

Syllabus Book

Bachelor of Science Computer Science and Communications Engineering

Bachelor of Science in Computer Science and Communications Engineering

V	Ü	P	S	Cr
72	39	19	0	174

1.	General Chemistry	Mayer	e	2	1	0	0	4
	Introduction to CAx	Hunger Köhler	e	0	0	2	0	3
	Fundamentals of Computer Engineering 1	Hunger	e	2	1	0	0	4
	Fundamentals of Electrical Engineering 1	Pertz	e	2	1	0	0	4
	Interdisciplinary Labs	NN	e	0	0	2	0	2
	Mathematics 1	Gottschling	e	4	2	0	0	7
	Mechanics 1	Braun Kecskemethy	e	2	1	0	0	4
	Non-Technical Subject 1	NN		2	0	0	0	2
Sum:				14	6	4	0	30

2.	Computer Based Problem Solving	Gottschling Weyh	e	0	0	2	0	2
	Fundamentals of Computer Engineering 2	Heisel	e	2	1	0	0	4
	Fundamentals of Electrical Engineering 2	Pertz	e	2	1	0	0	4
	Design Theory 1	Mauk	e	1	1	0	0	3
	Mathematics 2	Gottschling		3	2	0	0	6
	Mechanics 2	Braun Kecskemethy	e	2	1	0	0	4
	Non-Technical Subject 2	NN		2	0	0	0	2
	Physics	Franke	e	2	1	1	0	5
Sum:				14	7	3	0	30

3.	Algorithms and Datastructures	Heisel		2	1	0	0	4
	Fundamentals of Programming 1 (Programming in C)	Kochs	d	2	1	0	0	4
	Mathematics C1 (Discrete Mathematics)	Schreiber		2	2	0	0	6
	Non-Technical Subject 3	NN		2	0	0	0	2
	Non-Technical Subject 4	NN		2	0	0	0	2
	Project or 2 Electives			0	6	0	0	6
	Signals and Systems 1	Willms	e	3	2	0	0	6
			Sum:	13	12	0	0	30

4.	Computer Based Engineering Mathematics	Gottschling		1	1	1	0	4
	Digital Filters	Willms	e	2	1	0	0	3
	Fundamentals of Software Engineering 1 (Structured Analysis)	Hunger	d	2	0	2	0	5
	Microwave and RF Technology	Solbach	e	2	1	1	0	5
	Logical Design of Digital Systems	Hunger Werner	d	2	1	1	0	5
	Non-Technical Subject 5	NN		2	0	0	0	2
	Signals and Systems 2	Köppen-Seliger	e	2	2	0	0	5
			Sum:	13	6	5	0	29

5.	Analog Filters	Willms	e	2	1	0	0	3
	Basic Electronic Devices	Tegude	d	2	1	1	0	5
	Designing Multimedia Applications or Datamodels and Databases	Hunger Fuhr	d	2	0	2	0	5
	Internet Technology	Kochs	d	2	1	0	0	4
	Microcomputer Systems	Geisselhardt	e	2	1	2	0	6
	Radio Propagation Channels	Kranz	e	2	1	0	0	4
			Sum:	12	5	5	0	27

6.	Bachelor Thesis	NN	e	0	0	0	0	15
	Operating Systems and Computer Networks	Hunger	e	2	1	0	0	4
	Computer Networks Lab	Hunger	e	0	1	2	0	4
	Mobile Communications or Transmission and Modulation	Jung Kaiser	d e	2	1	0	0	3
	Non-Technical Subject 6	NN		2	0	0	0	2
			Sum:	6	3	2	0	28

Description of the degree course

name of the degree course			shorthand expression of degree course
Bachelor of Science in Computer Science and Communications Engineering			
type	period of study	SWS	ECTS-Credits
Bachelor	6	130	174
description			
<p>The Bachelor degree course “Computer Science and Communications Engineering” combines the branches computer science and communications engineering which were separately dealt within the past. In basics lectures, the fundamentals of scientific and engineering knowledge will be taught. On this basis, the knowledge required for studying this degree course are taught in the lectures of electrical engineering, computer science and information engineering which enables the students an entry into a company in the IT-industry.</p> <p>The occupations of graduates of this course lie particularly within the fields of communications technology; in the sense of the amalgamation of computer and communications engineering. Therefore the following deployment areas result:</p> <ul style="list-style-type: none"> • Installation, operation and maintenance of mobile radio and wireless information systems • Employment in service integration companies (e.g. telecommunication and multimedia) • Construction and operation of application systems with a greater proportion of signal processing and transmission, e.g. in process control or in medical technology • Here small and medium scale as well as big internationally active companies come into play as possible employers. 			

Modul- und lecture catalogue

modul name	shorthand expression of module
Computer Engineering	
course coordinator	faculty
Prof. Dr.-Ing. Axel Hunger	-
used in degree course	
<ul style="list-style-type: none"> • Bachelor of Science in Computer Engineering • Bachelor of Science in Computer Science and Communications Engineering • Bachelor of Science in Control and Information Systems • Bachelor of Science in Electrical and Electronic Engineering • Bachelor of Science in Mechanical Engineering • Bachelor of Science in Material Technology 	

nr	courses	semester	sws	workload	ECTS-credits
1	Fundamentals of Computer Engineering 1	1	3	120	4
2	Fundamentals of Computer Engineering 2	2	3	120	4
total			6	240	8

description:

This module covers the fundamentals of computer science necessary for the design and the analysis of hardware. The design and the analysis on the sides of software- as well as on the sides of hardware-implementation are herewith considered.

modul name	shorthand expression of module
Computer Engineering	
lecture name	shorthand expression of lecture
Fundamentals of Computer Engineering 1	
lecturer	department
Prof. Dr.-Ing. Axel Hunger	

semester	cycle	language	requirements
1		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	75	120	4

description
<p>This course covers the fundamentals of computer science necessary for design and analysis of hardware. The topics include Boolean algebra, basic minimization methods, coding of information, arithmetic and logic functions with binary codes, design of digital circuits (combinational and sequential) as well as basics of automata and microprogramming. Based on Boolean algebra and information coding, the functions of gates and similar components of digital circuits are explained. These components are used to design more complex functions up to the modules required for the set up of a basic microcomputer.</p>
kind of examination
<p>According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.</p>
literature
<ul style="list-style-type: none"> ·1 Roth, Charles: Fundamentals of Logic Design, PWS Publ., 2001 Boston, 45YGQ4426 ·2 Green, Derek C: Digital Electronics, Longman, 2002 Harlow, 45YGQ4434 ·3 Milos Ercegovic, Tomas Lang, Jaime H. Moreno: Introduction to Digital Systems, John Wiley & Sons Inc, 1999 New York, 45YGQ1436 ·4 Ronald J. Tocci: Digital Systems: Principles and Applications, Prentice Hall, 1977 New Jersey, 43YGQ1436 ·5 John Crisp: Introduction to Digital Systems, Newnes, 2000 Oxford, 45YGQ4141 ·6 Judith L. Gersting: Mathematical Structures for Computer Science, W.H. Freeman and Company, 1982, New York, San Francisco, 01TVA1033 , 07TVA1033 , 45TVA1033 ·7 Frederick J. Hill, Gerald R. Peterson: Introduction to Switching Theory and Logical Design, John Wiley & Sons Inc., 1974 Canada, 43YGQ175
remark

modul name	shorthand expression of module
Computer Engineering	
lecture name	shorthand expression of lecture
Fundamentals of Computer Engineering 2	
lecturer	department
Prof. Dr. rer. nat. Maritta Heisel	

semester	cycle	language	requirements
2		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	75	120	4

description
- Notion of algorithm - Functional vs. imperative paradigm - Notation for algorithms - Specification notation for algorithms - Method for developing correct algorithms - Transforming algorithms into programs - Analyzing the complexity of algorithms - Notion of abstract data type (ADT) - Examples of simple ADTs
kind of examination
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literature
David Gries: The Science of Programming, Springer-Verlag, 1981. Bertrand Meyer: Object-Oriented Software Construction, Prentice Hall, 1997.
remark

modul name	shorthand expression of module
Computer Systems and Networks	
course coordinator	faculty
Prof. Dr.-Ing. Axel Hunger	-
used in degree course	
<ul style="list-style-type: none"> • Bachelor of Science in Computer Engineering • Bachelor of Science in Computer Science and Communications Engineering 	

nr	courses	semester	sws	workload	ECTS-credits
1	Computer Networks Lab	6	3	120	4
2	Logical Design of Digital Systems	4	4	150	5
3	Microcomputer Systems	5	5	180	6
4	Operating Systems and Computer Networks	6	3	120	4
total			15	570	19

description:
Coming from the development of digital systems, over the description of microcomputer systems, in addition in this module, the practical contact with computer networks will be taught and in the end, the general construction and the functional method of computer networks and the operating systems will be explained.

modul name	shorthand expression of module
Computer Systems and Networks	
lecture name	shorthand expression of lecture
Computer Networks Lab	
lecturer	department
Prof. Dr.-Ing. Axel Hunger	

semester	cycle	language	requirements
6		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	75	120	4

description
The Lab „Computer Networks Lab“ provides basic knowledge about conception, implementation and operation of computer networks. Basic ideas and terms related to the network like network topologies, protocols, routing, sockets, etc. will be introduced and explained. Especially the functioning of servers and firewalls will be discussed. Within a project an intranet for a small company has to be developed, consists of file and web server. This intranet has to be connected to the World Wide Web by using a firewall. Additionally the intranet has to be connected to an external site of the company. Furthermore an introduction into socket programming and network analysis programs will be given in the scope of the lab.
kind of examination
literature
remark

modul name	shorthand expression of module
Computer Systems and Networks	
lecture name	shorthand expression of lecture
Logical Design of Digital Systems	
lecturer	department
Prof. Dr.-Ing. Axel Hunger Dr.-Ing. Stefan Werner	

semester	cycle	language	requirements
4		German	

SWS	presence hours	self-study hours	workload	ECTS-Credits
4	60	90	150	5

description
<p>This course deepens the logical design principles for digital systems. Prerequisites are basic knowledge in switching algebra, Karnaugh Veitch diagrams, as well as the elementary combinatorial and sequential circuits. Based on this, state machines will be discussed in detail, especially the minimization methods. Subsequently, memory structures and their bus interfaces are explained. After that, an introduction to systems design principles is given and deepened by the example of programmable logic devices. Finally a survey on design for testability methods is given. In the associated lab two practice-relevant design systems are used. On the one hand the simulation system Workview (Viewlogic). Hereby the simulation and the analysis of ROM's and Bus-Interfaces take place. On the other hand the programming device Sculpter (Actel) is used for the development of programmable logic devices.</p>
kind of examination
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literature
<ul style="list-style-type: none"> ·1 Bolton, M.: Digital systems design with programmable logic. Addison-Wesley, 1990. [43-YGQ 2458] ·2 Almaini, A.E.A.: Kombinatorische und sequentielle Schaltsysteme. Prentice Hall, 1986. [43-YGQ 3030] ·3 Wirth, N.: Digital Circuit Design. Springer, 1995. [43 YGQ 3218] ·4 Lipp, H.M.: Grundlagen der Digitaltechnik. Oldenbourg, 1995 [] ·5 Stürz, Cimander: Logischer Entwurf digitaler Schaltungen. Hüthig, 1977. [41-YGQ 1313] ·6 Auer, A.: Programmierbare Logic IC. Hüthig, 1994 [43-YGQ 2521] ·7 Auer, A.; Rudolf, D.: FPGA: Feldprogrammierbare Gate Arrays. Hüthig, 1995. [43-YGQ 3179] ·8 Hertweg, A.; Brück, R.: Entwurf digitaler Systeme. Hanser, 2000.
remark

modul name	shorthand expression of module
Computer Systems and Networks	
lecture name	shorthand expression of lecture
Microcomputer Systems	
lecturer	department
Prof. Dr.-Ing. Walter Geisselhardt	

semester	cycle	language	requirements
5		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
5	75	105	180	6

description
Design and implementation of small process control systems. Microprocessors and microcontrollers as constituents of electrical and mechanical systems defining their function and performance. Simple man-machine interface, interconnection to monitoring systems at a higher level. Examples: Automobile electronics, telecommunication, traffic control. Operating systems, device driver, I/O, high level vs. Assembler programming.
kind of examination
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literature
<ul style="list-style-type: none"> ·1 J. L. Hennessy, D. A. Patterson: Rechnerarchitektur; Vieweg, 1994 or later English editions ·2 W. Stallings: Computer Organization and Architecture; McMillan, 1993 ·3 R. Y. Kain: Computer Architecture Vol. 1,2; Prentice Hall, 1989 (43 1419) ·4 G. Küveler, D. Schwoch: Arbeitsbuch Informatik; Vieweg, 1996 ·5 H. Eberle: Architektur moderner RISC-Mikroprozessoren; Informatik-Spektrum 20, H.5, Okt.1997, S. 259-267 ·6 B. Jacob, T. Mudge: Virtual Memory: Issues of Implementation; IEEE Computer, vol.31, 1998, No. 6, pp.33-43 ·7 S. A. McKee, et al.: Smarter Memory: Improving Bandwidth for Streamed References; IEEE Computer, July 98, pp. 54-63 ·8 J. Altenburg: Mikrocontroller-Programmierung, Carl Hanser Verlag 2000, ISBN 3-446-21408-9
remark

modul name	shorthand expression of module
Computer Systems and Networks	
lecture name	shorthand expression of lecture
Operating Systems and Computer Networks	
lecturer	department
Prof. Dr.-Ing. Axel Hunger	

semester	cycle	language	requirements
6		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	75	120	4

description
<p>This course covers two aspects of computer organization: Operating systems and management of resources on the one hand and fundamentals of computer networks on the other hand. The principles of operating systems are explained and illustrated by functions of UNIX and MS-DOS. Memory management systems are discussed concerning the hierarchy from mass storage to cache memories as well as principles like paging, segmenting, and virtual addresses. The second area is dedicated to the different aspects of computer communication. This includes interfaces and busses in computer systems as well as protocols and transport mechanisms in computer networks. Some common protocols and access methods are explained; on this basis, criteria for the design of networks with regard to transmission rate and error probability are discussed.</p>
kind of examination
<p>According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.</p>
literature
<ul style="list-style-type: none"> ·1 A. Tanenbaum (1994). Moderne Betriebssysteme, Wien: Hanser Verlag. ·2 Conrads, D. (1993). Datenkommunikation, Vieweg Verlag, Braunschweig. ·3 Kaderali, Firoz Digitale (1995). Kommunikationstechnik II, Vieweg Verlag, Braunschweig, Kapitel 12: Lokale Netze. ·4 Kaderali, F. (1995). Graphen, Algorithmen, Netze, Vieweg Verlag, Braunschweig, Kapitel 8: Wegeauswahl in Netzen
remark

modul name	shorthand expression of module
Electrical Engineering	
course coordinator	faculty
Prof. Dr.-Ing. Klaus Solbach	-
used in degree course	
<ul style="list-style-type: none"> • Bachelor of Science in Computer Engineering • Bachelor of Science in Computer Science and Communications Engineering • Bachelor of Science in Control and Information Systems • Bachelor of Science in Electrical and Electronic Engineering • Bachelor of Science in Mechanical Engineering • Bachelor of Science in Material Technology 	

nr	courses	semester	sws	workload	ECTS-credits
1	Fundamentals of Electrical Engineering 1	1	3	120	4
2	Fundamentals of Electrical Engineering 2	2	3	120	4
total			6	240	8

description:
<p>The module introduces fundamental methods of network analysis and first considerations of field theoretical methods, which is important for later modules. Secondly, application oriented questions concerning solid state circuits and electric machines and energy transport are discussed with a view to ready application to practical problems of mechanical engineers and material technologists.</p>

modul name	shorthand expression of module
Electrical Engineering	
lecture name	shorthand expression of lecture
Fundamentals of Electrical Engineering 1	
lecturer	department
Dr.-Ing. Oliver Pertz	

semester	cycle	language	requirements
1		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	75	120	4

description
The first semester of this two semester course deals with three main topics. First, simple dc circuit elements are introduced (Sources, resistors) and methods for circuit analysis are taught (e.g. node and loop method). After that, amplifiers are introduced and various important circuits for operational amplifiers are discussed. At the end of the semester, ac circuit analysis and ac circuit elements like inductances and capacitors are introduced. Complex analysis is used for solving ac problems with sinusoidal voltages.
kind of examination
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literature
S.E. Schwarz, W. G. Oldham: Electrical Engineering: An Introduction ISBN 0195105850 List price: USD 102
remark

modul name	shorthand expression of module
Electrical Engineering	
lecture name	shorthand expression of lecture
Fundamentals of Electrical Engineering 2	
lecturer	department
Dr.-Ing. Oliver Pertz	

semester	cycle	language	requirements
2		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	75	120	4

description
"Fundamentals of Electrical Engineering" is a two semester course in the field of Electrical Engineering for the students of the first and second semester. The second semester continues with the ac circuit analysis already started with in the first semester. After that basic transistor and diode circuits are introduced and explained. At the end of the semester a brief introduction into electric machines and transformers finishes the second semester.
kind of examination
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literature
S.E. Schwarz, W. G. Oldham: Electrical Engineering: An Introduction ISBN 0195105850 List price: USD 102
remark

modul name	shorthand expression of module
Fundamentals of Software Engineering 1	
course coordinator	faculty
Prof. Dr.-Ing. Axel Hunger	-
used in degree course	
<ul style="list-style-type: none"> • Bachelor of Science in Computer Engineering • Bachelor of Science in Computer Science and Communications Engineering • Bachelor of Science in Control and Information Systems 	

nr	courses	semester	sws	workload	ECTS-credits
1	Fundamentals of Programming 1 (Programming in C)	3	3	120	4
2	Fundamentals of Software Engineering 1 (Structured Analysis)	4	4	150	5
total			7	270	9

description:
In this module, basic knowledge of the program design and the programming is supposed to be supplied. Herewith the software will be developed with the structured analysis and fundamental knowledge in the software implementation will be taught by the examples of C programming language.

modul name	shorthand expression of module
Fundamentals of Software Engineering 1	
lecture name	shorthand expression of lecture
Fundamentals of Programming 1 (Programming in C)	
lecturer	department
Prof. Dr.-Ing. Hans-Dieter Kochs	

semester	cycle	language	requirements
3		German	keine

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	75	120	4

description
A widely-used programming language is C, especially for industrial applications and for network and communication applications. C is also the basic syntax of C++. The course gives a detailed introduction to the syntax and semantics of C. Contents: 1) Introduction,. 2) Information - Representation and Modelling. 3) Design of algorithms. 4) From an algorithm to a program. 5) Lexical elements. 6) Objects. 7) Input and output. 8) Expressions. 9) Elementary steps and statements. 10) Functions. 11) Pointers. 12) Dynamical memory allocation - Memory management functions. 13) Structures.
kind of examination
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literature
<ul style="list-style-type: none"> ·1 American National Standards Institute: American National Standard for Information Systems - Programming Language C. ANSI X3.159-1989, Published by American National Standards Institute, 11 West 42nd Street, New York, New York 10036. 1989. ·2 Kernighan, Brian W., Tondo, Clovis L., Ritchie, Dennis M. : The C programming language . - Englewood Cliffs, NJ : Prentice-Hall . - (Prentice-Hall software series). 1988. ·3 U. Rembold: Einführung in die Informatik für Naturwissenschaftler und Ingenieure. Carl-Hanser-Verlag, München. 3. Auflage. 1999. ·4 K. Zeiner: Programmieren lernen mit C. Carl-Hanser-Verlag, München. ISBN 3446215964. 4. Auflage. 2000.
remark

modul name	shorthand expression of module
Fundamentals of Software Engineering 1	
lecture name	shorthand expression of lecture
Fundamentals of Software Engineering 1 (Structured Analysis)	
lecturer	department
Prof. Dr.-Ing. Axel Hunger	

semester	cycle	language	requirements
4		German	

SWS	presence hours	self-study hours	workload	ECTS-Credits
4	60	90	150	5

description
Software is considered as a product with a life cycle from the first idea via specification, functional design, and implementation up to its use in a practical environment. A top down strategy based on the structured analysis (de Marco) is used to plan the overall structure of a software project; the method of Ward and Mellor is explained in more details. The lab, running in parallel to the lectures, gives a chance to try and apply the methods presented in the lecture to a practical problem. This problem is defined in a way that the students have to group in teams which solve the given problem within the frame of this course. Therefore, the lab allows to get experience with the different methods in software-engineering as explained in the lecture. In addition, it is intended to promote co-operation in a team.
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
<ul style="list-style-type: none"> ·1 D.Hatley, I.Pirbhai. Strategien für die Echtzeitprogrammierung. Hanser Verlag München. ISBN 3-446-16288-7. ·2 Jörg Raasch, Systementwicklung mit strukturierten Methoden, Hanser Verlag München. ISBN 3-446-17490-7. Signatur Uni-Duisburg: TWQ 3542. ·3 P.T.Ward, S.J.Mellor. Strukturierte Systemanalyse von Echtzeitsystemen. Hanser Verlag München. ISBN 3-446-16198-8. Signatur Uni-Duisburg TWT 2698.
remark

modul name	shorthand expression of module
Fundamental Labs	
course coordinator	faculty
Prof. Dr.-Ing. Axel Hunger	-
used in degree course	
<ul style="list-style-type: none"> • Bachelor of Science in Computer Engineering • Bachelor of Science in Computer Science and Communications Engineering • Bachelor of Science in Control and Information Systems • Bachelor of Science in Electrical and Electronic Engineering • Bachelor of Science in Mechanical Engineering • Bachelor of Science in Material Technology 	

nr	courses	semester	sws	workload	ECTS-credits
1	Computer Based Problem Solving	2	2	60	2
2	Interdisciplinary Labs	1	2	60	2
3	Introduction to CAx	1	2	90	3
total			6	210	7

description:
The labs contained in this module should impart the basic knowledge of and abilities in general dealing with computers, in computer-aided development and the department-comprehensive subjects beyond that.

modul name	shorthand expression of module
Fundamental Labs	
lecture name	shorthand expression of lecture
Computer Based Problem Solving	
lecturer	department
Prof. Dr. rer. nat. Johannes Gottschling Dr.-Ing. Bernhardt Weyh	

semester	cycle	language	requirements
2		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
2	30	30	60	2

description
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
·1 Pratap, R.: Getting Started with MATLAB 6. A Quick Introduction for Sci-entists and Engineers. Oxford University Press, New York-Oxford 2002 ·2 Überhuber, C., Katzenbeisser, S.: MATLAB 6, eine Einführung. Springer Verlag, Wien New York 2000
remark

modul name	shorthand expression of module
Fundamental Labs	
lecture name	shorthand expression of lecture
Interdisciplinary Labs	
lecturer	department
NN	

semester	cycle	language	requirements
1		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
2	30	30	60	2

description
During the Interdisciplinary Lab the students get a general idea in the research fields of each department of the faculty of engineering disciplines. The students can choose 5 experiments out of the offer, where at least one experiment from each department should be chosen. By this the students have the chance to set up their priorities and get at the same time an overview over the research fields.
kind of examination
literature
Script
remark

modul name	shorthand expression of module
Fundamental Labs	
lecture name	shorthand expression of lecture
Introduction to CAx	
lecturer	department
Prof. Dr.-Ing. Axel Hunger Prof. Dr.-Ing. Peter Köhler	

semester	cycle	language	requirements
1		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
2	30	60	90	3

description
The Lab Exercise will give an introduction into the possibilities of computer aided development in general. It consists of two parts. The first part is an introduction to the computer aided Design (CAD), in particular the creating of technical drawings with the CAD-system MegaCAD. The second half covers computer aided development of digital circuits. The software Workview will be used to draw and simulate logical circuits such as code converters, adders and counters.
kind of examination
literature
<ul style="list-style-type: none"> ·1 Krulikowski, A.: Fundamentals of Geometric Dimensioning and Tolerancing. Delmar Learning, 2 edition (1997). ·2 Hoischen: Technisches Zeichnen. Cornelson-Verlag. ·3 Köhler, P.: Moderne Konstruktionsmethoden im Maschinenbau. Vogel Buchverlag. Würzburg 2002 ·4 http://www.megacad.de/download/index.htm
remark

modul name	shorthand expression of module
Fundamentals and Auxiliary Engineering Disciplines	
course coordinator	faculty
Prof. Dr.-Ing. Axel Hunger Prof. Dr.-Ing. Klaus Solbach	-
used in degree course	
<ul style="list-style-type: none"> • Bachelor of Science in Computer Science and Communications Engineering 	

nr	courses	semester	sws	workload	ECTS-credits
1	Algorithms and Datastructures	3	3	120	4
2	Basic Electronic Devices	5	4	150	5
3	Signals and Systems 2	4	4	150	5
total			11	420	14

description:
<p>This module includes different supplements to the mathematical and engineering fundamentals imparted in the first year of study. An enlargement of mathematical fundamentals with regard to the discrete mathematics, fundamentals of signal theory and the construction of electronic components belongs to this. These supplements are prerequisite for later modules.</p>

modul name	shorthand expression of module
Fundamentals and Auxiliary Engineering Disciplines	
lecture name	shorthand expression of lecture
Algorithms and Datastructures	
lecturer	department
Prof. Dr. rer. nat. Maritta Heisel	

semester	cycle	language	requirements
3			

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	75	120	4

description
- Fundamental Algorithms, including: * searching * sorting * divide-and-conquer * greedy - Fundamentals of computability - Notation for specifying ADTs - Important data types, such as * linked lists, stacks, queues, sets * binary trees, balanced trees, B-trees * graphens * hash-tables - Implementation of ADTs
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
·1 Bertrand Meyer: Object-Oriented Software Construction, Prentice Hall, 1997. ·2 Robert Sedgewick: Algorithms, Addison Wesley, 1998.
remark

modul name	shorthand expression of module
Fundamentals and Auxiliary Engineering Disciplines	
lecture name	shorthand expression of lecture
Basic Electronic Devices	
lecturer	department
Prof. Dr. rer. nat. Franz-Josef Tegude	

semester	cycle	language	requirements
5		German	

SWS	presence hours	self-study hours	workload	ECTS-Credits
4	60	90	150	5

description
Starting with the basics concerning MOS-capacitors and charge-coupled devices, the fundamentals of field-effect transistors (MOSFET, MESFET, JFET) are treated. In the second part the basics of bipolar devices (pn-diode, zener-diode, bipolar transistor) are covered. The DC- and AC-behaviour of these devices are intensively studied resulting in a discussion of various small-signal equivalent circuits
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
<ul style="list-style-type: none"> ·1 K.-H. Rumpf, K.Pulvers, Elektronische Halbleiterbauelemente – Vom Transistor zur VLSI-Schaltung, Dr. Alfred Hüthig Verlag Heidelberg, ISBN 3-7785-1345-1, 1987 ·2 R.Köstner, A.Möschwitzer, Elektronische Schaltungen, Carl Hanser Verlag, München Wien, Studienbücher, ISBN 3-446-16588-6, 1993 ·3 K.Bystron, J.Borgmeyer, Grundlagen der Technischen Elektronik, Carl Hanser Verlag, München Wien, Studienbücher, ISBN 3-446-15869-3, 1990 ·4 D. A. Neamen, Electronic Circuit Analysis and Design, Irwin Book Team, ISBN 0-256-11919-8, 1996 ·5 A.S.Sedra, K.C.Smith, Microelectronic Circuits, Oxford University Press, 1991, ISBN 019-510369-6 ·6 R.S. Muller, T.I.Kamins, Device Electronics for Integrated Circuits, John Wiley & Sons, 1986, ISBN 0-471-88758-7 ·7 R.J.Baker, H.W.Li, D.E.Boyce, CMOS: Circuit Design, Layout, And Simulation, IEEE Press Series on Microelectronic Systems, IEEE Press, 1998, ISBN 0-7803-3416-7 ·8 H.Tholl, Bauelemente der Halbleiterelektronik, B.G.Teubner, Stuttgart, 1978, II, Teil 2, ISBN 3-519-06419-7 ·9 F.J.Tegude, Festkörperelektronik, Skript zur Vorlesung, Universität Duisburg - Essen
remark

modul name	shorthand expression of module
Fundamentals and Auxiliary Engineering Disciplines	
lecture name	shorthand expression of lecture
Signals and Systems 2	
lecturer	department
Dr.-Ing. Birgit Köppen-Seliger	

semester	cycle	language	requirements
4		English	Mathematics 1+2, Fundamentals of Electrical Engineering 1+2, Signals and Systems 1

SWS	presence hours	self-study hours	workload	ECTS-Credits
4	60	90	150	5

description
Mathematical description of systems: General system characteristics, Block diagrams, Differential Equations, The Laplace transform, Operations in the s-domain, Inverse Laplace transforms, Partial Fraction Expansions, Pole Zero diagrams, Transfer functions, Block diagram manipulations, Test Functions, 2nd order systems Analysis of control loops: Steady state behaviour of the control loop, Parameter sensitivity of the control loop, Stability of control loops, Nyquist Analysis, Bode plots, Root-locus plots Controller design: Design objectives, Design approaches, P-I-D Controllers, Controller design using Ziegler-Nichols State space: Generalised state space representation, Deriving state equations from transfer functions, Solution of the state equation using Laplace transformations, Eigenvalues, The transfer function matrix
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
·1 Richard C. Dorf and Robert H. Bishop: Modern Control Systems, Addison-Wesley Publ. Comp., 1995; ·2 Heinz Unbehauen: Regelungstechnik I, II, III, Vieweg Verlag 1997
remark

modul name	shorthand expression of module
Computer Science Mathematics	
course coordinator	faculty
Prof. Dr.-Ing. Axel Hunger	-
used in degree course	
<ul style="list-style-type: none"> • Bachelor of Science in Computer Engineering • Bachelor of Science in Computer Science and Communications Engineering 	

nr	courses	semester	sws	workload	ECTS-credits
1	Computer Based Engineering Mathematics	4	3	120	4
2	Mathematics C1 (Discrete Mathematics)	3	4	180	6
total			7	300	10

description:
<p>This module includes different supplements to the mathematical-orientated fundamentals imparted in the first year of study. Here is to mention an enlargement of mathematical fundamentals regarding the discrete mathematics, as well as fundamentals in the area of computer based engineering mathematics.</p>

modul name	shorthand expression of module
Computer Science Mathematics	
lecture name	shorthand expression of lecture
Computer Based Engineering Mathematics	
lecturer	department
Prof. Dr. rer. nat. Johannes Gottschling	

semester	cycle	language	requirements
4			

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	75	120	4

description
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
.1 Script der Vorlesung .2 Gramlich, G; Werner, W.: Numerische Mathematik mit MATLAB, dpunkt.verlag, Heidelberg, ISBN 3-932588-55-X
remark

modul name	shorthand expression of module
Computer Science Mathematics	
lecture name	shorthand expression of lecture
Mathematics C1 (Discrete Mathematics)	
lecturer	department
Prof. Dr. rer. nat. Wolfgang Schreiber	

semester	cycle	language	requirements
3			

SWS	presence hours	self-study hours	workload	ECTS-Credits
4	60	120	180	6

description
1 Principles of counting Sets and lists, Lists with repetitions, Lists without repetitions, Sets, Multisets, Functions, Permutations, Generating functions, Decision trees 2 Graph theory Definitions, Adjacency lists and adjacency matrices, Paths and walks, Euler Paths, Trees, Spanning trees, Matchings, Flows in networks, Petri nets 3 Algebraic methods Arithmeticv, Modular Arithmetic, Polynomials, Finite fields, Codes and Cryptographie
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
·1 Aigner, M. Diskrete Matematik, Vieweg. ·2 Biggs, N.L. Discrete Matematics. Oxford University Press.
remark

modul name	shorthand expression of module
Mechanical Engineering	
course coordinator	faculty
Prof. Dr. rer. nat. Jan-Dirk Herbell	-
used in degree course	
<ul style="list-style-type: none"> • Bachelor of Science in Computer Engineering • Bachelor of Science in Computer Science and Communications Engineering • Bachelor of Science in Control and Information Systems • Bachelor of Science in Electrical and Electronic Engineering • Bachelor of Science in Mechanical Engineering • Bachelor of Science in Material Technology 	

nr	courses	semester	sws	workload	ECTS-credits
1	Design Theory 1	2	2	90	3
2	Mechanics 1	1	3	120	4
3	Mechanics 2	2	3	120	4
total			8	330	11

description:
This module provides basic statics and dynamics to solve scientific and technical problems. Design Theory I deals with rules and approaches for the construction of tools with respect of function, production and economy. Material sciences presented in Mechanics 1 + 2 are elementary.

modul name	shorthand expression of module
Mechanical Engineering	
lecture name	shorthand expression of lecture
Design Theory 1	
lecturer	department
Prof. Dr.-Ing. Paul Josef Mauk	

semester	cycle	language	requirements
2		English	keine

SWS	presence hours	self-study hours	workload	ECTS-Credits
2	30	60	90	3

description
At the beginning the product design process as problem solving procedure for technical problems is explain, with problem definition and customer demands for the product. Following the basic forces are discussed which machines and their parts under operating conditions are subdued. Further on are discussed the boundary forces of construction basic materials at static and dynamic forces, with the definition of the shape stability of real parts. At least are the location- and mold tolerances, the fitting systems and allowance discussed. To practice the basic principles, it will be clarified at the example of an bolt connection.
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
<ul style="list-style-type: none"> ·1 Robert L. Norton, Machine Design – An Integrated Approach, Prentice Hall, Inc. 2001, Upper Saddle River, ISBN 0-13-017706-7 ·2 George E. Dieter, Engineering Design – A Materials and Processing Approach, McGraw Hill Publ., Boston, 2001, ISBN 0-07-366136-8 ·3 Bernard J. Hamrock, Bo Jacobson, Steven R. Schmid, Fundamentals of Machine Elements, McGraw Hill Publ. Boston, 1999, ISBN 0-256-19069-0 ·4 U. Claussen, Methodisches Auslegen – Rechnergestütztes Konstruieren, Carl Hanser Verlag, München, 1993 ·5 Robert C. Juvinal, Kurt M. Marshek, Fundamentals of Machine Component Design, John Wiley & Sons Inc., New York, 2003, ISBN 0-471-44844-3 ·6 U. Claussen, Methodisches Auslegen – Rechnergestütztes Konstruieren, Carl Hanser Verlag, München, 1993 ·7 K. Lingaiah, Machine Design Data Book, McGraw Hill Publ., New York, 2001, ISBN ·8 J. E. Shigley, C.R. Mischke, Standard Handbook of Machine Design, McGraw Hill, New York, 1996, ISBN 0-07-056958-4
remark

modul name	shorthand expression of module
Mechanical Engineering	
lecture name	shorthand expression of lecture
Mechanics 1	
lecturer	department
Prof. Dr. rer. nat. Manfred Braun Prof. Dr.-Ing. Andres Kecskemethy	

semester	cycle	language	requirements
1		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	75	120	4

description
Introduction; Vector Notation Kinematics of point masses "Geometry of Motion" Dynamics of point masses ("Interaction between forces and motion") Kinematics and dynamics of multi-particle systems(center of mass, constraint forces, degrees of freedom, etc.)Rotational Motion (planar)Energy Methods
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
·1 Segel: Mathematics applied to Continuum Mechanics, Dover ·2 Goldstein: Classical mechanics, Addison-Wesley ·3 Lanczos: The Variational Principle of Mechanics, Dover ·4 kleppner, Kolenkow: An Introduction to Mechanics, McGraw-Hill
remark

modul name	shorthand expression of module
Mechanical Engineering	
lecture name	shorthand expression of lecture
Mechanics 2	
lecturer	department
Prof. Dr. rer. nat. Manfred Braun Prof. Dr.-Ing. Andres Kecskemethy	

semester	cycle	language	requirements
2		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	75	120	4

description
Continuation of Mechanics 1: Dynamics of planar rigid bodies, some special kinematics properties of planar motion Statics: special solutions of systems at rest, friction, beam theory
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
·1 Segel: Mathematics applied to Continuum Mechanics, Dover ·2 Goldstein: Classical mechanics, Addison-Wesley ·3 Lanczos: The Variational Principle of Mechanics, Dover ·4 Kleppner, Kolenkow: An Introduction to Mechanics, McGraw-Hill
remark

modul name	shorthand expression of module
Multimedia and Internet	
course coordinator	faculty
Prof. Dr.-Ing. Axel Hunger	-
used in degree course	
<ul style="list-style-type: none"> • Bachelor of Science in Computer Engineering • Bachelor of Science in Computer Science and Communications Engineering 	

nr	courses	semester	sws	workload	ECTS-credits
1	Designing Multimedia Applications or Datamodels and Databases	5	4	150	5
2	Internet Technology	5	3	120	4
total			7	270	9

description:
In this module, the knowledge which is needed in dealing with and in the development of the multimedia-, Internet- or database-applications is supposed to be imparted. After finishing this module, a student should be capable of designing and implementing the applications mentioned above.
aims:
After finishing the modul, a student should be able to design and implement typical network based and multimedia applications.

modul name	shorthand expression of module
Multimedia and Internet	
lecture name	shorthand expression of lecture
Designing Multimedia Applications or Datamodels and Databases	
lecturer	department

semester	cycle	language	requirements
5		German	

SWS	presence hours	self-study hours	workload	ECTS-Credits
4	60	90	150	5

description
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
remark

modul name	shorthand expression of module
Multimedia and Internet	
lecture name	shorthand expression of lecture
Internet Technology	
lecturer	department
Prof. Dr.-Ing. Hans-Dieter Kochs	

semester	cycle	language	requirements
5		German	keine

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	75	120	4

description
Introduction to essential basic technologies of the internet. Following topics are outlined in detail: 1) Introduction to the world-wide-web (WWW). 2) Introduction to networking basics: ISO/OSI-Reference model, e.g. foundation, concepts. 3) Introduction to internetworking and application basics, e.g. IP, TCP, addresses and addressing, routing, basic applications. 4) Networking Services, e.g. Telnet, FTP, HTTP, Electronic mail, DNS. 5) Internet Security, e.g. authentication, encryption and digital signature, firewalls. 6) WWW and HTML programming, e.g. HTML, XML, PHP, Perl (CGI-Scripts). 7) Introduction to JAVA. 8) Database and Web server technologies. 9) Webservices.
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
·1 A. Zenk. 2001. Lokale Netze - Planung, Aufbau und Wartung. Addison-Wesley. ISBN 3-8273-1829-7. ·2 Norbert Pohlmann, Firewall-Systeme, MITP-Verlag Bonn, ISBN 3-8266-0719-8 ·3 Marty Hall, Larry Brown, Core Web Programming, Sun Microsystems, Inc. ISBN 0-13-089793-0 (HTML, JAVA, XML) ·4 PHP www.php.net
remark

modul name	shorthand expression of module
Communications and Microwave Engineering	
course coordinator	faculty
Prof. Dr.-Ing. Klaus Solbach	-
used in degree course	
• Bachelor of Science in Computer Science and Communications Engineering	

nr	courses	semester	sws	workload	ECTS-credits
1	Analog Filters	5	3	90	3
2	Microwave and RF Technology	4	4	150	5
3	Mobile Communications or Transmission and Modulation	6	3	90	3
total			10	330	11

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modul name	shorthand expression of module
Communications and Microwave Engineering	
lecture name	shorthand expression of lecture
Analog Filters	
lecturer	department
Prof. Dr.-Ing. Hans-Ingolf Willms	

semester	cycle	language	requirements
5		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	45	90	3

description
Chapter 1 Introduction Chapter 1 starts with basics in network analysis and network synthesis. Chapter 2 Characteristics and realization of passive 2-terminal RLC networks Chapter 2 deals with the general properties of passive 2-terminal RLC-networks, continues in describing the specific characteristics of passive 2-terminal LC-, RC-, and RL-networks and derives methods for their realization. Chapter 3 Realization of active RC Two-Ports Chapter 3 begins with a short introduction on modelling operational amplifiers and their equivalent circuits. After that, several layout rules for active RC filters (lowpass, highpass, bandpass, bandstop) based on operational amplifiers are derived and explained by corresponding practical examples.
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
<ul style="list-style-type: none"> ·1 Unbehauen, R.: Elektrische Netzwerke. Springer-Verlag, Berlin, 1972 ·2 Desoer, C.A. and Kuh, E.S.: Basic Circuit Theory. McGraw-Hill, Tokyo, 1969 ·3 Balabanian, N. and Bickart, T.A.: Electrical Network Theory. John Wiley & Sons, New York, 1969 ·4 Haykin, S.S.: Active Network Theory. Addison-Wesley, London, 1970 ·5 Temes, G.C. and Mitra, S.K.: Modern Filter Theory and Design. John Wiley & Sons, New York, 1973 ·6 Pregla, R. und Schlosser, W.: Passive Netzwerke. Teubner, Stuttgart, 1972 ·7 Schüssler, H.W.: Netzwerke und Systeme I. BI-Verlag, Mannheim, 1971 ·8 Kuo, F.F.: Network Analysis and Synthesis. John Wiley & Sons, New York, 1973 ·9 Unbehauen, R.: Synthes elektrischer Netzwerke. R. Oldenbourg-Verlag, München, 1977 ·10 Unbehauen, R. und Mayer, A.: Netzwerksynthese in Beispielen. Band I und II. R. Oldenbourg-Verlag, München, 1977
remark

modul name	shorthand expression of module
Communications and Microwave Engineering	
lecture name	shorthand expression of lecture
Microwave and RF Technology	
lecturer	department
Prof. Dr.-Ing. Klaus Solbach	

semester	cycle	language	requirements
4		English	Mathematics 1,2,3 and Fund. of Electr. Engineering

SWS	presence hours	self-study hours	workload	ECTS-Credits
4	60	90	150	5

description
<p>The lectures start with a short history of Radio Frequency engineering and an introduction to system considerations, describing the function of antennas and sub-circuits (building blocks) and then analyzing the function of communication systems. Circuits for Radio Frequency (RF) and Microwave applications employ passive concentrated (R,L,C) and distributed elements (transmission lines) and active elements connected in networks. The lecture series starts with the characterization of R,L,C-components as concentrated elements with parasitics and presents linear circuits based on L- and C-elements which are used to realize impedance transformers, reactive compensation and frequency filters. The most versatile component of RF- and Microwave circuits is covered in a chapter on transmission line characteristics. From an equivalent circuit representation the waves on transmission lines are derived and concepts of characteristic impedance, reflection coefficient and impedance transformation are presented. Transmission line circuits are analyzed employing the matrix representation describing port current and voltage as well as describing incident and emanent waves at the network ports. Various types of practically important transmission line are analyzed. Active circuits are discussed using RF amplifiers as an example; the principle characteristics of gain, noise, stability and impedance match are derived based on transistor equivalent circuit representation. The course is complemented by a series of lab experiments covering the major topics of the lectures.</p>
kind of examination
<p>According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.</p>
literature
<ul style="list-style-type: none"> ·1 Lecture-manuscript: File available from http://www.uni-duisburg.de/FB9/HFT/home-ger.html or paper copy from Herr Küppers (Room BB1119) ·2 David M. Pozar, Microwave and RF Wireless Systems, John Wiley & Sons, Inc.,2001
remark

modul name	shorthand expression of module
Communications and Microwave Engineering	
lecture name	shorthand expression of lecture
Mobile Communications or Transmission and Modulation	
lecturer	department

semester	cycle	language	requirements
6		German/English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	45	90	3

description
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
remark

modul name	shorthand expression of module
Natural Science	
course coordinator	faculty
Prof. Dr.-Ing. Axel Hunger Prof. Dr.-Ing. Uwe Maier Prof. Dr.-Ing. Paul Josef Mauk Prof. Dr.-Ing. Klaus Solbach Prof. Dr. rer. nat. Jan-Dirk Herbell	-
used in degree course	
<ul style="list-style-type: none"> • Bachelor of Science in Computer Engineering • Bachelor of Science in Computer Science and Communications Engineering • Bachelor of Science in Control and Information Systems • Bachelor of Science in Electrical and Electronic Engineering • Bachelor of Science in Mechanical Engineering • Bachelor of Science in Material Technology 	

nr	courses	semester	sws	workload	ECTS-credits
1	General Chemistry	1	3	120	4
2	Mathematics 1	1	6	210	7
3	Mathematics 2	2	5	180	6
4	Physics	2	4	150	5
total			18	660	22

description:
<p>Mathematics is taught in order to allow students to understand and follow courses in engineering theory and develop their ability to describe and solve engineering problems. Physics and Chemistry are taught in order to allow students to understand the fundamentals of many engineering disciplines and applications. The two courses in Mathematics cover the general fundamentals, while further mathematical fundamentals are added in later semesters depending on the requirements of the particular engineering discipline chosen by the individual student. The course in Chemistry covers introductory material for the understanding of basic principles used in engineering and lays the fundamentals for those students who continue with more specialized introductions to Chemistry in mechanical engineering and material technology. The course in Physics concentrates on those areas which are not covered by courses in mechanical engineering and electrical engineering of the first year in order to allow students a broader view of physical fundamentals and principles which are encountered in engineering sciences.</p>

modul name	shorthand expression of module
Natural Science	
lecture name	shorthand expression of lecture
General Chemistry	
lecturer	department
Prof. Dr. rer. nat. Christian Mayer	

semester	cycle	language	requirements
1		English	keine

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	75	120	4

description
The lecture deals with the fundamentals of general chemistry (atomic models, periodic table, chemical bonds, chemical thermodynamics and kinetics) as well as with some aspects of the field of chemistry which are of special relevance for engineering applications (structural and functional materials).
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
<p>1) General Chemistry (English) first choice! by Peter W. Atkins (New York 1989) accessible in the library under code: 32UNP2386</p> <p>2) Chemie – einfach alles (German) by Peter W. Atkins and J.A. Beran (Weinheim 1996) accessible in the library under code: 32UNP2653</p> <p>3) General Chemistry (English) by Wendell H. Slabaugh and Tharan D. Parsons (New York 1976) accessible in the library under code: 31UNP1453</p> <p>4) Prinzipien der Chemie (German) by Dickerson, Gray and Haight (Berlin 1978) accessible in the library under code: 31UNP1762</p> <p>5) Basic Principles of Chemistry (English) by Harry B. Gray and Gilbert P. Haight (New York 1967) accessible in the library under code: 33UNP1259</p>
remark

modul name	shorthand expression of module
Natural Science	
lecture name	shorthand expression of lecture
Mathematics 1	
lecturer	department
Prof. Dr. rer. nat. Johannes Gottschling	

semester	cycle	language	requirements
1		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
6	90	120	210	7

description
Propositional calculus, Predicate calculus, Real numbers, Mathematical Induction, Complex numbers, Sequences of real numbers, Series of real numbers, Complex exponential function, Logarithm and general exponential functions, Limits and continuity of functions, Trigonometric functions, Hyperbolic functions, Techniques of differentiation, Tangent lines and rates of change, Rules for finding derivatives, Higher order derivatives, Antiderivatives, Rules for finding antiderivatives, Definite integrals, Properties of definite Integrals, Techniques of indefinite integration, The first derivative test, The second derivative test, Convexity and Concavity, Applications of extrema, L'Hôpital's Rule, Solids of revolution, Centroids of plane regions, Taylor series
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
<ul style="list-style-type: none"> ·1 Forster, Otto: Analysis 1, Differential- und Integralrechnung, 4. Auflage, Vieweg & Sohn, Braunschweig 1983, ISBN 3-528-37224-9 ·2 Haußmann, Werner; Jetter, Kurt; Mohn, Karl-Heinz: Mathematik für Ingenieure, Teil I, Duisburg 1998 ·3 Cronin-Scanlon, Jane: Advanced Calculus, A Start in Analysis, D. C. Heath and Company, Lexington, Massachusetts 1969 ·4 Swokowski, Earl. W: Calculus with Analytic Geometry, Second Edition, Prindle, Weber & Schmidt, Boston, Massachusetts 1979, ISBN 0-87150-268-2 ·5 Ash, Carol; Ash, Robert B.: The Calculus Tutoring Book, IEEE Press, University of Illinois at Urbana-Champaign, ISBN 0-87942-183-5 ·6 Livesley, R. K.: Mathematical Methods for Engineers, Ellis Horwood Limited, Chichester, West Sussex, England 1989, ISBN 0-7458-0714-3 ·7 Jordan, D. W.; Smith, P.: Mathematical Techniques, Second Edition, Oxford University Press, New York 1997, ISBN 0 19 856461 9 ·8 Apostol, T.M.: Calculus I, II, Xerox College Publishing: Lexington-Mass., Toronto 1967

modul name	shorthand expression of module
Natural Science	
lecture name	shorthand expression of lecture
Mathematics 2	
lecturer	department
Prof. Dr. rer. nat. Johannes Gottschling	

semester	cycle	language	requirements
2			

SWS	presence hours	self-study hours	workload	ECTS-Credits
5	75	105	180	6

description
Vector space, Matrices, Determinants and their properties, System of linear equations, Eigenvalues, Eigenvectors, Vector-valued functions, Functions of several variables, Limits and Continuity, Partial Derivatives, Local extrema, Vectorfields, Line Integrals, Introduction to ODE, Laplace transforms, Fourier series and transform, Introduction to PDE
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
<ul style="list-style-type: none"> ·1 Forster, Otto: Analysis 2, Differentialrechnung im \mathbb{R}^n, Gewöhnliche Differentialgleichungen, Vieweg & Sohn, ISBN 3-499-27031-5 ·2 Swokowski, Earl. W: Calculus with Analytic Geometry, Second Edition, Prindle, Weber & Schmidt, Boston, Massachusetts 1979, ISBN 0-87150-268-2 ·3 Ash, Carol; Ash, Robert B.: The Calculus Tutoring Book, IEEE Press, University of Illinois at Urbana-Champaign, ISBN 0-87942-183-5 ·4 Livesley, R. K.: Mathematical Methods for Engineers, Ellis Horwood Limited, Chichester, West Sussex, England 1989, ISBN 0-7458-0714-3 ·5 Jordan, D. W.; Smith, P.: Mathematical Techniques, Second Edition, Oxford University Press, New York 1997, ISBN 0 19 856461 9 ·6 Papula, Lothar: Mathematik für Ingenieure und Naturwissenschaftler, Band 1 und Band 2, 10. Auflage, Vieweg & Sohn, Braunschweig/Wiesbaden 2001, ISBN 3-528-94237-1 ·7 Apostol, T.M.: Calculus I, II, Xerox College Publishing: Lexington-Mass., Toronto 1967
remark

modul name	shorthand expression of module
Natural Science	
lecture name	shorthand expression of lecture
Physics	
lecturer	department
Prof. Dr. rer. nat. Hilmar Franke	

semester	cycle	language	requirements
2		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
4	60	90	150	5

description
1)Introduction: vectors, units, equation of linear and circular motion, energy, elastic- and inelastic collision; 2)oscillations and waves: free-,damped-,enforced oscillations, waves, acoustic waves, what is sound?, intensity of sound, dB scale 3)optics: geometrical optics: prism, lenses, mirror, Snell´s law, light guiding, imaging with simple instruments 4)atomic physics: Bohr´s model, quantum numbers and their meaning, Franck-Hertz-experiment, X-rays, application of X-rays 5)nuclear physics: electrons, protons, neutrons, radiation, radioactive decay, radioactive clocks, nuclear energy from fusion and fission.
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
·1 U.Leute: Physik, Hanser Verlag, 1995 ·2 Lindner: Physik für Ingenieure, Hanser Verlag, 2001 ·3 H.J.Paus: Physik in Experimenten und Beispielen, Hanser Verlag, 2001 ·4 Orear: Physik", Hanser Verlag, 2001 ·5 Bohrmann, Pitka, Stöcker, Terlitzki: Physik für Ingenieure, Harri German,1993 ·6 Übungsbuch: z.B.:Müller/Heinemann/Krämer/Zimmer: Übungsbuch Physik, Hanser Verlag, 2001
remark

modul name	shorthand expression of module
Non-Technical Subjects 1	
course coordinator	faculty
Prof. Dr.-Ing. Axel Hunger Prof. Dr.-Ing. Uwe Maier Prof. Dr.-Ing. Paul Josef Mauk Prof. Dr.-Ing. Klaus Solbach Prof. Dr. rer. nat. Jan-Dirk Herbell	-
used in degree course	
<ul style="list-style-type: none"> • Bachelor of Science in Computer Engineering • Bachelor of Science in Computer Science and Communications Engineering • Bachelor of Science in Control and Information Systems • Bachelor of Science in Electrical and Electronic Engineering • Bachelor of Science in Mechanical Engineering • Bachelor of Science in Material Technology 	

nr	courses	semester	sws	workload	ECTS-credits
1	Non-Technical Subject 1	1	2	60	2
2	Non-Technical Subject 2	2	2	60	2
total			4	120	4

description:
<p>This module gives Bachelor-students the opportunity to demonstrate their participation in non-technical subjects. Students are free to choose from all offers of the University Duisburg-Essen, e.g. language courses or lectures on business administration and sociology and culture. From the catalogue at least one course of the field business administration has to be selected.</p>

modul name	shorthand expression of module
Non-Technical Subjects 1	
lecture name	shorthand expression of lecture
Non-Technical Subject 1	
lecturer	department
NN	

semester	cycle	language	requirements
1			

SWS	presence hours	self-study hours	workload	ECTS-Credits
2	30	30	60	2

description
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
remark

modul name	shorthand expression of module
Non-Technical Subjects 1	
lecture name	shorthand expression of lecture
Non-Technical Subject 2	
lecturer	department
NN	

semester	cycle	language	requirements
2			

SWS	presence hours	self-study hours	workload	ECTS-Credits
2	30	30	60	2

description
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
remark

modul name	shorthand expression of module
Non-Technical Subjects 2	
course coordinator	faculty
Prof. Dr.-Ing. Axel Hunger Prof. Dr.-Ing. Uwe Maier Prof. Dr.-Ing. Paul Josef Mauk Prof. Dr.-Ing. Klaus Solbach Prof. Dr. rer. nat. Jan-Dirk Herbell	-
used in degree course	
<ul style="list-style-type: none"> • Bachelor of Science in Computer Engineering • Bachelor of Science in Computer Science and Communications Engineering • Bachelor of Science in Control and Information Systems • Bachelor of Science in Electrical and Electronic Engineering • Bachelor of Science in Mechanical Engineering • Bachelor of Science in Material Technology 	

nr	courses	semester	sws	workload	ECTS-credits
1	Non-Technical Subject 3	3	2	60	2
2	Non-Technical Subject 4	3	2	60	2
3	Non-Technical Subject 5	4	2	60	2
4	Non-Technical Subject 6	6	2	60	2
total			8	240	8

description:
<p>This module gives Bachelor-students the opportunity to demonstrate their participation in non-technical subjects. Students are free to choose from all offers of the University Duisburg-Essen, e.g. language courses or lectures on business administration and sociology and culture. From the catalogue at least one course of the field business administration has to be selected.</p>

modul name	shorthand expression of module
Non-Technical Subjects 2	
lecture name	shorthand expression of lecture
Non-Technical Subject 3	
lecturer	department
NN	

semester	cycle	language	requirements
3			

SWS	presence hours	self-study hours	workload	ECTS-Credits
2	30	30	60	2

description
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
remark

modul name	shorthand expression of module
Non-Technical Subjects 2	
lecture name	shorthand expression of lecture
Non-Technical Subject 4	
lecturer	department
NN	

semester	cycle	language	requirements
3			

SWS	presence hours	self-study hours	workload	ECTS-Credits
2	30	30	60	2

description
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
remark

modul name	shorthand expression of module
Non-Technical Subjects 2	
lecture name	shorthand expression of lecture
Non-Technical Subject 5	
lecturer	department
NN	

semester	cycle	language	requirements
4			

SWS	presence hours	self-study hours	workload	ECTS-Credits
2	30	30	60	2

description
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
remark

modul name	shorthand expression of module
Non-Technical Subjects 2	
lecture name	shorthand expression of lecture
Non-Technical Subject 6	
lecturer	department
NN	

semester	cycle	language	requirements
6			

SWS	presence hours	self-study hours	workload	ECTS-Credits
2	30	30	60	2

description
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
remark

modul name Signals	shorthand expression of module
course coordinator Prof. Dr.-Ing. Klaus Solbach	faculty -
used in degree course	
• Bachelor of Science in Computer Science and Communications Engineering	

nr	courses	semester	sws	workload	ECTS-credits
1	Digital Filters	4	3	90	3
2	Radio Propagation Channels	5	3	120	4
3	Signals and Systems 1	3	5	180	6
total			11	390	13

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modul name	shorthand expression of module
Signals	
lecture name	shorthand expression of lecture
Digital Filters	
lecturer	department
Prof. Dr.-Ing. Hans-Ingolf Willms	

semester	cycle	language	requirements
4		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	45	90	3

description
Chapter 1 Introduction Chapter 1 starts with the description of discrete-time signals and linear time-invariant systems showing time-discrete impulse responses. The description considers the signal and system characteristics in the time, frequency, and z domain. After that, the digital filter is introduced as a linear shift-invariant structure simulating an analog linear time-invariant filter characterized by a time-discrete impulse response. Chapter 2: Design of nonrecursive digital filters (FIR filters) In chapter 2 the design of linear shift-invariant digital filters with finite impulse response (FIR) at given magnitude frequency response is described. Chapter 3: Design of recursive digital filters (IIR filters) Chapter 3 deals with the design of linear shift-invariant recursive digital filters showing infinite impulse responses (IIR). Special attention is given to the impulse invariance method and the design method using the bilinear z-transform.
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
<ul style="list-style-type: none"> ·1 Rabiner, L:R. and Rader, C.M.: Digital Signal Processing. IEEE Press New York ·2 Schüßler, H.W.: Digitale Systeme zur Signalverarbeitung. Springer-Verlag, Berlin 1973 ·3 Oppenheim, A.V.: Applications of Digital Signal Processing. Prentice Hall Inc., New Jersey ·4 Emillani, P., Cappellini, V., and Constantinides, A.G.: Digital Filters and their Applications. Academic Press, London 1978 ·5 Bozic, S.M.: Digital and Kalman Filtering. Edward Arnold Ltd., London 1979 ·6 Lacroix, A. : Digitale Filter. R.Oldenbourg-Verlag, München 1980 ·7 Lacroix, A. und Witte,K.H.: Zeitdiskrete normierte Tiefpässe. Dr. Alfred Hüthig Verlag, Heidelberg 1980 ·8 Terell, T.J.: Introduction to Digital Filters. The Mac Millan Press Ltd., London 1980 ·9 Lynn, P.A. and Fuerst, W.: Digital Signal Processing with Computer Applications. The Bath Press, Avon 1990
remark

modul name	shorthand expression of module
Signals	
lecture name	shorthand expression of lecture
Radio Propagation Channels	
lecturer	department
Dr. Christian Kranz	

semester	cycle	language	requirements
5		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	45	75	120	4

description
The lecture covers the fundamentals of mobile communication systems with special emphasis on wave propagation, linear timevariant systems and digital modulation. Chapter 1 introduces into mobile communication with a historical review, the concept of wireless cellular systems, as well as handover, roaming and multiple access. In chapter 2 focus is given to wave propagation, starting with a physical explanation of the mobile channel, following the theoretical framework of Maxwell's equations and finishing with the calculation of Jakes' Doppler spectrum. Then, linear timevariant systems are introduced in detail hereas the last chapter deals with digital modulation schemes for wireless communications.
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
Skript
remark

modul name	shorthand expression of module
Signals	
lecture name	shorthand expression of lecture
Signals and Systems 1	
lecturer	department
Prof. Dr.-Ing. Hans-Ingolf Willms	

semester	cycle	language	requirements
3		English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
5	75	105	180	6

description
Transforms: Fourier transform, Laplace transform, and z-transform Deterministic analog signals: Time domain, frequency domain Analog systems: Linearity, time-invariance, causality, LTI systems, impulse response, step response, convolution, transfer function, system function Sampling theory Discrete systems: Linearity, time-invariance, causality, LSI systems, impulse response, step response, convolution, transfer function, system function
kind of examination
According to § 17 of the examination regulation the type and duration of the examination will be defined from the lecturer before the semester starts. Therefore an examination can be a written test with a length of 30 to 120 minutes or an oral examination with a length of 30 to 60 minutes. The language of the examination is the same as the language of the lecture.
literature
·1 Alan V. Oppenheim, Signals and Systems, Prentice-Hall, 1997 ·2 Ashok Ambardar Analog and digital Signal Processing, International Thomson Publishing, 1995 ·3 Leslie Balmer, Signals and Systems: An Introduction, Prentice-Hall, 1997 ·4 Hwei Hsu, Schaum's Outline of Signals and Systems, McGraw-Hill, 1995
remark

modul name	shorthand expression of module
Elective, Thesis	
course coordinator	faculty
Prof. Dr.-Ing. Axel Hunger Prof. Dr.-Ing. Uwe Maier Prof. Dr.-Ing. Paul Josef Mauk Prof. Dr.-Ing. Klaus Solbach Prof. Dr. rer. nat. Jan-Dirk Herbell	-
used in degree course	
<ul style="list-style-type: none"> • Bachelor of Science in Computer Engineering • Bachelor of Science in Computer Science and Communications Engineering • Bachelor of Science in Control and Information Systems • Bachelor of Science in Electrical and Electronic Engineering • Bachelor of Science in Mechanical Engineering • Bachelor of Science in Material Technology 	

nr	courses	semester	sws	workload	ECTS-credits
1	Bachelor Thesis	6	0	0	15
2	Project or 2 Electives	3	6	180	6
total			6	180	21

description:
Candidates of BSc in Mech. Eng. need to do a project in teamwork, before they may finish their bachelor's thesis.

modul name	shorthand expression of module
Elective, Thesis	
lecture name	shorthand expression of lecture
Bachelor Thesis	
lecturer	department
NN	

semester	cycle	language	requirements
6		German/English	

SWS	presence hours	self-study hours	workload	ECTS-Credits
0	0	0	0	15

description
With the final thesis the candidates finish their course; they should prove their ability to solve an engineering task by themselves.
kind of examination
literature
remark

modul name	shorthand expression of module
Elective, Thesis	
lecture name	shorthand expression of lecture
Project or 2 Electives	
lecturer	department

semester	cycle	language	requirements
3			

SWS	presence hours	self-study hours	workload	ECTS-Credits
6	90	90	180	6

description
kind of examination
literature
remark