B.Sc. Information System Technology - Basic Modules (PO 2015)

Module handbook
SB iST
Date: 01.03.2022

TECHNISCHE UNIVERSITÄT DARMSTADT

SB iST

This module manual only contains the madatory modules. An additional module manual lists the Options (Optionals and Applications).

Module handbook: B.Sc. Information System Technology - Basic Modules (PO 2015)

Date: 01.03.2022

SB iST
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Contents

1 Fundamentals

1.1 Fundamentals of Mathematics

Module name Mathematics I (Electrical Engineering)					
Module nr. 04-00-0108	**Credit points** 8 CP	**Workload** 240 h	**Self study** 180 h	**Module duration** 1 Term	**Module cycle** Every 2. Sem.
Language German			**Module owner** Apl. Prof. Dr. rer. nat. Steffen Roch		
1	**Teaching content** Basics, real and complex numbers, real funktions, continuity, differential and integral calculus in one variable, vector spaces, linear mappings, systems of linear equations				
2	**Learning objectives**				
3	**Recommended prerequisites for participation**				
4	**Form of examination** Module exam: • Module exam (Technical examination, Oral/written examination, Default RS)				
5	**Prerequisite for the award of credit points** Passing the final module examination				
6	**Grading** Module exam: • Module exam (Technical examination, Oral/written examination, Weighting: 100 %)				
7	**Usability of the module** Für B.Sc.ETiT, B.Ed.ETiT, B.Sc.WIETiT, B. Sc. Mec, B. Sc. CE, B. Sc. IST, B. Sc. MedTech				
8	**Grade bonus compliant to §25 (2)**				
9	**References**				
Courses					
	Course Nr. 04-00-0126-vu	**Course name** Mathematics I (Electical Engineering)			
	Instructor Apl. Prof. Dr. rer. nat. Steffen Roch			**Type** Lecture and practice	**SWS** 6

Module name Mathematics II (Electrical Engineering)					
Module nr. 04-00-0109	**Credit points** 8 CP	**Workload** 240 h	**Self study** 180 h	**Module duration** 1 Term	**Module cycle** Every 2. Sem.
Language German			**Module owner** Apl. Prof. Dr. rer. nat. Steffen Roch		

1	**Teaching content** Determinants, eigenvalues, quadratic forms, sequences and series of functions, Taylor and Fourier series, differentiala calculus in R^n, extrema, inverse and implicit functions, path integrals, integration in R^n
2	**Learning objectives**
3	**Recommended prerequisites for participation**
4	**Form of examination** Module exam: • Module exam (Technical examination, Oral/written examination, Default RS)
5	**Prerequisite for the award of credit points** Passing the final module examination
6	**Grading** Module exam: • Module exam (Technical examination, Oral/written examination, Weighting: 100 %)
7	**Usability of the module** B.Sc.ETiT, B.Ed.ETiT, B.Sc.WIETiT, B. Sc. Mec, B. Sc. CE, B. Sc. IST, B. Sc. MedTech
8	**Grade bonus compliant to §25 (2)**
9	**References**

Courses

	Course Nr. 04-00-0079-vu	**Course name** Mathematics II (Electrical Engineering)		
	Instructor Apl. Prof. Dr. rer. nat. Steffen Roch		**Type** Lecture and practice	**SWS** 6

Module name Mathematics III (Electrical Engineering)					
Module nr. 04-00-0111	**Credit points** 8 CP	**Workload** 240 h	**Self study** 180 h	**Module duration** 1 Term	**Module cycle** Every 2. Sem.
Language German			**Module owner** Apl. Prof. Dr. rer. nat. Steffen Roch		

1	**Teaching content** integral calculus: surface integrals, integral theorems; ordinary differential equations: linear and non-linear differential equations, existence and uniqueness of solutions, elementary techniques, linear systems with constant coefficients, Laplace transform; Complex Analysis: complex functions, complex differentiation, Cauchy's integral formula, power series and Laurent series, residues, residue theorem
2	**Learning objectives**
3	**Recommended prerequisites for participation**
4	**Form of examination** Module exam: • Module exam (Technical examination, Oral/written examination, Default RS)
5	**Prerequisite for the award of credit points** Passing the final module examination
6	**Grading** Module exam: • Module exam (Technical examination, Oral/written examination, Weighting: 100 %)
7	**Usability of the module** B.Sc.ETiT, B.Ed.ETiT, B.Sc.WIETiT, B. C. MedTech, B.Sc.MEC, B.Sc.CE, B.Sc.IST
8	**Grade bonus compliant to §25 (2)**
9	**References**

Courses

	Course Nr. 04-00-0127-vu	**Course name** Mathematics III (Electrical Engineering)		
	Instructor Apl. Prof. Dr. rer. nat. Steffen Roch		**Type** Lecture and practice	**SWS** 6

Module name Numerical and Statistical Methods					
Module nr. 04-00-0112	**Credit points** 8 CP	**Workload** 240 h	**Self study** 180 h	**Module duration** 1 Term	**Module cycle** Every 2. Sem.
Language German			**Module owner** Prof. Dr. rer. nat. Stefan Ulbrich		

1	**Teaching content** Numerical Analysis: linear equations, interpolation, numerical integration, systems of nonlinear equations, initial value problems for ODEs, numerical methods for eigenvalue problems Statistics: basic concepts of statistics and probability theory, regression, multivariate distributions, methods of estimation, confidence intervals, tests for normally distributed random variables, robust statistics
2	**Learning objectives**
3	**Recommended prerequisites for participation**
4	**Form of examination** Module exam: • Module exam (Technical examination, Oral/written examination, Default RS)
5	**Prerequisite for the award of credit points** Passing the final module examination
6	**Grading** Module exam: • Module exam (Technical examination, Oral/written examination, Weighting: 100 %)
7	**Usability of the module**
8	**Grade bonus compliant to §25 (2)**
9	**References**

Courses

	Course Nr. 04-00-0081-vu	**Course name** Numerical and Statistical Methods		
	Instructor Prof. Dr. rer. nat. Stefan Ulbrich		**Type** Lecture and practice	**SWS** 6

1.2 Fundamentals of Electrical Engineering and Information Technology

1.2.1 Electrical Engineering

Module name Introductionary Project					
Module nr. 18-de-1010	**Credit points** 2 CP	**Workload** 60 h	**Self study** 30 h	**Module duration** 1 Term	**Module cycle** WiSe
Language German			**Module owner** Prof. Dr.-Ing. Harald Klingbeil		

1	**Teaching content** Based on a complex technical problem students will get to know an idea of the diversity of electrical and information enginering. The introductionary project gives a perspective of the upcoming course of studies. It gives an introduction in engineering thinking and working. Groups of students will work in teams for one complete week. Each group of students will be accompanied by a team- and a technical tutor.
2	**Learning objectives** Students get to know problem analysis, information acquisition, team work, project management, and presentation of results.
3	**Recommended prerequisites for participation**
4	**Form of examination** Module exam: • Module exam (Study achievement, Oral examination, Duration: 15 min, p/np RS)
5	**Prerequisite for the award of credit points** Passing the final module examination
6	**Grading** Module exam: • Module exam (Study achievement, Oral examination, Weighting: 100 %)
7	**Usability of the module** BSc ETiT, BSc MEC, BSc iST
8	**Grade bonus compliant to §25 (2)**
9	**References** lecture notes (will be handed out)

Courses

	Course Nr. 18-de-1010-pj	**Course name** Introductionary Project (Project Week)	
	Instructor Prof. Dr.-Ing. Harald KlingbeilM. A. Stephanie BockshornDipl.-Soz. Beil	**Type** Project	**SWS** 2

Module name Electrical Engineering and Information Technology I					
Module nr. 18-hs-1070	**Credit points** 7 CP	**Workload** 210 h	**Self study** 135 h	**Module duration** 1 Term	**Module cycle** WiSe
Language German			**Module owner** Prof. Dr.-Ing. Jutta Hanson		

1 Teaching content

Units and Equations: Unit systems, equation writing.
Basic definitions: Charge, current, voltage, resistance, energy and power.
Currents and voltages in electrical circuits: Ohmic law, node and mesh equations, parallel and series connections, current and voltage measurement, linear and nonlinear elements, superposition method, star-delta-transformation, node and mesh analysis in linear circuits, controlled sources.
AC systems: Time-dependent currents and voltages, steady-state mode sinusoidal currents and voltages in linear RLC-circuits, phasor diagrams, resonances in RLC circuits, AC power, locus diagrams, two-port networks, transformer, polyphase systems.

2 Learning objectives

After successful completion of the module students are able:

- to utilize the basic equations in electrical engineering,
- to determine the currents and voltages in linear and nonlinear circuits,
- to analyze DC and AC systems,
- to calculate simple filter and resonant circuits,
- to apply the complex calculation in electrical AC systems.

3 Recommended prerequisites for participation

4 Form of examination

Module exam:

- Module exam (Technical examination, Examination, Duration: 90 min, Default RS)

5 Prerequisite for the award of credit points

Passing the final module examination

6 Grading

Module exam:

- Module exam (Technical examination, Examination, Weighting: 100 %)

7 Usability of the module

BSc. ETiT, BSc iST, BSc MEC, BSc. Wi-ETiT, BSc CE, LA Physik/Mathematik

8 Grade bonus compliant to §25 (2)

9 References

- Frohne, H. u.a. Moeller Grundlagen der Elektrotechnik
- Clausert, H. u.a. Grundgebiete der Elektrotechnik 1 + 2

Courses

	Course Nr. 18-hs-1070-vl	**Course name** Electrical Engineering and Information Technology I		
	Instructor Prof. Dr.-Ing. Jutta Hanson		**Type** Lecture	**SWS** 3
	Course Nr. 18-hs-1070-ue	**Course name** Electrical Engineering and Information Technology I		
	Instructor Prof. Dr.-Ing. Jutta Hanson		**Type** Practice	**SWS** 2

Module name Electrical Engineering and Information Technology Lab I					
Module nr. 18-kn-1040	**Credit points** 4 CP	**Workload** 120 h	**Self study** 60 h	**Module duration** 2 Term	**Module cycle** WiSe
Language German			**Module owner** Prof. Dr. Mario Kupnik		

1 Teaching content

After a safety instruction for electrical equipment, students dolab experiments covering foundations of electrical engineering by using theoretical and experimental instructions to improve basic electrical understanding. Building up a test set autonomously and performing of measurements and evaluations in the form of logs to confirm the theoretical knowledge and lead to independent work in practice.
The following experiments are performed:

- Investigate real behavior of ohmic resistors
- Investigate real behavior of capacitors and inductors
- Calculate impedances of basic two-terminal circuits using network theory
- Measure of electrical power in AC circuits and investigate in the real behaviour of transformers
- DC technology, capacity and inductors, AC technology - Impedances and two-terminal circuits, transformer & power;

2 Learning objectives

After preparing the afternoons independently and self-implementing the measurement setup and measurement tasks by active participation in the practical group and by thorough preparation of the associated measurement protocols, you should be able to:

1. Perform the measurement of basic electrical parameters of DC and AC circuits, independently and in compliance with safety rules
2. measuring the frequency response of passive electrical networks and resonant circuits, and electric power measurement
3. the measurement of circuits for the determination of magnetic, electro-thermal and high-frequency. You have to be able to build and run your own measurements
4. interpretations of the measurement results in terms of its technical meaning, but also their accuracy and error sources safely.

3 Recommended prerequisites for participation

Parallel attending the lectures and exercises, "Electrical Engineering I and II"

4 Form of examination

Module exam:

- Module exam (Study achievement, Optional, Default RS)

5 Prerequisite for the award of credit points

Passing the final module examination

6 Grading

Module exam:

- Module exam (Study achievement, Optional, Weighting: 100 %)

7 Usability of the module

BSc ETiT

8 Grade bonus compliant to §25 (2)

9	**References** detailed script with instructions for the experiments; Clausert, H. / Wiesemann, G.: Grundgebiete der Elektrotechnik, Oldenbourg,1999			
Courses				
	Course Nr. 18-kn-1040-pr	**Course name** Electrical Engineering and Information Technology Lab I A		
	Instructor Prof. Dr. Mario Kupnik		**Type** Internship	**SWS** 2
	Course Nr. 18-kn-1041-pr	**Course name** Electrical Engineering and Information Technology Lab I B		
	Instructor Prof. Dr. Mario Kupnik		**Type** Internship	**SWS** 2
	Course Nr. 18-kn-1040-tt	**Course name** Electrical Engineering and Information Technology I, Safety instructions and rules		
	Instructor Prof. Dr. Mario Kupnik		**Type** Tutorial	**SWS** 0

Module name Electrical Engineering and Information Technology II					
Module nr. 18-gt-1020	**Credit points** 7 CP	**Workload** 210 h	**Self study** 135 h	**Module duration** 1 Term	**Module cycle** SuSe
Language German			**Module owner** Prof. Dr.-Ing. Gerd Griepentrog		

1	**Teaching content** Electrostatic fields; stationary electrical flow fields; stationary magnetic fields; temporally variable magnetic fields; capacitor networks, transmission lines
2	**Learning objectives** The students have detached themselves from the conception that all electrical procedures are line- bound; they have a clear idea of the field term, can read and interpret field plots and also design simple field plots themselves; they understand the difference between a curl and a divergence field, can describe this difference mathematically and are able to recognize the field type from a mathematical description, respectively; they are able to calculate field distributions for simple rotationally symmetric arrangements analytically; they can deal surely with the definitions of the electrostatic, the electrical quasi-static, the magnetostatic and the magneto-electric field; they have recognized the connection and dualism of electricity and magnetism; they control the mathematical apparatus necessary for their description and can apply it to simple examples; they can calculate with nonlinear magnetic circuits; they can compute inductance, capacity and resistance of simple geometrical arrangements and understand them now as physical characteristics of the respective arrangement; they have recognized, how different forms of energy can be transferred into each other and are thereby already able to solve simple scientific engineering problems; they have understood the underlying physical backgrounds for many applications of electrical engineering and are able to describe them mathematically, develop it further in a simple way and apply it to other examples; they are familiar with the system of Maxwell's equations and can transfer them from the integral into the differential form; they have a first idea of the importance of Maxwell's equations for all conceptual formulations of electrical engineering and they understand the propagation of electromagnetic waves in the free space and on transmission lines
3	**Recommended prerequisites for participation** Electrical Engineering and Information Technology I
4	**Form of examination** Module exam: • Module exam (Technical examination, Examination, Duration: 120 min, Default RS)
5	**Prerequisite for the award of credit points** Passing the final module examination
6	**Grading** Module exam: • Module exam (Technical examination, Examination, Weighting: 100 %)
7	**Usability of the module** BSc ETiT, BSc MEC, BSc Wi-ETiT, LA Physik/Mathematik, BSc CE, BSc iST
8	**Grade bonus compliant to §25 (2)** Notenverbesserung entsprechend 25 (2) APB TU Darmstadt
9	**References**

- Downloadable slides
- Clausert, Wiesemann, Hinrichsen, Stenzel: „Grundgebiete der Elektrotechnik I und II“; ISBN 978-3-486-59719-6
- Prechtl, A.: „Vorlesungen über die Grundlagen der Elektrotechnik - Band 2“ ISBN: 978-3-211-72455-2

Courses

Course Nr.	**Course name**		
18-gt-1020-vl	Electrical Engineering and Information Technology II		
Instructor		**Type**	**SWS**
Prof. Dr.-Ing. Gerd Griepentrog		Lecture	3
Course Nr.	**Course name**		
18-gt-1020-ue	Electrical Engineering and Information Technology II		
Instructor		**Type**	**SWS**
Prof. Dr.-Ing. Gerd GriepentrogM. Sc. Daniel Großmann		Practice	2

1.2.2 Information Technology

Module name Deterministic Signals and Systems					
Module nr. 18-kl-1010	**Credit points** 7 CP	**Workload** 210 h	**Self study** 135 h	**Module duration** 1 Term	**Module cycle** WiSe
Language German			**Module owner** Prof. Dr.-Ing. Anja Klein		

1	**Teaching content** Fourier Series: Motivation; Fourier series with real coefficients; Fourier series with complex coefficients;examples and applications Fourier Transform: Motivation - Derviation from Fourier series - Dirichlet conditions - delta function - step function - properties of F-transform - special cases - examples and applications - transmissions systems- expansion into partial fractions Convolution: Time invariant systems - convolution in frequency domain- Parseval's theorem - properties-examples and applications Systems and Signals: Bandlimited and time limited systems - systems with only one energy store - examples and applications Laplace Transform: Motivation - single sided L-transform - inverse L-transform - theorems of L- transform - examples and applications Linear differential equations: Time invariant systems - rules - general differentiation - linear passive electrical networks - equivalent circuits for passive electrical elements - examples and applications z-Transform: motivation - sampling - numerical order - definition - examples - transfer function - sampling theorem - examples and applications Discrete Fourier Transform: motivation, derivation sampling, examples and applications
2	**Learning objectives** The student should understand the principles of integral transformations. He should apply them for the solution of physical problems. The techniques of this lecture are essential tools which will be needed in many follow-up lectures and exercises.
3	**Recommended prerequisites for participation** Elektrotechnik und Informationstechnik I und Elektrotechnik und Informationstechnik II
4	**Form of examination** Module exam: • Module exam (Technical examination, Examination, Duration: 120 min, Default RS)
5	**Prerequisite for the award of credit points** Passing the final module examination
6	**Grading** Module exam: • Module exam (Technical examination, Examination, Weighting: 100 %)
7	**Usability of the module** BSc ETiT, BSc MEC, BSc Wi-ETiT, LA Physik/Mathematik, BSc CE, BSc iST
8	**Grade bonus compliant to §25 (2)**
9	**References**

A script of the lecture or slides respectively, will be provided in electronic form.
Basic Literature:
Wolfgang Preuss, "Funktionaltransformationen", Carl Hanser Verlag, 2002; Klaus-Eberhard Krueger "Transformationen", Vieweg Verlag, 2002;
H. Clausert, G. Wiesemann "Grundgebiete der Elektrotechnik 2", Oldenbourg, 1993; Otto Föllinger "Laplace-, Fourier- und z-Transformation", Hüthig, 2003;
T. Frey, M. Bossert, Signal- und Systemtheorie, Teubner Verlag, 2004
Further Literature:
Dieter Mueller-Wichards "Transformationen und Signale", Teubner Verlag, 1999
Exercises:
Hwei Hsu "Signals and Systems", Schaum's Outlines, 1995

Courses

Course Nr.	**Course name**		
18-kl-1010-vl	Deterministic Signals and Systems		
Instructor		**Type**	**SWS**
Prof. Dr.-Ing. Anja KleinProf. Dr.-Ing. Marius Pesavento		Lecture	3

Course Nr.	**Course name**		
18-kl-1010-ue	Deterministic Signals and Systems		
Instructor		**Type**	**SWS**
Prof. Dr.-Ing. Anja KleinProf. Dr.-Ing. Marius PesaventoM. Sc. Maximilian Wirth		Practice	2

Module name Fundamentals of Communication					
Module nr. 18-jk-1010	**Credit points** 6 CP	**Workload** 180 h	**Self study** 120 h	**Module duration** 1 Term	**Module cycle** SuSe
Language German			**Module owner** Prof. Dr.-Ing. Rolf Jakoby		

1	**Teaching content** Part 1: Chap. 1 will be a brief introduction in "Electrical Information- and Communication Engineering", presenting signals as carrier of information, classifying electrical signals and describing elements of communication systems. Then, Chap. 2 introduces various line-conducted and wireless transmission media, power budget calculations for both media types, basics of antenna radiation and parameters etc., which will be emphasized by application examples like TV-satellite reception and mobile communication channels. Part 2: Chap. 3 is focused on signal distortions and interferences, especially thermal noise, considering noisy two-port devices and its concatenations, lossy networks, antenna noise temperature and the impact of noise on analog and digital signals. This chap. ends with basics of information theory and channel capacity for AWGN-channels. In contrast, chap 4 deals with noise-reduction and distortion-compensation methods. Part 3: Chap. 5 introduces sampling of band-limited signals and analog modulation of a pulse carrier (pulse-amplitude- pulse-duration- and pulse-angle-modulation), which will be extended on digital modulation in the baseband by means of pulse-code modulation (PCM), focusing on signal quantizing, analog-digital conversion, minimum bandwidth, bit error rate and error probability of a PCM word. At least, PCM-time-division multiplex and -systems will be discussed. Part 4: Chap. 7 deals with fundamentals of multiplex- and RF-modulation schemes as well as with frequency conversion, frequency multiplication and mixing strategies. Then, receiver principles and image frequency problems of heterodyne-receivers as well as amplitude modulation of a sinus carrier will close this chapter. Chap. 8 introduces digital modulation of a harmonic carrier, including band-limited inter-symbol interference-free transmission, matched filtering and binary shift keying of a sinusoidal carrier in amplitude (ASK), phase (PSK) or frequency (FSK). From this follows higher-order modulation schemes like M-PSK or M-QAM. A brief outlook on the functionality of channel coding and interleaving in chap. 9 will end up the lecture.
2	**Learning objectives** Aim of the Lecture: To teach the fundamentals of communications (physical layer), primarily the transmission of signals from a source to a sink, possible modulation and access methods as well as signal distortion and noise. The introduction of communications is a basement for further lectures like Communication Technology, Laboratories of Communication Technology (NTP A, B), Microwave Eng., Optical Communications, Mobile Communications and Terrestrial and satellite-based radio systems.
3	**Recommended prerequisites for participation** Deterministic Signals and Systems
4	**Form of examination** Module exam: • Module exam (Technical examination, Examination, Duration: 120 min, Default RS)
5	**Prerequisite for the award of credit points** Passing the final module examination
6	**Grading** Module exam: • Module exam (Technical examination, Examination, Weighting: 100 %)
7	**Usability of the module** BSc ETiT, Wi-ETiT
8	**Grade bonus compliant to §25 (2)**

9	**References** Complete Script and Literature: Pehl, E.: Digitale und analoge Nachrichtenübertragung, Hüthig, 1998; Meyer, Martin: Kommunikationstechnik, Vieweg, 1999; Stanski, B.: Kommunikationstechnik; Kammeyer, K.D.: Nachrichtenübertragung. B.G. Teubner 1996; Mäusl, R.: Digitale Modulationsverfahren. Hüthig Verlag 1995; Haykin, S.: Communication Systems. John Wiley 1994; Proakis, J., Salehi M.: Communication Systems Engineering. Prentice Hall 1994; Ziemer, R., Peterson, R.: Digital Communication. Prentice Hall 2001; Cheng, D.: Field and Wave Electromagnetics, Addision-Wesley 1992.

Courses

	Course Nr. 18-jk-1010-vl	**Course name** Fundamentals of Communications		
	Instructor Prof. Dr.-Ing. Rolf Jakoby		**Type** Lecture	**SWS** 3
	Course Nr. 18-jk-1010-ue	**Course name** Fundamentals of Communications		
	Instructor Prof. Dr.-Ing. Rolf Jakoby		**Type** Practice	**SWS** 1

Module name Electronics					
Module nr. 18-ho-1011	**Credit points** 7 CP	**Workload** 210 h	**Self study** 135 h	**Module duration** 1 Term	**Module cycle** WiSe
Language German			**Module owner** Prof. Dr.-Ing. Klaus Hofmann		

1 Teaching content

18-ho-1011-vl bzw. -ue:

Semiconductor Elements: Diode, MOSFET, Bipolartransistor. Electronic Circuit Design; Basic Analog Circuits and their properties, Behavior and properties of operational amplifiers, circuit simulation with SPICE, small signal amplification, single stage amplifiers, frequency response; digital circuits: CMOS-logic

18-ho-1011-pr:

Practical experiments in the fields:

- digital circuits: FPGA-programming
- analog circuits: basic building blocks, amplifiers, operational amplifiers, filters and demodulators

2 Learning objectives

A student is after successful attending the lecture able to

1. analyse the behavior of diodes, MOS- and Bipolartransistors in simple circuits,
2. assess the properties of single-transistor amplifiers (MOSFET and BJT), such as small signal behavior, input- and output-resistance;
3. design inverting and non-inverting operational amplifiers with passive components and knows the ideal and non-ideal properties;
4. calculate the frequency response of simple transistor circuits;
5. knows the different circuit techniques (CMOS, NMOS) of logical gates and knows the basic functions (inverter, NAND, NOR).

A student is after successful attending the lab able to

1. perform measurements in time and frequency domain using an oscilloscope on simple operational amplifiers;
2. design and realize a traffic light controller based on a finite state machine using a FPGA as the target implementation;
3. mount passive and active components on a PCB (including preparation of components, soldering) and put the system to function,
4. simulate a circuit (filter) using SPICE and perform measurements on the realization.

3 Recommended prerequisites for participation

Basics of Electrical Engineering

4 Form of examination

Module exam:

- Module exam (Technical examination, Examination, Duration: 90 min, Default RS)

Course related exam:

- [18-ho-1011-pr] (Study achievement, Optional, Default RS)

5 Prerequisite for the award of credit points

Passing the final module examination

6 Grading

	Module exam: • Module exam (Technical examination, Examination, Weighting: 4) Course related exam: • [18-ho-1011-pr] (Study achievement, Optional, Weighting: 3)			
7	**Usability of the module** BSc ETiT, BSc Wi-ETiT, BSc iST, BEd			
8	**Grade bonus compliant to §25 (2)**			
9	**References**			
Courses				
	Course Nr. 18-ho-1011-vl	**Course name** Electronics		
	Instructor Prof. Dr.-Ing. Klaus HofmannM. Sc. Oliver Bachmann		**Type** Lecture	**SWS** 2
	Course Nr. 18-ho-1011-ue	**Course name** Electronics		
	Instructor Prof. Dr.-Ing. Klaus HofmannM. Sc. Oliver Bachmann		**Type** Practice	**SWS** 1
	Course Nr. 18-ho-1011-pr	**Course name** Electronics Lab		
	Instructor M. Sc. Ferdinand KeilProf. Dr.-Ing. Klaus Hofmann		**Type** Internship	**SWS** 2

1.3 Foundations of Computer Science

1.3.1 Programming Concepts

Module name Functional and Object-oriented Programming Concepts					
Module nr. 20-00-0004	**Credit points** 10 CP	**Workload** 300 h	**Self study** 180 h	**Module duration** 1 Term	**Module cycle** Every 2. Sem.
Language German			**Module owner** Prof. Dr. phil. nat. Marc Fischlin		

1	**Teaching content** Basic competences in science-based, problem-oriented development of software systems. Introduction to basic terms and principles of computer science. Development of essential programming skills. Understanding the role of abstraction and modeling in the field of computer science. The main topics are: - Basic concepts of programming languages - Foundations of functional programming languages - Foundations of object-oriented programming languages - Design and implementation of small software systems - Basic type systems - Fundamental data structures and algorithms and their complexity - Recursion - Simple I/O - Basics of testing - Documenting source code
2	**Learning objectives** After successfully completing the course, the students are familiar with the foundations of functional and object-oriented programming languages and they are able to perform the following tasks: - systematically solve small programming tasks using functional and/or object-oriented programming language concepts; - perform quality assurance using basic (unit) tests; - understand the complexity of algorithms and data structures and assess their suitability for solving specific tasks; - document source code using standard tools.
3	**Recommended prerequisites for participation**
4	**Form of examination** Course related exam: • [20-00-0004-iv] (Study achievement, Oral/written examination, p/np RS) • [20-00-0004-iv] (Technical examination, Oral/written examination, Default RS)
5	**Prerequisite for the award of credit points** Pass exam (100%)
6	**Grading** Course related exam: • [20-00-0004-iv] (Study achievement, Oral/written examination, Weighting: 0 %) • [20-00-0004-iv] (Technical examination, Oral/written examination, Weighting: 100 %)

7	**Usability of the module** B.Sc. Informatik B.Sc. Wirtschaftsinformatik B.Sc. Psychologie in IT Joint B.A. Informatik B.Sc. Sportwissenschaft und Informatik B.Sc. Computational Engineering B.Sc. Informationssystemtechnik May be used in other degree programs.
8	**Grade bonus compliant to §25 (2)** In dieser Vorlesung findet eine Anrechnung von vorlesungsbegleitenden Leistungen statt, die lt. 25 (2) der 5. Novelle der APB und den vom FB 20 am 30.3.2017 beschlossenen Anrechnungsregeln zu einer Notenverbesserung um bis zu 1.0 führen kann.
9	**References** - How to Design Programs; M. Felleisen et al.; The MIT Press Cambridge - Structure and Interpretation of Computer Programs; H. Abelson et al.; Springer - Thinking in Java; B. Eckel; Prentice Hall - Christian Ullenboom: Java ist auch eine Insel; Galileo Computing

Courses

Course Nr.	**Course name**		
20-00-0004-iv	Functional and Object-oriented Programming Concepts		
Instructor		**Type** Integrated course	**SWS** 8

Module name Algorithms and Data Structures					
Module nr. 20-00-0005	**Credit points** 10 CP	**Workload** 300 h	**Self study** 180 h	**Module duration** 1 Term	**Module cycle** Every 2. Sem.
Language German			**Module owner** Prof. Dr. phil. nat. Marc Fischlin		

1	**Teaching content** - data structures: array, list, binary search tree, b-tree, graph representation, hash table, heaps - algorithms: sorting algorithmgs, string matching, graph traversal, insertion, search, and deletion on particular data structures, shortest path search, minimal spanning trees - asymptotic complexity - NP completeness - algorithmic strategies: Divide-and-Conquer, dynamic programming, brute-force, greedy, backtracking, meta heuristics
2	**Learning objectives** In this course students get to know fundamental data structures and algorithms and the complexity classes P, NP, and NPC. They acquire the abilities to apply fundamental principles of algorithmics and to assess and determine asymptotic complexity. Furthermore, they understand major algorithmic strategies and can apply them.
3	**Recommended prerequisites for participation** Recommended: Funktionale und objektorientierte Programmierkonzepte
4	**Form of examination** Course related exam: • [20-00-0005-iv] (Technical examination, Oral/written examination, Default RS) • [20-00-0005-iv] (Study achievement, Oral/written examination, p/np RS)
5	**Prerequisite for the award of credit points** Pass exam (100%) Written exam 120 min. Course achievement written/oral Pass of course achievement is admission requirement for written exam. Course achievement may be acquired through exercises, hands-on training, talks or similar issues at several times. To get admission not more than 50% of all benefits achieved in these areas should be needed.
6	**Grading** Course related exam: • [20-00-0005-iv] (Technical examination, Oral/written examination, Weighting: 100 %) • [20-00-0005-iv] (Study achievement, Oral/written examination, Weighting: 0 %)
7	**Usability of the module** B.Sc. Informatik B.Sc. Wirtschaftsinformatik B.Sc. Psychologie in IT Joint B.A. Informatik B.Sc. Sportwissenschaft und Informatik B.Sc. Computational Engineering B.Sc. Informationssystemtechnik May be used in other degree programs.
8	**Grade bonus compliant to §25 (2)**

	In dieser Vorlesung findet eine Anrechnung von vorlesungsbegleitenden Leistungen statt, die lt. 25 (2) der 5. Novelle der APB und den vom FB 20 am 30.3.2017 beschlossenen Anrechnungsregeln zu einer Notenverbesserung um bis zu 1.0 führen kann.			
9	**References** Will be appointed in lecture.			
Courses				
	Course Nr. 20-00-0005-iv	**Course name** Algorithms and data structures		
	Instructor		**Type** Integrated course	**SWS** 8

1.3.2 Digital Design / Logic Design

Module name Digital Design					
Module nr. 20-00-0900	**Credit points** 5 CP	**Workload** 150 h	**Self study** 105 h	**Module duration** 1 Term	**Module cycle** Every 2. Sem.
Language German			**Module owner** Prof. Dr. phil. nat. Marc Fischlin		

1	**Teaching content** - Digital Design: digital abstraction and its technological realization, number systems, logic gates, MOSFET transistors and CMOS gates, power consumption - Combinational Logic Design: boolean equations and algebra, mapping equations to gates, multi-level logic circuits, four-valued logic (0,1,X,Z), logic minimization, combinational building blocks, timing - Sequential Logic Design: latches, flip-flops, synchronous logic design, finite-state machines, timing, parallelism - Hardware Description Languages: modeling of combinational and sequential circuits, structural modeling, modeling of finite-state machines, data types, parametrized modules, testbenches - Digital Building Blocks: arithmetic circuits, fixed-/floating-point representations, sequential building blocks, memory arrays, logic arrays
2	**Learning objectives** After successfully attending the course, students are familiar with the concepts and basic building blocks of digital logic and their technological realization. They can independently apply this knowledge to design combinational and sequential circuits having specific behaviors and are able to implement them using a hardware description language. They can analyze digital circuits with regard to functional and non-functional characteristics.
3	**Recommended prerequisites for participation**
4	**Form of examination** Course related exam: • [20-00-0900-iv] (Technical examination, Oral/written examination, Default RS) • [20-00-0900-iv] (Study achievement, Oral/written examination, p/np RS)
5	**Prerequisite for the award of credit points** Pass exam (100%) Written exam 90 min. Course achievement written/oral Pass of course achievement is admission requirement for written exam. Course achievement may be acquired through exercises, hands-on training, talks or similar issues at several times. To get admission not more than 50% of all benefits achieved in these areas should be needed.
6	**Grading** Course related exam: • [20-00-0900-iv] (Technical examination, Oral/written examination, Weighting: 100 %) • [20-00-0900-iv] (Study achievement, Oral/written examination, Weighting: 0 %)
7	**Usability of the module** B.Sc. Informatik B.Sc. Informationssystemtechnik May be used in other degree programs.
8	**Grade bonus compliant to §25 (2)**
9	**References**

	Literature recommenations will be updated regularly, an example might be: Harris/Harris: Digital Design and Computer Architecture			
Courses				
	Course Nr. 20-00-0900-iv	**Course name** Digital Design		
	Instructor Prof. Dr.-Ing. Andreas Koch		**Type** Integrated course	**SWS** 3

Module name Logic Design					
Module nr. 18-sm-1040	**Credit points** 6 CP	**Workload** 180 h	**Self study** 120 h	**Module duration** 1 Term	**Module cycle** WiSe
Language German			**Module owner** Prof. Dr.-Ing. Christian Hochberger and Prof. Dr. rer. nat. Björn Scheue		

1 Teaching content

Boolean algebra, logic gates, hardware description languages, flipflops, sequential circuits, state-diagrams and -tables, technology mapping, programmable logic circuits

2 Learning objectives

By this module, Students will be enabled to

- rewrite boolean expressions and transform them into circuits of logic gates
- analyze and synthesize digital circuits
- describe digital circuits in a hardware description language
- extract finite state machines from informal descriptions and implement them with synchronous circuits

3 Recommended prerequisites for participation

4 Form of examination

Module exam:

- Module exam (Technical examination, Examination, Duration: 90 min, Default RS)

5 Prerequisite for the award of credit points

Passing the final module examination

6 Grading

Module exam:

- Module exam (Technical examination, Examination, Weighting: 100 %)

7 Usability of the module

BSc ETiT, BSc MEC, BSc Wi-ETiT

8 Grade bonus compliant to §25 (2)

9 References

R.H. Katz: Contemporary Logic Design

Courses

Course Nr.	**Course name**		
18-sm-1040-vl	Logic Design		
Instructor		**Type**	**SWS**
Prof. Dr. rer. nat. Björn ScheuermannM. Sc. Alexander SchwarzProf. Dr.-Ing. Christian Hochberger		Lecture	3

Course Nr.	**Course name**		
18-sm-1040-ue	Logic Design		
Instructor		**Type**	**SWS**
Prof. Dr. rer. nat. Björn ScheuermannM. Sc. Alexander SchwarzProf. Dr.-Ing. Christian Hochberger		Practice	1

1.3.3 Computer Systems / Computer Organisation

Module name Computer Organisation					
Module nr. 20-00-0902	**Credit points** 5 CP	**Workload** 150 h	**Self study** 105 h	**Module duration** 1 Term	**Module cycle** Every 2. Sem.
Language German			**Module owner** Prof. Dr. phil. nat. Marc Fischlin		

1	**Teaching content** - Architecture of Microprocessors: programming in assembly and machine language, addressing modes, tool flows, run-time environment - Microarchitecture: instruction set and architectural state, performance analysis, microarchitectures with single-cycle/multi-cycle/pipelined execution, exception handling, advanced microarchitectures - Memory and I/O-Systems: performance analysis, caches, virtual memory, I/O techniques, standard interfaces
2	**Learning objectives** After successfully attending the course, students understand the concepts of machine-level programming and can implement algorithms in Assembler. They are familiar with different techniques to independently realize processor architectures as microarchitectures in digital logic. They understand the structure and the operation of memory- and I/O systems and know the basics of standard interfaces. They can evaluate the quality of different realizations in multiple performance characteristics.
3	**Recommended prerequisites for participation**
4	**Form of examination** Course related exam: • [20-00-0902-iv] (Study achievement, Oral/written examination, p/np RS) • [20-00-0902-iv] (Technical examination, Oral/written examination, Default RS)
5	**Prerequisite for the award of credit points** Pass exam (100%) Written exam 90 min. Course achievement written/oral Pass of course achievement is admission requirement for written exam. Course achievement may be acquired through exercises, hands-on training, talks or similar issues at several times. To get admission not more than 50% of all benefits achieved in these areas should be needed.
6	**Grading** Course related exam: • [20-00-0902-iv] (Study achievement, Oral/written examination, Weighting: 0 %) • [20-00-0902-iv] (Technical examination, Oral/written examination, Weighting: 100 %)
7	**Usability of the module** B.Sc. Informatik B.Sc. Informationssystemtechnik May be used in other degree programs.
8	**Grade bonus compliant to §25 (2)**
9	**References** Literature recommendations will be updated regularly, an example might be: Harris/Harris: Digital Design and Computer Architecture

Courses				
	Course Nr. 20-00-0902-iv	**Course name** Computer Organisation		
	Instructor Prof. Dr.-Ing. Andreas Koch		**Type** Integrated course	**SWS** 3

Module name Computer Systems I					
Module nr. 18-hb-1020	**Credit points** 6 CP	**Workload** 180 h	**Self study** 120 h	**Module duration** 1 Term	**Module cycle** SuSe
Language German			**Module owner** Prof. Dr.-Ing. Christian Hochberger		

1	**Teaching content** Types of instruction sets, memory organization and its impact on the runtime, pipelining, instruction level parallelism, superscalar processors, VLIW processors, floating point numbers and operations, memory subsystem, cache types, virtual address spaces, benchmarking and performance prediction, system architecture and bus systems, peripheral devices
2	**Learning objectives** Upon successful completion of the module, students can analyze and evaluate processors, memory systems and bus systems. They can transform structures of high-level programming languages like subroutine calls into sequences of machine instructions. They are able to measure the performance of computers. They know how instructions are executed in modern processors and thus, they can predict the influence of a specific memory hierarchy onto the execution time of a given program. They know how internal and external bus systems work and can define the essential parameters for their dimension and operation.
3	**Recommended prerequisites for participation** Basic knowledge of digital design as it can be obtained by the lecture "Logic Design".
4	**Form of examination** Module exam: • Module exam (Technical examination, Examination, Duration: 90 min, Default RS)
5	**Prerequisite for the award of credit points** Passing the final module examination
6	**Grading** Module exam: • Module exam (Technical examination, Examination, Weighting: 100 %)
7	**Usability of the module** BSc ETiT, BSc Wi-ETiT
8	**Grade bonus compliant to §25 (2)**
9	**References** • Harris & Harris: Digital Design and Computer Architecture • Hennessy/Patterson: Computer architecture - a quantitative approach

Courses

	Course Nr. 18-hb-1020-vl	**Course name** Computer Systems I		
	Instructor Prof. Dr.-Ing. Christian Hochberger		**Type** Lecture	**SWS** 3

	Course Nr. 18-hb-1020-ue	**Course name** Computer Systems I		
	Instructor Prof. Dr.-Ing. Christian Hochberger		**Type** Practice	**SWS** 1

1.3.4 Systems and Parallel Programming & Operating Systems

Module name System and Parallel Programming					
Module nr. 20-00-0905	**Credit points** 5 CP	**Workload** 150 h	**Self study** 105 h	**Module duration** 1 Term	**Module cycle** Every 2. Sem.
Language German			**Module owner** Prof. Dr. phil. nat. Marc Fischlin		

1	**Teaching content** - programming languages for systems programming - foundations of parallel systems - parallel architectures, multi-core and many-core systems, clusters - programming paradigms and models for parallel computing - parallel algorithms - significant practical programming exercises covering the above topics
2	**Learning objectives** After successfully attending this course, students understand the foundations of parallel systems and of techniques for their efficiently programming. They can develop and analyze basic applications using systems and/or parallel programming techniques on selected platforms.
3	**Recommended prerequisites for participation**
4	**Form of examination** Course related exam: • [20-00-0905-iv] (Study achievement, Oral/written examination, Default RS)
5	**Prerequisite for the award of credit points** Pass exam (100%) Course achievement may be acquired through exercises, hands-on training, programming and successfull discussion on colloquiums. Each area must be passed.
6	**Grading** Course related exam: • [20-00-0905-iv] (Study achievement, Oral/written examination, Weighting: 100 %)
7	**Usability of the module** B.Sc. Informatik B.Sc. Informationssystemtechnik May be used in other degree programs.
8	**Grade bonus compliant to §25 (2)**
9	**References** To be appointed in lecture.

Courses

Course Nr.	**Course name**		
20-00-0905-iv	System and Parallel Programming		
Instructor		**Type**	**SWS**
Prof. Dr.-Ing. Andreas Koch		Integrated course	3

Module name Operating Systems					
Module nr. 20-00-0903	**Credit points** 5 CP	**Workload** 150 h	**Self study** 105 h	**Module duration** 1 Term	**Module cycle** Every 2. Sem.
Language German			**Module owner** Prof. Dr. phil. nat. Marc Fischlin		

1 Teaching content

- Introduction to Operating Systems (OS) - Role, purpose and design issues
- Processes and Threads - OS structures, process control, abstractions, kernel/user modes and operations, context switching, interrupts
- Inter-Process Communication - Message passing IPC, RPC, layers, interfaces, hierarchies
- Coordination: Deadlocks - Process coordination, critical sections, deadlock characterization, deadlock detection and recovery, deadlock avoidance
- Scheduling/Resource Management - Task ordering, preemptive and non-preemptive scheduling, schedulers and policies, OS implementations
- Concurrency: Races, Mutual Exclusions - Critical sections, races, spin locks, synchronization
- Programming Abstractions: Semaphores - Semaphores, Monitors
- Memory Management - Storage structures, management/replacements approaches, virtual memory, paging, caching, segmentation
- I/O - Device management, drivers, segmentation, interrupt handling, DMA
- File systems - File systems requirements, design and implementation, file structures, directories, naming, partitions, virtual file systems
- Fault Tolerance/Resilience - Fault types, fault handling approaches, reliable message delivery, OS reliability and availability, security issues
- Embedded/RT OS - Memory/disk/performance management, recovery, fault-tolerances, real-time aspects
- Distributed OS - Distributed computation and communication abstractions, synchronization, coordination, consistency
- Virtual Machines - Purpose and types of virtualization, virtual file systems, Hypervisors

2 Learning objectives

Students will gain an overview on fundamental Operating System concepts consequent to their succesful course attendance. Students are able to discuss approaches to different concepts regarding various technical requirements such as fault tolerance, security and performance. Moreover, students acquire techniques for the creation of operating systems.

3 Recommended prerequisites for participation

Recommended:
“Algorithmen und Datenstrukturen”, “Funktionale und objektorientierte Programmierung”, “Rechnerorganisation”

4 Form of examination

Course related exam:

- [20-00-0903-iv] (Technical examination, Oral/written examination, Default RS)

5 Prerequisite for the award of credit points

Pass exam (100%)
Choosing this modul prohibits choosing Modul 20-00-0175 Operating Systems.

6 Grading

Course related exam:

- [20-00-0903-iv] (Technical examination, Oral/written examination, Weighting: 100 %)

7 Usability of the module

	B.Sc. Informatik B.Sc. Informationssystemtechnik May be used in other degree programs.			
8	**Grade bonus compliant to §25 (2)**			
9	**References** - Modern Operating Systems; A. Tanenbaum, Prentice Hall, ISBN 0-13-813459-6 - Operating System Concepts; Silberschatz et al, John Wiley and Sons, ISBN 0-470-23399-3			
Courses				
	Course Nr. 20-00-0903-iv	**Course name** Operating Systems		
	Instructor Prof. Dr.-Ing. Andreas Koch		**Type** Integrated course	**SWS** 3

1.3.5 Software-Engineering

Module name Software Engineering					
Module nr. 20-00-0017	**Credit points** 5 CP	**Workload** 150 h	**Self study** 105 h	**Module duration** 1 Term	**Module cycle** Every 2. Sem.
Language German			**Module owner** Prof. Dr. phil. nat. Marc Fischlin		

1	**Teaching content** Providing an overview of the main areas of software engineering and the skills necessary for modeling and implementing small software systems. The main topics are: - Software Project Management - Software Process Models - Requirements Engineering - Software Development Tools - Software Quality; in particular: - Test Processes (automated testing, test coverage metrics, debugging) - Software Metrics - Object-oriented Analysis and Design - Modeling using UML - Software Design Patterns
2	**Learning objectives** After successfully completing the lecture, the students are able to perform the following tasks: - name and classify the areas of Software Engineering in the context of software development projects; - effectively use standard software development tools; - perform basic quality assurance using automated tests; - design and implement object-oriented systems using UML and design patterns.
3	**Recommended prerequisites for participation** Recommended: Funktionale und Objektorientierte Programmierkonzepte Algorithmen und Datenstrukturen
4	**Form of examination** Course related exam: • [20-00-0017-iv] (Technical examination, Oral/written examination, Default RS)
5	**Prerequisite for the award of credit points** Pass exam (100%)
6	**Grading** Course related exam: • [20-00-0017-iv] (Technical examination, Oral/written examination, Weighting: 100 %)
7	**Usability of the module**

	B.Sc. Informatik B.Sc. Wirtschaftsinformatik B.Sc. Psychologie in IT Joint B.A. Informatik B.Sc. Sportwissenschaft und Informatik M.Sc. Sportwissenschaft und Informatik B.Sc. Computational Engineering B.Sc. Informationssystemtechnik May be used in other degree programs.
8	**Grade bonus compliant to §25 (2)** In dieser Vorlesung findet eine Anrechnung von vorlesungsbegleitenden Leistungen statt, die lt. 25 (2) der 5. Novelle der APB und den vom FB 20 am 30.3.2017 beschlossenen Anrechnungsregeln zu einer Notenverbesserung um bis zu 1.0 führen kann.
9	**References** - Lehrbuch der Softwaretechnik: Softwaremanagement; H. Balzert; Springer - Design Patterns - Elements of Reusable Object-Oriented Software; E. Gamma, R. Helm, R. Johnson, J. Vlissides; Prentice Hall - Software Qualität - Testen, Analysieren und Verifizieren von Software; P. Liggesmeyer; Springer - WHY PROGRAMS FAIL: A Guide to Systematic Debugging; A. Zeller; Morgan Kaufmann - Writing Effective Use Cases; A. Cockburn; Pearson

Courses

	Course Nr.	**Course name**		
	20-00-0017-iv	Software Engineering		
	Instructor		**Type** Integrated course	**SWS** 3

Module name Software Engineering - Introduction					
Module nr. 18-su-1010	**Credit points** 6 CP	**Workload** 180 h	**Self study** 120 h	**Module duration** 1 Term	**Module cycle** WiSe
Language German			**Module owner** Prof. Dr. rer. nat. Andreas Schürr		

1 Teaching content

The lecture gives an introduction to the broad discipline of software engineering. All major topics of the field - as entitled e.g. by the IEEE's “Guide to the Software Engi-neering Body of Knowledge” - get addressed in the indicated depth. Main emphasis is laid upon requirements elicitation techniques (software analysis) and the design of soft-ware architectures (software design). UML (2.0) is introduced and used throughout the course as the favored modeling language. This requires the attendees to have a sound knowledge of at least one object-oriented programming language (preferably Java).
During the exercises, a running example (embedded software in a technical gadget or device) is utilized and a team-based elaboration of the tasks is encouraged. Exercises cover tasks like the elicitation of requirements, definition of a design and eventually the implementation of executable (proof-of-concept) code.

2 Learning objectives

This lecture aims to introduce basic software engineering techniques - with recourse to a set of best-practice approaches from the engineering of software systems - in a practice-oriented style and with the help of one running example.
After attending the lecture students should be able to uncover, collect and document essential requirements with respect to a software system in a systematic manner using a model-driven/centric approach. Furthermore, at the end of the course a variety of means to acquiring insight into a software system's design (architecture) should be at the student's disposal.

3 Recommended prerequisites for participation

sound knowledge of an object-oriented programming language (preferably Java)

4 Form of examination

Module exam:

- Module exam (Technical examination, Examination, Duration: 90 min, Default RS)

5 Prerequisite for the award of credit points

Passing the final module examination

6 Grading

Module exam:

- Module exam (Technical examination, Examination, Weighting: 100 %)

7 Usability of the module

BSc ETiT, BSc iST, BSc Wi-ETiT

8 Grade bonus compliant to §25 (2)

9 References

www.es.tu-darmstadt.de/lehre/se-i-v/

Courses

Course Nr. 18-su-1010-vl	**Course name** Software Engineering - Introduction	
Instructor Prof. Dr. rer. nat. Andreas Schürr	**Type** Lecture	**SWS** 3

	Course Nr. 18-su-1010-ue	**Course name** Software Engineering - Introduction		
	Instructor Prof. Dr. rer. nat. Andreas SchürrM. Sc. Lars Fritsche		**Type** Practice	**SWS** 1

2 Options and Applications

An additional module manual lists the elective sections of the Options and the Applications.

3 Studium Generale

Modules for the Studium Generale can be found in a separate module handbook for the Studium Generale.

Module name Mentoring as a subject-specific Instrument (for iST)					
Module nr. 18-de-1031	**Credit points** 1 CP	**Workload** 30 h	**Self study** 15 h	**Module duration** 2 Term	**Module cycle** WiSe
Language German			**Module owner** PD Dr.-Ing. Oktay Yilmazoglu		

1	**Teaching content** The following learning content is taught in the Mentoring: • reflection of own study decision and situation, • basics of the working techniques, • learning techniques and time management methods. The mentoring consists of student-led tutorials in the scope of normally twelve units consist-ing of group and one-on-one talks, as well as workshop elements and the simulation of an examination situation. For students without exam success in the first semester (WiSe) in an examination in the field of fundamentals (catalog 1 to 3) of the study and examination plan, the second semester (SoSe) takes place, usually in the scope of three units consisting of one-to-one-talks and workshop elements.
2	**Learning objectives** Through the mentoring, the students were encouraged to reflect on their study decision and situation. Mentoring enables students to learn and to train working methods and learning methods. They realize the importance of application of time management methods in learn-ing processes and acquire the ability to implement them target-oriented for enhancement of learning success. Students reflect own actions in learning processes and receive feedback from the mentor to gain a higher level of self-competence. After completion of this module students have the ability to optimize time management for learning success, to develop the personal learning style and methods and apply learning methods adequate to the met situa-tion and conditions. Students have the ability to analyse reasons for personal problems of understanding and solve them by means of adequate actions and methods.
3	**Recommended prerequisites for participation**
4	**Form of examination** Module exam: • Module exam (Study achievement, Optional, p/np RS) • participation in the moodle-course, usually until the end of the second semester, also answering of questionnaires, completion of homework and other activities in the context of the meetings • seminar paper (optional repetition of the examination)
5	**Prerequisite for the award of credit points** Passing the final module examination
6	**Grading**

	Module exam: • Module exam (Study achievement, Optional, Weighting: 100 %)
7	**Usability of the module** BSc iST
8	**Grade bonus compliant to §25 (2)**
9	**References** • Kurt Landau, Arbeitstechniken für Studierende der Ingenieurswissenschaften; Verlag ergonomia oHG, Stuttgart, ISBN 3-935089-65-1 • Kurt Landau, Besser studieren! Übungsbuch zum Werk Arbeitstechniken; Verlag er-gonomia oHG, Stuttgart, ISBN 3-935089-67-X • Other materials are provided in Moodle

Courses

Course Nr.	**Course name**		
18-de-1031-tt	Mentoring as a subject-specific Instrument (for IST)		
Instructor		**Type**	**SWS**
PD Dr.-Ing. Oktay YilmazogluDr.-Ing. Emna Ayari		Lecture	1