequences, series an culus, slope, deriva od ves, extreme value as, area and integr hods differential and integr hods sed teaching ents: | sets ons and in t, expone ions ond funct ative, tar tasks cal, mair | nequaliential a ions, a agent, o | ately asseir studie ities nd logari s well as differenti | ithm funct | ions, trigon | hs and w | unctions |
| 4 5 | Contents - Set - Tra - Ele and - Lin - Dif - Ne - Hig - Into inte - Ap Forms of Lecture, Participa Formal: Content: | : s, union and unsforming a mentary fun I their proper nit value of s ferential calc wton's metho gher derivative gral calculu egration meti plications of teaching: seminar-bas tion requirem No | average, number s nd solving equation ctions (power, root rties, inverse functi sequences, series an culus, slope, deriva od ves, extreme value as, area and integr hods differential and integr hods sed teaching ents: | sets ons and in t, expone ions ond funct ative, tar tasks cal, mair | nequaliential a ions, a agent, o | ately asseir studie ities nd logari s well as differenti | ithm funct | ions, trigon | hs and w | unctions |
| 4 | Contents - Set - Tra - Ele and - Lin - Dif - Ne - Hig - Into inte - Ap Forms of Lecture, Participa Formal: Content: | elop a pictur s, union and unsforming a sementary fund their proper it value of semential calculute and calculute | average, number s nd solving equation ctions (power, root rties, inverse functi sequences, series an culus, slope, deriva od ves, extreme value us, area and integr hods differential and int sed teaching ents: | They apelopments sets ans and interpretations and functative, tar tasks cal, main | nequaliential a ions, a agent, o | ately asseir studie | ithm funct | ions, trigon | hs and w | unctions |
| 4 | Contents - Set - Tra - Ele and - Lin - Dif - Ne - Hig - Into into - Ap Forms of Lecture, Participa Formal: Content: Forms of Written | : s, union and unsforming a rementary fund their proper it value of seferential calculute gration method plications of teaching: s, seminar-bastion requirem No Cassessment: examination | average, number s nd solving equation ctions (power, root rties, inverse functi sequences, series an culus, slope, deriva od ves, extreme value as, area and integr hods differential and integr hods sed teaching ents: | They apelopments sets ans and interpretations and functative, tar tasks cal, main | nequaliential a ions, a agent, o | ately asseir studie | ithm funct | ions, trigon | hs and w | unctions |

| 8 | Application of the module (in the following study programmes) |
|----|---|
| | Engineering Computer Sciences B.Eng. |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. Dr. rer. nat. Antje Ohlhoff |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| I I T T I I I I I I I I I I I I I I I I | Course: Lecture Tuition in s Exercise Practical or Supervised Learning ou Students concepts of and correce | self-Study utcomes/comp an calculate v of linear indep tly applied. T or the solutio | with vectors pendence an The students | oup size | 2nd s es ices and | Scop 2 2 0 0 0 | SCH SCH SCH SCH SCH | Annual (Summer actual or time / cl teaching 30 30 0 0 0 Students | ontact assroom h h h h understand vector process | Self-stu 45 45 0 0 and detectors are of the self-stu | h h h h h calculate |
|---|--|--|---|--|------------------------------------|---|---|--|---|---|----------------------------|
| I F S S S S S S S S S S S S S S S S S S | Course: Lecture Tuition in s Exercise Practical or Supervised Learning ou Students concepts of and correce methods for | eminars self-Study utcomes/comp an calculate v of linear indep tly applied. T or the solutio | Planned gro 60 students 30 students 15 students 60 students etences: with vectors pendence an | s, matri | es ices and | Scop 2 2 0 0 0 | SCH SCH SCH SCH SCH | actual continue / clime / clim | ontact assroom h h h h understand vector process | Self-stu 45 45 0 0 and detectors are of the self-stu | h h h h h calculate |
| I T T T T T T T T T T T T T T T T T T T | Lecture Tuition in s Exercise Practical or Supervised Learning ou Students concepts of and correcemethods for | self-Study utcomes/comp an calculate v of linear indep tly applied. T or the solutio | 60 students 30 students 20 students 15 students 60 students etences: with vectors pendence an | s, matri | ices and | 2 2 0 0 | SCH SCH SCH SCH SCH | time / cl teaching 30 30 30 0 0 | h h h h h understand vector process | 45 45 0 0 0 and detectors are of | h h h h h calculate |
| F F S C C C C C C C C C C C C C C C C C | Exercise Practical or Supervised Learning ou Students concepts of and correcemethods for | self-Study utcomes/comp an calculate v of linear indep tly applied. T or the solutio | 30 students 20 students 15 students 60 students etences: with vectors pendence an | s, matri | of a n | 2 0 0 | SCH SCH SCH SCH SCH SCH | 30 0 0 0 Students | h h h h understand vector process. | 45 0 0 0 and detectors are of | h h h h carmine tl |
| | Exercise Practical or Supervised Learning or Students concepts or and correcemethods for | self-Study utcomes/comp an calculate v of linear indep tly applied. T or the solutio | 20 students 15 students 60 students etences: with vectors pendence an | s, matri | of a n | 0 0 0 | SCH SCH SCH sch | 0 0 0 Students | h h h understand vector production | 0 0 0 and dete | h h h ermine the calculate |
| S I I S C C C C C C C C C C C C C C C C | Practical or Supervised Learning or Students concepts of and correct methods for | self-Study atcomes/comp an calculate v of linear indep tly applied. T or the solutio | 15 students 60 students etences: with vectors pendence an | s, matri | of a n | 0 0 d deter | SCH SCH rminants. | 0 0 Students | h h understand vector prod | 0 0 and dete | h h ermine ti |
| S I S C C C C C C C C C C C C C C C C C | Supervised Learning ou Students concepts of and corrected methods for | self-Study atcomes/comp an calculate v of linear indep tly applied. T or the solutio | 60 students etences: with vectors pendence an | s, matri | of a n | 0 d deter | SCH minants. | 0 Students | h understand vector prod | 0 and dete | h ermine tl |
| I S C a r T | Learning ou Students concepts of and correct methods for | atcomes/comp an calculate of linear indep tly applied. To the solutio | etences: with vectors pendence and | s, matri nd rank | of a n | d deter | minants. | Students | understand vector prod | and dete | ermine the |
| S c a r | Students concepts of and correct methods for | an calculate of linear indeptly applied. To the solution | with vectors pendence an The students | nd rank | of a n | | | | vector prod | luct are | calculat |
| i c a k | independe drawn and analyticall knowledge | ical problem ntly converted the meaning y and logic e and skills to op a picture of | ed into form ngfulness of ally to a la o related tas | nulae a f the s arge e sks. Th | and solution extent, ney ass | ved by n is c recogn sess the | the stud hecked. hise contains own s | lents; logi Students nections a trengths a | ical conclus are able to and creativ | sions are think a ely tran | e correct abstractl |
| | LineaMatriSolvaStraigCompEulerExport | ar algebra: Ventr independer and ability and so ght line and polex numbers ian relation nentiation to confident in the confid | nce, rank of vector prod lution of lin blane equations: arithmetic | a matraluct, ar lear systems, ho a, trigor | rix ngle an stems o omoger nometr | nd area of equa neous or ic and ex, com | calculati ations coordinat exponen | ion tes itial form | ulate them | | |
| | Forms of te | aching: eminar-based | 14 | | | | | | | | |

Formal:

Content:

Forms of assessment:

None

None

| | Written examination; each with preliminary examination |
|----|---|
| 7 | Prerequisite for the award of credit points: |
| | Module examination pass with preliminary examination |
| 8 | Application of the module (in the following study programmes) |
| | Engineering Computer Sciences B.Eng. |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. Dr. rer. nat. Antje Ohlhoff |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| Mat | hematics C | | | | | | | | MAC | 3 |
|-----------------------|--|--|--|--|--|--|--|--|---|---|
| Iden num | tification | Workload: | Credits: | Stud | y semest | er: | Frequenc | y of the offer | Durati | ion: |
| 1158 | | 150 h | 5 | 2nd | sem. | | Annual (Summe | r) | 1 sem | nester |
| 1 | Course: | | Planned group s | izes | Scop | e | Actual time / c teachin | lassroom | Self-stu | ıdy |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in | n seminars | 30 students | | 2 | SCH | 30 | h | 45 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical | or seminar | 15 students | | 0 | SCH | 0 | h | 0 | h |
| | Supervise | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| | doing so | they select s | uitable procedure | se for th | | | 1 /1 | | | |
| | converte practical checked transfer appropri | atical problemed into formulal problems, lo . Students can their knowled attely and devi | ns and application as and solved by gical conclusions think abstractly, lge and skills to relop a picture of | ons from the stu- s are con analytic related | n physic dents. I rrectly c ally and asks. T | es and end the produced that the produced that the produced that the produced the p | lectrical e ocess, suit and the rea ly, recogn ess their o | ngineering able methoos sonableness ise connecti wn strength | ds are se s of the s ions and | elected for solution in creativel |
| 3 | Converted practical checked transfer appropriate appropriate checked transfer appropriate checked | atical problemed into formulated into formulat | ns and application as and solved by gical conclusions think abstractly, lige and skills to be | ons from the stu- s are co- analytic related their ow their ow as of sev s dynami- ion of o | n physion dents. I rrectly of ally and tasks. To develop develop development of the control of t | es and e n the pro drawn and d logical they asses dopment | lectrical eccess, suited the really, recognists their of in their st | ngineering able method sonableness ise connecti wn strength udies. | ds are se s of the s ions and as and w | elected for solution in creativel eaknesse |
| | Contents: - Ta - D to - A - A Forms of | atical problemed into formulation formulation formulation formulation for the problems, logical states and deviately and deviately and deviately and deviated for the problems of the problems | ns and application as and solved by gical conclusions think abstractly, lige and skills to relop a picture of the culus for functional and applications ential equations, mods for the solute ordinary differential condinary differential and applications are applications and applications and applications are applications and applications and applications are applications and applications and applications are applications and applications are applications and applications are applications are applications and applications are applications are applications and applications are applications are applications are applications and applications are applications and applications are appli | ons from the stu- s are co- analytic related their ow their ow as of sev s dynami- ion of o | n physion dents. I rrectly of ally and tasks. To develop develop development of the control of t | es and e n the pro drawn and d logical they asses dopment | lectrical eccess, suited the really, recognists their of in their st | ngineering able method sonableness ise connecti wn strength udies. | ds are se s of the s ions and as and w | elected for solution : creativel eaknesse |
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| 10 | Module Coordinator: |
|----|--|
| | Prof. Dr. rer. nat. Jörg Horst |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| Metr | rology | | | | | | | | MT | |
|---------------|--|--------------------------------|---|----------|-----------|-----------|-------------------------|----------------|-----------|-------------|
| Ident numb | ification per: | Workload: | Credits: | Stud | y semest | er: | Frequenc | y of the offer | Duration | on: |
| 1169 |) | 150 h | 5 | 3rd | or 5th s | em. | Annual (Winter) | | 1 sem | ester |
| 1 | Course: | | Planned group s | sizes | Scope | e | Actual time / c teachin | lassroom | Self-stu | dy |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in | seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h |
| | • | ed self-study outcomes/comp | 60 students | | 0 | SCH | 0 | h | 0 | h |
| | After con a measur | npleting the n | measuring instru nodule, they will perform the mea nalysis. | be able | to selec | t a devic | e suitable | for a measu | rement ta | ask, desigi |
| 3 | Contents: | | | | | | | | | |
| | DigitaError oMeasu | calculation and rement of ele | s nechanical measu d causes of meas ctrical quantities mic behaviour of | uremen | t deviat | ions | | | | |
| 4 | Forms of | | | | | | | | | |
| | Lecture, | seminar-base | d teaching and pr | ractical | course | | | | | |
| 5 | Participat | ion requiremen | ts: | | | | | | | |
| | Formal: | 1075 | odules: Electrical Engin Electrical Engin | | | | | | | |
| | Content: | | | | | | | | | |
| 6 | Forms of | assessment: | | | | | | | | |
| | | | each with prelim | inary ex | aminati | ion | | | | |
| 7 | | | d of credit points: bass with prelimin | nary exa | aminatio | on | | | | |
| 8 | | | le (in the following | | | | | | | |
| | Electrica B.Eng. | l Engineering | B.Eng., Engine | ering Co | omputer | Science | es B.Eng. | and Renewa | ble Ener | gies |
| 9 | | ce of the grade | for the final grade: | | | | | | | |
| | _ | g to BRPO | | | | | | | | |
| 10 | | Coordinator: | | | | | | | | |
| | Prof. Dr. | rer. nat. Thor | nas Westerwalbe | esloh | | | | | | |
| | Other information: Literature will be announced at the beginning of th | | | | | | | | | |
| 11 | | | ounced at the beg | inning | of the co | ourse. | | | | |
| 11 | | e will be anno | ounced at the beg | inning | of the co | ourse. | | | | |

| Lecture 60 students 2 SCH 30 h Tuition in seminars 30 students 0 SCH 0 h Exercise 20 students 0 SCH 0 h Practical or seminar 15 students 2 SCH 30 h | Micro | osystems T | Гесhnology | | | | | | | MST | |
|--|-------|--------------|-----------------|---------------------|-----------|----------|----------------|-------------|----------------|----------|--------|
| Course: | | | Workload: | Credits: | Study | y semest | er: | Frequenc | y of the offer | Durat | ion: |
| Lecture 60 students 2 SCH 30 h Tuition in seminars 30 students 0 SCH 0 h Exercise 20 students 0 SCH 0 h Exercise 20 students 0 SCH 0 h Practical or seminar 15 students 2 SCH 30 h Supervised self-study 60 students 2 SCH 30 h Supervised self-study 60 students 0 SCH 0 h Supervised self-study 60 students 2 SCH 30 h Supervised self-study 60 students 0 SCH 0 h Learning outcomes/competences: - Knowledge of the materials and technologies of microelectronics and microsystem - Knowledge of the materials and technologies of microelectronics and microsystem - Knowledge of system integration of MEMS - Knowledge of system integration of MEMS - Knowledge and skills in the simulation techniques - Practical competence in the realisation of sensor systems with MEMS Contents: 1. Materials and technologies of microsystems engineering and microelectronics 2. Sensors - Acceleration sensors - Rotation rate sensors - Pressure sensors 3. System integration 4. Simulation Forms of teaching: Lecture, practicals - Participation requirements: Formal: None - Content: None - Forms of assessment: Written examination, combination examination or oral examination; each with preline examination performance - Prerequisite for the award of credit points: Module examination pass with preliminary examination - Application of the module (in the following study programmes) - Engineering Computer Sciences B.Eng Importance of the grade for the final grade: - according to BRPO - Module Coordinator: - Prof. Dr. Ing. Dirk Zielke | 1174 | | 150 h | 5 | 6th s | sem. | | | r) | 1 sen | nester |
| Lecture | 1 | Course: | | Planned group s | sizes | Scope | e | time / c | lassroom | Self-stu | ıdy |
| Exercise 20 students 0 SCH 0 h Practical or seminar 15 students 2 SCH 30 h Supervised self-study 60 students 0 SCH 0 h Learning outcomes/competences: - Knowledge of the materials and technologies of microelectronics and microsysten - Knowledge of the materials and technologies of microelectronics and microsysten - Knowledge of the main fields of application in sensor and actuator technology - Capabilities for systematising data sheet information of micro-electromechanical s - Knowledge of system integration of MEMS - Knowledge and skills in the simulation techniques - Practical competence in the realisation of sensor systems with MEMS Contents: 1. Materials and technologies of microsystems engineering and microelectronics 2. Sensors - Acceleration sensors - Pressure sensors 3. System integration 4. Simulation Forms of teaching: Lecture, practicals Participation requirements: Formal: None Content: None Forms of assessment: Written examination, combination examination or oral examination; each with preline examination performance Prerequisite for the award of credit points: Module examination pass with preliminary examination Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade: according to BRPO Module Coordinator: Prof. DrIng. Dirk Zielke | | Lecture | | 60 students | | 2 | SCH | | | 45 | h |
| Practical or seminar 15 students 2 SCH 30 h Supervised self-study 60 students 0 SCH 0 h Learning outcomes/competences: - Knowledge of the materials and technologies of microelectronics and microsysten - Knowledge of the main fields of application in sensor and actuator technology - Capabilities for systematising data sheet information of micro-electromechanical s - Knowledge of system integration of MEMS - Knowledge and skills in the simulation techniques - Practical competence in the realisation of sensor systems with MEMS Contents: 1. Materials and technologies of microsystems engineering and microelectronics 2. Sensors - Acceleration sensors - Rotation rate sensors - Pressure sensors 3. System integration 4. Simulation - Simulation - Simulation - Forms of teaching: Lecture, practicals - Participation requirements: Formal: None Content: None Content: None Perms of assessment: Written examination, combination examination or oral examination; each with preline examination performance Prerequisite for the award of credit points: Module examination pass with preliminary examination Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade: according to BRPO Module Coordinator: Prof. DrIng. Dirk Zielke | | Tuition in | seminars | 30 students | | 0 | SCH | 0 | h | 0 | h |
| Supervised self-study 60 students 0 SCH 0 h Learning outcomes/competences: - Knowledge of the materials and technologies of microelectronics and microsysten - Knowledge of the main fields of application in sensor and actuator technology - Capabilities for systematising data sheet information of micro-electromechanical s - Knowledge of system integration of MEMS - Knowledge and skills in the simulation techniques - Practical competence in the realisation of sensor systems with MEMS Solvential and technologies of microsystems engineering and microelectronics 2. Sensors - Acceleration sensors - Rotation rate sensors - Pressure sensors - Pressure sensors - Pressure sensors - System integration - | | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| Learning outcomes/competences: - Knowledge of the materials and technologies of microelectronics and microsystem - Knowledge of the main fields of application in sensor and actuator technology - Capabilities for systematising data sheet information of micro-electromechanical s - Knowledge of system integration of MEMS - Knowledge and skills in the simulation techniques - Practical competence in the realisation of sensor systems with MEMS 3 Contents: 1. Materials and technologies of microsystems engineering and microelectronics 2. Sensors - Acceleration sensors - Rotation rate sensors - Pressure sensors 3. System integration 4. Simulation 4 Forms of teaching: Lecture, practicals Participation requirements: Formal: None Content: None 6 Forms of assessment: Written examination, combination examination or oral examination; each with preline examination performance Prerequisite for the award of credit points: Module examination pass with preliminary examination 8 Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade: according to BRPO Module Coordinator: Prof. DrIng. Dirk Zielke 11 Other information: | | Practical of | or seminar | 15 students | | 2 | SCH | 30 | h | 45 | h |
| - Knowledge of the materials and technologies of microelectronics and microsystem - Knowledge of the main fields of application in sensor and actuator technology - Capabilities for systematising data sheet information of micro-electromechanical s - Knowledge of system integration of MEMS - Knowledge and skills in the simulation techniques - Practical competence in the realisation of sensor systems with MEMS Contents: 1. Materials and technologies of microsystems engineering and microelectronics 2. Sensors - Acceleration sensors - Rotation rate sensors - Pressure sensors 3. System integration 4. Simulation Forms of teaching: Lecture, practicals Participation requirements: Formal: None Content: None Forms of assessment: Written examination, combination examination or oral examination; each with preline examination performance Prerequisite for the award of credit points: Module examination pass with preliminary examination Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade: according to BRPO Module Coordinator: Prof. DrIng. Dirk Zielke Other information: | | Supervise | d self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| - Knowledge of the main fields of application in sensor and actuator technology - Capabilities for systematising data sheet information of micro-electromechanical s - Knowledge of system integration of MEMS - Knowledge and skills in the simulation techniques - Practical competence in the realisation of sensor systems with MEMS 3 | 2 | Learning | outcomes/comp | etences: | | • | - - | - | | | • |
| - Knowledge of the main fields of application in sensor and actuator technology - Capabilities for systematising data sheet information of micro-electromechanical s - Knowledge of system integration of MEMS - Knowledge and skills in the simulation techniques - Practical competence in the realisation of sensor systems with MEMS 3 Contents: 1. Materials and technologies of microsystems engineering and microelectronics 2. Sensors - Acceleration sensors - Rotation rate sensors - Pressure sensors 3. System integration 4. Simulation Forms of teaching: Lecture, practicals Participation requirements: Formal: None Content: None Forms of assessment: Written examination, combination examination or oral examination; each with preline examination performance Prerequisite for the award of credit points: Module examination pass with preliminary examination Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade: according to BRPO Module Coordinator: Prof. DrIng. Dirk Zielke Other information: | | - Know | ledge of the m | aterials and tech | nologie | s of mi | croelect | ronics and | l microsyster | ms tech | nology |
| - Capabilities for systematising data sheet information of micro-electromechanical s - Knowledge of system integration of MEMS - Knowledge and skills in the simulation techniques - Practical competence in the realisation of sensor systems with MEMS 3 Contents: 1. Materials and technologies of microsystems engineering and microelectronics 2. Sensors - Acceleration sensors - Rotation rate sensors - Pressure sensors 3. System integration 4. Simulation Forms of teaching: Lecture, practicals 5 Participation requirements: Formal: None Content: None Content: None 6 Forms of assessment: Written examination, combination examination or oral examination; each with preline examination performance 7 Prerequisite for the award of credit points: Module examination pass with preliminary examination 8 Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. 9 Importance of the grade for the final grade: according to BRPO 10 Module Coordinator: Prof. DrIng. Dirk Zielke 11 Other information: | | | | | | | | | | | |
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| - Knowledge and skills in the simulation techniques - Practical competence in the realisation of sensor systems with MEMS Contents: 1. Materials and technologies of microsystems engineering and microelectronics 2. Sensors - Acceleration sensors - Rotation rate sensors - Pressure sensors 3. System integration 4. Simulation Forms of teaching: Lecture, practicals Participation requirements: Formal: None Content: None Forms of assessment: Written examination, combination examination or oral examination; each with preline examination performance Prerequisite for the award of credit points: Module examination pass with preliminary examination Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade: according to BRPO Module Coordinator: Prof. DrIng. Dirk Zielke Other information: | | | | | | | | | | • | |
| - Practical competence in the realisation of sensor systems with MEMS Contents: 1. Materials and technologies of microsystems engineering and microelectronics 2. Sensors - Acceleration sensors - Rotation rate sensors - Pressure sensors 3. System integration 4. Simulation Forms of teaching: Lecture, practicals Participation requirements: Formal: None Content: None Forms of assessment: Written examination, combination examination or oral examination; each with preline examination performance Prerequisite for the award of credit points: Module examination pass with preliminary examination Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade: according to BRPO Module Coordinator: Prof. DrIng. Dirk Zielke | | | | | | niques | | | | | |
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| 1. Materials and technologies of microsystems engineering and microelectronics 2. Sensors - Acceleration sensors - Rotation rate sensors - Pressure sensors 3. System integration 4. Simulation 4 Forms of teaching: Lecture, practicals 5 Participation requirements: Formal: None Content: None 6 Forms of assessment: Written examination, combination examination or oral examination; each with preline examination performance 7 Prerequisite for the award of credit points: Module examination pass with preliminary examination 8 Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. 9 Importance of the grade for the final grade: according to BRPO 10 Module Coordinator: Prof. DrIng. Dirk Zielke 11 Other information: | | _ | | | | | | | | | |
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| - Acceleration sensors - Rotation rate sensors - Pressure sensors 3. System integration 4. Simulation 4 Forms of teaching: Lecture, practicals 5 Participation requirements: Formal: None Content: None 6 Forms of assessment: Written examination, combination examination or oral examination; each with preline examination performance 7 Prerequisite for the award of credit points: Module examination pass with preliminary examination 8 Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. 9 Importance of the grade for the final grade: according to BRPO 10 Module Coordinator: Prof. DrIng. Dirk Zielke 11 Other information: | | | | ologies of micro | osystem | s engin | eering a | nd microe | lectronics | | |
| - Rotation rate sensors - Pressure sensors 3. System integration 4. Simulation 4 Forms of teaching: Lecture, practicals 5 Participation requirements: Formal: None Content: None 6 Forms of assessment: Written examination, combination examination or oral examination; each with preline examination performance 7 Prerequisite for the award of credit points: Module examination pass with preliminary examination 8 Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. 9 Importance of the grade for the final grade: according to BRPO 10 Module Coordinator: Prof. DrIng. Dirk Zielke 11 Other information: | | | | | | | | | | | |
| - Pressure sensors 3. System integration 4. Simulation 4 Forms of teaching: Lecture, practicals 5 Participation requirements: Formal: None Content: None 6 Forms of assessment: Written examination, combination examination or oral examination; each with prelinexamination performance 7 Prerequisite for the award of credit points: Module examination pass with preliminary examination 8 Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. 9 Importance of the grade for the final grade: according to BRPO 10 Module Coordinator: Prof. DrIng. Dirk Zielke 11 Other information: | | | | | | | | | | | |
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| 4. Simulation Forms of teaching: Lecture, practicals Participation requirements: Formal: None Content: None Forms of assessment: Written examination, combination examination or oral examination; each with preline examination performance Prerequisite for the award of credit points: Module examination pass with preliminary examination Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade: according to BRPO Module Coordinator: Prof. DrIng. Dirk Zielke Other information: | | - Pressu | re sensors | | | | | | | | |
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| Lecture, practicals Participation requirements: Formal: None Content: None Forms of assessment: Written examination, combination examination or oral examination; each with preline examination performance Prerequisite for the award of credit points: Module examination pass with preliminary examination Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade: according to BRPO Module Coordinator: Prof. DrIng. Dirk Zielke Other information: | | 4. Simu | lation | | | | | | | | |
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| Written examination, combination examination or oral examination; each with prelinexamination performance Prerequisite for the award of credit points: Module examination pass with preliminary examination Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade: according to BRPO Module Coordinator: Prof. DrIng. Dirk Zielke Other information: | | Content: | None | ; | | | | | | | |
| examination performance Prerequisite for the award of credit points: Module examination pass with preliminary examination Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade: according to BRPO Module Coordinator: Prof. DrIng. Dirk Zielke Other information: | 6 | Forms of | assessment: | | | | | | | | |
| examination performance Prerequisite for the award of credit points: Module examination pass with preliminary examination Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade: according to BRPO Module Coordinator: Prof. DrIng. Dirk Zielke Other information: | | Written e | examination, c | combination exam | minatior | ı or ora | l examir | nation; eac | ch with preli | minary | |
| Prerequisite for the award of credit points: Module examination pass with preliminary examination Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade: according to BRPO Module Coordinator: Prof. DrIng. Dirk Zielke Other information: | | | | | | | | Ť | | • | |
| Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade: according to BRPO Module Coordinator: Prof. DrIng. Dirk Zielke Other information: | 7 | | | | | | | | | | |
| Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng. Importance of the grade for the final grade: according to BRPO Module Coordinator: Prof. DrIng. Dirk Zielke Other information: | | Module 6 | examination p | ass with prelimi | nary exa | minatio | on | | | | |
| 9 Importance of the grade for the final grade: according to BRPO 10 Module Coordinator: Prof. DrIng. Dirk Zielke 11 Other information: | 8 | Application | on of the modul | e (in the following | g study p | | | | | | |
| 9 Importance of the grade for the final grade: according to BRPO 10 Module Coordinator: Prof. DrIng. Dirk Zielke 11 Other information: | | Engineer | ring Computer | Sciences B.Eng | Ţ. | | | | | | |
| according to BRPO 10 Module Coordinator: Prof. DrIng. Dirk Zielke 11 Other information: | 9 | | | | | | | | | | |
| 10 Module Coordinator: Prof. DrIng. Dirk Zielke 11 Other information: | | _ | - | | | | | | | | |
| Prof. DrIng. Dirk Zielke Other information: | 10 | | | | | | | | | | |
| 11 Other information: | _ | | | lke | | | | | | | |
| | 11 | | | - | | | | | | | |
| LANGUAGUE WILLIAM MINIMANUAL DE DIO LOS HOURS OF THE COURSE. | ** | | | unced at the beo | inning a | of the c | ourse | | | | |
| 12 Language: | 12 | | | and at the beg | , | | | | | | |
| German | 12 | | | | | | | | | | |

| Net | works and | Bus Systems | | | | | | | NBS | |
|------------------|---|--|---|------------------------------------|------------------------------|--------------------------------|--|--------------|----------|-------|
| | tification | Workload: | Credits: | Study | semest | er: | Frequency | of the offer | Durati | on: |
| num 118 | | 150 h | 5 | 5th s | em. | | Annual (Winter) | | 1 sem | ester |
| 1 | Course: | | Planned group s | Planned group sizes | | e | Actual contact time / classroom teaching | | Self-stu | dy |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in | n seminars | 30 students | 30 students | | SCH | 30 | h | 45 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical | or seminar | 15 students | | 0 | SCH | 0 | h | 0 | h |
| | Supervise | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| 3 | • | Communicati Network topo Serial and par Transmission Real-time cap Classic fieldb Ethernet and | rallel bus systems media, data back | s Kup and o cially CA s, Ethern | coding, ANoper et-base | bus acc 1, PROF d fieldb | TBUS and | LON | | |
| 4 | • Forms of | OPC-UA | W Bresh (II, Bull | | , 11101 | 11121 4 | ild TST | | | |
| | | | 1 | | | | | | | |
| 5 | | s, exercises, pr | | | | | | | | |
| 5 | Participa | | ts: | | | | | | | |
| 5 | | s, exercises, pr | ts: e | | | | | | | |
| | Participal Formal: Content: Forms of | s, exercises, prition requirement None None assessment: | e e | | | | | | | |
| 6 | Participal Formal: Content: Forms of Term pa | s, exercises, prition requirement Non- Non- assessment: per, written ex | ts: e e xamination, comb | bination | examir | nation or | oral exan | nination | | |
| 6 | Participal Formal: Content: Forms of Term pal Prerequisi Module | Non- assessment: per, written exite for the awar examination p | ts: e e e e e amination, comb d of credit points: bass | | | | oral exan | nination | | |
| 6 7 | Participal Formal: Content: Forms of Term pal Prerequis Module Applicati | Non- assessment: per, written existe for the awar examination pon of the modu | ts: e e e e e e amination, comb d of credit points: bass le (in the following | g study pr | ogramn | nes) | | | | |
| 5 6 7 8 | Participal Formal: Content: Forms of Term pal Prerequis Module Applicati Electrical | None assessment: per, written existe for the awar examination pon of the modu al Engineering ce of the grade | e examination, combound of credit points: pass le (in the following B.Eng. and Eng for the final grade: | g study pr ineering | ogramn Comp | nes) uter Scie | | | | |
| 6 7 8 | Participal Formal: Content: Forms of Term pal Prerequis Module Applicati Electrical Importan accordin | None assessment: per, written exite for the awar examination pon of the modulal Engineering ce of the grade ag to BRPO or Coordinator: | e examination, combound of credit points: bass le (in the following B.Eng. and Eng for the final grade: | g study pr ineering | ogramn Comp | nes) uter Scie | | | | |
| 6 7 8 9 | Participal Formal: Content: Forms of Term pal Prerequise Module Application Electrical Important according Module Of Prof. Dr | Non- assessment: per, written exite for the awar examination pon of the modu al Engineering ce of the grade ag to BRPO or Coordinator:Ing. Andreas | e examination, combound of credit points: bass le (in the following B.Eng. and Eng for the final grade: | g study pr ineering | ogramn Comp | nes) uter Scie | | | | |
| 6 7 8 | Participal Formal: Content: Forms of Term pal Prerequis Module Applicati Electrical Important accordin Module Prof. Dr Other inf | None assessment: per, written exitte for the awar examination pon of the modu al Engineering ce of the grade g to BRPO or Coordinator:Ing. Andreas ormation: re will be annoted | e examination, combound of credit points: bass le (in the following B.Eng. and Eng for the final grade: | g study pr ineering | rogramn Comp e subje | nes) uter Scie | | | | |
| 6 7 8 9 | Participal Formal: Content: Forms of Term pal Prerequis Module Applicati Electrical Important accordin Module Of Prof. Dr Other inf | s, exercises, prition requirement None None assessment: per, written existe for the awar examination proof the modulal Engineering ce of the grade ag to BRPO or Coordinator:Ing. Andreas formation: re will be annoted. | e examination, combound of credit points: bass le (in the following B.Eng. and Eng for the final grade: SPO if ungraded Bünte | g study pr ineering | rogramn Comp e subje | nes) uter Scie | | | | |

| Netv | work Techi | nology | | | | | | | NW | |
|---------------|---|--|--|--|--|--|--|-----------------------|-----------|-------|
| Ident numl | tification | Workload: | Credits: | Study | semes | ter: | Frequency | of the offer | Duratio | on: |
| 1181 | | 150 h | 5 | 3rd o | or 5th s | em. | Annual (Winter) | | 1 seme | ester |
| 1 | Course: | | Planned group s | Planned group sizes So | | e | Actual contact time / classroom teaching | | Self-stud | dy |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in | n seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Supervise | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| | - Stu | dents are fan | niliar with the role | of a swi | itch an | _ | ure virtual | | AN). | |
| 3 | - Stu | dents are fan e students na | | of a swi | itch an | d config | ure virtual | | AN). | |
| 3 | Contents: - Arc - Me - Loc - Sub - Pro - Fur - Cor - App | chitecture and dia for data to cal networks onet formation tocols of dat nection of impenfiguration oplication level. | niliar with the role me possibilities to | emputer-spring description of a swing protect in protec | aided control to length | communities of the communities o | ication sys M), transport I lly router, rks, | tems, | AN). | |
| | Contents: - Arc - Me - Loc - Sub - Pro - Fur - Cor - App - Sim | chitecture and dia for data to cal networks onet formation tocols of dat action of impenfiguration oplication level nulation and teaching: | d application of coransmission, and their character also with variable a transmission in rortant network confective components services and propractical constructed teaching, proje | omputer-sistics, le subne networks upling de its for se itocols, tion of co | aided of t lengths (networks thing u | communities (VLS) ork and (especial postwork) network er network. | ication sys M), transport 1 lly router, rks, | tems, ayer), switch), | | ship |
| 3 4 5 5 | Contents: - Arc - Me - Loc - Sub - Pro - Fur - Cor - App - Sim | chitecture and dia for data to cal networks onet formation of impenfiguration of plication and teaching: | d application of coransmission, and their character also with variable a transmission in rortant network corf active components! services and propractical constructed teaching, projectnts: | omputer-sistics, le subne networks upling de its for se itocols, tion of co | aided of t lengths (networks thing u | communities (VLS) ork and (especial postwork) network er network. | ication sys M), transport 1 lly router, rks, | tems, ayer), switch), | | ship |
| 1 | - Stu The Contents: - Arc - Me - Loc - Sub - Pro - Fur - Coi - Apj - Sim Forms of Lecture, | chitecture and dia for data to al networks onet formation tocols of dataction of impufiguration oplication level nulation and teaching: seminar-basetion requirements | d application of coransmission, and their character also with variable a transmission in rortant network corf active components! services and propractical constructed teaching, projectnts: | omputer-sistics, le subne networks upling de its for se itocols, tion of co | aided of t lengths (networks thing u | communities (VLS) ork and (especial postwork) network er network. | ication sys M), transport 1 lly router, rks, | tems, ayer), switch), | | ship |
| 1 | - Stu - The Contents: - Arc - Me - Loc - Sub - Pro - Fur - Cor - App - Sim Forms of Lecture, Participat Formal: Content: Forms of | chitecture and dia for data to cal networks onet formation of impunifiguration of plication level nulation and teaching: seminar-base tion requirements No No assessment: | d application of coransmission, and their charactern also with variable transmission in rortant network confective components services and propractical constructed teaching, projects: | of a swiprotect approtect appropriate subnerverse subnerverse stocols, tion of color and grant and grant and grant and grant and grant approximately approxi | aided of t lengths (netweevices titing u | communities of the communities o | ication sys M), transport l lly router, rks, rks. | tems, ayer), switch), | he intern | ship |
| 1 | - Stu The Contents: - Arc - Me - Loc - Sub - Pro - Fur - Cor - App - Sim Forms of Lecture, Participat Formal: Content: Forms of Written | chitecture and dia for data to cal networks onet formation tocols of dat action of impufiguration oplication level nulation and teaching: seminar-base tion requirement of No No assessment: | d application of coransmission, and their charactern also with variable a transmission in rortant network confective components services and propractical constructed teaching, projectnts: | of a swiprotect approtect appropriate subnerverse subnerverse stocols, tion of color and grant and grant and grant and grant and grant approximately approxi | aided of t lengths (netweevices titing u | communities of the communities o | ication sys M), transport l lly router, rks, rks. | tems, ayer), switch), | he intern | ship |
| 5 | - Stu The Contents: - Arc - Me - Loc - Sub - Pro - Fur - Coi - Apj - Sim Forms of Lecture, Participal Formal: Content: Forms of Written examina Prerequis | chitecture and dia for data to cal networks onet formation tocols of dataction of impufiguration oplication level bulation and teaching: seminar-base No No assessment: examination extreme to not performation to performation performation performation performation performation to the away as the student performation performation to the away as the student performation to the away as the student performation performation to the away as the student performation performation to the student performation perform | d application of coransmission, and their characternals owith variable a transmission in rortant network confective components services and propractical construct ed teaching, projectnts: ne ne ne ne ne ne ne ne | emputer-ristics, le subne networks upling duts for sectocols, tion of contract and grammination | aided of the length of the len | communities of the communities o | ication sys M), transport l lly router, rks, rks. | tems, ayer), switch), | he intern | ship |
| 1 | - Stu The Contents: - Arc - Me - Loc - Sub Pro - Fur - Coi - Api - Sin Forms of Lecture, Participat Formal: Content: Forms of Written examina Prerequis Module | chitecture and dia for data to cal networks onet formation tocols of dataction of impufiguration oplication level nulation and leaching: seminar-base look not require media for the away examination and leaching: seminar-base look not require media lo | d application of coransmission, and their charactern also with variable a transmission in rortant network confective components services and propractical constructed teaching, projectnts: | emputer- ristics, le subne networks upling de tts for se ttocols, tion of co | aided of the length of the len | communities on the communities of the communities o | ication sys M), transport l lly router, rks, rks. | tems, ayer), switch), | he intern | ship |

| 9 | Importance of the grade for the final grade: |
|----|---|
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. DrIng. Lutz Grünwoldt |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. Lecture notes will be provided. Each student will be a member of a Cisco class and will have access to a simulation environment and extensive online curricula. Certificates can be issued for successful participation in Cisco final exams. |
| 12 | Language: |
| | German |

| Nun | nerical Mat | hematic | s | | | | | | | NM | |
|---------------|--|--------------------------------|--------------------|--|----------|-----------|----------|--|-----------------|------------|--------|
| Ident numl | rification per: | Workl | oad: | Credits: | Study | y semest | er: | Frequenc | ey of the offer | Durati | ion: |
| 1007 | 7 | 150 h | | 5 | 4th s | em. | | Annual (Summe | er) | 1 sem | nester |
| 1 | Course: | | | Planned group s | izes | Scope | e | actual contact time / classroom teaching | | Self-study | |
| | Lecture | | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in | seminar | s | 30 students | | 0 | SCH | 0 | h | 0 | h |
| | Exercise | | | 20 students | | 2 | SCH | 30 | h | 45 | h |
| | Practical of | or semin | ar | 15 students | | 0 | SCH | 0 | h | 0 | h |
| | Supervise | d self-stı | ıdy | 60 students | | 0 | SCH | 0 | h | 0 | h |
| 2 | Learning outcomes/competences: | | | | | | | | | | |
| 3 | engineer - Root-f | se teaching scie | nces: .lgorithi | | | | | | | quently i | n |
| | InterpoNumerRegres | olation rical diff ssion | ferentia | ions of large lin tion and integra ure and technol | tion | -mnear | equation | i systems |) | | |
| 4 | Forms of | teaching | | | | | | | | | |
| | Lecture, | | | | | | | | | | |
| 5 | Participat | ion requi | | : | | | | | | | |
| | Formal: Content: | | | matics 1 (1147) | | ematics | 2 (1153 |), Mather | natics 3 | | |
| 6 | Forms of | assessme | | , Mathematics | 4 | | | | | | |
| | Term par | per, wri | ten exa | mination or cor | nbinatio | on exan | 1 | | | | |
| 7 | Prerequisi | ite for the | e award | of credit points: | | | | | | | |
| 0 | Module o | | | ss (in the following | etudy n | rogramn | 200) | | | | |
| 8 | | | | Sciences B.Eng | | ogranin | 168) | | | | |
| 9 | | | | r the final grade: | | | | | | | |
| | accordin | | _ | | | | | | | | |
| 10 | Module Coordinator: | | | | | | | | | | |
| | | | | ian Schröder | | | | | | | |
| 11 | Other info | | | nced at the beg | inning o | of the co | ourse. | | | | |
| 12 | Language | | | | | | | | | | |
| | German | | | | | | | | | | |

| Nun | nerical Sim | nulation | | | | | | | NSI | |
|----------------------------|--|--|---|-------------------|--|------------|--------------------|----------------|----------|-------|
| Iden | tification ber: | Workload: | Credits: | Study | semest | er: | Frequenc | y of the offer | Duratio | on: |
| 1008 | 3 | 150 h | 5 | 5th s | em. | | Annual (Winter) | | 1 sem | ester |
| 1 | Course: | | Planned group siz | zes | Scope | e | Actual time / c | lassroom | Self-stu | dy |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in | n seminars | 30 students | | 0 | SCH | 0 | h | 0 | h |
| | Exercise | | 20 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Practical | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h |
| 2 | Supervise | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| | | | | | | | | | | |
| 3 | - Funda | ematical tools mentals and c | lassification of pa nerical solution of | | | - | | | | |
| 3 | MatheFundaMethoApplic | ematical tools amentals and cods for the nur cations from n | | partial | differe | - | | | | |
| | MatheFundaMethoApplicForms of | ematical tools mentals and cods for the nur- cations from n | nerical solution of atural science and | partial | differe | - | | | | |
| 4 | - Mathe - Funda - Metho - Applic | ematical tools imentals and cods for the nur- cations from no teaching: exercise, prace | nerical solution of atural science and ctical course | partial | differe | - | | | | |
| | MatheFundaMethoApplicForms of Lecture,Participat | ematical tools imentals and cods for the nur- cations from national teaching: exercise, praction requirement | nerical solution of atural science and etical course tts: | partial | differe | - | | | | |
| 4 5 | - Mathe - Funda - Metho - Applic | ematical tools amentals and cods for the nur cations from n teaching: exercise, praction requiremen Non- | nerical solution of atural science and ctical course tts: | partial techno | differe logy | ential equ | uations | athematics (| (1007 or | 1186) |
| 4 5 | - Mathe - Funda - Metho - Applic Forms of Lecture, Participat Formal: Content: | ematical tools amentals and coods for the numerations from numerations from numerations from numeration requirements Non | nerical solution of atural science and etical course tts: e ar Algebra (1139) | partial techno | difference of the difference o | 03), Nu | uations | athematics (| (1007 or | 1186) |
| 4 55 | - Mathe - Funda - Metho - Applic Forms of Lecture, Participat Formal: Content: Forms of Term pa Prerequis | ematical tools amentals and cods for the nur cations from n teaching: exercise, praction requiremen None Line assessment: per, written exite for the awar | nerical solution of atural science and etical course tts: e ar Algebra (1139) examination or comd of credit points: | partial techno | difference of the difference o | 03), Nu | uations | athematics (| (1007 or | 1186) |
| 4 5 6 | - Mathe - Funda - Metho - Applic Forms of Lecture, Participat Formal: Content: Forms of Term pa Prerequis Module Applicati | ematical tools mentals and cods for the nur cations from n teaching: exercise, praction requirement Non- Line assessment: per, written exite for the awar examination pon of the modu | nerical solution of atural science and etical course ets: e ar Algebra (1139) examination or comd of credit points: bass le (in the following states) | partial techno | differed blogy rsis (10 on exam | 03), Nui | uations | athematics (| (1007 or | 1186) |
| 4 5 6 7 | - Mathe - Funda - Metho - Applic Forms of Lecture, Participat Formal: Content: Forms of Term pa Prerequis Module Applicati Engineer | ematical tools amentals and coods for the numerations from numerations from numerations from numerations from numerations from numeration requirements assessment: per, written exists for the aware examination proportion of the moduring Compute ce of the grade | nerical solution of atural science and etical course tts: e ar Algebra (1139) examination or comd of credit points: bass | partial techno | differed blogy rsis (10 on exam | 03), Nui | uations | athematics (| (1007 or | 1186) |
| 4 | - Mathe - Funda - Metho - Applic Forms of Lecture, Participat Formal: Content: Forms of Term pa Prerequis Module Applicati Engineer Importance accordin | ematical tools mentals and cods for the nur cations from n teaching: exercise, praction requirement None Line assessment: per, written existe for the awar examination p on of the modu ring Compute ce of the grade ag to BRPO Coordinator: | nerical solution of atural science and etical course tts: e ar Algebra (1139) examination or comd of credit points: bass le (in the following of the final grade: | partial techno | differed blogy rsis (10 on exam | 03), Nui | uations | athematics (| (1007 or | 1186) |
| 4 5 6 7 8 9 | - Mathe - Funda - Metho - Applic Forms of Lecture, Participat Formal: Content: Forms of Term pa Prerequis Module Applicati Engineer Importance accordin Module C Prof. Dr. | ematical tools mentals and cods for the nur cations from n teaching: exercise, praction requirement Non Line assessment: per, written existe for the awar examination pon of the moduring Compute ce of the grade ag to BRPO Coordinator: . rer. nat. Chri | nerical solution of atural science and etical course ets: e ar Algebra (1139) examination or come of of credit points: bass le (in the following street of the sciences B.Eng. | partial techno | differed blogy rsis (10 on exam | 03), Nui | uations | athematics (| (1007 or | 1186) |
| 4 5 6 7 8 | - Mathe - Funda - Metho - Applic Forms of Lecture, Participat Formal: Content: Forms of Term pa Prerequis Module Applicati Engineer Important accordin Module O Prof. Dr. Other info | ematical tools mentals and cods for the nur cations from n teaching: exercise, praction requirement None Line assessment: per, written existe for the awar examination pronof the moduring Compute ce of the grade ag to BRPO Coordinator: . rer. nat. Christormation: re will be annoted. | nerical solution of atural science and etical course tts: e ar Algebra (1139) examination or comd of credit points: bass le (in the following of the final grade: | , Analy | difference of the content of the con | 03), Num | uations | athematics (| (1007 or | 1186) |

| Opt | ical Systen | ns Engineerin | g | | | | | | OST | |
|-------------|---|--|--|------------------------------|---------------|-----------|--|--------------|-----------|--------|
| Iden num | tification | Workload: | Credits: | Study | semes | ter: | Frequency | of the offer | Duratio | on: |
| 130 | | 150 h | 5 | 6th s | em. | | Annual (Summer | ·) | 1 seme | ester |
| 1 | Course: | | Planned group s | izes | Scop | e | Actual contact time / classroom teaching | | Self-stud | dy |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in | n seminars | 30 students | 30 students | | SCH | 15 | h | 22.5 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h |
| | | l self-study 60 students | | | 0 | SCH | 0 | h | 0 | h |
| 2 | Learning outcomes | | netences: | | | | | | | |
| 3 | FundaPhysiSmartLightiMachiSelectColou | rence between imentals of op- cal properties sensors and on ing and optics ine vision sof- ed filters and r machine vis | | ineering f applica tools opy | g ation of | optical | system tec | hnology | | |
| | - Select - Two-c reading | ed real-life apdimensional cand verificati | oplication example oding, recording | es of the | variou | ıs sensoı | | stems. Disti | nction be | etween |
| 4 | | teaching: seminar-base | ed teaching, practi | ical cou | rse | | | | | |
| 5 | Formal: | Nor | ie | | | | | | | |
| 6 | Content: | Nor assessment: | le . | | | | | | | |
| | Combin | ation examina | ntion, performance | e exami | nation | or oral e | xaminatio | n | | |
| 7 | | | rd of credit points: pass and course as | ssessme | nt | | | | | |
| 8 | Applicati | on of the modu | ile (in the following | study pi | rogramr | | | | | |
| | | | er Sciences B.Eng | | dustria | l Engine | ering and | Managemer | nt B.Sc. | |
| 9 | _ | - | for the final grade: | | | | | | | |
| | | ig to BRPO | | | | | | | | |
| 10 | | Coordinator: . rer. nat. Mai | c-Oliver Schierer | nberg | | | | | | |
| | _ | ormation: | | | | | | | | |

| | Literature will be announced at the beginning of the course. |
|----|--|
| 12 | Language: |
| | German |

| Opto | electronic | s | | | | | | | OPT | |
|-------|---|---|--|---|------------------------------------|--|--|--------------|------------|------|
| Ident | ification | Workload: | Credits: | Study | semest | er: | Frequency | of the offer | Duration | n: |
| 1190 | | 150 h | 5 | 5 5th se | | | Annual (Winter) | | 1 seme | ster |
| 1 | Course: | | Planned group si | izes | Scop | e | Actual contact time / classroom teaching | | Self-study | y |
| | Lecture | | 60 students | 60 students | | SCH | 30 | h | 45 | h |
| | Tuition in | n seminars | 30 students | 30 students | | SCH | 15 | h | 22.5 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Supervise study | ed self | 60 students | | 0 | SCH | 0 | h | 0 | h |
| 3 | Contents: - Phy - Sen - Rac - pho - Rac | components as exical principle niconductor elliation detect todiodes, pho liation emittin | es of the propertie ectronics: Fundar ors: thermal det totransistors, CCl g devices: Lumin ion technology w | es of light mentals tectors, D devices | ht and and in quantues, CM diodes, | propagat teraction im dete OS sens laser dio | tion of electronic of light an ectors (e.g. ors, etc.) | tromagneti | c waves | |
| 4 | | teaching: seminar-base | d teaching and pr | actical t | raining | ; in smal | l groups (2 | - 4 partici | pants) | |
| 5 | Participat Formal: | tion requiremen | ts: | | | | | | | |
| | Content: | Mod 1066 1068 1071 | c physics and electules: Electronics 1; Electronics 2; Electrical Engin | eering 1 | l; | ring moo | dules, as we | ell as those | listed bel | ow: |

| | 1169 Metrology; |
|----|--|
| | 1195 Physics 1; |
| | 1200 Physics 2; |
| | 1200 1 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 |
| | |
| | |
| | |
| 6 | Forms of assessment: |
| | Oral examination; in each case with preliminary examination |
| 7 | Prerequisite for the award of credit points: |
| | Module examination pass with preliminary examination |
| 8 | Application of the module (in the following study programmes) |
| | Electrical Engineering B.Eng. and Engineering Computer Sciences B.Eng. |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. Dr. rer. nat. Sonja Schöning |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| | Students must have sufficient knowledge and experience in the use and safety of electrical equipment |
| | |
| | |
| 12 | Language: |
| | German |

| Identi | | Organisation | | | | | | | PUO | |
|--------|---|---|--|--------------------------------------|---------------------|-------------------------------|--|---|--------------------------------------|----------|
| numb | ification er | Workload: | Credits: | Study | semes | ter: | Frequency | of the offer | Duratio | n: |
| 1192 | | 150 h | 5 4th | | r 6th s | em. | Annual (Summer | | 1 semester | |
| 1 | Course: | | Planned group sizes | | Scope | | Actual contact time / classroom teaching | | Self-study | |
| | Lecture | | 60 students | | 3 | SCH | 45 | h | 67.5 | h |
| | Tuition in | n seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | | or seminar | 15 students | | 0 | SCH | 0 | h | 0 | h |
| | • | ed self-study outcomes/com | 60 students | | 0 | SCH | 0 | h | 0 | h |
| | They ca practica They are entrepre They ha | l examples. The familiar with neurial activitive basic know | principles of organey can use organ in important topic y. wledge about the in examples, e.g. 1 | nisationa s of orga characte | l forms nisation | s with reponal char | gard to the age and ca | eir applicab n assess the f key quali | ility. ir signific fications a | cance fo |
| | | | | | g the co | onflict re | solution a | nd motivati | onai skiii | s. |
| | Fundam Fundam Fundam Environ Organis Organis Personn | ance, goals an entals of labor entals of Comentals of Lear mental conditational and opational change el managemen | munication ning Theory ions, learning cor erational structur | ntrol, stra | es man | agement | ong learni | ng | | s. |
| 3 4 5 | Signification Fundam Fundam Environ Organisation Organisation Personn Forms of Lecture, | ance, goals an entals of labor entals of Comentals of Lear mental conditational and opational change el managementals eseminar-base | ur law umunication ning Theory ions, learning core rational structure nt and conflict res d teaching with 6 | ntrol, stra re, forms solution | es man | agement for lifelomary and | ong learni d secondar | ng | | s. |
| 4 | Signification Fundam Fundam Environ Organisation Organisation Personn Forms of Lecture, | ance, goals an entals of labor entals of Comentals of Lear mental conditational and opational change el management teaching: | ur law umunication ning Theory ions, learning cor erational structur that and conflict res d teaching with e | ntrol, stra re, forms solution | es man | agement for lifelomary and | ong learni d secondar | ng | | s. |

| | Written examination, combination examination, performance examination or oral examination |
|----|--|
| 7 | Prerequisite for the award of credit points: |
| | Module examination pass |
| 8 | Application of the module (in the following study programmes) |
| | Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Engineering B.Sc. |
| | |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | Economist Ulrike Franke |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. Renewable Energies study |
| | programme: Possible elective subject |
| 12 | Language: |
| | German |

| Phy | sics 1 | | | | | | | | PH1 | |
|---------------------------------|---|--|--|-------------------------------------|---------|-------------|--|------------------------|-----------------------|-------|
| Iden num | tification | Workload: | Credits: | Study | semest | er: | Frequency | of the offer | Duratio | on: |
| 119 | | 150 h | 5 | 1st s | em. | | Annual (Winter) | | 1 seme | ester |
| 1 | Course: | | Planned group s | Planned group sizes | | e | Actual contact time / classroom teaching | | Self-study | |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition is | n seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Superviso | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| 2 | Learning | outcomes/com | inetences: | | 1 | | | | | |
| | technical questions independently. Students can carry out experiments, evaluate measurements and present the results clearly. They know the methods of error estimation of measurement results and can independently produce reports laboratory experiments during the practical course. | | | | | | | ney knov reports or | | |
| 3 | Contents | | | tical cot | irse. | | | | | |
| 33 | MeasuBasicKinenDynarWork | : cal quantities urement accur concepts of c natics: Descri mics: Newton | and units racy and measurer lassical mechanic ption of motion 's laws of motion conservation of en | ment err | | | | | | |
| 3 | PhysicMeastBasicKinenDynarWorkMoneRotati | cal quantities arement accur concepts of conatics: Descrimics: Newton and energy, contum and colons and angu | and units racy and measurer lassical mechanic ption of motion 's laws of motion conservation of en | ment err | | | | | | |
| | - Physic - Measu - Basic - Kinen - Dynan - Work - Mome - Rotati - Basic Forms of Lecture, | cal quantities arement accur concepts of conatics: Descrimics: Newton and energy, contum and colons and anguiconcepts of fiteaching: | and units racy and measurer lassical mechanic ption of motion 's laws of motion conservation of en lisions lar momentum | ment err s ergy | ors | ic physic | es practica | l course - P | Part 1 (3 | |
| 4 | - Physic - Measu - Basic - Kinen - Dynar - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: | cal quantities arement accur concepts of contains: Descrimics: Newton and energy, contum and colons and anguiconcepts of fixeaching: seminar with ents) tion requirement | and units racy and measurer lassical mechanic ption of motion 's laws of motion conservation of en lisions lar momentum luid mechanics a practice-oriented | ment err s ergy | ors | ic physic | es practica | l course - P | ² art 1 (3 | |
| 4 | - Physic - Measu - Basic - Kinen - Dynar - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: Content: | cal quantities arement accur concepts of conatics: Descrimics: Newton and energy, contum and colons and angu concepts of fiteaching: seminar with ents) tion requirement Non Non assessment: | and units racy and measurer lassical mechanic ption of motion 's laws of motion conservation of en lisions lar momentum luid mechanics a practice-oriented ints: | ment err s ergy | es, bas | | es practica | l course - P | art 1 (3 | |
| 5 | - Physic - Meast - Basic - Kinen - Dynar - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: Content: Forms of Written | cal quantities arement accur concepts of conatics: Descrimics: Newton and energy, contum and colons and anguiconcepts of fixeaching: seminar with ents) tion requirement of assessment: examination; | and units racy and measurer lassical mechanic ption of motion 's laws of motion conservation of en lisions lar momentum luid mechanics a practice-oriented ints: | ment err s ergy | es, bas | | es practica | l course - P | Part 1 (3 | |
| 4 5 6 | - Physic - Meast - Basic - Kinen - Dynar - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: Content: Forms of Written Prerequise | cal quantities arement accur concepts of conatics: Descrimics: Newton and energy, contum and colons and anguiconcepts of fiteaching: seminar with ents) tion requirement in Non-assessment: examination; site for the awa | and units racy and measurer lassical mechanic ption of motion 's laws of motion conservation of en lisions lar momentum luid mechanics practice-oriented ints: ie | ment err s ergy | es, bas | ion | es practica | I course - P | Part 1 (3 | |
| 4 5 5 7 | - Physic - Meast - Basic - Kinen - Dynar - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: Content: Forms of Written Prerequis module | cal quantities arement accur concepts of contains: Descrimics: Newton and energy, contains and anguitant concepts of fixeaching: seminar with ents) tion requirement Non assessment: examination; site for the awa examination p | and units racy and measurer lassical mechanic ption of motion 's laws of motion conservation of en lisions lar momentum luid mechanics a practice-oriented at: ae each with prelimit rd of credit points: pass with prelimit | nent err s ergy l exercis inary ex | es, bas | ion | es practica | I course - P | Part 1 (3 | |
| 4 5 6 | - Physic - Measu - Basic - Kinen - Dynar - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: Content: Forms of Written Prerequis module Applicati | cal quantities arement accur concepts of contains: Descrimics: Newton and energy, contum and colons and anguiconcepts of fixeaching: seminar with ents) Non assessment: examination; site for the awa examination properties of the model. | and units racy and measurer lassical mechanic ption of motion 's laws of motion conservation of en lisions lar momentum luid mechanics practice-oriented ints: he | ment err s ergy l exercis inary exa | es, bas | ion on nes) | | | Part 1 (3 | |
| 4 5 6 7 | - Physic - Measu - Basic - Kinen - Dynar - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: Content: Forms of Written Prerequis module Applicati Electrica | cal quantities arement accur concepts of conatics: Descrimics: Newton and energy, contum and colons and angu concepts of fiteaching: seminar with ents) tion requirement Non assessment: examination; site for the awa examination plan of the modulal Engineering and conference of the grade | and units racy and measurer lassical mechanic ption of motion 's laws of motion conservation of en lisions lar momentum luid mechanics a practice-oriented nts: lee lee lee leach with prelimit rd of credit points: pass with prelimir lie (in the following | ment erris ergy l exercis inary exa | es, bas | ion on nes) | | | Part 1 (3 | |
| 4 5 6 7 | - Physic - Measu - Basic - Kinen - Dynar - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: Content: Forms of Written Prerequis module Applicati Electrica Importan accordin | cal quantities arement accur concepts of conatics: Descrimics: Newton and energy, contum and colons and angu concepts of fiteaching: seminar with ents) tion requirement in the semination; site for the away examination properties of the grade and to BRPO | and units racy and measurer lassical mechanic ption of motion 's laws of motion conservation of en lisions lar momentum luid mechanics a practice-oriented ints: lee lee leeach with prelimited of credit points: pass with prelimited in the following g B.Eng. and Eng | ment erris ergy l exercis inary exa | es, bas | ion on nes) | | | Part 1 (3 | |
| 4 5 6 7 8 | - Physic - Meast - Basic - Kinen - Dynar - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: Content: Forms of Written Prerequis module Applicati Electrica Importan accordir Module O | cal quantities arement accur concepts of conatics: Descrimics: Newton and energy, contum and colons and anguiconcepts of filteraching: seminar with ents) tion requirement in Non-assessment: examination; site for the awa examination plan of the modulal Engineering to BRPO Coordinator: | and units racy and measurer lassical mechanic ption of motion 's laws of motion conservation of en lisions lar momentum luid mechanics a practice-oriented ats: the the the the the the the the the th | ment erris ergy l exercis inary exa | es, bas | ion on nes) | | | Part 1 (3 | |
| 3 4 5 6 7 8 9 | - Physic - Measu - Basic - Kinen - Dynar - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: Content: Forms of Written Prerequis module Applicati Electrica Importan accordir Module O Prof. Dr | cal quantities arement accur concepts of conatics: Descrimics: Newton and energy, contum and colons and angu concepts of fiteaching: seminar with ents) tion requirement in the semination; site for the away examination properties of the grade and to BRPO | and units racy and measurer lassical mechanic ption of motion 's laws of motion conservation of en lisions lar momentum luid mechanics a practice-oriented ats: the the the the the the the the the th | ment erris ergy l exercis inary exa | es, bas | ion on nes) | | | Part 1 (3 | |

12 Language:
German

| | sics 2 | | | | | | | | PH2 | |
|-------|--|--|---|----------------------------------|--------------------------------|-------------------------------------|--|------------------------------------|---------------------------|--------------------|
| Iden | tification | Workload: | Credits: | Study | semest | er: | Frequency of | of the offer | Duration | : |
| 120 | | 150 h | 5 | 2nd s | sem. | | Annual (Summer) | | 1 semester | |
| 1 | Course: | | Planned group sizes | | Scope | | Actual contact time / classroom teaching | | Self-study | |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | | n seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h |
| | | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| 2 | The stud of therm principle The stud and can | nodynamics, os es to technical lents know the | c knowledge of the cillations and was problems and wo scientific working have skills to pro- | aves and ork out s ng meth | d optics olution od with | s. They on the sindependent the alt | can systema endently. ernating eff | tically appeted to the sect of exp | ply basic p eriment an | hysical d theor |
| | Contents: - Thermodynamics: Temperature, ideal gas law, laws of thermodynamics, thermal properties and processes - Oscillations: simple harmonic motion, damped and driven oscillations, resonance - Waves: Wave propagation, interference, reflection, transmission, refraction, diffraction, acoust waves - Optics: Geometrical optics, optical systems, wave optics, polarisation | | | | | | | | | |
| | Forms of teaching: Lecture, seminar with practice-oriented exercises, basic physics practical course - Part 2 (3 | | | | | | | | | |
| 4 | Forms of | teaching: | · · · | | | | | course - Pa | art 2 (3 | |
| 4 5 | Forms of Lecture, experimental Participate | teaching: seminar with jents) tion requirement | practice-oriented | | | | | course - Pa | art 2 (3 | |
| 5 | Forms of Lecture, experime | seminar with pents) tion requirement None Conte | practice-oriented s: ents of the modul | exercise | es, basi | c physic | | course - Pa | art 2 (3 | |
| 5 | Forms of Lecture, experime Participat Formal: Content: | seminar with pents) tion requirement None Conto Modu 1195 assessment: | practice-oriented s: ents of the modul ales: Physics 1 | exercis | cs 1 (1 | c physic | | course - Pa | art 2 (3 | |
| | Forms of Lecture, experime Participal Formal: Content: Forms of Written Prerequise | seminar with pents) tion requirement None Conte Mode 1195 assessment: examination; esite for the award | practice-oriented s: ents of the modulules: Physics 1 each with prelimited of credit points: | exercis | es, basi | c physic | | course - Pa | art 2 (3 | |
| 6 | Forms of Lecture, experime Participal Formal: Content: Forms of Written Prerequis module | seminar with pents) tion requirement None Conte Mode 1195 assessment: examination; esite for the award examination pa | practice-oriented s: ents of the modulules: Physics 1 each with preliminal of credit points: ass with prelimin | exercis | es, basi | c physic | | course - Pa | art 2 (3 | |
| 6 | Forms of Lecture, experime Participat Formal: Content: Forms of Written Prerequise module of Application | reaching: seminar with pents) tion requirement None Conto Modu 1195 assessment: examination; esite for the award examination particularly properties. | practice-oriented s: ents of the modul ales: Physics 1 ach with prelimit of credit points: ass with prelimin e (in the following | exercise le Physienary exa | es, basi | c physic | es practical | | art 2 (3 | |
| 6 | Forms of Lecture, experime Participate Formal: Content: Forms of Written Prerequise module of Applicating Electricate Important | reaching: seminar with pents) tion requirement None Conte Modu 1195 rassessment: examination; examination particular and Engineering ce of the grade f | practice-oriented s: ents of the modulules: Physics 1 each with preliminal of credit points: ass with prelimin | exercise le Physienary exa | es, basi | c physic | es practical | | art 2 (3 | |
| 6 7 8 | Forms of Lecture, experime Participat Formal: Content: Forms of Written Prerequise module of Applicati Electrica Importan accordin Module of Prof. Dr | seminar with pents) tion requirement None Conto Modu 1195 assessment: examination; estite for the award examination patential Engineering | practice-oriented s: ents of the modul ales: Physics 1 ach with prelimin of credit points: ass with prelimin e (in the following B.Eng. and Engi for the final grade: | exercise le Physienary exa | es, basi | c physic | es practical | | art 2 (3 | |

12 Language:
German

| | tical Proje | ct / Internship | | | | | | | PRA | | |
|------------------|---|--|--|------------------------------------|----------------------------|---------------------|--|----------------|-----------------------|------------------------|--|
| Ident numl | tification ber: | Workload: | Credits: | Study | semest | er: | Frequenc | y of the offer | Durati | | |
| 1292 | 292 450 h | | 15 7th se | | em. | | each semester | | 12 weeks | | |
| 1 | Course: | | Planned group sizes | | Scope | | Actual contact time / classroom teaching | | Self-study | | |
| | Lecture | | 60 students | | 0 | SCH | 0 | h | 450 | h | |
| | | n seminars | 30 students | | 0 | SCH | 0 | h | 0 | h | |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h | |
| | | or seminar | 15 students | | 0 | SCH | 0 | h | 0 | h | |
| | Supervise | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h | |
| | applied i | in a practice-or and develop s | t, the activities a riented manner.' uitable solution solving, presenta | To this e strategie | nd, stu es. The | dents sh main ai | ould work m is to de | independer | ntly on e | ngineerii | |
| 3 | Contents | • | | | | | | | | | |
| | an activi | ty report and the | task. At the end he students a finational advising fro | ıl report. | During | g the prac | ctical proj | ect, the stud | npany 1s lents sho | to prepa uld receiv | |
| | | | | | | | | | | | |
| 1 | Forms of | teaching | | | | | | | | | |
| 4 | | teaching: | σ with exercises | as accor | mpanyi | no onida | ance | | | | |
| | Seminar | -based teachin | g with exercises | as accor | mpanyi | ng guida | ance | | | | |
| 5 | Seminar Participat | -based teachin tion requirement | ts: | as accor | mpanyi | ng guida | ance | | | | |
| | Seminar Participat Formal: | -based teachin tion requirement None | ts: | as accor | mpanyi | ng guida | ance | | | | |
| 5 | Seminar Participat Formal: Content: | -based teachin tion requirement | ts: | as accor | mpanyi | ng guida | ance | | | | |
| 5 | Seminar Participat Formal: Content: Forms of | -based teachin tion requirement None None assessment: | ts: | as accor | mpanyi | ng guida | ance | | | | |
| 5 | Seminar Participal Formal: Content: Forms of Term pa | -based teachin tion requirement None None assessment: | ts: | as accor | mpanyi | ng guida | ance | | | | |
| 5 | Seminar Participat Formal: Content: Forms of Term pa Prerequis | -based teachin tion requirement None None assessment: | d of credit points: | as accor | mpanyi | ng guida | ance | | | | |
| 5 6 7 | Seminar Participal Formal: Content: Forms of Term pa Prerequis Module | -based teachin tion requirement None None assessment: per tite for the award examination p | d of credit points: | | | | ance | | | | |
| 5 6 7 | Seminar Participat Formal: Content: Forms of Term pa Prerequis Module Applicati | -based teachin tion requirement None None assessment: per site for the award examination p on of the modul | d of credit points: | g study pr | ogramn | nes) | | ng., Mecha | nical En | gineerin | |
| 5 6 7 | Seminar Participal Formal: Content: Forms of Term pa Prerequis Module Applicati Electrica B.Eng., | -based teachin tion requirement None None assessment: per site for the award examination p on of the modul al Engineering | d of credit points: ass e (in the following | g study pr eering (| ogramn Compu | nes) ter Scie | nces B.E. | | | | |
| 5 6 7 | Seminar Participal Formal: Content: Forms of Term pa Prerequis Module Applicati Electrica B.Eng., B.Sc. | -based teachin tion requirement None None assessment: per tite for the award examination p on of the modul al Engineering Mechatronics | d of credit points: ass e (in the following B.Eng., Engin | g study pr eering (e Energi | ogramn Compu | nes) ter Scie | nces B.E. | | | | |
| 5 6 7 8 | Seminar Participal Formal: Content: Forms of Term pa Prerequis Module Applicati Electrica B.Eng., B.Sc. Importan | -based teachin tion requirement None None assessment: per tite for the award examination p on of the modul al Engineering Mechatronics ce of the grade to | d of credit points: ass e (in the following B.Eng., Engin | g study pr eering (e Energi | ogramn Compu | nes) ter Scie | nces B.E. | | | | |
| 5 6 7 8 9 | Seminar Participal Formal: Content: Forms of Term pa Prerequis Module Applicati Electrica B.Eng., B.Sc. Importan accordin | -based teachin tion requirement None None assessment: per site for the award examination p on of the modul al Engineering Mechatronics ce of the grade to | d of credit points: ass e (in the following B.Eng., Engin | g study pr eering (e Energi | ogramn Compu | nes) ter Scie | nces B.E. | | | | |
| 55 66 77 88 | Seminar Participat Formal: Content: Forms of Term pa Prerequis Module Applicati Electrica B.Eng., B.Sc. Importan accordin Module C | -based teachin tion requirement None None assessment: per site for the award examination p on of the modul al Engineering Mechatronics ce of the grade for t | d of credit points: ass e (in the following B.Eng., Engin B.Sc., Renewabl | g study pr eering (e Energi | ogramn Compu | nes) ter Scie | nces B.E. | | | | |
| 5 6 7 8 | Seminar Participal Formal: Content: Forms of Term pa Prerequis Module Applicati Electrica B.Eng., B.Sc. Importan accordin Module O Prof. Dr | -based teachin tion requirement None None assessment: per site for the award examination p on of the modul al Engineering Mechatronics ce of the grade to g to BRPO Coordinator:Ing. Anton K | d of credit points: ass e (in the following B.Eng., Engin B.Sc., Renewabl | g study pr eering (e Energi | ogramn Compu | nes) ter Scie | nces B.E. | | | | |
| 5 6 7 8 | Seminar Participal Formal: Content: Forms of Term pa Prerequis Module Applicati Electrica B.Eng., B.Sc. Importan accordin Module O Prof. Dr | -based teachin tion requirement None None None assessment: per site for the award examination p on of the modul al Engineering Mechatronics ce of the grade to g to BRPO Coordinator:Ing. Anton K ormation: | d of credit points: ass e (in the following g B.Eng., Engin B.Sc., Renewabl | g study pr eering (e Energi | ogramn Compu es B.Ei | nes) ter Scien | nces B.E. | | | | |
| 5 | Seminar Participal Formal: Content: Forms of Term pa Prerequis Module Applicati Electrica B.Eng., B.Sc. Importan accordin Module O Prof. Dr | -based teachin tion requirement None None None assessment: per tite for the aware examination p on of the modul al Engineering Mechatronics ce of the grade to th | d of credit points: ass e (in the following B.Eng., Engin B.Sc., Renewabl | g study pr eering (e Energi | ogramn Compu es B.Ei | nes) ter Scien | nces B.E. | | | | |

| | ality Manag | gement | | | | | | | QM | |
|-------------|---|--|--|--|---|------------------------------------|--|---|--|---------------------------------|
| | ntification ber: | Workload: | Credits: | Study | semest | er: | Frequency | of the offer | Duration | 1: |
| | 229 150 h | | 5 | 4th o | r 6th se | em. | Annual (Summer) | | 1 semester | |
| 1 | Course: | | Planned group s | Planned group sizes | | e | Actual contact time / classroom teaching | | Self-study | |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition i | n seminars | 30 students | | 2 | SCH | 30 | h | 45 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical | or seminar | 15 students | | 0 | SCH | 0 | h | 0 | h |
| | Supervis | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| 3 | Learning outcomes/competences: Name and explain the basic terms, elementary connections and laws of quality mana explain and apply the instruments and tools to design, maintain, evaluate and in management. Apply these tools along the entrepreneurial value chain. Optimising bus in terms of quality-oriented and cost-minimising corporate management. Acquire independently perform management tasks in quality management. Understand and management as an integrative way of thinking and as a fundamental corporate and management as an integrative way of the current quality management standards, eveight principles of QM, elaboration of the essential contents of the ISO 9000 family (espareas of procurement, incoming goods, production and sales), process orient management, measures/programmes for continuous improvement (CIP, Six Sigma, idea quality objectives and key figures (balanced scorecard), quality costs, customer satisfactors benchmarking, customer and supplier relations (supplier audit), legal aspects. | | | | | | | | and applymanageme | y quality ent tool. |
| | areas of manage quality | of procureme ment, measur objectives and | ent, incoming goes/programmes for d key figures (bala | oods, proced scanned | roducti ious im orecard | on and provem l), qualit | sales), pent (CIP, Si by costs, cus | rocess or x Sigma, ic stomer sati | ientation, dea manag | project gement), |
| 4 | areas of manage quality of benchm | of procureme ment, measur objectives and arking, custon | ent, incoming go es/programmes for d key figures (bala mer and supplier r | oods, proced scanned | roducti ious im orecard | on and provem l), qualit | sales), pent (CIP, Si by costs, cus | rocess or x Sigma, ic stomer sati | ientation, dea manag | project gement), |
| | areas of manage quality of benchm | of procurement ment, measure objectives and arking, custon freaching: , practicals and tion requirement in Normal More in the procurement in the | ent, incoming go es/programmes for d key figures (balamer and supplier r d exercises nts: | oods, proced scanned | roducti ious im orecard | on and provem l), qualit | sales), pent (CIP, Si by costs, cus | rocess or x Sigma, ic stomer sati | ientation, dea manag | project gement), |
| 5 | Forms of Lecture, Participa Formal: | of procurement ment, measure objectives and arking, custon freaching: , practicals and tion requirement ion requirement Normalian Norma | ent, incoming go es/programmes for d key figures (balamer and supplier r d exercises nts: | oods, proced scanned | roducti ious im orecard | on and provem l), qualit | sales), pent (CIP, Si by costs, cus | rocess or x Sigma, ic stomer sati | ientation, dea manag | project gement), |
| 5 | Forms of Lecture. Participa Formal: Content: | of procurement measure objectives and arking, custon freaching: practicals and tion requirement Nor Nor Sussessment: | ent, incoming go es/programmes for d key figures (balamer and supplier r d exercises nts: | oods, proceedings of the process of | roducti nous im orecard (suppl | on and provemally, qualitier audit | sales), pent (CIP, Si y costs, cus), legal aspe | rocess or x Sigma, io stomer sati | ientation, dea manag isfaction a | project gement), nalyses, |
| 5 | Forms of Lecture. Participa Forms of Written Prerequis | f teaching: , practicals antion requireme Nor f assessment: examination, site for the awa | ent, incoming go es/programmes for d key figures (balamer and supplier r d exercises ents: ene combination exar rd of credit points: | oods, proceedings of the process of | roducti nous im orecard (suppl | on and provemally, qualitier audit | sales), pent (CIP, Si y costs, cus), legal aspe | rocess or x Sigma, io stomer sati | ientation, dea manag isfaction a | project gement), nalyses, |
| 4 5 6 7 8 8 | Forms of Lecture, Participal Formal: Content: Forms of Written Prerequising Module Application | of procurement ment, measure objectives and arking, custon arking, custon freaching: , practicals and tion requirement ion requirement ion, site for the away examination ion of the model. | ent, incoming go es/programmes for d key figures (bala mer and supplier r d exercises nts: ne ne combination exar rd of credit points: pass ule (in the following | noods, proceedings of the process of | roducti nous im orecard (suppl | on and aprovemal), qualitier audit | sales), pent (CIP, Si y costs, cus), legal aspe | rocess or x Sigma, io stomer satisfiects. | ientation, dea manag isfaction a | project gement), nalyses, |
| 5 6 7 | Forms of Lecture, Participal Formal: Content: Forms of Written Prerequising Module Application | of procurement ment, measure objectives and arking, custon arking, custon freaching: , practicals and tion requirement ion requirement ion, site for the away examination ion of the model. | d exercises nts: ne combination exar rd of credit points: pass | noods, proceedings of the process of | roducti nous im orecard (suppl | on and aprovemal), qualitier audit | sales), pent (CIP, Si y costs, cus), legal aspe | rocess or x Sigma, io stomer satisfiects. | ientation, dea manag isfaction a | project gement), nalyses, |
| 5 6 7 8 8 | Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicate Apparat | f teaching: , practicals and tion requireme Nor assessment: examination, site for the awa examination ion of the module of the grade are of th | ent, incoming go es/programmes for d key figures (bala mer and supplier r d exercises nts: ne ne combination exar rd of credit points: pass ule (in the following | mination g study pr | roducti nous im orecard (suppl | on and aprovemal), qualitier audit | sales), pent (CIP, Si y costs, cus), legal aspe | rocess or x Sigma, io stomer satisfiects. | ientation, dea manag isfaction a | project gement), nalyses, |
| 5 6 7 | Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicat Apparat | f teaching: practicals and tion requireme Nor assessment: examination, site for the awa examination ion of the moditive Biotechnolicity and site for the divergence of the moditive Biotechnolicity and the moditive Biotechnolicity an | ent, incoming gotes/programmes for the destroyer of the supplier research of the supplier research of credit points: pass place (in the following pology B.Sc., Engirest) | mination g study pr | roducti nous im orecard (suppl | on and aprovemal), qualitier audit | sales), pent (CIP, Si y costs, cus), legal aspe | rocess or x Sigma, io stomer satisfiects. | ientation, dea manag isfaction a | project gement), nalyses, |

| 11 | Other information: |
|----|--|
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| Identification Work | | Workload | Cradita | C41 | | | F | | Dymotic | | |
|---|--------------------------------------|---|--|--|--|--|--|--|------------|---|--|
| number: 150 h | | Workload: | Credits: | Study | semest | ter: | Frequenc | y of the offer | Duratio | on: | |
| | | 150 h | 5 | 5th s | em. | | Annual (Winter) | | 1 semester | | |
| l | Course: | | Planned group s | Planned group sizes | | e | Actual contact time / classroom teaching | | Self-study | | |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h | |
| | Tuition is | n seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h | |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h | |
| | | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h | |
| | | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h | |
| Based on the basic archite The students They converted the encodings. They know They explain conventionate They solve states | | | ture concepts. explain how Von number represent the representatio temory hierarchie the computer arc | ences: ow how modern computer hardware works, especially microncept of a Von Neumann computer, students evaluate and are concepts. olain how Von Neumann computers can be programmed at the modern representations between any position systems. The representation of integers and floating point numbers in district and the programmed at | | | | | | nalyse various the machine level fferent binary concepts. t in comparison t | |
| | • | They develop | | g tasks u | - | | | aphics proce | essors (e. | g. using | |
| 3 | Contents | They develop CUDA C). : Historical over Von Neuman Design of dig Basic function machine instruction Computer arith Memory hiera Bus systems Advanced arc Computer arc Computer arc Computer arc Computer arc Computer arc Computer arc Cup | erview of computent architecture ital computers aring of processor uctions) | g tasks unes for some ter architer architer architer architer architers at the unesting terms at the unesting terms are the unesting term | ectures compor register coding | e computes nents r transfer of numb ut-of-ord Progran | er executioning in l | pecially in the haracters) | he proces | | |
| 3 | Contents | : Historical over Von Neumann Design of dig Basic function machine instruction Computer arise Memory hiera Bus systems Advanced arc Computer arc Programming teaching: | erview of computent architecture ital computers arthrough a processor uctions) thmetic (ALUs, Farchy (cache) | ter architer architer at the research the research terms at the re | ectures compor register coding ines, or cessors e.g. via | e computes senents r transfer of numb at-of-ord Program CUDA | er executioning in l | oecially in the haracters) on, etc.) A32 assemb | he proces | ssing of | |
| | Contents Forms of Lecture, assemble | : Historical over Von Neumann Design of dig Basic function machine instruction Computer arise Memory hiera Bus systems Advanced arc Computer arc Programming teaching: | erview of computent architecture ital computers arthrough a processor uctions) thmetic (ALUs, Farchy (cache) whitecture concept ital computers are archy (cache) whitecture of graphics processes for the programment of the p | ter architer architer at the research the research terms at the re | ectures compor register coding ines, or cessors e.g. via | e computes senents r transfer of numb at-of-ord Program CUDA | er executioning in l | oecially in the haracters) on, etc.) A32 assemb | he proces | ssing of | |

| | Content: | Basic computer science and programming knowledge |
|----|---------------------|--|
| | | Basic knowledge of digital technology |
| | | Modules: |
| | | 1045 Digital Electronics II; |
| | | |
| | | 1070 Digital Electronics I; |
| | P 6 | 1105 Computer Science 1; |
| 6 | Forms of assessm | |
| | Written examina | ation or oral examination |
| 7 | Prerequisite for th | e award of credit points: |
| | Module examina | ation pass |
| 8 | Application of the | e module (in the following study programmes) |
| | Electrical Engin | eering B.Eng., Engineering Computer Sciences B.Eng. and Mechatronics B.Sc. |
| 9 | Importance of the | grade for the final grade: |
| | according to BR | PO |
| 10 | Module Coordina | tor: |
| | Prof. DrIng. W | Volfram Schenck |
| 11 | Other information | |
| | Literature will b | e announced at the beginning of the course. |
| 12 | Language: | |
| | German | |

| | ification | rol Engineerin | 0 | Credits: | Ctudy | semest | 041 | Eraguana | y of the offer | Duratio | an' |
|------|-------------------------------------|---|-------------------------|---|----------|----------|------------------|-------------------------------|----------------|------------|--------------|
| numl | | Workload. | | Cicuits. | Study | Scillesu | C1. | Trequenc | y of the offer | Duratio | <i>)</i> 11. |
| 1233 | 3 | 150 h | | 5 | 4th sem. | | Annual Summer | | 1 sem. | | |
| 1 | Course: | 1 | Planned group size | | | Scope | 2) | Actual time / c teachin | lassroom | Self-stud | ly |
| | Lecture | | 60 | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in | seminars | 30 | 30 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Exercise | | 20 | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical of | or seminar | 15 | 15 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Supervise | Supervised self-study | | 60 students | | 0 | SCH | 0 | h | 0 | h |
| 2 | Learning | outcomes/comp | eten | ces: | | ļ | | | | | |
| | Students - have - can ci - can tr | : basic knowled reate models f ansform diffe | lge i or si renti | n the field of s mple physical al equations in e-invariant sys | systen | ns. | | ney invest | igate and ev | aluate the | e dynam |

- can recognise and explain connections between the time domain representation and the frequency domain.
- explain the standard control loop and name the variables in the loop.
- can systematically analyse control engineering problems.
- examine single-loop feedback systems for stability.
- assess the properties of a control loop with regard to dynamics and disturbance behaviour.
- design single-loop control loops on real-world systems in the laboratory. They can discuss the results and derive measures.
- 3 Contents:
 - Structural description of dynamic systems
 - Description of linear systems in the time domain (differential equations, state space representation, linearisation of non-linear systems)
 - Behaviour of linear systems (input/output behaviour, impulse response, canonical form, controller canonical form, determination of characteristic values of LTI systems)
 - Description and analysis of linear systems in the frequency domain, integral transforms (Fourier, Laplace)
 - Frequency response and transfer function
 - Standard control loop and controller design
 - Command response and disturbance rejection of closed-loop control
 - Stability of feedback systems (Nyquist stability criterion).
 - Design of single-loop feedback systems (frequency characteristics, root locus)
 - Practical course in control engineering
- 4 Forms of teaching:
 Lecture, seminar-based teaching with exercises, practical course

 5 Participation requirements:
 Formal: None
 Content: Modules:
 1147 Mathematics A;
 1153 Mathematics B;
 1158 Mathematics C;

| 6 | Forms of assessment: |
|----|--|
| | Written or oral examination; in each case with preliminary examination performance |
| 7 | Prerequisite for the award of credit points: |
| | Module examination pass with preliminary examination |
| 8 | Application of the module (in the following study programmes) |
| | Engineering Computer Sciences B.Eng. |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. DrIng. Martin Kohlhase |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. Notes in the course |
| | |
| | |
| 12 | Language: |
| | German |

| | otics | | | | | | | | ROB | |
|--|--|--|--|--|--|---------------------|--|---------------|------------|-------|
| Ident | | | Credits: | Stud | ly semest | er: | Frequency of the offer Annual (Winter) | | Duration: | |
| 1240 | | | 5 | 5th | sem. | | | | 1 seme | ester |
| 1 | Course: | | Planned group s | Planned group sizes | | e | Actual contact time / classroom teaching | | Self-study | |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in | seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Supervise | d self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| 3 | multimodal sensor systems), the students can grasp both the practical significance of robotics ar different approaches to robot development. They will thus become capable of independent engineerir thinking and working in robotics and related areas of application. Contents: Teaching content: - Manipulators - Robot kinematics (incl. mathematical foundations) - Forward and inverse kinematics - Mobile robots - Sensors for mobile robots - Artificial intelligence and robotics | | | | | | | | igmeerin; | |
| Behaviour-based roboticsLearning robots | | | | | | | | | | |
| | Forms of teaching: Lecture, seminar-based teaching with exercises, practical course | | | | | | | | | |
| 4 | Lecture, | | sed teaching with e | exercise | es, practi | ical cou | rse | | | |
| 4 | | | | exercise | es, practi | ical cour | rse | | | |
| | | seminar-ba ion requirem No Ma | ents: one athematics 1 and 2, | , Comp | uter Sci | | | Mechanics, | Electrica | ıl |
| | Participat Formal: Content: Forms of | seminar-ba ion requirem No Mi En assessment: | ents: one athematics 1 and 2, gineering 1 and 2, | Comp Physics | uter Sci | ence, En | gineering | | | |
| 5 | Participat Formal: Content: Forms of Written | seminar-ba ion requirem No Ma En assessment: examination | ents: one athematics 1 and 2, | Comp Physics | uter Sci | ence, En | gineering | | | |
| 5 | Participat Formal: Content: Forms of Written of Prerequis Module | seminar-ba ion requirem No Ma En assessment: examination ite for the aw examination | ents: one athematics 1 and 2, gineering 1 and 2, n, combination examinated of credit points: n pass and course a | Comp Physics minatio | uter Scies son, perfo | ence, En | gineering | | | |
| 6 | Participat Formal: Content: Forms of Written of Prerequis Module Application | seminar-bation requirem No No En assessment: examination ite for the aw examination on of the moove Biotechn | ents: one athematics 1 and 2, gineering 1 and 2, n, combination examinated of credit points: n pass and course a dule (in the following mology B.Sc., Elect | Comp Physics minatio ssessm g study prical En | uter Scient, performent programment progra | rmance nes) ng B.En | examination | on or oral ex | xaminatio | on |
| 5 6 7 8 | Participat Formal: Content: Forms of Written of Prerequis Module Application Apparati Mechatro | seminar-ba ion requirem No Ma En assessment: examination ite for the aw examination on of the mon ve Biotechn onics B.Sc. ce of the grace | ents: one athematics 1 and 2, gineering 1 and 2, n, combination examinated of credit points: n pass and course a dule (in the following | Comp Physics minatio ssessmo g study prical En | uter Scient, performent programment progra | rmance nes) ng B.En | examination | on or oral ex | xaminatio | on |
| 5 6 7 8 8 9 | Participat Formal: Content: Forms of Written of Prerequis Module Application Apparati Mechatro Important accordin | seminar-ba ion requirem No Ma En assessment: examination ite for the aw examination on of the mon ve Biotechn onics B.Sc. ce of the grac g to BRPO | ents: one athematics 1 and 2, gineering 1 and 2, a, combination examinated of credit points: a pass and course a dule (in the following mology B.Sc., Elect and Industrial Eng | Comp Physics minatio ssessmo g study prical En | uter Scient, performent programment progra | rmance nes) ng B.En | examination | on or oral ex | xaminatio | on |
| 5 6 7 8 | Participat Formal: Content: Forms of Written of Prerequis Module of Application Apparati Mechatro Important accordin Module of | seminar-ba ion requirem No Ma En assessment: examination ite for the aw examination on of the mon ve Biotechn onics B.Sc. ce of the grace | ents: one athematics 1 and 2, gineering 1 and 2, n, combination examinated of credit points: n pass and course a dule (in the following nology B.Sc., Elect and Industrial Engile for the final grade: | Comp Physics minatio ssessmo g study prical En | uter Scient, performent programment progra | rmance nes) ng B.En | examination | on or oral ex | xaminatio | on |

| | Literature and other sources will be announced at the beginning of the course. |
|----|--|
| 12 | Language: |
| | German |

| Sens | sors | | | | | | | | SEN | | | |
|------------------------|--|-----------------|-------------------------------------|-----------------|-----------------|---------|--|----------------|------------|---------|--|--|
| Identification number: | | Workload: | Credits: | Study semester: | | | Frequency | y of the offer | Duration: | | | |
| 1242 | 2 | 150 h | 5 | 4th | 4th or 6th sem. | | | r) | 1 sem | ester | | |
| 1 | Course: | | Planned group sizes | | Scope | | Actual contact time / classroom teaching | | Self-study | | | |
| | Lecture | | 60 students | | 2 | SCH | 30 | h | 45 h | | | |
| | Tuition in | n seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h | | |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h | | |
| | Practical | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h | | |
| | Supervise | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h | | |
| 2 | the resul | ts of their wor | suring circuit. The | ney can | present | measure | ed results 1 | n a suitable | way and | documei | | |
| 3 | Contents | | | | | | | | | | | |
| | Measuring amplifier | | | | | | | | | | | |
| | AD converter typesMeasuring bridges | | | | | | | | | | | |
| | | | e and resistive se | ensors | | | | | | | | |
| | | erature measu | | | | | | | | | | |
| | | al sensors | | | | | | | | | | |
| 4 | | teaching: | | | | | | | | | | |
| 5 | | | d teaching and la | aboratoi | y exerc | ises | | | | | | |
| J | Participation requirements: Formal: Modules: 1068 Electronics 2; 1169 Metrology | | | | | | | | | | | |
| | Content: | Mod 1075 | ules: Electrical Engir | neering | 2 | | | | | | | |
| 5 | | assessment: | each with prelim | inary e | xaminat | ion | | | | | | |
| 7 | | | d of credit points: | | | | | | | | | |
| | | | bass with prelimi | | | | | | | | | |
| 8 | Electrica | al Engineering | le (in the following B.Eng. and Eng | ineerin | - | | ences B.Er | ng. | | | | |
| 9 | _ | ce of the grade | for the final grade: | | | | | | | | | |
| 10 | Module (| Coordinator: | | | | | | | | | | |
| | Prof. DrIng. Thomas Westerwalbesloh | | | | | | | | | | | |
| 11 | Other information: Literature will be announced at the beginning of the course. | | | | | | | | | | | |

12 Language:
German

| - 0 | nals and Sy | rstems | | | | | | | SigSy | S | |
|------------------|--|--|--|--|---|---------------------|------------------------------------|------------------------|------------|-----------|--|
| | ntification nber: | Workload: | Credits: | Study | Study semester: 4th or 6th sem. | | | Frequency of the offer | | Duration: | |
| 112 | | 150 h | 5 | 4th o | | | | ·) | 1 sem | ester | |
| 1 | Course: | | Planned group sizes | | Scope | | actual contact time / classroom | | Self-study | | |
| | Lecture | | 60 students | | 2 SCH | | teaching 30 h | | 45 | h | |
| | Tuition is | n seminars | 30 students | | 1 | SCH | 15 | h | 22.5 | h | |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h | |
| | | or seminar | 15 students | | 1 | SCH | 15 | h | 22.5 | h | |
| | | ed self-study outcomes/com | 60 students | | 0 | SCH | 0 | h | 0 | h | |
| | After completing the module, students can - name the different signal representations in time, frequency a appropriate transformations and apply them, - recognise linear and non-linear time-varying systems and explain - calculate and evaluate the transition from analogue to digital signal name analogue and digital modulation methods and critically come name analogue and digital modulation methods and critically come Laplace transform), - Continuous-time signals and their functional transformations (Fou Laplace transform), - Discrete-time signals and their functional transformations (zetransform) - Fundamentals of spectral analysis - Linear time invariant systems - Linear and non-linear distortions - The sampling theorem - Methods of analogue and digital modulation processes | | | | | | their essent | tial prope | erties, | | |
| 3 | - L - C - D tr - F - L - T - M | evel calculation on time aplace transform on time and non the sampling the sampling the sampling to the sampling the sampling of an application of a possible transfer of a po | ne signals and theirm), signals and their of spectral analysic variant systems -linear distortions heorem | r functi is s modula | ional t | ransforn | | | | | |
| | - L - C L - D tr - F - L - T - T | evel calculation on time and non the sampling to fethods of anathree laborator. | ne signals and theirm), signals and their of spectral analysicariant systems -linear distortions theorem alogue and digital | r functi is s modula nall grou | onal t | ransforn ocesses | nations (z | | | | |
| 4 | - L - C L - D tr - F - L - T - M - T | evel calculation on tinuous-time aplace transform) undamentals of inear time invinear and non the sampling to the feeting: Teaching: | ne signals and their orm), signals and their or spectral analysis variant systems -linear distortions heorem alogue and digitality practicals in smeather the systems of th | r functi is s modula nall grou | onal t | ransforn ocesses | nations (z | | | | |
| 4 | - L - C - L - D tr - F - L - T - M - T | evel calculation on tinuous time and non time and non the sampling the fethods of anathree laborator seminar-base tion requirement Non Mati | ne signals and their orm), signals and their or spectral analysis variant systems -linear distortions heorem alogue and digitality practicals in smeather the systems of th | r functi is modula nall grou atory pra | tion props | ocesses | nations (z | -transform, | discrete | | |
| 4 5 | - L - C L - D tr - F - L - T - M - T Forms of Lecture, Participa Formal: Content: | evel calculation on tinuous time and non the sampling the fethods of anathree laborator of teaching: seminar-base tion requirement of the sampling | ne signals and their orm), signals and their orm), signals and their of spectral analysis ariant systems rariant systems ralinear distortions theorem alogue and digital ray practicals in smooth the system of the | r functi is modula nall grou atory pra | tion praps | ocesses in smal | l groups. | ering 1 (107 | discrete | | |
| 4 5 | - L - C L - D tr - F - L - T - M - T Forms of Lecture, Participa Formal: Content: | evel calculation on tinuous-time aplace transform) undamentals of inear time invinear and non the sampling the fethods of anathree laborator. Seeminar-base tion requirement in the sampling of the sampling of the fethods of anathree laborator. Seeminar-base tion requirement in the sampling of the sampl | ne signals and their orm), signals and their orm), signals and their of spectral analysis variant systems -linear distortions heorem alogue and digital cry practicals in small order of the search of the system of | r functi is modula nall grou atory pra | tion praps | ocesses in smal | l groups. | ering 1 (107 | discrete | | |
| 3 4 5 7 | - L - C L - D tr - F - L - T - M - T Forms of Lecture, Participa Formal: Content: Forms of Written Prerequise | evel calculation on tinuous-time aplace transform) undamentals of inear time invinear and non the sampling the fethods of anathree laborators. Seminar-base tion requirement in and the sampling the fethods of anathree laborators. Seminar-base tion requirement in and the fethods of anathree in and the fethods of anathree laborators. Seminar-base tion requirement in and the fethods of anathree in an and the fethods of an anathree in an anathree in and the fethods of an anathree in an | ne signals and their orm), signals and their orm), signals and their of spectral analysis variant systems -linear distortions heorem alogue and digitality practicals in smooth of the system of the s | r functi is modula hall grou atory pra) and 2 (| tion properties. | cesses in smal | l groups. | ering 1 (107 | discrete | | |
| 4 5 | - L - C L - D tr - F - L - T - M - T Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicati | evel calculation on the sampling to the calculation requirement of the cases seems and the cases seems are cases are cas | ne signals and their orm), signals and their orm), signals and their of spectral analysis variant systems -linear distortions heorem alogue and digital cry practicals in small order of the search of the system of | r functions is a modula mall ground atory practices of a modula atory practices of a m | tion properties. 1152). prelimination | connes) | l groups. al Enginee | ering 1 (107 | discrete | | |

| | according to BRPO |
|----|--|
| 10 | Module Coordinator: |
| | Prof. DrIng. Rüdiger Schultheis |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| Simulation Technology | | | | | | | | | SIM | | |
|-----------------------|------------------------|--------------|-------------------|----------------------------|--------------------------|---|--|------------------|------------|--------|---|
| Ident numb | ification er: | Workload: | | Credits: | Credits: Study semester: | | Frequency of the offer | | Duration: | | |
| 1244 | 1244 150 h | | | 5 | 5th sem. | | | Annual Winter | | 1 sem. | |
| 1 | Course: | | Planned group siz | | es Scope | | Actual contact time / classroom teaching | | Self-study | | |
| | Lecture | | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in seminars | | 30 students | | | 1 | SCH | 15 | h | 22.5 | h |
| | Exercise | Exercise | | 20 students 15 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical or seminar 1 | | 15 | | | 1 | SCH | 15 | h | 22.5 | h |
| | Supervise | d self-study | 60 | 60 students | | 0 | SCH | 0 | h | 0 | h |

2 Learning outcomes/competences:

Students

- have an overview of different approaches to model-based development.
- create mechanical and electrical models and implement them in graphical form (as block diagrams, for example) in a simulation environment (such as MATLAB/Simulink).
- calculate simulation parameters from models and configure the simulation software accordingly.
- simulate mechanical and electrical models on a computer and evaluate the simulation results.
- compare simulated time response of modelled systems with measured signals of real-world systems and assess the model quality and simulation accuracy.
- can discretise continuous time models and implement them on an embedded system in form of difference equations (z-transforms).
- understand the principles of (first-order) numerical procedures for solving ordinary differential equations (ODEs) and evaluate the different procedures in terms of efficiency, stability and accuracy.
- outline and explain numerical methods (e.g. in direction fields).

3 Contents:

- Introduction to simulation technology.
- Model-based development (software-in-the-loop, model-in-the-loop, hardware-in-the-loop and rapid control prototyping).
- Methods of modelling (state space form, descriptor model and representation in the form of block diagrams).
- Modelling of mechanical systems and electrical circuits.
- Ordinary differential equations (ODEs), state space models, extended state space models and introduction in descriptor equation.
- Structural singularities and algebraic loops.
- Introduction in sampled data systems and discrete-time systems (difference equations and z-transforms)
- Numerical methods for ordinary differential equations (Euler procedure, Heun procedure, family of Runge-Kutta procedures).
- Stability and accuracy of numerical methods.
- Introduction in linear multistep methods.
- Practical course in simulation

4 Forms of teaching:

| | Lecture, semina | Lecture, seminar-based teaching with exercises, practical course | | | | | | |
|----|--|--|--|--|--|--|--|--|
| 5 | Participation requ | irements: | | | | | | |
| | Formal: None | | | | | | | |
| | Content: | Modules: | | | | | | |
| | | 1233 Feedback Control Engineering; | | | | | | |
| 6 | Forms of assessm | Forms of assessment: | | | | | | |
| | Written or oral | examination; in each case with preliminary examination performance | | | | | | |
| 7 | Prerequisite for the award of credit points: | | | | | | | |
| | Module examination pass with preliminary examination | | | | | | | |
| 8 | Application of the | e module (in the following study programmes) | | | | | | |
| | Electrical Engin | eering B.Eng., Engineering Computer Sciences B.Eng. and Mechatronics B.Sc. | | | | | | |
| 9 | Importance of the | grade for the final grade: | | | | | | |
| | according to BR | PO PO | | | | | | |
| 10 | Module Coordina | tor: | | | | | | |
| | Prof. DrIng. M | | | | | | | |
| 11 | Other information | I: | | | | | | |
| | Literature will b | be announced at the beginning of the course. | | | | | | |
| 12 | Language: | | | | | | | |
| | German | | | | | | | |

| | ial Media a | and Natural La | nguage Processi | ng | | | | | SMNL | P |
|-------|--------------------|---|--|--|--|---|---|-------------|--------------------------|---------|
| Iden | tification ber: | Workload: | Credits: | Study | semest | er: | Frequency of the offer | | Duration: | |
| 335 | | 150 h | 5 | 5th se | em. | | Annual (Winter) | | 1 Sem | ester |
| 1 | Course: | | Planned group s | sizes | Scope | ; | Actual co time / clast teaching | classroom | | у |
| | Lecture | | 60 students | | | SCH | 0 | h | 56 | h |
| | Tuition i | n seminars | 30 students | | 0 | SCH | 0 | h | 0 | h |
| | Exercise | | 20 students | | 2 | SCH | 16 | h | 62 | h |
| | Practical | or seminar | 15 students | | 0 | SCH | 0 | h | 0 | h |
| | Supervis | ed self-study | 60 students | | 1 | SCH | 16 | h | 0 | h |
| 2 | | outcomes/comp | | 11 . | | 1 0 | | Į. | 1 | 1 |
| | • | | ne the history an | | | el of soc | nal media. | | | |
| | • | | the technologies | | | ol 1' | o om d f | | ina (= : : | |
| | • | • | cripts to retrieve or newspaper arti | | om soci | ai medi | a and for w | eb crawl | ing (e.g. to |) extra |
| | • | - | the application a | | natural | language | e processing | and clas | sify the tec | chniaue |
| | | | the field of mach | | | | | 5 | J | 1 |
| | • | They apply N | LP methods for t | the synta | ctic an | d seman | tic analysis | of text da | ata. | |
| | | They implem | | which | data fro | m socia | l media is a | analysed | lata. Lusing NLP meth | |
| | | | | | | | | | | |
| | | | Manta | | | | | | | |
| 3 | Contents | : | | | | | | | | |
| 3 | Contents | | o social media (h | nistory, b | ousiness | s model, | technologie | es) | | |
| 3 | | Introduction t | o social media (h ta from social me | | | s model, | technologic | es) | | |
| 3 | • | Introduction t Retrieving da Retrieving da | ta from social me ta from websites | edia (AP and blog | Is) gs (web | crawlin | g) | | | |
| 3 | • | Introduction t Retrieving da Retrieving da Introduction t | ta from social me ta from websites o natural languaş | edia (AP and blog ge proces | Is) gs (web ssing (I | crawlin | g) story, moti | vation, fie | elds of app | licatio |
| 3 | • | Introduction t Retrieving dat Retrieving dat Introduction t relation to oth | ta from social me ta from websites o natural languaş er techniques of | edia (AP) and blog ge proces data mir | Is) gs (web ssing (I ning and | crawlin NLP) (hi d machii | g) story, moti [,] ne learning) | vation, fie | 11 | |
| 3 | • | Introduction to Retrieving data Retrieving data Introduction to relation to oth NLP methods | ta from social me ta from websites o natural languag er techniques of for the syntactic | edia (AP and blog ge proces data mir analysis | Is) gs (web ssing (I ning and s of tex | crawlin NLP) (hi d machii t data (e. | g) story, motine learning) g. for parsi | vation, fic | tence breal | |
| 3 | • | Introduction to Retrieving data Retrieving data Introduction to relation to oth NLP methods NLP methods | ta from social me ta from websites o natural languag er techniques of for the syntactic for the semantic | edia (AP and blog ge proces data min analysis analysis | Is) gs (web ssing (I ning and s of tex s of tex | crawlin NLP) (hi d machin t data (e. t data (e. | g) story, moti- ne learning) g. for parsi g. for senti- | vation, fic | tence breal | |
| 3 | • | Introduction to Retrieving data Retrieving data Introduction to relation to oth NLP methods NLP methods | ta from social me ta from websites o natural languag er techniques of for the syntactic | edia (AP and blog ge proces data min analysis analysis | Is) gs (web ssing (I ning and s of tex s of tex | crawlin NLP) (hi d machin t data (e. t data (e. | g) story, moti- ne learning) g. for parsi g. for senti- | vation, fic | tence breal | |
| 3 | • | Introduction to Retrieving data Retrieving data Introduction to relation to oth NLP methods NLP methods | ta from social me ta from websites o natural languag er techniques of for the syntactic for the semantic | edia (AP and blog ge proces data min analysis analysis | Is) gs (web ssing (I ning and s of tex s of tex | crawlin NLP) (hi d machin t data (e. t data (e. | g) story, moti- ne learning) g. for parsi g. for senti- | vation, fic | tence breal | |
| 3 | • | Introduction to Retrieving data Retrieving data Introduction to relation to oth NLP methods NLP methods | ta from social me ta from websites o natural languag er techniques of for the syntactic for the semantic | edia (AP and blog ge proces data min analysis analysis | Is) gs (web ssing (I ning and s of tex s of tex | crawlin NLP) (hi d machin t data (e. t data (e. | g) story, moti- ne learning) g. for parsi g. for senti- | vation, fic | tence breal | |
| 33 | • | Introduction to Retrieving data Retrieving data Introduction to relation to oth NLP methods NLP methods Case studies | ta from social me ta from websites o natural languag er techniques of for the syntactic for the semantic | edia (AP and blog ge proces data min analysis analysis | Is) gs (web ssing (I ning and s of tex s of tex | crawlin NLP) (hi d machin t data (e. t data (e. | g) story, moti- ne learning) g. for parsi g. for senti- | vation, fic | tence breal | |
| | Forms of | Introduction to Retrieving data Retrieving data Introduction to relation to oth NLP methods NLP methods Case studies Teaching: | ta from social me ta from websites o natural languag er techniques of for the syntactic for the semantic from market rese | edia (AP and blog ge proces data mir analysis analysis earch and | Is) gs (web ssing (I ning and s of tex s of tex I from t | crawlin NLP) (hi d machii t data (e. t data (e. the socia | g) story, motione learning) g. for parsions, for sentions of sciences | vation, fid | tence breal | |
| | Forms of | Introduction to Retrieving data Retrieving data Introduction to relation to oth NLP methods NLP methods Case studies Teaching: | ta from social me ta from websites o natural languag er techniques of for the syntactic for the semantic | edia (AP and blog ge proces data mir analysis analysis earch and | Is) gs (web ssing (I ning and s of tex s of tex I from t | crawlin NLP) (hi d machii t data (e. t data (e. the socia | g) story, motione learning) g. for parsions, for sentions of sciences | vation, fid | tence breal | |
| 4 | Forms of Self-stu | Introduction to Retrieving data Retrieving data Introduction to relation to oth NLP methods NLP methods Case studies Teaching: | ta from social me ta from websites o natural languag er techniques of for the syntactic for the semantic from market rese | edia (AP and blog ge proces data mir analysis analysis earch and | Is) gs (web ssing (I ning and s of tex s of tex I from t | crawlin NLP) (hi d machii t data (e. t data (e. the socia | g) story, motione learning) g. for parsions, for sentions of sciences | vation, fid | tence breal | |
| 4 | Forms of Self-str | Introduction to Retrieving day Retrieving day Introduction to relation to oth NLP methods NLP methods Case studies Teaching: | ta from social me ta from websites o natural languag er techniques of for the syntactic for the semantic from market rese rcises and practic | edia (AP and blog ge proces data mir analysis analysis earch and | Is) gs (web ssing (I ning and s of tex s of tex I from t | crawlin NLP) (hi d machii t data (e. t data (e. the socia | g) story, motione learning) g. for parsions, for sentions of sciences | vation, fid | tence breal | |
| 3 4 5 | Forms of Self-str | Introduction to Retrieving day Retrieving day Introduction to relation to oth NLP methods NLP methods Case studies of teaching: | ta from social me ta from websites to natural languag ter techniques of for the syntactic for the semantic from market rese recises and practic ts: | edia (AP) and blog ge proces data mir analysis analysis earch and | Is) gs (webssing (I ning and s of tex s of tex from the | o crawlin NLP) (hi d machin t data (e. t data (e. the socia | g) story, motione learning) g. for parsions. g. for sential sciences | vation, fid | tence breal | |
| 4 | Forms of Self-str | Introduction to Retrieving day Retrieving day Introduction to relation to oth NLP methods NLP methods Case studies Teaching: | ta from social me ta from websites o natural languag er techniques of for the syntactic for the semantic from market rese rcises and practic | edia (AP) and blog ge proces data mir analysis analysis analysis earch and | Is) gs (webssing (Ining and softex softex I from the form | o crawlin NLP) (hi d machin t data (e. t data (e. the social | g) story, motione learning) g. for parsions. g. for sential sciences | vation, fid | tence breal | |

| | Written exam, project work or oral exam |
|----|---|
| 7 | Prerequisite for the award of credit points: |
| | Module examination pass |
| 8 | Application of the module (in the following study programmes) |
| | Digital Technologies (work-integrated) B.Eng. |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | N. N. |
| 11 | Other information: |
| | |
| 12 | Language: |
| | German |

| Soft | ware Engir | neering | | | | | | | | SWE | |
|-------|---------------------------------|--------------|--------------------|---|----------------------|----------------------|-----------------------|---------------------|-----------------------------|----------------------|-----------|
| Ident | rification per: | Workle | oad: | Credits: | Stud | y semest | er: | Frequency | y of the offer | Duratio | on: |
| 1245 | 5 | 150 h | | 5 | 5 3rd or 5th sem. | | | Annual (Winter) | | 1 semester | |
| 1 | Course: | 1 | | Planned group s | sizes | Scop | e | Actual of time / co | lassroom | Self-stu | dy |
| | Lecture | | | 60 students | | 2 | SCH | 30 | h | 45 | h |
| | Tuition in | seminar | S | 30 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Exercise | | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical or seminar | | | 15 students | | 1 | SCH | 15 | h | 22.5 | h |
| | Supervise Study- Learning | | | 60 students | | 0 | SCH | 0 | h | 0 | h |
| | common They are | UML dable to | iagram plan and | implementati types. Student: d carry out soft nnology and bu | s can us tware te | e collat sts. The | oorative ey can ex | tools for y | version man benefits and | agement I problen | in a team |
| 3 | Contents: | | | | | | | | | | |
| | - Requir | ements | analvsis | and specificat | ion | | | | | | |
| | - Softwa | | - | 1 | | | | | | | |
| | - Use of | UML a | s a mod | elling language | e | | | | | | |
| | - Config | • | _ | ment | | | | | | | |
| | - Testing | | | | | | | | | | |
| | - Proces | | | | | | | | | | |
| 4 | Forms of | | | eaching with e | waraisa | nrooti | aal aau | **** | | | |
| 5 | Participat | | | cacining with c | ACICISC | s, practi | cai coui | 180 | | | |
| 3 | Formal: | ion requi | None | | | | | | | | |
| | Content: | | | edge of object- | -oriente | d progra | amming | | | | |
| | | | Module | 0 0 | | - r8- | | | | | |
| | | | | omputer Scien | | | | | | | |
| | | | | omputer Scien | ice 2 | | | | | | |
| 6 | Forms of | | | , | | | | | | | |
| 7 | | | | oral examination | on | | | | | | |
| 7 | | | | of credit points: s and course a | ccacema | nt | | | | | |
| 8 | | | | in the following | | | nes) | | | | |
| U | | | | ciences B.Eng | | • | | ering and | Managemer | nt B.Sc. | |
| 9 | | | | the final grade: | | | Liigiile | ting and | unugonioi | | |
| - | accordin | | - | | | | | | | | |
| 10 | Module C | | | | | | | | | | |
| | Prof. Dr. | rer. nat | . Georgi | os Lajios | | | | | | | |
| 11 | Other info | | | | | | | | | | |
| | | | e annoui | nced at the beg | inning | of the c | ourse. | | | | |
| 12 | Language | : | | | | | | | | | |
| | German | | | | | | | | | | |

| Stati | stics | | | | | | | | STAT | L | |
|----------------------------|--|--|---|--|--|--|--|----------------|------------|---------|--|
| Ident | tification ber: | Workload: | Credits: | Study | semes | ter: | Frequenc | y of the offer | Duration: | | |
| 3224 | | 150 h | 5 | 3rd o | r 4th s | em. | each semester | | 1 semester | | |
| 1 | Course: | | Planned group s | Planned group sizes | | e | Actual contact time / classroom teaching | | Self-study | | |
| | Lecture | | 60 students | | 2 | SCH | 0 | h | 56 | h | |
| | Tuition in seminars | | 30 students | | 0 SCH 0 h | | h | 0 h | | | |
| | Exercise | | 20 students | | 2 | SCH | 16 | h | 62 | h | |
| | Practical or seminar | | 15 students | | 0 | SCH | 0 | h | 0 | h | |
| | Supervise | ed self-study | 60 students | | 1 | SCH | 16 | h | 0 | h | |
| 2 | Learning outcomes/competences: | | | | | | | | | | |
| | Students | 3: | | | | | | | | | |
| | • | can explain ba | asic concepts of s | statistics. | | | | | | | |
| | • | can apply the | basic methods ar | nd proced | dures o | of descri | ntive stati | stics and pro | hability | theory | |
| | | | | - | | | • | - | • | - | |
| | | | alyse economic q | uestions | and p | robiems | with statis | sucai metno | as ana to | o snow | |
| | | correlations. | | | | | | | | | |
| | • | are able to sol | lve tasks with the | help of | suitabl | e softwa | are (SPSS | Excel). | | | |
| | | | | P | | | (| | | | |
| | | | | | | | | , , , . | | | |
| | | | | | | | | , , , . | | | |
| | | | | | | | | , , , . | | | |
| | | | | | | | | ,, | | | |
| 3 | Contents | : | | | | | | | | | |
| 3 | | | ratistics (one-dim | ensional | | | tributions, | | nultivari | iate | |
| 3 | • | Descriptive st | ratistics (one-dim | ensional | | | tributions, | | nultivari | iate | |
| 3 | • | Descriptive st statistics, regr | ression analysis) | | freque | ency dist | | | nultivari | iate | |
| 3 | • | Descriptive st statistics, regr Probability th | ression analysis) eory (discrete an | | freque | ency dist | | | nultivari | iate | |
| 3 | • | Descriptive st statistics, regr Probability th Statistical inte | ression analysis) eory (discrete and erference | | freque | ency dist | | | nultivari | iate | |
| 3 | • | Descriptive st statistics, regr Probability th | ression analysis) eory (discrete and erference | | freque | ency dist | | | multivari | iate | |
| 3 | • | Descriptive st statistics, regr Probability th Statistical inte | ression analysis) eory (discrete and erference | | freque | ency dist | | | multivari | iate | |
| | Forms of | Descriptive st statistics, regr Probability th Statistical into Use of Excel/ teaching: | ression analysis) eory (discrete and erference SPSS | d continu | freque | ency dist | ons) | measures, r | multivari | iate | |
| | Forms of | Descriptive st statistics, regr Probability th Statistical into Use of Excel/ teaching: | ression analysis) eory (discrete and erference | d continu | freque | ency dist | ons) | measures, r | multivari | iate | |
| 4 | Forms of Learning | Descriptive st statistics, regr Probability th Statistical into Use of Excel/ teaching: g units for self | ression analysis) eory (discrete and erference SPSS F-study, classroon | d continu | freque | ency dist | ons) | measures, r | multivari | iate | |
| 4 | Forms of Learning | Descriptive st statistics, regr Probability th Statistical into Use of Excel/ teaching: | ression analysis) eory (discrete and erference SPSS F-study, classroon | d continu | freque | ency dist | ons) | measures, r | multivari | iate | |
| 4 | Forms of Learning Participal Formal: | Descriptive st statistics, regr Probability th Statistical into Use of Excel/ teaching: g units for self | ression analysis) eory (discrete and erference SPSS F-study, classroon | d continu | freque | ency dist | ons) | measures, r | multivari | iate | |
| | Forms of Learning Participal Formal: Content: | Descriptive st statistics, regrestrosphere Probability the Statistical into Use of Excel/teaching: g units for self tion requirements | ression analysis) eory (discrete and erference SPSS F-study, classroon | d continu | freque | ency dist | ons) | measures, r | multivari | iate | |
| 4 | Forms of Learning Participal Formal: Content: | Descriptive st statistics, regr Probability th Statistical into Use of Excel/ teaching: g units for self | ression analysis) eory (discrete and erference SPSS F-study, classroon | d continu | freque | ency dist | ons) | measures, r | multivari | iate | |
| 5 | Forms of Learning Participal Formal: Content: Forms of | Descriptive st statistics, regrestratistics, regrestratistics, regrestrations. Probability the Statistical interestration of Excel/feaching: g units for self-tion requirement | ression analysis) eory (discrete and erference SPSS E-study, classroon ets: | d continu | freque uous d | ency dist | ons) | measures, r | | | |
| 5 | Forms of Learning Participal Formal: Content: Forms of Term pa | Descriptive st statistics, regrestratistics, regrestratistics, regrestrations. Probability the Statistical interestration of Excel/Steaching: g units for self- tion requirement | ression analysis) eory (discrete and erference SPSS E-study, classroon ats: | d continu | freque uous d | ency dist | ons) | measures, r | | | |
| 5 6 | Forms of Learning Participal Formal: Content: Forms of Term pa | Descriptive st statistics, regrestratistics, regrestrations. Probability the Statistical interestration of Excel/steaching: g units for self-steaching: g units for self-steaching: | ression analysis) eory (discrete and erference SPSS E-study, classroon ats: xamination, combonying the course | d continu | freque uous d | ency dist | ons) | measures, r | | | |
| 5 | Forms of Learning Participal Formal: Content: Forms of Term pate examina Prerequise | Descriptive st statistics, regrestratistics, regrestratistics, regrestrations. Probability the Statistical interestration of Excel/Teaching: g units for self-tion requirement | ression analysis) eory (discrete and erference SPSS E-study, classroon ats: xamination, combonying the course of credit points: | d continu | freque uous d | ency dist | ons) | measures, r | | | |
| 5 6 7 | Forms of Learning Participal Formal: Content: Forms of Term participal examina Prerequision Module | Descriptive st statistics, regress regressions requirements assessment: aper, written extring accompanite for the awar examination probability the Statistical interest of the statistical interest of the statistical interest of the statistics of | ression analysis) eory (discrete and erference SPSS F-study, classroom ets: examination, combining the course of of credit points: | n session | freque uous d | ency dist | ons) | measures, r | | | |
| 5 6 7 | Forms of Learning Participal Formal: Content: Forms of Term participal examinal Prerequision Module Application | Descriptive st statistics, regrestratistics, regrestratistics, regrestrations. Probability the Statistical into Use of Excel/feaching: g units for self tion requirement | ression analysis) eory (discrete and erference SPSS E-study, classroom ats: examination, combining the course of credit points: bass le (in the following | n session | frequence de la companya de la compa | ency distribution | of exercise | measures, r | nation or | | |
| 5 6 7 | Forms of Learning Participar Formal: Content: Forms of Term parexamina Prerequise Module Application Digital | Descriptive st statistics, regrestratistics, regrestratistics, regrestrations, regrestration extends the statistical interestration requirements assessment: The statistical interestration requirements assessment: The statistic regrestration accompassite for the aware examination proof the modulus assessments. | ression analysis) eory (discrete and erference SPSS E-study, classroom ats: examination, combining the course of credit points: bass le (in the following work-integrated) | n session pined exa | frequence de la companya de la compa | ency distribution | ons) of exercise | measures, r | nation or | I) B.En | |
| 5 6 7 | Forms of Learning Participar Formal: Content: Forms of Term parexamina Prerequise Module Application Digital Mechatr | Descriptive st statistics, regrestatistics, regrestatistics, regrestations, regrestation examination properties of the statistical interestation requirements assessment: The second of the second of the second of the modular and second of the second of the modular and second of the second of the modular and second of the modular and second of the modular and second of the sec | ression analysis) eory (discrete and erference SPSS E-study, classroon ats: examination, combining the course of credit points: bass le (in the following work-integrated) attion (work-integrated) | n session pined exa | frequence de la companya de la compa | ency distribution is form of the form of t | ons) of exercise ject work, echnologie | measures, r | nation or | I) B.En | |
| 5 6 7 | Forms of Learning Participar Formal: Content: Forms of Term parexamina Prerequise Module Application Digital Mechatr | Descriptive st statistics, regrestatistics, regrestatistics, regrestations, regrestation examination properties of the statistical interestation requirements assessment: The second of the second of the second of the modular and second of the second of the modular and second of the second of the modular and second of the modular and second of the modular and second of the sec | ression analysis) eory (discrete and erference SPSS E-study, classroom ats: examination, combining the course of credit points: bass le (in the following work-integrated) | n session pined exa | frequence de la companya de la compa | ency distribution is form of the form of t | ons) of exercise ject work, echnologie | measures, r | nation or | I) B.En | |
| 5 6 7 | Forms of Learning Participar Formal: Content: Forms of Term parexamina Prerequise Module Application Digital Mechatr | Descriptive st statistics, regrestatistics, regrestatistics, regrestations, regrestation examination properties of the statistical interestation requirements assessment: The second of the second of the second of the modular and second of the second of the modular and second of the second of the modular and second of the modular and second of the modular and second of the sec | ression analysis) eory (discrete and erference SPSS E-study, classroon ats: examination, combining the course of credit points: bass le (in the following work-integrated) attion (work-integrated) | n session pined exa | frequence de la companya de la compa | ency distribution is form of the form of t | ons) of exercise ject work, echnologie | measures, r | nation or | I) B.En | |
| 4 5 6 7 8 | Forms of Learning Participal Formal: Content: Forms of Term pa examina Prerequis Module Applicati Digital Mechatr B.Eng. a | Descriptive st statistics, regrest Probability th Statistical interest Use of Excel/Teaching: g units for self-tion requirement | ression analysis) eory (discrete and erference SPSS E-study, classroon ats: examination, combining the course of credit points: bass le (in the following work-integrated) attion (work-integrated) | n session pined exa g study pr B.Eng. grated) B Manage | frequence de la companya de la compa | ency distribution is form of the form of t | ons) of exercise ject work, echnologie | measures, r | nation or | I) B.En | |
| 5 6 7 8 8 | Forms of Learning Participal Formal: Content: Forms of Term pal examina Prerequision Module Application Digital Mechatr B.Eng. a | Descriptive st statistics, regrest statistics, regrest statistics, regrest statistical interpretation requirements assessment: aper, written extraor accompasite for the awar examination proof the modulus Logistics (vonics/Automand Industrial receptor). | ression analysis) eory (discrete and erference SPSS E-study, classroom ats: examination, combining the course of credit points: bass le (in the following work-integrated) atton (work-integrated) etion (work-integrated) Engineering and | n session pined exa g study pr B.Eng. grated) B Manage | frequence de la companya de la compa | ency distribution is form of the form of t | ons) of exercise ject work, echnologie | measures, r | nation or | I) B.En | |
| 5 7 8 8 | Forms of Learning Participal Formal: Content: Forms of Term pal examina Prerequis Module Applicati Digital Mechatr B.Eng. a | Descriptive st statistics, regrest statistics, regrest statistics, regrest statistics, regrest statistical interpretation of teaching: gunits for self ston requirements assessment: aper, written extra accompassite for the awar examination proposed for the modulus and Industrial ce of the grade ag to BRPO | ression analysis) eory (discrete and erference SPSS E-study, classroom ats: examination, combining the course of credit points: bass le (in the following work-integrated) atton (work-integrated) etion (work-integrated) Engineering and | n session pined exa g study pr B.Eng. grated) B Manage | frequence de la constant de la const | ency distribution is form of the form of t | ons) of exercise ject work, echnologie | measures, r | nation or | I) B.En | |
| 4 5 6 7 8 | Forms of Learning Participal Formal: Content: Forms of Term pa examina Prerequis Module Applicati Digital Mechatr B.Eng. a Importan accordin | Descriptive st statistics, regrestatistics, regrestatistics, regrestations, regrestation examination produced by the statistical interestation requirements of the modular and Industrial regrestations. The station accompanies for the award examination produced by the station accompanies for the modular and Industrial regrestations. The station accompanies for the grade and Industrial regrestations are stationally the stational according to the grade and the stational according to the grade and the stational according to the grade and the stational according to the stational accordin | ression analysis) eory (discrete and erference SPSS E-study, classroon ats: Examination, combining the course of of credit points: bass le (in the following work-integrated) attion (work-integrated) the form the final grade: | n session pined exa g study pr B.Eng. grated) B Manage | frequence de la constant de la const | ency distribution is form of the form of t | ons) of exercise ject work, echnologie | measures, r | nation or | I) B.En | |
| 4 5 6 7 8 9 | Forms of Learning Participal Formal: Content: Forms of Term palexamina Prerequis Module Applicati Digital Mechatr B.Eng. a Important according Module Corrections | Descriptive st statistics, regrest Probability th Statistical interest Use of Excel/ teaching: g units for self tion requirement | ression analysis) eory (discrete and erference SPSS E-study, classroon ats: Examination, combining the course of of credit points: bass le (in the following work-integrated) attion (work-integrated) the form the final grade: | n session pined exa g study pr B.Eng. grated) B Manage | frequence de la constant de la const | ency distribution is form of the form of t | ons) of exercise ject work, echnologie | measures, r | nation or | I) B.En | |
| 5 6 7 8 | Forms of Learning Participal Formal: Content: Forms of Term palexamina Prerequis Module Applicati Digital Mechatr B.Eng. a Important according Module Corrections | Descriptive st statistics, regrestatistics, regrestatistics, regrestations, regrestation examination produced by the statistical interestation requirements of the modular and Industrial regrestations. The station accompanies for the award examination produced by the station accompanies for the modular and Industrial regrestations. The station accompanies for the grade and Industrial regrestations are stationally the stational according to the grade and the stational according to the grade and the stational according to the grade and the stational according to the stational accordin | ression analysis) eory (discrete and erference SPSS E-study, classroon ats: Examination, combining the course of of credit points: bass le (in the following work-integrated) attion (work-integrated) the form the final grade: | n session pined exa g study pr B.Eng. grated) B Manage | frequence de la constant de la const | ency distribution is form of the form of t | ons) of exercise ject work, echnologie | measures, r | nation or | I) B.En | |

12 Language:
German

| Stud | dent Resear | rch Project (Pro | oject 2) | | | | | | STA | |
|-------------|----------------------------|---|--|--|--|---|---|--------------------|--------------|---------|
| Iden num | tification | Workload: | Credits: | Study | semest | er: | Frequency | of the offer | Duration | 1: |
| 121 | | 150 h | 5 | 5th s | em. | | Annual (Winter) | | 1 semes | ster |
| 1 | Course: | | Planned group sizes Scope | | | e | Actual co | | Self-study | |
| | Lecture | | 60 students | 0 | SCH | 0 | h | 0 | h | |
| | | n seminars | 30 students | | 0 | SCH | 0 | h | 0 | h |
| | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| | Practical | or seminar | 15 students | | 2 | SCH | 30 | h | 120 | h |
| | Supervise | ed self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| 3 | Contents | y an examiner rithin the univership the students he students in adependently as the students usuritically reflects: Information propagation of solution plementation | ave sufficient kence to solve a condependently obtessess to what extending on the achievement on strategies of project goals all available sou | rer) of t knowled, omplex train all sent thes heir worked state | ge and opic. necessae goals k steps of the | skills ry infor can be a and solu r work. | amme. The to apply t rmation, an achieved ar | he methodalyse the | g is to take | king in |
| 4 | Term p | teaching: aper with plane by an examin | nning "mileston er. | es" and | final | colloqui | ium, regula | ar feedbac | k discussi | ion and |
| 5 | Participa Formal: Content: | tion requirement None None | : | | | | | | | |
| 6 | Forms of | assessment: | ation examination | n | | | | | | |
| 7 | | | l of credit points: | ш | | | | | | |
| • | _ | | ass and course as | ssessme | nt | | | | | |
| 8 | Applicati | on of the modul | e (in the following Sciences B.Eng | study pr | | nes) | | | | |
| 9 | | | or the final grade: | | | | | | | |
| _ | _ | ng to BRPO | 8.4400 | | | | | | | |
| 10 | Module (| Coordinator: | | | | | | | | |
| | | Ing. Lutz Gri | | | | | | | | |

11 Other information:

Faculty tutoring is provided in each case by an examiner from the study programme, whom the student can select himself or herself according to the topic. All lecturers in the programme should each provide several topics in time for the winter semester.

If, at the proposal of the examiner, the course work is carried out as a joint project by several students, the examiner is responsible for ensuring that a clearly defined, significant and assessable share of the work is determined in advance for each student in the group.

In a discussion with the examiner, the expected scope and form of the work is determined at the beginning of the student research phase.

12 Language:

German

| Identi numbe 1218 | fication | Workload: | | | | | | | | |
|-------------------------|--|--|---|--|--|--|--|-----------------------|----------------------------------|-----------------------|
| | per: | | Credits: | Study | semes | er: | Frequency of the offer | | Duration: | |
| | | 150 h | 5 | 3rd sem. | | | Annual (Winter) | | 1 semester | |
| 1 | Course: | 1 | Planned group s | Planned group sizes | | | Actual contact time / classroom teaching | | Self-study | |
| • | Lecture | | 60 students | | 0 | SCH | 0 | h | 0 | h |
| - | Tuition in | seminars | 30 students | | 0 | SCH | 0 | h | 0 | h |
| • | Exercise | | 20 students | | 0 | SCH | 0 | h | 0 | h |
| - | | or seminar | 15 students | | 2 | SCH | 30 | h | 120 | h |
| - | Supervise | d self-study | 60 students | | 0 | SCH | 0 | h | 0 | h |
| 2 | Learning | outcomes/comp | betences: | | | | 1 | _ | | |
| 3 | red red so red s | sponsible for a rry out project all groups. scuss interfact am. lve conflicts, stify decisions intly prepare panning, development on drive | project into subt the content and to the transition of the e agreements, im develop their und s and present rest project documents opment and implant, kinematics, pat | imely in ner, defin nplement derstand ults. tation. | ion of and | ntation. s and ma sary soft their role a given p | ware competent in the tead | onents and m and take | independ debug th responsi | lently in the bility. |
| | - Do - M - Ay - Im - Do - Pr | ecomposition ilestone plann greeing on into plementation bebugging soft hases of system oblem-solving | g and identification into subproblem into subproblem into at team and a cerfaces between of the necessary ware and development for g and decision-mad documentation | s and the subgrou the subg softwar from desi- naking be | eir distrep level groups or competer competer competer competer to e | ribution of a team conents | to subgrount n in the gr | ps of the te | am | |
| 4 | Forms of | | | | | | | | | |
| | | oject in the la | | | | | | | | |
| 5 | - | ion requiremen | | | | | | | | |
| , | Formal: | None | | | | | | | | |
| | Content: | | c electronics and | progran | nming | knowled | .ge | | | |
| 6 | | assessment: | | | | | | | | |
| | | | ion examination | or oral e | examin | ation | | | | |
| 7 | _ | | d of credit points: | | | | | | | |
| I | Module | examination p | ass | | | | | | | |
| 8 | | | le (in the following | | | ` | | | | |

| 9 | Importance of the grade for the final grade: |
|----|--|
| | according to BRPO |
| 10 | Module Coordinator: |
| | Prof. Dr. rer. nat. Axel Schneider |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. |
| 12 | Language: |
| | German |

| T.J. · | nical Engl | lish 1 | | | | | | | FSE1 | |
|--------------|---|--|--|---|-----------------|---|--|---|---|---------------------------------------|
| | ification | Workload: | Credits: | Study | semest | er: | Frequency | of the offer | Duratio | on: |
| numb 1085 | | 150 h | 5 | 1st se seme | emester ster | r3 rd | Annual (Winter) | | 1 semester | |
| 1 | Course: | | Planned group s | ned group sizes Scope | | | Actual contact time / classroom teaching | | Self-study | |
| | Lecture | | | | 0 | SCH | 0 | h | 0 | h |
| | Tuition in | n seminars | 30 students | | 4 | SCH | 60 | h | 90 | h |
| | Exercise | | | | 0 | SCH | 0 | h | 0 | h |
| | Practical | or seminar | | | 0 | SCH | 0 | h | 0 | h |
| | Supervise | ed self-study | 30 students | | 0 | SCH | 0 | h | 0 | h |
| 3 | Contents: - Ti - Ti di m tr: - Ti | he students ca hey master the mensions and aterials; manuansmission). | n describe relevante core terminold shapes; mather interdisciplinary | r solving target gr able to material on tengine ogy of ematical tomation | eering the tee | responsi ise work disciplin chnical tions; fo | hes. topic (e.g. prees and lectricity; | an present their learn meet deadl base unit mechanisi ogistics; da | ing procines. s in engms; procenta proce | gineering; perties of ssing and |
| | di | scussing diag | rams). | | | | | | | |
| 4 | Forms of | teaching: | | | | | | | | |
| 4 | Seminar | | ng, individual and | l group v | work, e | etc. | | | | |
| 4 5 | Seminar Semeste Participat | -based teaching project (Assi | ignment) | l group v | work, e | tc. | | | | |
| | Seminar Semeste | -based teaching r project (Assistion requirement None | ignment) | | | | ng to the F | European R | eference | |
| | Seminar Semeste Participat Formal: Content: | -based teaching r project (Assistion requirement None Engl | ignment) ts: | npetence | | | ng to the I | European R | eference | |

| 7 | Prerequisite for the award of credit points: |
|----|--|
| | 70% attendance and active participation; passed semester project and written exam |
| 8 | Application of the module (in the following study programmes) |
| | Electrical Engineering B.Eng., Engineering Computer Sciences B.Eng. and Renewable Energies |
| | B.Eng. |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | OStR Cornelia Biegler-König |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. Textbook, additional |
| | materials, intranet self-study courses |
| 12 | Language: |
| | English |

| | nnical Eng | lish 2 | | | | | | | FSE2 | | |
|-------|---|--|--|---|---------------------------------------|---------------------------------|-------------------------|--------------------|------------|------------|--|
| Ident | tification | Workload: | Credits: | Study | semest | er: | Frequenc | y of the offer | Duratio | on: | |
| 1086 | | 150 h | 5 | | 4th semester 6 th semester | | | Annual (Summer) | | 1 semester | |
| 1 | Course: | | Planned group s | Planned group sizes | | e | Actual time / c teachin | lassroom | Self-study | | |
| | Lecture | | | | | SCH | 0 | h | 0 | h | |
| | | n seminars | 30 students | 0 students | | | 60 | h | 90 | h | |
| | Exercise | | | | 0 | SCH | 0 | h | 0 | h | |
| | Practical | or seminar | | | 0 | SCH | 0 | h | 0 | h | |
| | Supervis | ed self-study | 30 students | | 0 | SCH | 0 | h | 0 | h | |
| 3 | - M T cc - P a Contents - Stude - They automat | Methodological They present the contexts and ma dersonal compet uthentic Englis ents can activel master the core ded systems; dis | y participate in in e terminology for scussing readings | ney are a concisely essment. ow Engi | onal cog with p | skim te n speaki nency ar | ing and in | writing. Th | ey establi | ish wide | |
| | | ic sectors, ma | disciplinary skil unufacturing pro uasion strategies | - cesses | projec | | | | | arketing | |
| 4 | Forms of Seminar | ic sectors, maic writing; pers | nufacturing pro uasion strategies | - cesses | projects; pitcl | ning a t | | | | arketing | |
| 4 | Forms of Seminar | ic sectors, maic writing; personal teaching: r-based teaching | nufacturing pro nuasion strategies g, individual and gnment) | - cesses | projects; pitcl | ning a t | | | | arketing | |
| | Forms of Seminar | ic sectors, maic writing; personal control of teaching: r-based teaching reproject (Assignation requirement) Mod | anufacturing pro nuasion strategies g, individual and gnment) | - cesses | projects; pitcl | ning a t | | | | arketing | |
| | Forms of Seminar Seminar Participa | ic sectors, made ic writing; personal ic writing; personal ic writing; personal ic writing; r-based teaching; r-based te | g, individual and anment) ts: ules: Technical Engli | - cesses s). I group v | projec s; pitcl work, e | etc. | echnical | product; co | onference | arketing | |
| | Forms of Seminar Seminar Participa Formal: | ic sectors, made ic writing; personal ic writing; personal ic writing; personal ic writing; r-based teaching; r-based te | g, individual and anment) ts: ules: Technical Engli | - cesses s). I group v | projec s; pitcl work, e | etc. | echnical | product; co | onference | arketing | |

| | 70% attendance and active participation, passed semester project and written exam |
|----|--|
| 8 | Application of the module (in the following study programmes) |
| | Electrical Engineering B.Eng., Engineering Computer Sciences B.Eng. and Renewable Energies |
| | B.Eng. |
| 9 | Importance of the grade for the final grade: |
| | according to BRPO |
| 10 | Module Coordinator: |
| | OStR Cornelia Biegler-König |
| 11 | Other information: |
| | Literature will be announced at the beginning of the course. Textbook, course |
| | supplementary materials, self-study courses |
| | Study programmes in Electrical Engineering, Engineering Computer Sciences, Renewable Energies: |
| | Elective subject |
| 12 | Language: |
| | English |

| THE | oretical Co | mputer | Science | | | | | | | TI | | |
|-----------------------|--|--|--|---|-------------------------------|--|--------------------------------|--|-------------------|------------|-------|--|
| Ident | ification | Workl | oad: | Credits: | Study | semes | ter: | Frequency | of the offer | Duratio | on: | |
| 1299 | | 150 h | | 5 | 4th o | r 6th s | em. | Annual (Summer |) | 1 sem | ester | |
| 1 | Course: | | P | lanned group s | sizes | Scop | e | Actual contact time / classroom teaching | | Self-study | | |
| | Lecture | | 6 | 0 students | | 0 | SCH | 0 | h | 0 | h | |
| | Tuition in | n seminai | rs 3 | 0 students | | 4 | SCH | 60 | h | 90 | h | |
| | Exercise | | 2 | 0 students | | 0 | SCH | 0 | h | 0 | h | |
| | Practical | | | 5 students | | 0 | SCH | 0 | h | 0 | h | |
| | Supervised self-study 60 students 0 SCH 0 h | | | | | | | | | 0 | h | |
| 2 | | Learning outcomes/competences: Students can | | | | | | | | | | |
| | - di - di | scuss th | e problen e P-NP p | y hierarchy ar ns of calculat roblem with t the compiler | oility and the help | decidate decidate decident dec | ability an | nd the halti | | | | |
| 3 | Contents: | | | | | | | | | | | |
| | | | | tput, determi | nistic, no | n-dete | rministic | c) | | | | |
| | | egular te | | | | | | | | | | |
| | | | | -free languag | ges | | | | | | | |
| | | | n automat | | | | | | | | | |
| | | | | nd type 0 lan | iguages, | Turing | machin | e | | | | |
| | | | hierarchy | / idability, Chi | urah'a th | oic he | lting pr | hlam | | | | |
| | | | | , P-NP proble | | 2818, 112 | nung pro | obieiii | | | | |
| | | | construct | | 2111 | | | | | | | |
| 4 | Forms of | | | | | | | | | | | |
| | Seminar | -based t | eaching | | | | | | | | | |
| | Participat | ion requi | irements: | | | | | | | | | |
| 5 | Formal: | | N | | | | | | | | | |
| 5 | | | None | | | | | | | | | |
| | Content: | 00000000 | ant. | | | | | | | | | |
| | Forms of Term pa examina | per, wri tion, pro | tten exam oject work | ination, com | bination nation or | examin course | nation, c e-related | ourse asses examination | ssment, per on | formance | e | |
| 6 | Forms of Term pa examina | per, writion, pro | tten exam oject work e award of | c, oral examination | bination nation or | examin course | nation, c e-related | ourse asses examination | ssment, per on | formance | e | |
| 7 | Forms of Term pa examina Prerequis Module | per, writion, prolite for the examina | tten examoject work | credit points: | nation or | course | e-related | ourse asses examination | ssment, per on | formance | e | |
| 7 | Forms of Term pa examina Prerequis Module Applicati | per, writion, prolite for the examination of the | tten example tten example two results to the control of the contro | credit points: | nation or | course | nes) | examination | ssment, per on | formance | e | |
| 7 | Forms of Term pa examina Prerequis Module Applicati Applied | per, wri tion, pro ite for th examina on of the Mathen | tten exam oject work e award of ation pass module (i natics B.S | credit points: n the following c. and Engine | nation or g study preering In | course | nes) | examination | ssment, per on | formance | e | |
| 5 6 7 8 9 | Forms of Term pa examina Prerequis Module Applicati Applied Important | per, writion, prolite for the examination of the Mathematical of the mathematical desired from t | tten example two holes work work was a ward of ation pass module (in atics B.S. grade for the same work work work work work work work work | credit points: | g study preering In | ogramr | e-related nes) tics B.Er | examination | ssment, per on | formance | e | |
| 7 | Forms of Term pa examina Prerequis Module Applicati Applied Important | ite for the examination of the Mathemice of the g to BR | tten exam pject work e award of ation pass module (i natics B.S grade for t PO or SP | credit points: n the following c. and Engine he final grade: | g study preering In | ogramr | e-related nes) tics B.Er | examination | ssment, per on | formance | e | |

| 11 Other information: | | | | | | | | |
|-----------------------|--|--|--|--|--|--|--|--|
| | Literature will be announced at the beginning of the course. | | | | | | | |
| 12 | Language: | | | | | | | |
| | German | | | | | | | |

| Elective Module | | | | | | | | | | | WM | | |
|------------------------|---|---|-------|---------------------|------------------|-------|-----|--|---|------------|----|--|--|
| Identification number: | | Workload: | | Credits: | Study semester: | | er: | Frequency of the offer | | Duration: | | | |
| 9001 | | 150 h | | 5 | 4th/5th/6th sem. | | | each semester | | 1 semester | | | |
| 1 | Course: | | Pl | Planned group sizes | | Scope | | Actual contact time / classroom teaching | | Self-study | | | |
| | Lecture | | 60 | 60 students | | | SCH | | h | | h | | |
| | Tuition in seminars | | 30 | 30 students | | | SCH | | h | | h | | |
| Exercise | | | 20 |) students | | 0 | SCH | 0 | h | 0 | h | | |
| | Practical or seminar | | | 15 students | | 0 | SCH | 0 | h | 0 | h | | |
| | Supervised self-study | | | 60 students | | | SCH | | h | | h | | |
| 2 | Learning outcomes/competences: | | | | | | | | | | | | |
| 3 | Contents: | | | | | | | | | | | | |
| 4 | Forms of teaching: | | | | | | | | | | | | |
| 5 | Participation requirements: | | | | | | | | | | | | |
| | Formal: | | | | | | | | | | | | |
| | Content: | | | | | | | | | | | | |
| 6 | Forms of assessment: | | | | | | | | | | | | |
| 7 | Prerequisite for the award of credit points: | | | | | | | | | | | | |
| 8 | Application of the module (in the following study programmes) | | | | | | | | | | | | |
| 5 | Engineering Computer Sciences B.Eng. | | | | | | | | | | | | |
| 9 | Importance of the grade for the final grade: | | | | | | | | | | | | |
| 10 | | Module Coordinator: Prof. DrIng. Lutz Grünwoldt | | | | | | | | | | | |
| 1.1 | Other info | rmation: | Grunw | | | | | | | | | | |
| 11 | | | | | | | | | | | | | |
| 12 | Language: | | | | | | | | | | | | |
| | German | | | | | | | | | | | | |