UNIVERSITÄT
DUISBURG
ESSEN

Syllabus Book

Bachelor of Science
Mechanical Engineering

Version: 01.10.2005

				V	Ü	P	S	Cr
Bachelor of Science in Mechanical Engineering				**77**	**41**	**13**	**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.	**Design Theory 2**	Mauk	*e*	2	2	0	0	5
	Mathematics C2 (Numerical Mathematics)	Schreiber	*e*	2	2	0	0	6
	Mechanics 3	Braun Kecskemethy	*e*	2	2	1	0	6
	Statistics for Engineers	Gottschling	*d*	1	1	0	0	3
	Thermodynamics 1	Atakan	*e*	2	1	0	0	4
	Materials Science 1	Fischer	*d*	4	0	1	0	5
			Sum:	**13**	**8**	**2**	**0**	**29**

4.	**Computer Based Engineering Mathematics**	Gottschling		1	1	1	0	4
	Manufacturing	Witt	*d*	2	1	0	0	4
	Design Theory 3	Mauk	*e*	2	2	0	0	5
	Non-Technical Subject 3	NN		2	0	0	0	2
	Non-Technical Subject 4	NN		2	0	0	0	2
	Fluid Mechanics	Roth Hänel	*e*	2	1	0	0	3
	Thermodynamics 2	Atakan	*e*	2	2	0	0	5
	Materials Science 2	Nowack	*d*	2	0	1	0	4
			Sum:	**15**	**7**	**2**	**0**	**29**

5.	**CAD / CAE**	Köhler	*d*	2	0	1	0	3
	Material Flow and Logistics or Wave Treatment		*d*	2	1	0	0	4
	Modelling and Simulation or Computational Fluid Dynamics		*d* *e*	2	1	0	0	3
	Non-Technical Subject 5	NN		2	0	0	0	2
	Non-Technical Subject 6	NN		2	0	0	0	2
	Production Management	Bergers	*e*	2	1	0	0	4
	Control Technique	Söffker	*e*	3	2	0	0	6
	Fluid Mechanics or Machine Tools		*d*	2	0	1	0	4
			Sum:	**17**	**5**	**2**	**0**	**28**

6.	**Bachelor Thesis**	NN		0	0	0	0	15
	Energy Engineering or Mechatronics		*d*	2	1	0	0	3
	Product Engineering or Process Engineering		*d*	2	1	0	0	4
	Project or 2 Electives			0	6	0	0	6
			Sum:	**4**	**8**	**0**	**0**	**28**

Description of the degree course

name of the degree course			shorthand expression of degree course
Bachelor of Science in Mechanical Engineering			
type	**period of study**	**SWS**	**ECTS-Credits**
Bachelor	6	131	174

description

The study in the Bachelor degree course “Mechanical Engineering” provides general training in the engineering areas of machine and plant construction and imparts special in depth knowledge in application areas. The students are to obtain system competency and the ability to solve interdisciplinary engineering problems by way of subject and system comprehensive lectures. Through the international orientation, the engineering training is adapted to the globalisation of markets and facilitates studying the degree course for foreign students. The graduates will be open for particular professional areas of

- (international) machine- and plant construction,
- thermal, mechanical and chemical process engineering,
- automobile industry and it’s supplying enterprises,
- technical environmental protection,
- engineering companies and consultancies.

The study programme should provide the students with the necessary knowledge, capabilities and methods in such a way that they are capable of doing academic research, critically classifying academic knowledge and acting responsibly taking the requirements and changes in the professional world into consideration. In appropriate cases, graduates with appropriate qualifications can – preferably after a phase of practical professional work – proceed to study in a Master’s degree course, which then opens a way to study for a doctoral degree.

Modul- und lecture catalogue

modul name	shorthand expression of module
Computer Engineering	
course coordinator	**faculty**
Prof. Dr.-Ing. Axel Hunger	-

used in degree course

- 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

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.

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 Roth, Charles: Fundamentals of Logic Design, PWS Publ., 2001 Boston, 45YGQ4426
·2 Green, Derek C: Digital Electronics,Longman, 2002 Harlow, 45YGQ4434
·3 Milos Ercegovac, 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
Electrical Engineering	
course coordinator	**faculty**
Prof. Dr.-Ing. Klaus Solbach	-

used in degree course

- 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:

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.

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
Engineering I	
course coordinator	**faculty**
Prof. Dr. rer. nat. Jan-Dirk Herbell	-
used in degree course	
• Bachelor of Science in Mechanical Engineering	

nr	courses	semester	sws	workload	ECTS-credits
1	Control Technique	5	5	180	6
2	Energy Engineering or Mechatronics	6	3	90	3
3	Modelling and Simulation or Computational Fluid Dynamics	5	3	90	3
total			**11**	**360**	**12**

description:
In addition to mandatory „Control Techniques“ this module offers limited choice of important practical topics.

modul name	shorthand expression of module
Engineering I	
lecture name	**shorthand expression of lecture**
Control Technique	
lecturer	**department**
Prof. Dr.-Ing. Dirk Söffker	

semester	cycle	language	requirements
5		English	Engineering Mathematics

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

description
terms, definition, idea of feedback, technical control, dynamic systems, description of dynamical systems, description of linear systems, behaviour of linear systems, time behaviour of elements and loops, frequency behaviour and Laplace transformation, characteristics of elements and of loops in the frequency domain, stability of dynamical systems, control design, tuning rules, modern approaches of control and control theory
kind of examination
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literature
·1 Ogata, K.: Modern control engineering, Int. Ed., Prentice Hall. ·2 Lunze, J.: Regelungstechnik I, Springer.
remark

modul name	shorthand expression of module
Engineering I	
lecture name	**shorthand expression of lecture**
Energy Engineering or Mechatronics	
lecturer	**department**

semester	cycle	language	requirements
6		German	

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

description
kind of examination
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literature
remark

modul name	shorthand expression of module
Engineering I	
lecture name	**shorthand expression of lecture**
Modelling and Simulation or Computational Fluid Dynamics	
lecturer	**department**

semester	cycle	language	requirements
5		German/English	

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

description
kind of examination
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literature
remark

modul name	shorthand expression of module
Engineering II	
course coordinator	**faculty**
Prof. Dr. rer. nat. Jan-Dirk Herbell	-
used in degree course	
• Bachelor of Science in Mechanical Engineering	

nr	courses	semester	sws	workload	ECTS-credits
1	Material Flow and Logistics or Wave Treatment	5	3	120	4
2	Product Engineering or Process Engineering	6	3	120	4
3	Production Management	5	3	120	4
total			**9**	**360**	**12**

description:
Similar to engineering I also this module offers some limited choice of topics in addition to mandatory “Production Management”. “Product Engineering” deals with cooperative Engineering, while “Process Engineering leads to environmental protection management.

modul name	shorthand expression of module
Engineering II	
lecture name	**shorthand expression of lecture**
Material Flow and Logistics or Wave Treatment	
lecturer	**department**

semester	cycle	language	requirements
5		German	

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
remark

modul name	shorthand expression of module
Engineering II	
lecture name	**shorthand expression of lecture**
Product Engineering or Process Engineering	
lecturer	**department**

semester	cycle	language	requirements
6		German	

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

description
kind of examination
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literature
remark

modul name	shorthand expression of module
Engineering II	
lecture name	**shorthand expression of lecture**
Production Management	
lecturer	**department**
Prof. Dr.-Ing. Diethard Bergers	

semester	cycle	language	requirements
5		English	

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

description

Production Management (PM) comprises the strategic as well as the operative PM. Production enterprises can be regarded as systems consisting of the production factors (man, machine, material). The lectures contain all process steps from the choice of the product program, create of work plans /process management and the implementation of Production Planning and Control (PPC) with their strategies. Knowledge over material flow management / store management and other variables of influence are indispensable requirements in PM. Students learn how the PM is involved in the value added chain.

kind of examination

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literature

·106 Hans-Jürgen Warnecke: Der Produktionsbetrieb 1 : Organisation, Produkt, Planung, 2. Auflage, Springer Verlag 1995, ISBN 3-540-58392-0
·107 Hans-Jürgen Warnecke: Der Produktionsbetrieb 2 : Produktion, Produktsicherung, 3. Auflage, Springer Verlag 1995, ISBN 3-540-58397-13.
·108 Hans-Peter Wiendahl: Betriebsorganisation für Ingenieure, 4. Auflage, Carl Hanser Verlag 1997, ISBN 3-446-18776-24.
·109 Marc A. Vonderembse/Gregory P. White: Operations Management (Concepts, Methods, Strategies), West Publishing Company NY

remark

modul name	shorthand expression of module
Fundamental Labs	
course coordinator	**faculty**
Prof. Dr.-Ing. Axel Hunger	-

used in degree course

- 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 deportment-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
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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

·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
Engineering Fundamentals	
course coordinator	**faculty**
Prof. Dr. rer. nat. Jan-Dirk Herbell	-
used in degree course	
• Bachelor of Science in Mechanical Engineering	

nr	courses	semester	sws	workload	ECTS-credits
1	Computer Based Engineering Mathematics	4	3	120	4
2	Mathematics C2 (Numerical Mathematics)	3	4	180	6
3	Mechanics 3	3	5	180	6
4	Statistics for Engineers	3	2	90	3
total			**14**	**570**	**19**

description:
Engineering Fundamentals start with basic methods in numerical mathematics, differential and integral equations, and continue with error proceeding. Statistics include quality control. The lectures in mechanics are necessary to understand the following lectures in design and engineering.

modul name	shorthand expression of module
Engineering Fundamentals	
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
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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
Engineering Fundamentals	
lecture name	**shorthand expression of lecture**
Mathematics C2 (Numerical Mathematics)	
lecturer	**department**
Prof. Dr. rer. nat. Wolfgang Schreiber	

semester	cycle	language	requirements
3		English	

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

description

1 Error Analysis Representation of numbers, Floating-point-numbers, Rounding errors, Error Propagation, Error propagation in arithmetic operations, Condition numbers 2 Nonlinear equations The method of Bisection, The secant method, Newton‘s method, Fixed point iteration, Polynomial equations, Systems of nonlinear equations, Newton‘s method for systems 3 Systems of Linear Equations The LR and Cholesky Decomposition, The LR-Decomposition, The Cholesky Decomposition, Gauss Elimination and Back-Substitution, Pivoting strategies, The QR Decomposition, Data fitting; Least square problems, lterative solutions, Jacobi Iteration (total-step-method), Gauss-Seidel-Iteration (single-step-method), Convergence properties 4 Finding Eigenvalues The Power method, Localizing eigenvalues , The QR-method, Hessenberg matrices 5 Ordinary Differential Equations Basic analytic methods, Separation of variables, Linear differential equations, One-step-methods, Euler‘s Method, Midpoint Euler, Two-stage-models, Runge-Kutta-methods 6 Polynoniial Interpolation Lagrange form of Interpolation Polynomial, Interpolation Error, Divided Differences, Spline Interpolation

kind of examination

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literature

·1 Gautschi, W. Numerical Analysis, Birkhäuser.
·2 Hammerlin und Hoffmann. Numerische Mathematik, Springer.
·3 Householder. A.S. Principles of Numerical Analysis, Dover Publications.
·4 Kincaid,D. and Cheney, W. Numerical Analysis, Brooks/Cole Publishing.
·5 Locher. Numerische Mathematik für Informatiker.
·6 Philipps,C. and Cornelius, B. Computional Numerical Methods, Ellis Hoorwood.
·7 Stoer, J. and Burlisch, R. Introduction to numerical Analysis.

remark

modul name	shorthand expression of module
Engineering Fundamentals	
lecture name	**shorthand expression of lecture**
Mechanics 3	
lecturer	**department**
Prof. Dr. rer. nat. Manfred Braun Prof. Dr.-Ing. Andres Kecskemethy	

semester	cycle	language	requirements
3		English	

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

description

1. Basic Concepts of Elastostatics The notions of stress and strain. The planar stress case, normal and shear stresses, stress tensor, rotation of the stress tensor, Mohr stress circle, principal strains and principal strain directions. The planar strain case: normal and shearing strains, strain tensor, rotation of strain tensor, Mohr's circle for the strains, principal strains and strain directions. Stress-strain relationships. The simple torsion and longitudinal loading cases. Bernoulli beam theory, basic laws, boundary conditions, example. Stress functions. 2. Kinematics of Machinery Rigid body motion, rotations, planar velocity fields, the instantaneous center of rotation, closure conditions in kinematic loops. The general acceleration field. Relative motions. Application of kinematic analysis to dynamics of machinery (planar case). 3. Vibration Analysis of Mechanical Systems with One Degree of Freedom Basic forms of mechanical oscillators, stationary points, linearization of equations of motion, free. Undamped linear vibrations, rigid-body oscillator. Damped linear vibrations. Forces vibrations, basic forms of excitation, harmonic excitation. 4. Impact Analysis Basic notions, fundamental laws for impact analysis, impact hypotheses. The free two-body impact case, impact coefficients. Central impact. Eccentric impact, bearing impacts.

kind of examination

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literature

·1 Segel: Mathematics applied to Continuum Mechanics, Dover
·2 Goldstein: Classical mechanics, Addison-Wesley
·3 Lanczos: The Variational Principle of Mechanics, Dover

remark

modul name	shorthand expression of module
Engineering Fundamentals	
lecture name	**shorthand expression of lecture**
Statistics for Engineers	
lecturer	**department**
Prof. Dr. rer. nat. Johannes Gottschling	

semester	cycle	language	requirements
3		German	

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

description
Introduction to theory of Probability, Laplace-Probability, Permutation and combination, Conditional probability, Independent events, Random variables, Distribution of a random variable, Mean and variance of probability distributions, Binomial distribution, Poisson & Hypergeometric distributions, Normal distribution, Confidence intervals, Testing of hypothesis, Quality control, Control chart, Chi-Quadrat test, Kolmogoroff-Smirnow test, Regression analysis and curve fitting, Analysis of variance
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 Kreyszig, Erwin: Statistische Methoden und ihre Anwendungen Vandenhoeck & Ruprecht, Göttingen 1991, ISBN 3-525-40717-3 ·2 Gottschling, Johannes: Statistik für Ingenieure, Skript zur Veranstaltung
remark

modul name	shorthand expression of module
Engineering Design	
course coordinator	**faculty**
Prof. Dr. rer. nat. Jan-Dirk Herbell	-
used in degree course	
• Bachelor of Science in Mechanical Engineering	

nr	courses	semester	sws	workload	ECTS-credits
1	CAD / CAE	5	3	90	3
2	Design Theory 2	3	4	150	5
3	Design Theory 3	4	4	150	5
total			**11**	**390**	**13**

description:

Within the scope of this module students shall learn, how to design complex element groups, machinery or plants functionally, production-oriented and economically. This includes whose calculation and technical documentation. All basic design engineering skills are taught every mechanical engineer should have. In sum, machines and element groups exist of many different machine elements as screws, bearings, gear wheels, matched joints etc. After successful completion of this module students should be able to select and dimension/ calculate those machine elements in accordance with technical demands. Furthermore they should be able to shape and document the designed modules by use of modern CAD-software. This means, they should know basic use of a modern 3D-CAD-Package.

modul name	shorthand expression of module
Engineering Design	
lecture name	**shorthand expression of lecture**
CAD / CAE	
lecturer	**department**
Prof. Dr.-Ing. Peter Köhler	

semester	cycle	language	requirements
5		German	

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

description

Initial topics of the lecture will be methodical basics and aspects which deal with the support for processes of product-development. Accordingly problems will be discussed concerning product-modelling based on parametric 3D-CAD-Systems. Relevant techniques in this field are working with macros and variants, features, remoted model-generation and other elementary methods for integration of product-knowledge in a CAD-model. Further themes are the analysis, presentation and optimisation of a product, respectively the combination of design and calculation. The referred CAD-System for practice is Pro/ENGINEER.

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 Köhler, P.: Moderne Konstruktionsmethoden im Maschinenbau. Vogel Buchverlag. Würzburg 2002
·2 Köhler, P., u.a.:Pro/ENGINEER-Praktikum. 3. Aufl.,Vieweg-Verlag. 2003
·3 Rizza, R.: Getting Started with Pro/ENGINEER (2nd Edition. Prentice Hall. 2001
·4 Dimarogonas, A.: Machine Design: A CAD Approach. John Wiley & Sons. 2000.

remark

modul name	shorthand expression of module
Engineering Design	
lecture name	**shorthand expression of lecture**
Design Theory 2	
lecturer	**department**
Prof. Dr.-Ing. Paul Josef Mauk	

semester	cycle	language	requirements
3		English	

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

description

Contents of this lecture are the breakable shaft-hub connections in mechanical design, like the shape and frictional fits. This is followed by the not breakable shaft hub connections with special emphasis of the shrink and press fits as well as the welded joints and the welding procedures for most diverse metallic materials. The further topics of the lecture are the fundamentals for axles, shafts and hubs as well as the methods for the computation of the shaft geometry and the shaft deformations under combined load as well as the strength for a given load condition also under kinematics conditions. Friction and lubrication with a systematic treatment of the lubricants and the lubrication theory leads the principles for the different bearing designs further on to roller and sliding bearings with its different characteristics, its construction, their computation of load-carrying capacity and endurance as well as. Rotary and stationary sealing are the last topic of the lecture.

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

Literaturempfehlung (German):
·1 G. Niemann, H. Winter, B.-R. Höhn,Maschinenelemente Band 2,3, Springer-Verlag, Berlin, 2001, ISBN 3-540-65816-5
Literaturempfehlung (English):
·2 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
Engineering Design	
lecture name	**shorthand expression of lecture**
Design Theory 3	
lecturer	**department**
Prof. Dr.-Ing. Paul Josef Mauk	

semester	cycle	language	requirements
4		English	

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

description

Contents of this lecture are the technical springs, cooperating and vibration response of technical springs and the design of such spring systems for technical applications. Form a further point gear wheel and gears with the teeth laws and tooth types as well as the kinematic and static-dynamic conditions of the load of transmission teeth. The relevant interpretation standards as well as the technically important gearbox failure follow. Clutch and brakes than represent a further topic stare and adjustable systems for braking and connecting rotating motion. The oil transmissions than form a further topic -, chain, flat and v-belt drives as well as synchronous belt drives for technical applications. Pipes, piping and hydraulic accumulators with their mechanical loads under internal pressure and load by transported media form a further part of the meeting. The application of different interpretation principles is represented by the example of the crank gears with the kinetics and dynamics of the crank gear of the relevant load of the elements by the example of applications of presses and shears. Special designs of the crank gear in form of crank gear systems put on such as knee levers and drive shaft crank gears form the conclusion of the lecture.

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

Literaturempfehlung (German):
·1 G. Niemann, H. Winter, B.-R. Höhn: Maschinenelemente Band 2,3: Springer-Verlag, Berlin, 2001, ISBN 3-540-65816-5

Literaturempfehlung (English):
·2 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	
course coordinator	**faculty**
Prof. Dr. rer. nat. Jan-Dirk Herbell	-

used in degree course

- 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 explaint, 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

·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
·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
Machine Technology	
course coordinator	**faculty**
Prof. Dr. rer. nat. Jan-Dirk Herbell	-
used in degree course	
• Bachelor of Science in Mechanical Engineering	

nr	courses	semester	sws	workload	ECTS-credits
1	Fluid Mechanics	4	3	90	3
2	Fluid Mechanics or Machine Tools	5	3	120	4
total			**6**	**210**	**7**

description:
Besides „Fluid Mechanics“ the students may choose between „Fluid Machines“ or „Machine Tools“. Fluid Mechanics deals with fundamentals in statics and kinematics of fluids. In addition, students may continue to learn the basic principles of turbomachinery. Instead of that students may concentrate on construction guide lines and main components for machine designs.

modul name	shorthand expression of module
Machine Technology	
lecture name **Fluid Mechanics**	**shorthand expression of lecture**
lecturer	**department**
Prof. Dr.-Ing. Paul Roth Prof. Dr.-Ing. Dieter Hänel	

semester	cycle	language	requirements
4		English	

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

description

This lecture presents an introduction into the mechanics of fluids and contains the following chapters: - static of fluids - kinematics of fluids - streamtube theory of incompressible fluids derivation of conservation equations for mass and energy Bernoulli equation energy equation with external energy and with friction - momentum theorem - angular momentum theorem - streamtube theory of compressible fluids (introduction to gasdynamics)

kind of examination

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literature

· Umdruck
· Script

remark

modul name	shorthand expression of module
Machine Technology	
lecture name	**shorthand expression of lecture**
Fluid Mechanics or Machine Tools	
lecturer	**department**

semester	cycle	language	requirements
5		German	

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

description
kind of examination
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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

- 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:

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.

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

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literature

1) General Chemistry (English) first choice!
by Peter W. Atkins (New York 1989)
accessible in the library under code: 32UNP2386
2) Chemie – einfach alles (German)
by Peter W. Atkins and J.A. Beran (Weinheim 1996)
accessible in the library under code: 32UNP2653
3) General Chemistry (English)
by Wendell H. Slabaugh and Theran D. Parsons (New York 1976)
accessible in the library under code: 31UNP1453
4) Prinzipien der Chemie (German)
by Dickerson, Gray and Haight (Berlin 1978)
accessible in the library under code: 31UNP1762
5) Basic Principles of Chemistry (English)
by Harry B. Gray and Gilbert P. Haight (New York 1967)
accessible in the library under code: 33UNP1259

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

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literature

·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: Lexton-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, Determinats 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

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literature

·1 Forster, Otto: Analysis 2, Differentialrechnung im IR(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: Lexton-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

- 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:

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.

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

- 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	4	2	60	2
2	Non-Technical Subject 4	4	2	60	2
3	Non-Technical Subject 5	5	2	60	2
4	Non-Technical Subject 6	5	2	60	2
total			**8**	**240**	**8**

description:

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.

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
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 4	
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 5	
lecturer	**department**
NN	

semester	cycle	language	requirements
5			

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
5			

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
Thermodynamics	
course coordinator	**faculty**
Prof. Dr. rer. nat. Burak Atakan Prof. Dr. rer. nat. Jan-Dirk Herbell	-
used in degree course	
• Bachelor of Science in Control and Information Systems • Bachelor of Science in Mechanical Engineering	

nr	courses	semester	sws	workload	ECTS-credits
1	Thermodynamics 1	3	3	150	5
2	Thermodynamics 2	4	4	120	4
total			**7**	**270**	**9**

modul name	shorthand expression of module
Thermodynamics	
lecture name	**shorthand expression of lecture**
Thermodynamics 1	
lecturer	**department**
Prof. Dr. rer. nat. Burak Atakan	

semester	cycle	language	requirements
3		English	helpful: Mathematics (1+2), Physics, Chemistry

SWS	presence hours	self-study hours	workload	ECTS-Credits
3	60	90	150	5

description

The fundamentals of engineering thermodynamics will be introduced and applied to problems of energy conversion, chemical engineering and materials science. (Power cycles, refrigeration, and combustion will be covered in the second part of the lecture: "Thermodynamics 2" Contents: Introduction/Motivation, Concepts/Definitions, Properties of a pure substance , Work and Heat, The first Law of Thermodynamics (Cycles, closed systems, open Systems, internal energy and enthalpy) The second law of Thermodynamics(Carnot-Cycle, closed systems) Entropy and related properties (Gibbs and Helmholtz function, the chemical potential) The properties of simple mixtures Phase diagrams Chemical Equilibrium

kind of examination

According to ï¿½ 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

ï¿½1 Fundamentals of Thermodynamics, Richard E. Sonntag, Claus Borgnakke, Gordon J. Van Wylen, 5.Aufl., John Wiley & Sons .
ï¿½2 Fundamentals of Engineering Thermodynamics von Michael J. Moran, Howard N. Shapiro, 3. Aufl., John Wiley & Sons .
ï¿½3 Chemical and Engineering Thermodynamics, Sandler, Stanley I., John Wiley & Sons
ï¿½4 Physical Chemistry, P.W. Atkins, Oxford University Press

remark

modul name	shorthand expression of module
Thermodynamics	
lecture name	**shorthand expression of lecture**
Thermodynamics 2	
lecturer	**department**
Prof. Dr. rer. nat. Burak Atakan	

semester	cycle	language	requirements
4		English	Thermodynamics 1

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

description
The fundamentals of thermodynamics, introduced in the first part of this lecture, will be applied more extensively to idealized technical systems and an introduction to chemical thermodynamics and heat transfer will be given. Contents: Recapitulation of the first course Mixtures of ideal gases and vapors (humid air) Second law control volume analysis Exergy and availability Idealized power and refrigeration cycles Combustion thermodynamics Basic heat transfer
kind of examination
According to ï¿½ 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
ï¿½1 Fundamentals of Thermodynamics, Richard E. Sonntag, Claus Borgnakke, Gordon J. Van Wylen, 5.Aufl., John Wiley & Sons . ï¿½2 Fundamentals of Engineering Thermodynamics von Michael J. Moran, Howard N. Shapiro, 3. Aufl., John Wiley & Sons . ï¿½3 Chemical and Engineering Thermodynamics, Sandler, Stanley I., John Wiley & Sons ï¿½4 Fundamentals of heat and mass transfer / Frank P. Incropera ; David P. DeWitt : Wiley
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

- 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	6	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
6			

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

description
kind of examination
literature
remark

modul name	shorthand expression of module
Materials and Manufacturing	
course coordinator	**faculty**
Prof. Dr. rer. nat. Jan-Dirk Herbell	-
used in degree course	
• Bachelor of Science in Mechanical Engineering	

nr	courses	semester	sws	workload	ECTS-credits
1	Manufacturing	4	3	120	4
2	Materials Science 1	3	5	150	5
3	Materials Science 2	4	3	120	4
total			**11**	**390**	**13**

description:
This module deals with practical features of materials use like solidity and failure. The knowledge of materials' quality is basic for design and manufacturing.

modul name	shorthand expression of module
Materials and Manufacturing	
lecture name	**shorthand expression of lecture**
Manufacturing	
lecturer	**department**
Prof. Dr.-Ing. Gerd Witt	

semester	cycle	language	requirements
4		German	

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

description

The lecture deals with procedures for the production of geometrically specified solid objects. The classification of these objects is based on the individual families of materials (metals, plastics, ceramics and wood) in accordance with DIN 8580, which divides the manufacturing processes into six main groups (moulding, forming, separation, joining, surface coating, change of material characteristics). Many different manufacturing processes can be used. In concrete cases, the selection of the particular manufacturing process is based on the demands on the workpiece, the manufacturing costs and the required quality. That is why methods for profitability studies and high-quality features of finished products are described. The manufacturing technique is of great importance during the production of products compatible to environment. Through innovative procedures, the full potential of the technologies can be achieved and the natural resources protected. That is why methods of the recycling economy are also considered within the framework of this lecture.

kind of examination

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literature

·1 Warnecke, H.-J.; Westkämper E.: Einführung in die Fertigungstechnik, Teubner, Stuttgart, 1998
·2 Fritz, A.; Schulze, G.: Fertigungstechnik, Springer-Verlag Berlin, 1998

remark

modul name	shorthand expression of module
Materials and Manufacturing	
lecture name	**shorthand expression of lecture**
Materials Science 1	
lecturer	**department**
Prof. Dr.-Ing. Alfons Fischer	

semester	cycle	language	requirements
3		German	

SWS	presence hours	self-study hours	workload	ECTS-Credits
5	75	75	150	5

description
Based on materials properties the context of quality and manufacturing in discussed. The Fe-C-System is presented in detail.
kind of examination
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literature
·1 Bargel/Schulze; Werkstoffkunde, Springer-Verlag ·2 Bergmann; Werkstofftechnik, Carl Hanser Verlag ·3 Hornbogen; Werkstoffe, Springer Verlag ·4 Schatt, Worch; Werkstoffwissenschaft, Germaner Verlag für Grundstoffindustrie
remark

modul name	shorthand expression of module
Materials and Manufacturing	
lecture name	**shorthand expression of lecture**
Materials Science 2	
lecturer	**department**
Prof. Dr.-Ing. Horst Nowack	

semester	cycle	language	requirements
4		German	

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

description
Based on the lecture Werkstoffe I by Prof. Fischer, the practical application of materials in various fields of mechanical engineering will be considered. The basic materials characteristics as well as the demands of engineering application will be outlined. High strength metallic materials (steel, Al-, Mg-, Ti- alloys), composite materials and ceramics will be presented.
kind of examination
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literature
·1 E. Hornbogen: Werkstoffe ·2 E. Haibach: Betriebsfestigkeit ·3 K. Schwalbe: Bruchmechanik ·4 Leitfaden der Betriebsfestigkeit VdeH ·5 FKM-Richtlinie ·6 Bergmann
remark