Karlsruher Institut für Technologie

Module Handbook
Mechanical Engineering International (B.Sc.)

SPO 2017

Valid from Summer Term 2019

Date: 18.03.2019

KIT DEPARTMENT OF MECHANICAL ENGINEERING

Table Of Contents

1 Field of study structure

Mandatory	
Orientation Exam	
Bachelor Thesis	15 CR
Fundamentals of Engineering	143 CR
Majors in Mechanical Engineering (International)	16 CR
International Project Management and Soft Skills	6 CR

1.1 Orientation Exam

Mandatory		
M-MACH-104162	Orientation Exam	0 CR

1.2 Bachelor Thesis

Credits
15

Mandatory		
M-MACH-103722	Bachelor Thesis	15 CR

1.3 Fundamentals of Engineering

Credits
143

Mandatory		
M-MATH-104022	Advanced Mathematics	21 CR
M-MACH-102572	Engineering Mechanics	23 CR
M-MACH-104232	Manufacturing Processes (MEI)	4 CR
M-MACH-102562	Materials Science	14 CR
M-MACH-102574	Technical Thermodynamics	15 CR
M-MACH-102565	Fluid Mechanics	8 CR
M-PHYS-104030	Physics	5 CR
M-ETIT-104049	Electrical Engineering	8 CR
M-MACH-102564	Measurement and Control Systems	7 CR
M-MACH-102563	Computer Science	6 CR
M-MACH-102573	Mechanical Design	20 CR
M-MACH-102566	Machines and Processes	7 CR
M-MACH-100297	Production Operations Management	5 CR

1.4 Majors in Mechanical Engineering (International)

Credits
16

Election block: Majors in Mechanical Engineering (International) (1 item)		
M-MACH-103351	MF A: Global Production Management	16 CR
M-MACH-103350	MF B: Energy Engineering	16 CR
M-MACH-103349	MF C: Automotive Engineering	16 CR

1.5 International Project Management and Soft Skills

Credits
6

Mandatory		
M-MACH-103322	International Project Management and Soft Skills	6 CR

Summer Term 2019	B.Sc. Mechanical Engineering International: Basic Courses, 1st year				
Time	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
08:00 am - 09:30 am		**3174015** Materials Science and Engineering II (Lecture) 02.95 ID SR 203			
09:45 am - 11:15 am	**0120010** Advanced Mathematics II (Lecture) 02.95 ID SR 203	**0120020** Advanced Mathematics II (Problem Session) 02.95 ID SR 203	**0120010** Advanced Mathematics II (Lecture) 02.95 ID SR 203	**3174015/ -26** Materials Science and Engineering II (Lecture and Tutorials) 02.95 ID SR 203	**3162011** Engineering Mechanics II (Tutorial) 10.91 Mittlerer HS
11:30 am - 01:00 pm		**3162010** Engineering Mechanics II (Lecture) 10.91 Mittlerer HS	**3162010** Engineering Mechanics II (Lecture) 10.81 HS 62		**3146018** Mechanical Design II (Tutorials) 02.95 ID SR 101
01:00 pm -02:00 pm					
02:00 pm - 03.30 pm			**3121036** Computer Science for Engineers Lab Course 02.95 ID SR 203	**0120020** Advanced Mathematics II (Problem Session) 02.95 ID SR 203	
03:45 pm - 05:15 pm	**3121035** Computer Science for Engineers (Tutorial) 02.95 ID SR 101	**3146017** Mechanical Design II (Lecture) 02.95 ID SR 101			
05:30 pm -07:00 pm					

01/03/2019

Basic Courses	Tutorial	Lab Course

3174016 Materials Science and Engineering Lab Course
Block course in CW 37/38

3162286 Lab Course 'Engineering Mechanics II'
Location/time will be announced on the website

3121034 Computer Science for Engineers
Location/time see lecture homepage

Summer Term 2019	B.Sc. Mechanical Engineering International: 2nd year				
Time	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
08:00 am - 09:30 am		**3166526** Technical Thermodynamics and Heat Transfer II 02.95 ID SR 101	**3166526** Technical Thermodynamics and Heat Transfer II (every 2 weeks) 02.95 ID SR 203	**3146020** Mechanical Design IV 02.95 ID SR 101 / **3134140** Machines and Processes Grashof	**3166033** Technical Thermodynamics and Heat Transfer II (Tutorial) 02.95 ID SR 203
09:45 am - 11:15 am	**4040431** Wave and Quantum Physics Gerthsen	**3154510** Fluid Mechanics I 10.23 room 609	**3146021** Mechanical Design IV (Tutorials) 20.21 Pool H		**3154510** Fluid Mechanics I 10.91 room 228
11:30 am - 01:00 pm	**3162012** Engineering Mechanics 4 10.50 Kleiner HS			**3166530** Technical Thermodynamics and Heat Transfer II (Auditorium exercises) 02.95 ID SR 203	
01:00 pm - 02:00 pm					
02:00 pm - 03.30 pm		**2110969** Arbeitstechniken im Maschinenbau (englisch) 02.95 ID SR 203			
03:45 pm - 05:15 pm		**3134140** Machines and Processes Grashof	**3162013** Engineering Mechanics 4 (Tutorial) 02.95 ID SR 203	**4040432** Wave and Quantum Physics (Tutorial) 30.22 Kl. HS B	
05:30 pm - 07:00 pm					

04/03/2019

Lecture	Tutorial	Workshop

3146022 Mechanical Design IV Workshop

Summer Term 2019	B.Sc. Mechanical Engineering International: 3nd year				
Time	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
08:00 am - 09:30 am				3134140 Machines and Processes Grashof	
09:45 am - 11:15 am		2161225 Machine Dynamics (Tutorial) 30.41 Chemie HS 1			3122512 Heat and Mass Transfer 02.95 ID SR 203
11:30 am - 01:00 pm					3122513 Heat and Mass Transfer (Tutorials) 02.95 ID SR 203
01:00 pm - 02:00 pm			3190923 Fundamentals of Energy Technology 02.95 ID SR 101		
02:00 pm - 03.30 pm			2114855 Automotive Engineering II 30.41 Chemie HS 3	2114856 Vehicle Ride Comfort & Acoustics I 2114857 Vehicle Ride Comfort & Acoustics II 70.04, R 219	2114858 Tutorial for Automotive Engineering II Nusselt 2161224 Machine Dynamics Grashof
03:45 pm - 05:15 pm		3134140 Machines and Processes Grashof	3190924 Tutorial for 'Fundamentals of Energy Technology' 02.95 ID SR 101		
05:30 pm - 07:00 pm					

04/03/2019

Lecture	MF A	MF B	MF C
3150044 SmartFactory@Industry	3150040 Globale Produktionsplanung (MEI) Block course, time and location will be announced on the website	3118095 Grundlagen der globalen Logistik Block course, time and location will be announced on the website	3122031 Virtual Engineering (Specific Topics) Block course, time and location will be announced on the website	3150012 Automatisierte Produktionssysteme (MEI) Block course, time and location will be announced on the website

3 Modules

M 3.1 Module: Advanced Mathematics [M-MATH-104022]

Responsible: Prof. Dr. Maria Aksenovich
Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: Fundamentals of Engineering

Credits	Language	Level	Version
21	Englisch	3	1

Mandatory			
T-MATH-108266	Advanced Mathematics I	7 CR	Aksenovich, Kühnlein
T-MATH-108268	Advanced Mathematics II	7 CR	Aksenovich, Kühnlein
T-MATH-108270	Advanced Mathematics III	7 CR	Aksenovich, Kühnlein
T-MATH-108265	Advanced Mathematics I Prerequisite	0 CR	Aksenovich, Kühnlein
T-MATH-108267	Advanced Mathematics II Prerequisite	0 CR	Aksenovich, Kühnlein
T-MATH-108269	Advanced Mathematics III Prerequisite	0 CR	Aksenovich, Kühnlein

Competence Certificate
Three written exams for the parts I-III of length 120 minutes each.

Competence Goal
The students know the foundations of calculus of one and several variables, linear algebra, theory of differential equations, and probability theory. They know and can apply techniques in these fields.

Module grade calculation
The grade for the module is composed from equally weighted grades for the examinations in Advanced Mathematics I-III.

Prerequisites
None.

Content
Basic set theoretic notions, proofs, sequences and convergence, functions and continuity, series, derivatives, integrals, vector spaces, matrices, Laplace transform, functions of several variables, applications of multivariate calculus, Fourier analysis, differential equations, probability.

Workload
In class: 270 hours

- lectures, tutorials and examinations

Independent study: 360 hours

- independent review of course material
- work on homework assignments
- preparation for written exams

Literature

- Lecture notes
- K. F. Riley, M. P. Hobson, S. J. Bence “Mathematical methods for physics and engineering”, Cambridge University Press, 2015

M 3.2 Module: Bachelor Thesis [M-MACH-103722]

Responsible: Prof. Dr.-Ing. Martin Heilmaier
Organisation: KIT Department of Mechanical Engineering

Part of: Bachelor Thesis

Credits	Language	Level	Version
15	Englisch	3	1

Mandatory			
T-MACH-108685	Bachelor Thesis	12 CR	Heilmaier
T-MACH-108684	Presentation	3 CR	Heilmaier

Competence Certificate
The module Bachelor Thesis consists of a written bachelor thesis and an oral presentation of a scientific subject chosen by the student himself/herself or given by the supervisor. The bachelor's thesis is designed to show that the student is able to deal with a problem of his/her subject area in an independent manner and within the given period of time using scientific methods.
The work load of the bachelor thesis corresponds to 12 ECTS. The maximal processing time of the bachelor thesis takes three months.
The date of issue of the subject has to be fixed by the supervisor and the student and to be put on record at the examination board. The subject of the bachelor thesis may be only returned once and only within the first month of processing time
On a reasoned request of the student, the examination board can extend the processing time by up to one month. If the bachelor thesis is not completed in time, this examination is "failed" (5,0), unless the student is not responsible.
The bachelor thesis is to be evaluated by not less than a professor or a senior scientist according to § 14 Abs. 3 Ziff. 1 KITG and another examiner. Generally, one of the two examiners is the person who has assigned the thesis. If the examiners do not agree, the bachelor thesis is graded by the examination board within this assessment; another expert can be appointed too. The bachelor thesis has to be graded within a period of six weeks after the submission.
The colloquium presentation must be held within 6 weeks after the submission of the bachelor thesis. The presentation should last around 20 minutes, corresponds to 3 ECTS, and is followed by a scientific discussion with the present expert audience.

Competence Goal
The student is able to work independently on a defined, subject-relevant theme based on scientific criteria within a given period of time. The student is able to do research, to analyze information, to abstract as well as collect and recognize basic principles and regularities on the basis of less structured information. He/she overviews a question, is able to choose scientific methods and techniques, and use them to solve the question or to identify other potentials. In general, this will be carried out in consideration of social and/or ethical aspects.

The student can interpret, evaluate, and if needed plot the results obtained. He/she is able to clearly structure a scientific work and (a) to communicate it in written form using technical terminology as well as (b) to present it in oral form and discuss it with experts.

Prerequisites
The requirement for admission to the bachelor thesis module are 120 ECTS. As to exceptions, the examination board decides on a request of the student (see § 14 (1) SPO).

Modelled conditions
The following conditions have to be fulfilled:

1. You need to earn at least 120 credits in the following fields:
   - Fundamentals of Engineering
   - International Project Management and Soft Skills
   - Majors in Mechanical Engineering (International)

Content
The student shall be allowed to make suggestions for the topic of his/her bachelor thesis. The topic is set by the supervisor of the thesis in accordance with § 14 (3) SPO.

Workload
The workload for the preparation and presentation of the bachelor thesis is about 450 hours.

M 3.3 Module: Computer Science (BSc-Modul 09, Inf) [M-MACH-102563]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

Credits	Duration	Language	Level	Version
6	2 term	Deutsch/Englisch	3	2

Mandatory			
T-MACH-105205	Computer Science for Engineers	6 CR	Ovtcharova
T-MACH-105206	Computer Science for Engineers	0 CR	Ovtcharova

Competence Certificate
Written examination "Computer Science for Engineers", 100%, 180 minutes; Examination prerequisite: passed lap course.

Competence Goal
Students can identify and explain fundamental terms, problems and concepts of computer science. They can apply the basic methods of the OO modeling with UML and implement the object-oriented programming (OOP) with the programming language JAVA.

Module grade calculation
Examination result "Computer Science for Engineers" 100%

Prerequisites
None

Content
Basics: Information representation- and processing, terms and definitions: alphabet, data, signals, information, numeral systems, propositional logic and Boolean algebra, computer architectures, programming paradigms.
Object Orientation: Definition and important characteristics of object orientation, Object-oriented modeling with UML.
Data Structures: Definition, properties and application of graphs, trees, linked lists, queues and stacks.
Algorithms: Characteristics of algorithms, complexity analysis, design methods, important examples.
Database management systems: Relational data model, relational algebra, declarative language SQL. Basics and concepts of JAVA. Introduction to programming using JAVA.

Annotation
For the Bachelor's program Mechanical Engineering the module (including all brick details, exams and courses) is offered in German.

For the Bachelor's program Mechanical Engineering (International) the module (including all brick details, exams and courses) is offered in English.

Workload
Attendance time: 63 hours

Self-study: 117 hours

Learning type
Lecture and Lab Course

M 3.4 Module: Electrical Engineering [M-ETIT-104049]

Responsible: Dr.-Ing. Klaus-Peter Becker
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: Fundamentals of Engineering

Credits	Language	Level	Version
8	Englisch	3	1

Mandatory			
T-ETIT-108386	Electrical Engineering and Electronics	8 CR	Becker

Competence Certificate
Written exam, duration 3 hours.

Prerequisites
none

Annotation
Exam and Lecture will be held in English.

M 3.5 Module: Engineering Mechanics (BSc-Modul 03, TM) [M-MACH-102572]

Responsible: Prof. Dr.-Ing. Thomas Böhlke
Prof. Dr.-Ing. Wolfgang Seemann

Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

Credits	Duration	Language	Level	Version
23	4 term	Deutsch/Englisch	3	1

Mandatory			
T-MACH-100282	Engineering Mechanics I	7 CR	Böhlke, Langhoff
T-MACH-100283	Engineering Mechanics II	6 CR	Böhlke, Langhoff
T-MACH-105201	Engineering Mechanics III & IV	10 CR	Seemann
T-MACH-100528	Tutorial Engineering Mechanics I	0 CR	Böhlke, Langhoff
T-MACH-100284	Tutorial Engineering Mechanics II	0 CR	Böhlke, Langhoff
T-MACH-105202	Tutorial Engineering Mechanics III	0 CR	Seemann
T-MACH-105203	Tutorial Engineering Mechanics IV	0 CR	Seemann

Competence Certificate
prerequisites EM I, II (see T-MACH-100528 "Engineering Mechanics I (Tutorial)" as well as T-MACH-100284 "Engineering Mechanics II (Tutorial)"): they consist of solving problems of the work sheets in four categories: written mandatory homework, written homework, computational homework, colloquia.

prerequisites EM III, IV

"Engineering Mechanics I", written exam, 90 minutes; graded:
"Engineering Mechanics II", written exam, 90 minutes; graded;
"Engineering Mechanics III/IV", written exam, 180 Minutes; graded;

The final grade of this module is computed as ECTS-based weighted sum of the included exams.

Competence Goal
After having finished the lectures EM I and EM II the students can

- assess stress and strain distributions for the basic load cases within the framework of elasticity and thermoelasticity
- compute and evaluate 3D stress and strain states
- apply the principle of virtual displacements
- apply energy methods and evaluate approximate solutions
- evaluate the stability of equilibrium positions
- solve worksheet problems to topics of the lecture using the computer algebra system MAPLE

In EM III and EM IV the students learn to analyse the motion of points and systems. Based on the axioms of Newton and Euler they know how to derive equations of motion. Besides the synthetic methods they get familiar with analytical methods which are based on energy expressions and can be applied efficiently and formalised. These methods are introduced in the scope of systems of mechanical engineering so that students can determine and analyse motions and the forces which are generated by these motions.

Prerequisites
None

Content
This Module consists of the courses "Engineering Mechanics I (lecture)" up to "Engineering Mechanics IV (lecture)" as well as "Engineering Mechanics I (Tutorial)" up to "Engineering Mechanics IV (Tutorial)"

Contents of "Engineering Mechanics I": basics of vector calculus; force systems; statics of rigid bodies; internal forces and moments in bars and beams; friction; centre of gravity, centre of mass; work, energy, principle of virtual work; statics of inextensible ropes; elastostatics of tension-compression-bars

Contents of "Engineering Mechanics II": bending; shear; torsion; stress and strain state in 3D; Hooke's law in 3D; elasticity theors in 3D; energy methods in elastostatics; approximation methods; stability

Contents of "Engineering Mechanics III":

Kinematics: Cartesian, cylindrical and natural coordinates. Time derivatives in moving reference frames, angular velocities of reference frames.

Kinetics of a particle:
Newton's axiom, Principle of d'Alembert, work of a force, kinetic and potential energies, principle of linear momentum, principle of moment of momentum, kinetics in moving reference systems

Systems of particles:
Principle of center of mass, Principle of moment of momentum, impacts between particles, systems with variable mass, applications.

Plain motion of rigid bodies:
Pure translation, pure rotation, general plain motion. Instantaneous center of rotation, Kinetics, moment of momentum, principle of work and principle of energy conservation for a rotation around a space-fixed axis. Mass moment of inertia, parallel-axis-theorem.Principle of linear momentum and principle of moment of momentum for arbitrary plain motion. Principle of d'Alembert for plain motion. Principles of linear and moment of momentum in integral form. Applications for impact problems.

Contents of "Engineering Mechanics IV":

Spatial kinematics of a rigid body, Euler angles, angular velocity using Euler angles, Euler's equations, inertia tensor, kinetic energy of a rigid body, free gyroscopes, forced gyroscopes, systems of rigid bodies, principle of d'Alembert, Lagrange's equations of the first and second kind, generalized coordinates, free and forced vibration of one degree of freedom systems, frequency response, vibration of multi degree of freedom systems, vibration absorption

Annotation
For the Bachelor’s program Mechanical Engineering the module (including all brick details, exams and courses) is offered in German.

For the Bachelor’s program Mechanical Engineering (International) the module (including all brick details, exams and courses) is offered in English.

Workload
lectures and exercises: 204h

homework and preparation of examination: 486h

Learning type
Lectures, Tutorials, Lab course groups, attestation of solved work sheets, colloquiua, consultation hours (optional)

M 3.6 Module: Fluid Mechanics (BSc-Modul 12, SL) [M-MACH-102565]

Responsible: Prof. Dr.-Ing. Bettina Frohnapfel
Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

Credits	Duration	Language	Level	Version
8	2 term	Deutsch/Englisch	3	1

Mandatory			
T-MACH-105207	Fluid Mechanics 1&2	8 CR	Frohnapfel

Competence Certificate
Common examination of "Fluid Mechanics I" and "Fluid Mechanics II"; written exam, 3 hours (graded)

Competence Goal
After having completed this module the student is capable of deriving the mathematical equations that describe the motion of fluids and can determine flow quantities for generic problems. He/she can name characteristic properties of fluids and distinguish different flow states. The student is capable of determining fluid quantities in fundamental applications. This includes the calculation of

- static and dynamic forces acting from the fluid onto the solid
- two-dimensional viscous flows
- one-dimensional incompressible and compressible flows without losses
- lossy flows through pipes

Module grade calculation
result of exam

Prerequisites
none

Content
properties of fluids, surface tension, hydro- and aerostatics, kinematics, stream tube theory (compressible and incompressible), losses in pipeline systems, dimensional analysis, dimensionless numbers

tensor notation, fluid elements in continuum, Reynolds transport theorem, conservation of mass and momentum, continuity equation, constitutive law for Newtonian fluids, Navier-Stokes equations, angular momentum and energy conservation, integral form of the conservation equations, forces between fluids and solids, analytical solutions of the Navier-Stokes equations

Annotation
For the Bachelor’s program Mechanical Engineering the module (including all brick details, exams and courses) is offered in German.

For the Bachelor’s program Mechanical Engineering (International) the module (including all brick details, exams and courses) is offered in English.

Workload
regular attendance: 64 hoursself-study: 176 hours

Learning type
Lectures + tutorials

Literature
Zirep J., Bühler, K.: Grundzüge der Strömungslehre, Grundlagen, Statik und Dynamik der Fluide, Springer Vieweg

Kuhlmann, H.: Strömungsmechanik, Pearson Studium

Spurk, J.H.: Strömungslehre, Einführung in die Theorieder Strömungen, Springer-Verlag

Kundu, P.K., Cohen, K.M.: Fluid Mechanics, Elsevier 2008

M 3.7 Module: International Project Management and Soft Skills [M-MACH-103322]

Responsible: Prof. Dr.-Ing. Barbara Deml
Prof. Dr. Stefan Nickel

Organisation: KIT Department of Mechanical Engineering

Part of: International Project Management and Soft Skills

Credits	Language	Level	Version
6	Englisch	3	1

Mandatory			
T-MACH-105296	Working Methods in Mechanical Engineering	4 CR	Deml
T-WIWI-108295	Project and Operations Management	2 CR	Nickel

Competence Certificate
Success is monitored within the framework of academic achievements.

Competence Goal

- The student gains knowledge of the principles and various instruments of project management and project planning and the acquisition of abilities to plan projects and create controlling systems.
- The student performs an analysis of various methods and procedures of multi-project management and project controlling in a global context.
- The student acquires knowledge of the product development process as well as important parameters of product development and development methods in the context of project management.

Prerequisites
None

Content
Working Methods in Mechanical Engineering:

1. Time and self management
2. Teamwork
3. Literature research
4. Scientific Writing
5. Scientific Presentation

Project and Operations Management:

Students will learn how to structure planning problems occurring in a company's operations or in international projects. Moreover, they are introduced to fundamental quantitative planning techniques and tools for solving real-world project and operations management problems.

Topics of the lecture include:

- Introduction to optimization
- Network planning techniques (CPM, PERT, stochastic time analysis etc.)
- Inventory management (single- and multi-period models etc.)
- Operations scheduling (single and parallel machine scheduling etc.)

Workload
The total workload for this module is approximately 180 hours. The total workload per course is obtained from the workload contributing to lecture and exercise attendance, exam hours, and the required time which it takes for an average student with average capacities to achieve the specified learning targets of this module.

Learning type
Lectures

Workshops

Literature
The script and references are available for download on ILIAS.

M 3.8 Module: Machines and Processes (mach13BSc-Modul 13, MuP) [M-MACH-102566]

Responsible: Dr.-Ing. Heiko Kubach
Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

Credits	Duration	Language	Level	Version
7	1 term	Deutsch/Englisch	3	2

Mandatory			
T-MACH-105208	Machines and Processes	7 CR	Bauer, Kubach, Maas, Pritz
T-MACH-105232	Machines and Processes, Prerequisite	0 CR	Bauer, Kubach, Maas, Pritz

Competence Certificate
written exam (2 h)

Competence Goal
The students can name and describe basic energy conversion processes and energy converting machines. They can explain the application of these energy conversion processes in various machines. They can analyze and evaluate the processes and machines in terms of functionality and efficiency and they are able to solve basic technical problems in terms of operating the machines.

Module grade calculation
Grade out of written exam (100%)

Prerequisites
None.

Content

- Internal combsution engines
- Hydraulic fluid machinery
- Thermal turbo machines
- Thermodynamics

Annotation
For the Bachelor’s program Mechanical Engineering the module (including all brick details, exams and courses) is offered in German.

For the Bachelor’s program Mechanical Engineering (International) the module (including all brick details, exams and courses) is offered in English.

Workload
regular attendance: 48 h

self-study: 162 h

Learning type
Lecture+Tutorial

Lab Course

M 3.9 Module: Manufacturing Processes (MEI) [M-MACH-104232]

Responsible: Prof. Dr.-Ing. Volker Schulze
Dr.-Ing. Frederik Zanger

Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

Credits	Language	Level	Version
4	Englisch	3	1

Mandatory			
T-MACH-108747	Basics of Manufacturing Technology (MEI)	4 CR	Schulze, Zanger

Competence Certificate
written exam (duration: 60 min)

Competence Goal
The students …

- are able to classify the manufacturing processes by their general functionality according to the specific main groups (DIN 8580).
- have the ability to declare and explain the function of the significant manufacturing processes of the main groups (DIN 8580).
- are enabled to describe the characteristic process features (geometry, materials, accuracy, tools, machines) of the significant manufacturing processes of the main groups (DIN 8580).
- have the ability to derive the relevant process specific technical advantages and disadvantages of the characteristic process features.
- are enabled to perform a selection of suitable manufacturing processes for given components.
- are enabled to classify the required manufacturing processes in the expiry of a process chain for the production of given sample products.

Prerequisites
none

Content
The objective of the lecture is to classify the manufacturing technology within the wider context of production engineering, to provide an overview of the different manufacturing processes and to establish basic process knowledge of the common processes. The lecture conveys the basic principles of manufacturing technology and deals with the manufacturing processes based on example components according to their classification into main groups regarding technical and economic aspects.

The following topics will be covered:

- Primary processing (casting, plastics engineering, sintering, additive manufacturing processes)
- Forming (sheet-metal forming, massive forming)
- Cutting (machining with geometrically defined and geometrically undefined cutting edges, separating, abrading)
- Joining
- Coating
- Heat treatment and surface treatment

Workload
regular attendance: 21 hours
self-study: 99 hours

Learning type
Lecture

M 3.10 Module: Materials Science (BSc-Modul 04, WK) [M-MACH-102562]

Responsible: Prof. Dr.-Ing. Martin Heilmaier
Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

Credits	Duration	Language	Level	Version
14	2 term	Deutsch/Englisch	3	2

Mandatory			
T-MACH-105145	Materials Science I & II	11 CR	Gibmeier, Heilmaier, Weidenmann
T-MACH-105146	Materials Science Lab Course	3 CR	Heilmaier, Möslang, Weidenmann

Competence Certificate
not graded: participation in 10 lab experiments, introductory colloquia must be passed and 1 short presentation must be presented. The lab course must be finished successfully prior to the registration for the oral exam;

graded: oral exam covering the whole module, about 25 minutes.

Competence Goal
Within this Module the students should

- gain knowledge of basics about structural and functional materials
- be able to draw relationships between atomic structure, microstructure and properties
- be able to apply appropriate methods to determine mechanical and other relevant properties as well as to characterize the microstructure of materials
- be able to assess material properties and corresponding applications

Prerequisites
none

Content
WK I

Structure of atoms and atomic bonding

Crystalline solids

Defects in crystalline solids

Amorphous and partially crystalline solids

Constitution of alloys and materials

Diffusion and phase transformation in the solid state

Microscopic characterization method

Characterization with X-Rays and neutrons

Non-destructive Testing

Mechanical Testing

WK II

Iron based alloys

Non-iron based alloys

Ceramics

Glases

Polymers

Composite Materials

Annotation
For the Bachelor’s program Mechanical Engineering the module (including all brick details, exams and courses) is offered in German.

For the Bachelor’s program Mechanical Engineering (International) the module (including all brick details, exams and courses) is offered in English.

Workload
The work load of the module is about 420 hours.

The workload for the lab course Materials Science is 90 h in total and consists of the presence during the 10 experiments (one week half-time, 4 hours per day) as well as preparation and rework time at home.

The workload for the lecture Materials Science I & II is 165 h per semester and consists of the presence during the lectures (WS: 4 SWS, SS: 2SWS) and the exercises (1 SWS per WS and 1 SWS per SS) as well as preparation and rework time at home.

Learning type
The module "Materials Science" consists of the lectures "Materials Science I and II" with additional tutorials for small groups and a one week materials science laboratory course.

M 3.11 Module: Measurement and Control Systems (BSc-Modul 11, MRT) [M-MACH-102564]

Responsible: Prof. Dr.-Ing. Christoph Stiller
Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

Credits	Duration	Language	Level	Version
7	1 term	Deutsch/Englisch	3	2

Mandatory			
T-MACH-104745	Basics in Measurement and Control Systems	7 CR	Stiller

Competence Certificate
Type of Examination: written exam

Duration of Examination: 150 minutes

Competence Goal

- Students are able to name, describe and explain control principles applied to physical quantities.
- They are able to name, analyze and assess system theoretic characteristics of dynamical systems.
- Students are able to represent real systems in a system theoretic model and to assess the suitability of a given model.
- Students are able to apply methods for controller design and to analyze their properties.
- Students are able to select appropriate principles of metrology and to model, analyze and assess measurement setups.
- Students are able to quantify and assess measurement uncertainties.

Module grade calculation
result of exam

Prerequisites
none

Content
1. Dynamic systems
2. Properties of important systems and modeling
3. Transfer characteristics and stability
4. Controller design
5. Fundamentals of measurement
6. Estimation
7. Sensors
8. Introduction to digital measurement

Annotation
For the Bachelor’s program Mechanical Engineering the module (including all brick details, exams and courses) is offered in German.

For the Bachelor’s program Mechanical Engineering (International) the module (including all brick details, exams and courses) is offered in English.

Workload
84 hours presence time, 126 hours selfstudies

Learning type
Lecture

Tutorials

M 3.12 Module: Mechanical Design (BSc-Modul 06, MKL) [M-MACH-102573]

Responsible: Prof. Dr.-Ing. Albert Albers
Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

Credits	Language	Level	Version
20	Deutsch/Englisch	3	2

Mandatory			
T-MACH-105286	Mechanical Design I & II	7 CR	Albers, Burkardt, Matthiesen
T-MACH-104810	Mechanical Design III & IV	13 CR	Albers, Burkardt, Matthiesen
T-MACH-105282	Mechanical Design I, prerequisites	0 CR	Albers, Matthiesen
T-MACH-105283	Mechanical Design II, prerequisites	0 CR	Albers, Matthiesen
T-MACH-105284	Mechanical Design III, Constructing the Team	0 CR	Albers, Matthiesen
T-MACH-105285	Mechanical Design IV, Constructing the Team	0 CR	Albers, Matthiesen

Competence Certificate
Mechanical Design I & II:

Preliminary examination: Successful participation in workshops in the field of mechanical Design I, as well as successful processing of output power in mechanical design II

Written examination in the field of mechanical engineering I and II: duration 60 min plus reading time

Mechanical Design III & IV:

Preliminary examination: Successful participation in workshops in the field of mechanical Design III & IV

- Examination in the field of mechanical Design III & IV consisting of
  written part with duration 60 min plus reading time and
- constructive part with duration 180 min plus reading ime

Competence Goal
Learning object springs:

- be able to recognize spring types and explain stress
- Identify and describe the properties of a resilient LSS in machine elements presented later on
- Understanding and explaining the principle of action
- Know and list areas of application for springs
- graphically illustrate the load and the resulting stresses
- be able to describe the degree of species usefulness as a means of lightweight construction
- be able to analyse different solution variants with regard to lightweight construction (use species efficiency)
- Being able to explain several springs as a circuit and calculate total spring stiffness

Learning objects Technical Systems:

- Being able to explain what a technical system is
- "Thinking in systems."
- Using system technology as an abstraction tool for handling complexity
- Recognizing functional relationships of technical systems
- Getting to know the concept of function
- be able to use C&C²-A as a means of system technology

Learning objects Visualization:

- Ability to create and interpret schematics
- Using freehand technical drawing as a means of communication
- To be able to apply the technical basics of freehand drawing
- Derivation of 2D representations into different perspective representations of technical structures and vice versa
- Master reading of technical drawings
- Dedicated dimensioning of technical drawings
- Create sectional views of technical systems as a technical sketch

Learning objects Bearings:

- be able to recognize bearings in machine systems and explain their basic functions
- name bearings (type/type/function) and recognize them in machine systems and technical drawings
- Being able to name areas of application and selection criteria for the various bearings and bearing arrangements and explain interrelationships
- Ability to functionally explain the design of the bearing definitions in different directions radially/axially and circumferentially
- Know and describe selection as an iterative process as an example
- be able to perform dimensioning of bearing arrangements as an example of the engineer's approach to dimensioning machine elements
- Develop first ideas for probabilities in predicting the life of machine elements
- Recognise from the damage pattern whether static or dynamic overload was the cause of material failure
- Calculate equivalent static and dynamic bearing loads from the catalogue and given external forces on the bearing
- Being able to name, explain and transfer the basic equation of the dimensioning to the bearing dimensioning

Learning objectives seals:

The students…

- can discuss the basic functions of seals
- can describe the physical causes for mass transfer
- can apply the C&C-Model on seals
- can name, describe and apply the three most important classification criteria of seals
- can explain the function of a contacting seal and a non-contacting seal.
- can differentiate the seal types and organize them to the classification criteria.
- can discuss the structure and the effect of a radial shaft seal
- can evaluate radial shaft seals, compression packings, mechanical seals, gap seals and labyrinth seals
- can describe and apply the constructional principle of selffortification
- can describe the stick-slip phenomenon during the movement sequences of a reciprocating seal

Learning design:

The students…

- understand the meaning of design
- are able to recognize and implement basic rules and principles of design
- are able to design the connection of partial systems into the total system
- can name requirements of design and take them into account
- know the main groups of manufacturing methods
- are able to explain the manufacturing processes
- are able to depict a casted design in a drawing clearly, e.g. draft of the mold, no material accumulation, …
- know how components are designed

- Know how the production of the components has an effect on
- their design
- Know the requirements and boundary conditions on design

Learning bolted connections:

The students…

- can list and explain various bolt applications.
- can recognize bolt types and explain their function
- can build a C&C² model of a bolted joint and discuss the influences on its function
- can explain the function of a bolted connection with the help of a spring model
- can reproduce, apply and discuss the screw equation.
- Can estimate the load-bearing capacity of low-loaded bolted joints for dimensioning purposes
- Can indicate which bolted joint is to be calculated and which only roughly dimensioned.
- Can carry out the dimensioning of bolted connections as flange connections
- Can create, explain and discuss the force deflection diagram of a bolted connection

Learning objectives tolerances and fits:

The students…

- know the importance of the microstructure of working surfaces on technical surfaces on the function. They are familiar with a system for describing the surface microstructure in technology and parameters for describing the surface fine structure of working surfaces both in their definition and in their statement and in the quantitative order of magnitude.
- know and can explain surface measurement principles.
- know the relationship between the surface structure and the manufacturing processes and the costs.
- know the purpose of standards, standard types and preferred numbers.
- know and can define tolerances as a description of the geometry of working surfaces. They know the ISO fitting systems in type and structure and can apply it.
- can explain the different types of toleration and their significance for the economic product development process.

Learning objectives component connections:

The students…

- can generally explain basic functions of shaft-hub-connections.
- know and can explain a selection of different component connections to the respective working principles.
- can explain the component connection "centering" in its function and draw it in a technical drawing.
- understand form-closing and force-closing shaft-hub connections and can explain them. They can dimension a cylindrical interference fit (calculation and dimensioning criteria) and understand the stresses on a cylindrical interference fit and can display them graphically.

Learning objectives gears:

The students…

- Understand the function of gearboxes in the context of drive systems.
- are familiar with different operating principles of gearboxes and different types of gearboxes.
- know and understand the law of gearing. They know names on the gear and different flank curves.
- Understand engagement of gears, application limits and damage to gears. They know the basic ideas of gear dimensioning.
- know and understand planetary gearboxes. They understand the operating principle of hydraulic transmissions.

Learning objects dimensioning

Students can...

- Explain the target values of the economic dimensioning
- explain what are the main results of a dimensioning process
- explain the scope of the dimensioning (economic and legal significance)
- Explain the basic sizing procedure and record it as a generic flowchart
- Explain uncertainties in dimensioning
- specify the different basic procedures, both for dimensioning and for determining the influencing variables, e.g. loads, as well as their advantages or disadvantages in relation to each other
- explain different types of calculation methods and their characteristics (static/dynamic, local vs. nominal voltages)
- Name different types of failure (implies the definition of failure)
- Explain possible causes of failure
- provide suitable replacement models for simple subsystems of technical systems as a basis for dimensioning
- Explain different basic load types for given examples Dominant load types relevant to design
- Use the basics of elastostatics for all basic load cases to design components that can be modeled as linear structures according to the nominal stress concept.
- describe the dimensioning parameters presented in the VL and their use (shape number, shape yield strength, shape yield strength ratio)
- explain the purpose of strength hypotheses

- explain the strength hypotheses for metallic materials presented in the VL and select them according to the specific situation
- explain the principal effects of notches, including the factors affecting the magnitude of these effects
- describe how notches can be taken into account in the dimensioning process
- notched components that can be modeled as linear load-bearing structures for static loads
- Explain possibilities for determining the strength of a material or component
- Name influencing variables on the loadability and derive measures from them in order to influence the loadability of a component if necessary.
- describe different types of material behaviour under overelastic stressing of metallic materials
- Describe dynamic loads
- from Wöhler, Haigh- or Smith diagrams determine material characteristics for the loadability under given load conditions
- construct the Smith chart approximately with the given characteristic values
- explain the difference between strength and fatigue strength
- Components that can be modeled as linear structures according to the nominal stress concept for dynamic loads in base load cases and combined loads in the same phase
- for components that can be modeled as linear structures, explain the design approach presented in the lecture for any combined, dynamic loads
- Perform strength analyses in accordance with DIN 743, in the course of which even failure-critical points in the component can be identified and, if the result is negative, appropriate measures can be derived and evaluated.
- Name factors influencing the safety factors to be selected and explain what type of influence this is

Learning objectives shaft couplings:

Students can...

- Name the reasons for using shaft couplings (in short: "Couplings")
- name exemplary applications of couplings
- List basic functions of clutches and delimit clutches to transmissions
- indicate the basic power balance of a coupling
- mention various ancillary functions that occur with clutches
- name various criteria for classifying couplings
- describe the embodiment-function relationship for a given coupling for both main and secondary functions
- If necessary, derive the main and auxiliary functions required for the application, select a suitable coupling (and if necessary also a specific size) or combine several couplings if necessary.
- Explain interactions of couplings with adjacent subsystems, possibly specific to certain designs or groups of couplings
- Specify selection criteria for couplings
- explain central design principles for different groups of couplings, including the designation of key design targets
- for frictionally engageable clutches, slip time, transferable torque and thermal resistance should be designed roughly under the assumptions and simplifications dealt with in the lecture, estimate the relevant loads by the surrounding technical system and, if necessary, influence the specified target values by design measures.
- Apply relevant standards for the design of couplings
- Name possible failure modes for given couplings
- specify which design measures on a coupling can be used to influence the dynamic behaviour of the surrounding system in a desired direction
- explain the various possible actuation types for switchable clutches and give examples of corresponding clutch designs

Learning Objectives Fundamentals of Fluid Technology:

Students can...

- differentiate between different areas of fluid technology on the basis of essential aspects of the operating principles
- Identify properties/ special features of fluid technology systems and the resulting areas of application
- explain basic approaches for the design of hydraulic systems
- differentiate the flow types shown in the lecture
- with the basic equations (continuity equation, Bernoulli,...) of hydrostatics and hydrodynamics explained in the lecture.
- Identify sources of pressure losses in hydraulic systems and influencing factors
- designate basic subsystems of a hydraulic system
- Assign system and component examples shown in the lecture to components of a hydraulic system
- name the symbols shown in the lecture and assign them to the respective system/component
- use symbols to explain the function of simple hydraulic systems
- Draw up function diagrams for hydraulic systems that are similar in complexity to the systems shown in the lecture.

Prerequisites
None

Content
MKL I:

Introduction to mechanical design

Tools for visualization (technical drawing)

Product Development as a problem solution

Technical Systems Product Development

- Systems theroy
- Contact and Channel Approach C&C²-A

Basics of selected construction and machine elements

- springs
- Bearing and fence

The lecture is accompanied by exercises with the following content:

gear workshop

Exercises for visualization tools (technical drawing)

Exercise on Technical Systems Product Creation

- Systems theroy
- Contact and Channel Approach C&C²-A

Exercise on the spring module

Exercise on the bearing and fence Module

MKL II:

- Basics bearings
- Sealings
- Design
- Tolerances and fits
- component connections
- The lecture is accompanied by exercises to deepen the contents of the lecture.

MKL III:

- component connections
- tolerances and fits
- gears
-

MKL IV:

Elementary component connections - Part 2

Basics of clutches

- Function and operating principles
- Characteristic features and classification
- Non-engaging shaft clutches
- Switchable shaft clutches
- Flexible clucthes

Basics of gearboxes

- Function and operating principles
- Basics of gear drives
- Characteristic features and classification
- selection criteria
- Basics of other transmissions
- Fundamentals of lubrication and lubricants

Basics of gearing

- Function and operating principles
- Types of thoothing
- Cycloid as flank curve
- Involute as flank curve
  Method of manufacturing gears
- Profil overlap
- Profil offset
- Limits of application and damage

- Dimensioning
- Thooth strength
- Pitting resistance

Basics of hydraulics

- Basic functions and operating principles
- Characteristic features and classification
- Types and properties
- Sample
- Application
- Design calculation

Annotation
For the Bachelor's program Mechanical Engineering the module (including all brick details, exams and courses) is offered in German.

For the Bachelor's program Mechanical Engineering (International) the module (including all brick details, exams and courses) is offered in English.

Workload
MKL1:
Attendance at lectures (15 VL): 22,5h

Presence exercises (8 exercises): 12h

Attendance (3x 2h) and preparation (3x3h) Workshop sessions: 15h

Preparation and execution of online test: 6h

Personal preparation and follow-up of lecture and exercise: 34,5hMKL1:

MKL2:

Attendance lectures (15 VL): 22,5h

Presence exercises (7 ÜB): 10,5h

Personal preparation and follow-up of lecture and exercise, incl. prerequisite and preparation for the exam:: 117h

MKL 3:

Attendance lectures (15 L): 22,5h

Presence exercises (4 exercises): 6h

Attendance milestones project work (3x 4h): 12h

Project work in a team: 80h

Personal preparation and follow-up of lecture and exercise: 29,5h

MKL 4:

Attendance lectures (13 L): 19,5h

Presence exercises (6 exercises): 9h

Attendance milestones project work (3x 4h): 12h

Project work in a team: 120h

Personal preparation and follow-up of lecture and exercise, incl. preparation for the exam: 82,5h

Learning type
Lecture

Tutorial

Project work during the semester

M 3.13 Module: MF A: Global Production Management [M-MACH-103351]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: Majors in Mechanical Engineering (International)

Credits	Language	Level	Version
16	Englisch	3	1

Mandatory			
T-MACH-106731	Global Production Engineering (MEI)	4 CR	Lanza
T-MACH-105379	Global Logistics	4 CR	Furmans
Election block: SP A: Globales Produktionsmanagement (at least 8 credits)			
T-MACH-106733	SmartFactory@Industry (MEI)	4 CR	Lanza
T-MACH-105381	Virtual Engineering (Specific Topics)	4 CR	Ovtcharova
T-MACH-106732	Automated Production Systems (MEI)	4 CR	Fleischer

Competence Certificate
Oral exams: duration approx. 5 min per credit point
Amount, type and scope of the success control can vary according to the individually choice.

Competence Goal
The students acquire in the compulsory core subjects profound knowledge about the scientific theories, principles and methods of Production Engineering. Afterwards they are able to evaluate and design complex production systems according to problems of manufacturing and process technologies, materials handling, handling techniques, information engineering as well as production organisation and management.

After completion this module, the students are able

- to analyse and solve planning and layout problems on the level of the enterprise, production, processes and work tasks,
- to plan and control a production,
- to evaluate and configure the quality and efficiency of production, processes and products.

Prerequisites
None

Content
The aim of "SP A: Global Production Management" is to present the challenges of globally operating companies and to give an overview of the central aspects of global production networks as well as to gain in-depth knowledge of common methods and procedures for designing them. For this purpose, methods for site selection, approaches for the site-specific adaptation of production technologies as well as planning approaches for setting up a new production location will be imparted during the module. The module will be rounded off by presenting Industry 4.0 methods and technologies.

The topics in detail are:

- Framework conditions and influencing factors of global production (historical development, goals, opportunities and risks)
- Site selection
- Site-specific production adaptation
- Planning a new production site
- Design and management of global production networks
- Integration of Industry 4.0 methods and technologies

Recommendation
none

Workload
The work load is about 480 hours, corresponding to 16 credit points.

Learning type
Lectures, seminars, workshops, excursions

M 3.14 Module: MF B: Energy Engineering [M-MACH-103350]

Responsible: Prof. Dr.-Ing. Hans-Jörg Bauer
Organisation: KIT Department of Mechanical Engineering

Part of: Majors in Mechanical Engineering (International)

Credits	Language	Level	Version
16	Englisch	3	1

Mandatory			
T-MACH-105220	Fundamentals of Energy Technology	8 CR	Badea, Cheng
Election block: SP B: Energietechnik (at least 8 credits)			
T-MACH-105213	Fundamentals of Combustion I	4 CR	Maas, Sommerer
T-MACH-105292	Heat and Mass Transfer	4 CR	Bockhorn, Maas

Competence Certificate
Oral exams: duration approx. 5 min. per credit point.
However, amount, type and scope of the success control can vary according to the individually choice.

Competence Goal
After completion of SP B students are able

- to describe the elements of an energy system and their interactions,
- to list different conventional energy sources and assess their static range,
- to name the fluctuating supply of renewable energies such as wind, solar radiation, ocean currents and tides etc. and
- describe its effects on the energy system,
- to assess the technical boundary conditions of energy systems
- to derive approaches for an optimal mix of different energy technologies,
- to explain the operational principle of well-established power plants as well as of power plants based on renewables,
- to name the physical and chemical processes during energy conversion

Prerequisites
None

Content
The aim of SP B "Energy Engineering" is to bring the students closer to the challenges of modern energy systems. The functional principles of conventional and regenerative power plant types are presented and the underlying physical principles of technical combustion and heat and mass transfer are explained. The students learn the basics to evaluate energy systems on a technical and economic basis.

Topics include:

- forms of energy
- energy sources: fossil fuels, nuclear energy, renewable energies
- energy demand structures
- principles of thermal and electrical power plants (conventional and renewable)
- physical basics of technical combustion
- stationary and transient heat and mass transfer phenomena
- environmental aspects of energy production
- role of renewable energies
- conversion, transport and storage of energy
- economic feasibility study of energy systems
- future of the energy sector

Workload
The work load is about 480 hours, corresponding to 16 credit points.

Learning type
Lectures

Tutorials

M 3.15 Module: MF C: Automotive Engineering [M-MACH-103349]

Responsible: Prof. Dr. Frank Gauterin
Organisation: KIT Department of Mechanical Engineering

Part of: Majors in Mechanical Engineering (International)

Credits	Language	Level	Version
16	Englisch	3	1

Mandatory			
T-MACH-100092	Automotive Engineering I	8 CR	Gauterin, Unrau
Election block: SP C: Kraftfahrzeugtechnik (at least 8 credits)			
T-MACH-102117	Automotive Engineering II	4 CR	Gauterin, Unrau
T-MACH-105154	Vehicle Comfort and Acoustics I	4 CR	Gauterin
T-MACH-105155	Vehicle Comfort and Acoustics II	4 CR	Gauterin
T-MACH-105210	Machine Dynamics	5 CR	Proppe

Competence Certificate
Oral exams: duration approx. 5 min. per credit point.
However, amount, type and scope of the success control can vary according to the individually choice.

Competence Goal
The students know the movements and the forces at the vehicle and are familiar with active and passive safety. They have proper knowledge about operation of engines and alternative drives, the necessary transmission between engine and drive wheels and the power distribution. They have an overview of the components necessary for the drive and have the basic knowledge, to analyse, to evaluate, and to develop the complex system "vehicle".

Further learning objectives according to the selected courses of supplementary subjects.

Prerequisites
none

Content
1. History and future of the automobile

2. Driving mechanics: driving resistances and driving performance, mechanics of longitudinal and lateral forces, active and passive safety

3. Drive systems: combustion engine, hybrid and electric drive systems

4. Transmissions: clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)

5.Power transmission and distribution: drive shafts, cardon joints, differentials

Workload
The work load is about 480 hours, corresponding to 16 credit points.

Learning type
Lectures

Tutorials

M 3.16 Module: Orientation Exam [M-MACH-104162]

Organisation: University
Part of: Orientation Exam

Credits	Language	Level	Version
0	Deutsch	3	1

Mandatory			
T-MACH-100282	Engineering Mechanics I	7 CR	Böhlke, Langhoff
T-MACH-100283	Engineering Mechanics II	6 CR	Böhlke, Langhoff
T-MATH-108266	Advanced Mathematics I	7 CR	Aksenovich, Kühnlein

Modelled deadline
This module must be passed until the end of the **3. term**.

M 3.17 Module: Physics [M-PHYS-104030]

Responsible: Prof. Dr. Gernot Goll
Prof. Dr. Bernd Pilawa
Organisation: KIT Department of Physics
Part of: Fundamentals of Engineering

Credits	Language	Level	Version
5	Deutsch/Englisch	3	1

Mandatory			
T-PHYS-108322	Wave and Quantum Physics	5 CR	Goll, Pilawa

Competence Certificate
The assessment consists of a written exam according to Section 4(2), 1 of the examination regulation.

Competence Goal
The students

- are familiar with the properties of waves and can discuss those
- can reflect on the principles of relativity
- comprehend the coherence of the particle and wave description of light and matter
- can explain the limits of wave physics
- are able the apply the Schrödinger-equation to basic problems in quantum mechanics
- can explain the basic properties of atoms, especially for the hydrogen atom
- can discuss fundamental aspects of the electronic properties of solids

Prerequisites
None

Content

- Properties of waves
- Acoustic and electromagnetic waves
- Interference and diffraction
- Relativity
- Wave-particle dualism
- Basic properties of atoms
- Basic electronic properties of solids

Annotation
For the Bachelor's program Mechanical Engineering the module (including all brick details, exams and courses) is offered in German.

For the Bachelor's program Mechanical Engineering (International) the module (including all brick details, exams and courses) is offered in English.

Workload
150 hours, consisting of attendance times (45), follow-up of the lecture including exam preparation and preparation of exercises (105)

Learning type
Lecture and Tutorial

M 3.18 Module: Production Operations Management [M-MACH-100297]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

Credits	Language	Level	Version
5	Deutsch/Englisch	3	2

Mandatory			
T-MACH-100304	Production Operations Management	3 CR	Furmans, Lanza, Schultmann
T-MACH-108734	Production Operations Management-Project	2 CR	Furmans, Lanza

Competence Certificate
The success control takes place in the form of partial examinations in the individual courses of the module. These are a written exam (duration: 90 minutes) and a different type of examination. The module grade is made up of the grades of the courses in the module weighted by credit points.

Competence Goal
If you successfully passed this course you will be able to:

- state the relevant technical terms of business administration, logistics and production engineering
- describe the interrelation between these technical terms
- describe the most important decision problems qualitatively and quantitatively
- apply the appropriate decision models to solve the respective decision problems
- critically evaluate the results and draw appropriate conclusions
- extend the learned methods and models by researching on you own

Prerequisites
none

Content
The institutes alternate with each cycle. Basic skills about the planning and operation of a production plant are taught. The lecture covers the basics of operations and supply chain management as well as business management basics in accounting, investment calculation and legal forms.

Annotation
It is a joint module of the Institute of Materials Handling and Logistics (IFL) and the Institute of Production Science (WBK).

For the Bachelor's program Mechanical Engineering the module (including all brick details, exams and courses) is offered in German.

For the Bachelor's program Mechanical Engineering (International) the module (including all brick details, exams and courses) is offered in English.

Workload
Attendance time: 42 hours,

Self-study: 108 hours

Learning type

1. Lectures (Obligatory)
2. Tutorials (Obligatory)
3. Group work (Obligatory)
4. Oral defense of the group work (Obligatory)

M 3.19 Module: Technical Thermodynamics (BSc-Modul 05, TTD) [M-MACH-102574]

Responsible: Prof. Dr. Ulrich Maas
Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

Credits	Duration	Language	Level	Version
15	2 term	Deutsch/Englisch	3	1

Mandatory			
T-MACH-104747	Technical Thermodynamics and Heat Transfer I	8 CR	Maas
T-MACH-105287	Technical Thermodynamics and Heat Transfer II	7 CR	Maas
T-MACH-105204	Excercises in Technical Thermodynamics and Heat Transfer I	0 CR	Maas
T-MACH-105288	Excercises in Technical Thermodynamics and Heat Transfer II	0 CR	Maas

Competence Certificate
Prerequisite: attestation each semester by homework assignments

Thermodynamics I: Written exam, graded, 3 hours

Thermodynamics II: Written exam, graded, 3 hours

Competence Goal
The students acquire the competency to master the fundamentals of thermodynamics and the ability to apply the knowledge an problem-solving in various branches of mechanical engineering and especially in the Energy Technology sector.

An integral part of the model is that students can define the fundamental laws of thermodynamics and their application. The students are competent in describing and comparing the main processes in energy conversion. Using tools also applied in Industry they are capable of analysing and rating the efficiency of processes. The students are capable of discussing the thermodynamical correlation of ideal gas mixtures, real gases and of humid air as well analysing them with the help of the laws of thermodynamic. Furthermore the students are capable of defining and applying the heattransfer mechanisms.

Module grade calculation
weight according to CP

Prerequisites
None

Content
Thermodynamics I:

- System, properties of state
- Chemical and thermodynamic properties of pure components
- Absolute temperature, model systems
- 1st law of thermodynamics for resting and moved systems Entropy and 2nd law of thermodynamics
- Behavior of real substances described by tables, diagrams and equations of state
- Machine processes

Thermodynamics II:

- Repetition of the topics of “Thermodynamics and Heat Transfer I”
- Mixtures of ideal gases
- Moist air
- Behaviour of real substances described by equations of state
- Applications of the laws of thermodynamics to chemical reactions

Annotation
For the Bachelor’s program Mechanical Engineering the module (including all brick details, exams and courses) is offered in German.

For the Bachelor’s program Mechanical Engineering (International) the module (including all brick details, exams and courses) is offered in English.

Workload
lectures and exercises: 150h

homework and preparation of examination: 300h

Learning type
Lecture
Exercise course
Tutorial

4 Courses

T 4.1 Course: Advanced Mathematics I [T-MATH-108266]

Responsible: Prof. Dr. Maria Aksenovich
Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: M-MACH-104162 - Orientierungsprüfung
M-MATH-104022 - Höhere Mathematik

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	7	Each term	1

Events					
WS 18/19	0140000	Advanced Mathematics I (Lecture)	4 SWS	Lecture (V)	Aksenovich
Exams					
WS 18/19	00033	Advanced Mathematics I		Prüfung (PR)	Thäter
WS 18/19	7700070	Advanced Mathematics I		Prüfung (PR)	Aksenovich

Competence Certificate
Assessment is carried out in form of a written examinations of 120 minutes length.

Prerequisites
Passing scores for homework and the midterm test are prerequesites for the examination.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MATH-108265 - Advanced Mathematics I Prerequisite must have been passed.

T 4.2 Course: Advanced Mathematics I Prerequisite [T-MATH-108265]

Responsible: Prof. Dr. Maria Aksenovich
Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: M-MATH-104022 - Höhere Mathematik

Type	Credits	Recurrence	Version
Studienleistung schriftlich	0	Each winter term	1

Events					
WS 18/19	0150000	Advanced Mathematics I (Tutorial)	2 SWS	Practice (Ü)	Aksenovich
Exams					
WS 18/19	00034	Advanced Mathematics I Prerequisite		Prüfung (PR)	Thäter
WS 18/19	7700071	Advanced Mathematics I Prerequesite		Prüfung (PR)	Aksenovich

Competence Certificate
Assessment is carried out based on written homework assignments and a midterm test. Exact requirements will be detailed in class.

Prerequisites
None.

T 4.3 Course: Advanced Mathematics II [T-MATH-108268]

Responsible: Prof. Dr. Maria Aksenovich
Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: M-MATH-104022 - Höhere Mathematik

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	7	Each term	1

Exams				
SS 2018	7700029	Advanced Mathematics II	Prüfung (PR)	Thäter
WS 18/19	00023	Advanced Mathematics II	Prüfung (PR)	Aksenovich

Competence Certificate
Assessment is carried out in form of a written examinations of 120 minutes length.

Prerequisites
Passing scores for homework and the midterm test are prerequesites for the examination.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MATH-108267 - Advanced Mathematics II Prerequisite must have been passed.

T 4.4 Course: Advanced Mathematics II Prerequisite [T-MATH-108267]

Responsible: Prof. Dr. Maria Aksenovich
Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: M-MATH-104022 - Höhere Mathematik

Type	Credits	Recurrence	Version
Studienleistung schriftlich	0	Each summer term	1

Exams				
SS 2018	7700030	Advanced Mathematics II Prerequisite	Prüfung (PR)	Thäter

Competence Certificate
Assessment is carried out based on written homework assignments and a midterm test. Exact requirements will be detailed in class.

Prerequisites
None.

T 4.5 Course: Advanced Mathematics III [T-MATH-108270]

Responsible: Prof. Dr. Maria Aksenovich
Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: M-MATH-104022 - Höhere Mathematik

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	7	Each term	1

Events					
WS 18/19	0160000	Advanced Mathematics III (Lecture)	4 SWS	Lecture (V)	Januszewski

Competence Certificate
Assessment is carried out in form of a written examinations of 120 minutes length.

Prerequisites
Passing scores for homework and the midterm test are prerequesites for the examination.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MATH-108269 - Advanced Mathematics III Prerequisite must have been passed.

T 4.6 Course: Advanced Mathematics III Prerequisite [T-MATH-108269]

Responsible: Prof. Dr. Maria Aksenovich
Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: M-MATH-104022 - Höhere Mathematik

Type	Credits	Recurrence	Version
Studienleistung schriftlich	0	Each winter term	1

Events					
WS 18/19	0170000	Advanced Mathematics III (Tutorial)	2 SWS	Practice (Ü)	Januszewski

Competence Certificate
Assessment is carried out based on written homework assignments and a midterm test. Exact requirements will be detailed in class.

Prerequisites
None.

T 4.7 Course: Automated Production Systems (MEI) [T-MACH-106732]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103351 - SP A: Globales Produktionsmanagement

Type	Credits	Recurrence	Version
Prüfungsleistung mündlich	4	Each summer term	1

Events					
SS 2018	3150012	Automated Production Systems (MEI)	2 SWS	Lecture (V)	Fleischer
Exams					
WS 18/19	76-T-MACH-106732	Automated Production Systems (MEI)		Prüfung (PR)	Fleischer

Competence Certificate
oral exam (20 min)

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Automated Production Systems (MEI)

3150012, SS 2018, 2 SWS, Open in study portal **Lecture (V)**

Learning Content
The lecture provides an overview of the structure and functioning of automated production systems. In the introduction chapter the basic elements for the realization of automated production systems are given. This includes:

- Drive and control technology
- Handling technology for handling work pieces and tools
- Industrial Robotics
- automatic machines, cells, centers and systems for manufacturing and assembly
- planning of automated manufacturing systems

In the second part of the lecture, the basics are illustrated using implemented manufacturing processes for the production of automotive components. The analysis of automated manufacturing systems for manufacturing of defined components is also included.

T 4.8 Course: Automotive Engineering I [T-MACH-100092]

Responsible: Prof. Dr. Frank Gauterin
Dr.-Ing. Hans-Joachim Unrau

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103349 - SP C: Kraftfahrzeugtechnik

Type	Credits	Recurrence	Expansion	Language	Version
Prüfungsleistung schriftlich	8	Each winter term	1 terms		2

Events					
WS 18/19	2113805	Automotive Engineering I	4 SWS	Lecture (V)	Gauterin, Unrau
WS 18/19	2113809	Automotive Engineering I	4 SWS	Lecture (V)	Gauterin, Gießler
Exams					
SS 2018	76-T-MACH-100092	Automotive Engineering		Prüfung (PR)	Gauterin, Unrau
WS 18/19	76-T-MACH-100092	Automotive Engineering		Prüfung (PR)	Unrau, Gauterin

Competence Certificate
Written examination

Duration: 120 minutes

Auxiliary means: none

Prerequisites
The brick "T-MACH-102203 - Automotive Engineering I" is not started or finished. The bricks "T-MACH-100092 - Grundlagen der Fahrzeugtechnik I" and "T-MACH-102203 - Automotive Engineering I" can not be combined.

Below you will find excerpts from events regarding this course:

V Automotive Engineering I

2113805, WS 18/19, 4 SWS, Open in study portal **Lecture (V)**

Learning Content
1. History and future of the automobile

2. Driving mechanics: driving resistances and driving performance, mechanics of longitudinal and lateral forces, active and passive safety

3. Drive systems: combustion engine, hybrid and electric drive systems

4. Transmission: clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)

5. Power transmission and distribution: drive shafts, cardon joints, differentials

Workload
regular attendance: 45 hours
self-study: 195 hours

Literature
1. Mitschke, M. / Wallentowitz, H.: Dynamik der Kraftfahrzeuge, Springer Vieweg, Wiesbaden 2014

2. Pischinger, S. / Seiffert, U.: Handbuch Kraftfahrzeugtechnik, Springer Vieweg, Wiesbaden 2016

3. Gauterin, F. / Unrau, H.-J. / Gnadler, R.: Script to the lecture 'Grundlagen der Fahrzeugtechnik I', KIT, Institute of Vehicle System Technology, Karlsruhe, annual update

V

Automotive Engineering I

2113809, WS 18/19, 4 SWS, Open in study portal

Lecture (V)

Notes
In English language.

Learning Content
1. History and future of the automobile

2. Driving mechanics: driving resistances and driving performances, mechanics of longitudinal and lateral forces, active and passive safety

3. Drive systems: combustion engine, hybrid and electric drive systems

4. Transmission: clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)

5.Power transmission and distribution: drive shafts, cardon joints, differentials

Workload
regular attendance: 45 hours
self-study: 195 hours

Literature
1. Robert Bosch GmbH: Automotive Handbook, 9th edition, Wiley, Chichister 2015

2. Onori, S. / Serrao, L: / Rizzoni, G.: Hybrid Electric Vehicles - Energy Management Strategies, Springer London, Heidelberg, New York, Dordrecht 2016

3. Reif, K.: Brakes, Brake Control and Driver Assistance Systems - Function, Regulation and Components, Springer Vieweg, Wiesbaden 2015

4. Gauterin, F. / Gießler, M. / Gnadler, R.: Script to the lecture 'Automotive Engineering I', KIT, Institute of Vehicle System Technology, Karlsruhe, annual update

T 4.9 Course: Automotive Engineering II [T-MACH-102117]

Responsible: Prof. Dr. Frank Gauterin
Dr.-Ing. Hans-Joachim Unrau

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103349 - SP C: Kraftfahrzeugtechnik

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	4	Each summer term	1

Events					
SS 2018	2114835	Automotive Engineering II	2 SWS	Lecture (V)	Unrau
SS 2018	2114855	Automotive Engineering II	2 SWS	Lecture (V)	Gießler
Exams					
SS 2018	76-T-MACH-102117	Automotive Engineering II		Prüfung (PR)	Unrau, Gauterin
WS 18/19	76-T-MACH-102117	Automotive Engineering II		Prüfung (PR)	Unrau, Gauterin
WS 18/19	76T-MACH-102117-2	Automotive Engineering II		Prüfung (PR)	Gauterin, Unrau

Competence Certificate
Written Examination

Duration: 90 minutes

Auxiliary means: none

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Automotive Engineering II

2114835, SS 2018, 2 SWS, Open in study portal — **Lecture (V)**

Learning Content
1. Chassis: Wheel suspensions (rear axles, front axles, kinematics of axles), tyres, springs, damping devices
2. Steering elements: Manual steering, servo steering, steer by wire
3. Brakes: Disc brake, drum brake, comparison of designs

Workload
regular attendance: 22,5 hours
self-study: 97,5 hours

Literature
1. Heißing, B. / Ersoy, M.: Fahrwerkhandbuch: Grundlagen, Fahrdynamik, Komponenten, Systeme, Mechatronik, Perspektiven, Springer Vieweg, Wiesbaden, 2013

2. Breuer, B. / Bill, K.-H.: Bremsenhandbuch: Grundlagen - Komponenten - Systeme - Fahrdynamik, Springer Vieweg, Wiesbaden, 2017

3. Gnadler, R. / Unrau, H.-J.: Script to the lecture 'Grundlagen der Fahrzeugtechnik II'

V Automotive Engineering II

2114855, SS 2018, 2 SWS, Open in study portal — **Lecture (V)**

Learning Content

1. Chassis: Wheel suspensions (rear axles, front axles, kinematics of axles), tyres, springs, damping devices
2. Steering elements: Steering elements of single vehicles and of trailers
3. Brakes: Disc brake, drum brake, retarder, comparison of the designs

Literature
Elective literature:

1. Reimpell, J.: Fahrwerktechnik: Grundlagen, Vogel Verlag, 1995
2. Burckhardt, M.: Bremsdynamik und Pkw-Bremsanlagen, Vogel Verlag, 1991
3. Gnadler, R.: Skript zur Vorlesung "Grundlagen der Fahrzeugtechnik II"

T 4.10 Course: Bachelor Thesis [T-MACH-108685]

Responsible: Prof. Dr.-Ing. Martin Heilmaier
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-103722 - Bachelorarbeit

Type	Credits	Recurrence	Version
Abschlussarbeit	12	Each term	1

Exams				
WS 18/19	76-T-MACH-108685	Bachelor Thesis	Prüfung (PR)	

Competence Certificate
The bachelor thesis is designed to show that the student is able to deal with a problem of his/her subject area in an independent manner and within the given period of time using scientific methods.

The work load of the bachelor thesis corresponds to 12 ECTS. The maximal processing time of the bachelor thesis takes three months. The date of issue of the subject has to be fixed by the supervisor and the student and to be put on record at the examination board. The subject of the bachelor thesis may be only returned once and only within the first month of processing time.

On a reasoned request of the student, the examination board can extend the processing time by up to one month. If the bachelor thesis is not completed in time, this examination is "failed" (5,0), unless the student is not responsible.

The bachelor thesis is to be evaluated by not less than a professor or a senior scientist according to § 14 Abs. 3 Ziff. 1 KITG and another examiner. Generally, one of the two examiners is the person who has assigned the thesis. If the examiners do not agree, the bachelor thesis is graded by the examination board within this assessment; another expert can be appointed too. The bachelor thesis has to be graded within a period of six weeks after the submission.

Prerequisites
The requirement for admission to the bachelor thesis module are 120 ECTS. As to exceptions, the examination board decides on a request of the student (see § 14 (1) SPO).

Modeled Conditions
The following conditions have to be fulfilled:

1. You need to earn at least 120 credits in the following fields:
   - Fundamentals of Engineering
   - International Project Management and Soft Skills
   - Majors in Mechanical Engineering (International)

Annotation
The workload for the preparation of the bachelor thesis is about 360 hours.

T 4.11 Course: Basics in Measurement and Control Systems [T-MACH-104745]

Responsible: Prof. Dr.-Ing. Christoph Stiller
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102564 - Mess- und Regelungstechnik

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	7	Each winter term	2

Events					
WS 18/19	2137301	Measurement and Control Systems	3 SWS	Lecture (V)	Stiller
WS 18/19	2137302	Measurement and Control Systems (Tutorial)	1 SWS	Practice (Ü)	Stiller, Janosovits, Wirth
WS 18/19	3137020	Measurement and Control Systems	3 SWS	Lecture (V)	Stiller
WS 18/19	3137021	Measurement and Control Systems (Tutorial)	1 SWS	Practice (Ü)	Stiller, Janosovits, Wirth
Exams					
SS 2018	76-T-MACH-104745	Basis of Measurement and Control Systems		Prüfung (PR)	Stiller
WS 18/19	76-T-MACH-104745	Basis of Measurement and Control Systems		Prüfung (PR)	Stiller

Competence Certificate
written exam

2,5 hours

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Measurement and Control Systems

2137301, WS 18/19, 3 SWS, Open in study portal **Lecture (V)**

Learning Content
1 Dynamic systems
2 Properties of important systems and modeling
3 Transfer characteristics and stability
4 Controller design
5 Fundamentals of measurement
6 Estimation
7 Sensors
8 Introduction to digital measurement

Workload
210 hours

Literature

- Measurement and Control Systems:

R.H. Cannon: Dynamics of Physical Systems, McGraw-Hill Book Comp., New York,1967
G.F. Franklin: Feedback Control of Dynamic Systems, Addison-Wesley Publishing Company, USA, 1988
R. Dorf and R. Bishop: Modern Control Systems, Addison-Wesley
C. Phillips and R. Harbor: Feedback Control Systems, Prentice-Hall

- Regelungstechnische Bücher:

J. Lunze: Regelungstechnik 1 & 2, Springer-Verlag
R. Unbehauen: Regelungstechnik 1 & 2, Vieweg-Verlag
O. Föllinger: Regelungstechnik, Hüthig-Verlag
W. Leonhard: Einführung in die Regelungstechnik, Teubner-Verlag
Schmidt, G.: Grundlagen der Regelungstechnik, Springer-Verlag, 2. Aufl., 1989

- Messtechnische Bücher:

E. Schrüfer: Elektrische Meßtechnik, Hanser-Verlag, München, 5. Aufl., 1992
U. Kiencke, H. Kronmüller, R. Eger: Meßtechnik, Springer-Verlag, 5. Aufl., 2001
H.-R. Tränkler: Taschenbuch der Messtechnik, Verlag Oldenbourg München, 1996
W. Pfeiffer: Elektrische Messtechnik, VDE Verlag Berlin 1999
Kronmüller, H.: Prinzipien der Prozeßmeßtechnik 2, Schnäcker-Verlag, Karlsruhe, 1. Aufl., 1980

V Measurement and Control Systems

3137020, WS 18/19, 3 SWS, Open in study portal

Lecture (V)

Learning Content

1. 1 Dynamic systems
   2 Properties of important systems and modeling
   3 Transfer characteristics and stability
   4 Controller design
   5 Fundamentals of measurement
   6 Estimation
   7 Sensors
   8 Introduction to digital measurement

Workload
180 hours

Literature

- Measurement and Control Systems:

R.H. Cannon: Dynamics of Physical Systems, McGraw-Hill Book Comp., New York,1967
G.F. Franklin: Feedback Control of Dynamic Systems, Addison-Wesley Publishing Company, USA, 1988
R. Dorf and R. Bishop: Modern Control Systems, Addison-Wesley
C. Phillips and R. Harbor: Feedback Control Systems, Prentice-Hall

- Regelungstechnische Bücher:

J. Lunze: Regelungstechnik 1 & 2, Springer-Verlag
R. Unbehauen: Regelungstechnik 1 & 2, Vieweg-Verlag
O. Föllinger: Regelungstechnik, Hüthig-Verlag
W. Leonhard: Einführung in die Regelungstechnik, Teubner-Verlag
Schmidt, G.: Grundlagen der Regelungstechnik, Springer-Verlag, 2. Aufl., 1989

- Messtechnische Bücher:

E. Schrüfer: Elektrische Meßtechnik, Hanser-Verlag, München, 5. Aufl., 1992
U. Kiencke, H. Kronmüller, R. Eger: Meßtechnik, Springer-Verlag, 5. Aufl., 2001
H.-R. Tränkler: Taschenbuch der Messtechnik, Verlag Oldenbourg München, 1996
W. Pfeiffer: Elektrische Messtechnik, VDE Verlag Berlin 1999
Kronmüller, H.: Prinzipien der Prozeßmeßtechnik 2, Schnäcker-Verlag, Karlsruhe, 1. Aufl., 1980

T 4.12 Course: Basics of Manufacturing Technology (MEI) [T-MACH-108747]

Responsible: Prof. Dr.-Ing. Volker Schulze
Dr.-Ing. Frederik Zanger

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-104232 - Fertigungsprozesse (MEI)

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	4	Each winter term	1

Events					
WS 18/19	3118092	Basics of Manufacturing Technology (MEI)	2 SWS	Lecture (V)	Schulze
Exams					
WS 18/19	76-T-MACH-108747	Basics of Manufacturing Technology (MEI)	Prüfung (PR)	Schulze	

Competence Certificate
written exam (duration: 60 min)

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Basics of Manufacturing Technology (MEI)

3118092, WS 18/19, 2 SWS, Open in study portal **Lecture (V)**

Description
Media:

Lecture notes will be provided in ilias (https://ilias.studium.kit.edu/).

Notes
The lecture notes and further information on onganisation of the lecture will be available on ILIAS.

Learning Content
The objective of the lecture is to classify the manufacturing technology within the wider context of production engineering, to provide an overview of the different manufacturing processes and to establish basic process knowledge of the common processes. The lecture conveys the basic principles of manufacturing technology and deals with the manufacturing processes based on example components according to their classification into main groups regarding technical and economic aspects. Regard is paid to classic manufacturing processes as well as new developments like additive manufacturing processes. The following topics will be covered:

- Primary processing (casting, plastics engineering, sintering, additive manufacturing processes)
- Forming (sheet-metal forming, massive forming)
- Cutting (machining with geometrically defined and geometrically undefined cutting edges, separating, abrading)
- Joining
- Coating
- Heat treatment and surface treatment

Annotation
None

Workload
regular attendance: 21 hours
self-study: 99 hours

Literature
Lecture Notes

T 4.13 Course: Computer Science for Engineers [T-MACH-105206]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102563 - Informatik

Type	Credits	Recurrence	Version
Studienleistung praktisch	0	Each summer term	2

Events					
SS 2018	2121392	Computer Lab for Computer Science in Mechanical Engineering	2 SWS	Practice (PÜ)	Ovtcharova, Mitarbeiter
SS 2018	3121036	Computer Science for Engineers Lab Course	2 SWS	Practice (PÜ)	Ovtcharova, Mitarbeiter
WS 18/19	2121392	Computer Lab for Computer Science in Mechanical Engineering	2 SWS	Practice (PÜ)	Ovtcharova, Mitarbeiter
WS 18/19	3121036	Computer Science for Engineers Lab Course	2 SWS	Practice (PÜ)	Ovtcharova, Mitarbeiter
Exams					
SS 2018	76-T-MACH-105206	Computer Science for Engineers		Prüfung (PR)	Ovtcharova
WS 18/19	76-T-MACH-105206	Computer Science for Engineers		Prüfung (PR)	Ovtcharova

Competence Certificate
Programming assignments, that are to be implemented at the computer, are given every two weeks. The students are supervised by tutors while they work on the assignments. Therefore online tests must be solved by the students to assess the understanding of the tasks and the lecture material. All assignments have to be handed in, before they can take part in the exam.

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Computer Lab for Computer Science in Mechanical Engineering

2121392, SS 2018, 2 SWS, Open in study portal **Practice (PÜ)**

Learning Content
Introduction to programming using JAVA

Workload
Regular attendance: 21 hours, self-study: 28 hours

V Computer Lab for Computer Science in Mechanical Engineering

2121392, WS 18/19, 2 SWS, Open in study portal **Practice (PÜ)**

Learning Content
Introduction to programming using JAVA

Workload
Regular attendance: 21 hours, self-study: 28 hours

T 4.14 Course: Computer Science for Engineers [T-MACH-105205]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102563 - Informatik

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	6	Each summer term	1

Events					
SS 2018	2121390	Computer Science for Engineers	4 SWS	Lecture / Practice (VÜ)	Ovtcharova
SS 2018	2121391	Exercises Computer Science for Engineers	2 SWS	Practice (Ü)	Ovtcharova, Mitarbeiter
SS 2018	3121034	Computer Science for Engineers	2 SWS	Lecture (V)	Ovtcharova, Mitarbeiter
SS 2018	3121035	Computer Science for Engineers (Tutorial)	2 SWS	Practice (Ü)	Ovtcharova, Mitarbeiter
WS 18/19	3121035	Computer Science for Engineers (Tutorial)	2 SWS	Practice (Ü)	Ovtcharova, Mitarbeiter
Exams					
SS 2018	76-T-MACH-105205	Computer Science for Engineers		Prüfung (PR)	Ovtcharova
WS 18/19	76-T-MACH-105205	Computer Science for Engineers		Prüfung (PR)	Ovtcharova

Competence Certificate
Written exam [180 min]

Prerequisites
Computer Science for Engineers, passed

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-105206 - Computer Science for Engineers must have been passed.

Below you will find excerpts from events regarding this course:

V Computer Science for Engineers

2121390, SS 2018, 4 SWS, Open in study portal — **Lecture / Practice (VÜ)**

Learning Content
Basics: Information representation- and processing, terms and definitions: alphabet, data, signals, information, numeral systems, propositional logic and Boolean algebra, computer architectures, programming paradigms.

Object Orientation: Definition and important characteristics of object orientation, Object-oriented modeling with UML.

Data Structures: Definition, properties and application of graphs, trees, linked lists, queues and stacks.

Algorithms: Characteristics of algorithms, complexity analysis, design methods, important examples.

Database management systems: Relational data model, relational algebra, declarative language SQL.

Workload
regular attendance: 21 hours
self-study: 134 hours

V

Exercises Computer Science for Engineers

2121391, SS 2018, 2 SWS, Open in study portal

Practice (Ü)

Learning Content
Basics and language elements of Java
Classes, attributes, methods
Constructors and objects
Loops and conditions
Inheritance, polymorphism
Interfaces, abstract classes
Collections, exceptions
Parallelism, threads

Workload
Regular attendance: 21 hours, self-study: 14 hours

Literature
See lecture

T 4.15 Course: Electrical Engineering and Electronics [T-ETIT-108386]

Responsible: Dr.-Ing. Klaus-Peter Becker
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-104049 - Elektrotechnik

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	8	Each winter term	1

Events					
WS 18/19	2306350	Electrical Engineering and Electronics for Mechanical Engineers	4+2 SWS	Lecture / Practice (VÜ)	Stahl, Poletkin
Exams					
WS 18/19	7306350	Electrical Engineering and Electronics for Mechanical Engineers		Prüfung (PR)	Becker

Competence Certificate
Written exam, duration 3 hours.

Prerequisites
none

Annotation
Exam will be held in english language.

T 4.16 Course: Engineering Mechanics I [T-MACH-100282]

Responsible: Prof. Dr.-Ing. Thomas Böhlke
Dr.-Ing. Tom-Alexander Langhoff

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102572 - Technische Mechanik
M-MACH-104162 - Orientierungsprüfung

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	7	Each winter term	2

Events					
WS 18/19	2161245	Engineering Mechanics I	3 SWS	Lecture (V)	Böhlke
WS 18/19	3161010	Engineering Mechanics I (Lecture)	3 SWS	Lecture (V)	Langhoff, Böhlke
Exams					
SS 2018	76-T-MACH-100282	Engineering Mechanics I		Prüfung (PR)	Böhlke, Langhoff
WS 18/19	76-T-MACH-100282	Engineering Mechanics I		Prüfung (PR)	Böhlke, Langhoff
WS 18/19	76-T-MACH-100282-englisch	Engineering Mechanics I		Prüfung (PR)	Böhlke, Langhoff

Competence Certificate
written exam, 90 min, graded

Prerequisites
successful participation in "Engineering Mechanics I (Tutorial)" (see T-MACH-100528)

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-100528 - Tutorial Engineering Mechanics I must have been passed.

Below you will find excerpts from events regarding this course:

V Engineering Mechanics I

2161245, WS 18/19, 3 SWS, Open in study portal — **Lecture (V)**

Learning Content

- basics of vector calculus
- force systems
- statics of rigid bodies
- internal forces and moments in bars and beams
- friction
- centre of gravity, centre of mass
- work, energy, principle of virtual work
- statics of inextensible ropes
- elastostatics of tension-compression- bars

Workload
regular attendance: 52,5 hours
self-study: 127,5 hours

Literature

lecture notes

Hibbeler, R.C: Technische Mechanik 1 - Statik. Prentice Hall. Pearson Studium 2005.

Gross, D. et al.: Technische Mechanik 1 - Statik. Springer 2006.

Gummert, P.; Reckling, K.-A.: Mechanik. Vieweg 1994.

Parkus, H.: Mechanik der festen Körper. Springer 1988.

T 4.17 Course: Engineering Mechanics II [T-MACH-100283]

Responsible: Prof. Dr.-Ing. Thomas Böhlke
Dr.-Ing. Tom-Alexander Langhoff

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102572 - Technische Mechanik
M-MACH-104162 - Orientierungsprüfung

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	6	Each summer term	2

Events					
SS 2018	2162250	Engineering Mechanics II	3 SWS	Lecture (V)	Böhlke
SS 2018	3162010	Engineering Mechanics II (Lecture)	2 SWS	Lecture (V)	Langhoff, Pallicity, Böhlke
Exams					
SS 2018	76-T-MACH-100283	Engineering Mechanics II		Prüfung (PR)	Böhlke, Langhoff
WS 18/19	76-T-MACH-100283	Engineering Mechanics II		Prüfung (PR)	Böhlke, Langhoff
WS 18/19	76-T-MACH-100283-englisch	Engineering Mechanics II		Prüfung (PR)	Böhlke, Langhoff

Competence Certificate
written exam, 90 min, graded

Prerequisites
successful participation in "Engineering Mechanics II (Tutorial)" (see T-MACH-100284)

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-100284 - Tutorial Engineering Mechanics II must have been passed.

Below you will find excerpts from events regarding this course:

V Engineering Mechanics II

2162250, SS 2018, 3 SWS, Open in study portal — **Lecture (V)**

Learning Content

- bending
- shear
- torsion
- stress and strain state in 3D
- Hooke's law in 3D
- elasticity theors in 3D
- energy methods in elastostatics
- approximation methods
- stability
- inelastic material behaviour

Workload
regular attendance: 42 hours
self-study: 138 hours

Literature

lecture notes
Hibbeler, R.C: Technische Mechanik 2 - Festigkeitslehre. Prentice Hall. Pearson Studium 2005.
Gross, D. et al.: Technische Mechanik 2 - Elastostatik. Springer 2006.
Gummert, P.; Reckling, K.-A.: Mechanik. Vieweg 1994.
Parkus, H.: Mechanik der festen Körper. Springer 1988.

T 4.18 Course: Engineering Mechanics III & IV [T-MACH-105201]

Responsible: Prof. Dr.-Ing. Wolfgang Seemann
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102572 - Technische Mechanik

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	10	Each winter term	2

Events					
SS 2018	2162231	Engineering Mechanics IV	2 SWS	Lecture (V)	Seemann
SS 2018	3162012	Engineering Mechanics 4	2 SWS	Lecture (V)	Seemann
WS 18/19	2161203	Engineering Mechanics III	2 SWS	Lecture (V)	Seemann
WS 18/19	3161012	Engineering Mechanics III (Lecture)	2 SWS	Lecture (V)	Seemann
Exams					
SS 2018	76-T-MACH-105201	Engineering Mechanics III & IV		Prüfung (PR)	Seemann
WS 18/19	76-T-MACH-105201	Engineering Mechanics III & IV		Prüfung (PR)	Seemann

Competence Certificate
Written Exam (3 h), graded

Prerequisites
Succesful accomplishment of the exercise sheets in Engineering Mechanics III (T-MACH-105202) and of the exercise sheets in Engineering Mechanics IV (T-MACH-105203).

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-105202 - Tutorial Engineering Mechanics III must have been passed.
2. The course T-MACH-105203 - Tutorial Engineering Mechanics IV must have been passed.

Below you will find excerpts from events regarding this course:

V Engineering Mechanics IV

2162231, SS 2018, 2 SWS, Open in study portal — **Lecture (V)**

Learning Content
Spatial kinematics of a rigid body, Euler angles, angular velocity using Euler angles, Euler's equations, inertia tensor, kinetic energy of a rigid body, free gyroscopes, forced gyroscopes, systems of rigid bodies, principle of d'Alembert, Lagrange's equations of the first and second kind, generalized coordinates, free and forced vibration of one degree of freedom systems, frequency response, vibration of multi degree of freedom systems, vibration absorption

Workload
time of attendance: 24h; self-study: 65h

Literature
Hibbeler: Technische Mechanik 3, Dynamik, München, 2006
Marguerre: Technische Mechanik III, Heidelberger Taschenbücher, 1968
Magnus: Kreisel, Theorie und Anwendung, Springer-Verlag, Berlin,
1971 Klotter: Technische Schwingungslehre, 1. Bd. Teil A, Heidelberg

V Engineering Mechanics III

2161203, WS 18/19, 2 SWS, Open in study portal — **Lecture (V)**

Learning Content
Kinematics: Cartesian, cylindrical and natural coordinates. Time derivatives in moving reference frames, angular velocities of reference frames.

Kinetics of a particle:
Newton's axiom, Principle of d'Alembert, work of a force, kinetic and potential energies, principle of linear momentum, principle of moment of momentum, kinetics in moving reference systems

Systems of particles:
Principle of center of mass, Principle of moment of momentum, impacts between particles, systems with variable mass, applications.

Plain motion of rigid bodies:
Pure translation, pure rotation, general plain motion. Instantaneous center of rotation, Kinetics, moment of momentum, principle of work and principle of energy conservation for a rotation around a space-fixed axis. Mass moment of inertia, parallel-axis-theorem.Principle of linear momentum and principle of moment of momentum for arbitrary plain motion. Principle of d'Alembert for plain motion. Principles of linear and moment of momentum in integral form. Applications for impact problems.

Workload
time of attendance: 24h; self-study: 65h

Literature
Hibbeler: Technische Mechanik 3, Dynamik, München, 2006

Gross, Hauger, Schnell: Technische Mechanik Bd. 3, Heidelberg, 1983

Lehmann: Elemente der Mechanik III, Kinetik, Braunschweig, 1975

Göldner, Holzweissig: Leitfaden der Technischen Mechanik.

Hagedorn: Technische Mechanik III.

T 4.19 Course: Excercises in Technical Thermodynamics and Heat Transfer I [T-MACH-105204]

Responsible: Prof. Dr. Ulrich Maas
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102574 - Technische Thermodynamik

Type	Credits	Recurrence	Version
Studienleistung schriftlich	0	Each winter term	1

Events					
WS 18/19	2165502	Exercise course Technical Thermodynamics and Heat Transfer I	2 SWS	Practice (Ü)	Maas
WS 18/19	3165015	Technical Thermodynamics and Heat Transfer I (Tutorial)	2 SWS	Practice (Ü)	Schießl, Maas
Exams					
SS 2018	76-T-MACH-105204	Excercises in Technical Thermodynamics and Heat Transfer I		Prüfung (PR)	Maas
WS 18/19	76-T-MACH-105204	Excercises in Technical Thermodynamics and Heat Transfer I		Prüfung (PR)	Maas

Competence Certificate
Homework is mandatory.

T 4.20 Course: Excercises in Technical Thermodynamics and Heat Transfer II [T-MACH-105288]

Responsible: Prof. Dr. Ulrich Maas
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102574 - Technische Thermodynamik

Type	Credits	Recurrence	Version
Studienleistung	0	Each summer term	1

Events					
SS 2018	2166556	Technical Thermodynamics and Heat Transfer II (Tutorial)	2 SWS	Practice (Ü)	Maas
SS 2018	3166033	Technical Thermodynamics and Heat Transfer II (Tutorial)	2 SWS	Practice (Ü)	Schießl, Maas
Exams					
SS 2018	76-T-MACH-105288	Excercises in Technical Thermodynamics and Heat Transfer II		Prüfung (PR)	Maas
WS 18/19	76-T-MACH-105288	Excercises in Technical Thermodynamics and Heat Transfer II		Prüfung (PR)	Maas

Competence Certificate
Homework is mandatory.

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Technical Thermodynamics and Heat Transfer II (Tutorial) — Practice (Ü)

2166556, SS 2018, 2 SWS, Open in study portal

Learning Content
Calculation of thermodynamical problems

Workload
Regular attendance: 21,0 hours
Self-stuy: 28 hours

Literature
Course notes
Elsner, N.; Dittmann, A.: Energielehre und Stoffverhalten (Grundlagen der technischen Thermodynamik Bd. 1 und 2), 8. Aufl., Akademie-Verlag, 680 S. 1993.
Baehr, H.D.: Thermodynamik: eine Einführung in die Grundlagen und ihre technischen Anwendungen, 9. Aufl., Springer-Verlag, 460 S., 1996.

T 4.21 Course: Fluid Mechanics 1&2 [T-MACH-105207]

Responsible: Prof. Dr.-Ing. Bettina Frohnapfel
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102565 - Strömungslehre

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	8	Each summer term	2

Events					
SS 2018	2154512	Fluid Mechanics I	3 SWS	Lecture / Practice (VÜ)	Frohnapfel
SS 2018	3154510	Fluid Mechanics I	3 SWS	Lecture / Practice (VÜ)	Frohnapfel
WS 18/19	2153512	Fluid Mechanics II	3 SWS	Lecture / Practice (VÜ)	Frohnapfel
WS 18/19	3153511	Fluid Mechanics II	3 SWS	Lecture / Practice (VÜ)	Frohnapfel
Exams					
SS 2018	76-T-MACH-105207	Fluid Mechanics (1+2)		Prüfung (PR)	Frohnapfel, Kriegseis
WS 18/19	76-T-MACH-105207	Fluid Mechanics (1+2)		Prüfung (PR)	

Competence Certificate
written exam 3 hours

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Fluid Mechanics I

2154512, SS 2018, 3 SWS, Open in study portal — **Lecture / Practice (VÜ)**

Description
Media:

Blackboard, Power Point, Experiments

Learning Content
properties of fluids, surface tension, hydro- and aerostatics, kinematics, stream tube theory (compressible and incompressible), losses in pipeline systems, dimensional analysis, dimensionless numbers

Workload
regular attendance: 32 hours
self-study: 88 hours

Literature
Kundu, P.K., Cohen, K.M.: Fluid Mechanics, Elsevier, 4th Edition, 2008

Durst, F.: Fluid Mechanics: An Introduction to the Theory of Fluid Flows, Springer 2008

Batchelor, G.K.: An Introduction to Fluid Dynamics, Cambridge Mathematical Library

V Fluid Mechanics I

3154510, SS 2018, 3 SWS, Open in study portal — **Lecture / Practice (VÜ)**

Description
Media:

Blackboard, Power Point, Experiments

Learning Content
properties of fluids, surface tension, hydro- and aerostatics, kinematics, stream tube theory (compressible and incompressible), losses in pipeline systems, dimensional analysis, dimensionless numbers

Workload
regular attendance: 32 hours
self-study: 88 hours

Literature
Kundu, P.K., Cohen, K.M.: Fluid Mechanics, Elsevier, 4th Edition, 2008

Durst, F.: Fluid Mechanics: An Introduction to the Theory of Fluid Flows, Springer 2008

Batchelor, G.K.: An Introduction to Fluid Dynamics, Cambridge Mathematical Library

V **Fluid Mechanics II** **Lecture / Practice (VÜ)**
2153512, WS 18/19, 3 SWS, Open in study portal

Description
Media:

Blackboard, Power Point, Experiments

Learning Content
tensor notation, fluid elements in continuum, Reynolds transport theorem, conservation of mass and momentum, continuity equation, constitutive law for Newtonian fluids, Navier-Stokes equations, angular momentum and energy conservation, integral form of the conservation equations, forces between fluids and solids, analytical solutions of the Navier-Stokes equations

Workload
regular attendance: 32 hours
self-study: 88 hours

Literature
Kundu, P.K., Cohen, K.M.: Fluid Mechanics, Elsevier, 4th Edition, 2008

Durst, F.: Fluid Mechanics: An Introduction to the Theory of Fluid Flows, Springer 2008

Batchelor, G.K.: An Introduction to Fluid Dynamics, Cambridge Mathematical Library

V **Fluid Mechanics II** **Lecture / Practice (VÜ)**
3153511, WS 18/19, 3 SWS, Open in study portal

Description
Media:

Blackboard, Power Point, Experiments

Learning Content
tensor notation, fluid elements in continuum, Reynolds transport theorem, conservation of mass and momentum, continuity equation, constitutive law for Newtonian fluids, Navier-Stokes equations, angular momentum and energy conservation, integral form of the conservation equations, forces between fluids and solids, analytical solutions of the Navier-Stokes equations

Workload
regular attendance: 32 hours
self-study: 88 hours

Literature
Kundu, P.K., Cohen, K.M.: Fluid Mechanics, Elsevier, 4th Edition, 2008

Durst, F.: Fluid Mechanics: An Introduction to the Theory of Fluid Flows, Springer 2008

Batchelor, G.K.: An Introduction to Fluid Dynamics, Cambridge Mathematical Library

T 4.22 Course: Fundamentals of Combustion I [T-MACH-105213]

Responsible: Prof. Dr. Ulrich Maas
Dr. Jörg Sommerer

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103350 - SP B: Energietechnik

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	4	Each winter term	1

Events					
WS 18/19	2165515	Fundamentals of Combustion I	2 SWS	Lecture (V)	Maas
WS 18/19	2165517	Fundamentals of Combustion I (Tutorial)	1 SWS	Practice (Ü)	Maas
WS 18/19	3165016	Fundamentals of Combustion I	2 SWS	Lecture (V)	Maas, Sommerer
WS 18/19	3165017	Fundamentals of Combustion I (Tutorial)	1 SWS	Practice (Ü)	Maas, Sommerer
Exams					
SS 2018	76-T-MACH-105213	Fundamentals of Combustion I		Prüfung (PR)	Maas
SS 2018	76-T-MACH-105464	Fundamentals of Combustion I		Prüfung (PR)	Maas
WS 18/19	76-T-MACH-105213	Fundamentals of Combustion I		Prüfung (PR)	Maas
WS 18/19	76-T-MACH-105464	Fundamentals of Combustion I		Prüfung (PR)	Maas

Competence Certificate
Written exam, 3 h

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Fundamentals of Combustion I

2165515, WS 18/19, 2 SWS, Open in study portal **Lecture (V)**

Description
Media:

Blackboard and Powerpoint presentation

Learning Content

- Ignition processes
- Fundamental concepts ans phenomena
- Experimental analysis of flames
- Conservation equations for laminar flat flames
- Chemical reactions
- Chemical kinetics mechanisms
- Laminar premixed flames
- Laminar diffusion flames

Annotation
Compulsory elective subject: 2+1 SWS and 5 LP.

Workload
Regular attendance: 22.5 h

Self-study: 97.5 h

Literature
Lecture notes,

Combustion - Physical and Chemical Fundamentals, Modeling and Simulation, Experiments, Pollutant Formation, authors: U. Maas, J. Warnatz, R.W. Dibble, Springer-Lehrbuch, Heidelberg 1996

V Fundamentals of Combustion I (Tutorial)

2165517, WS 18/19, 1 SWS, Open in study portal

Practice (Ü)

Literature

- Lecture Notes
- J. Warnatz; U. Maas; R.W. Dibble: Combustion, Springer, Heidelberg 1996

T 4.23 Course: Fundamentals of Energy Technology [T-MACH-105220]

Responsible: Dr. Aurelian Florin Badea
Prof. Dr.-Ing. Xu Cheng

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103350 - SP B: Energietechnik

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	8	Each summer term	1

Events					
SS 2018	2130927	Fundamentals of Energy Technology	3 SWS	Lecture (V)	Cheng, Badea
SS 2018	3190923	Fundamentals of Energy Technology	3 SWS	Lecture (V)	Badea
Exams					
SS 2018	76-T-MACH-105220	Fundamentals of Energy Technology		Prüfung (PR)	Badea, Cheng
WS 18/19	76-T-MACH-105220	Fundamentals of Energy Technology		Prüfung (PR)	Badea, Cheng

Competence Certificate
Written examination, 90 min

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Fundamentals of Energy Technology

2130927, SS 2018, 3 SWS, Open in study portal — **Lecture (V)**

Learning Content
The following relevant fields of the energy industry are covered:
- Energy demand and energy situation
- Energy types and energy mix
- Basics. Thermodynamics relevant to the energy sector
- Conventional fossil-fired power plants
- Combined Cycle Power Plants
- Cogeneration
- Nuclear energy
- Regenerative energies: hydropower, wind energy, solar energy, other energy systems
- Energy demand structures. Basics of economic efficiency and calculus. Optimization
- Energy storage
- Transport of energy
- Power generation and environment. Future of the energy industry

Workload
lectures: 45 h

preparation to exam: 195 h

V Fundamentals of Energy Technology

3190923, SS 2018, 3 SWS, Open in study portal — **Lecture (V)**

Learning Content
The following relevant fields of the energy industry are covered:
- Energy forms
- Thermodynamics relevant to energy industry
- Energy sources: fossil fuels, nuclear energy, renewable sources
- Energy industry in Germany, Europe and worldwide
- Power generation and environment
- Evaluation of energy conversion processes
- Thermal/electrical power plants and processes
- Transport of energy / energy carriers
- Energy storage
- Systems utilizing renewable energy sources
- Basics of economic efficiency and calculus / Optimisation
- Future of the energy industry

Workload
lectures: 45 h
preparation to exam: 195 h

T 4.24 Course: Global Logistics [T-MACH-105379]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103351 - SP A: Globales Produktionsmanagement

Type	Credits	Recurrence	Version
Prüfungsleistung mündlich	4	Each summer term	1

Events					
SS 2018	3118095	Global Logistics	2 SWS	Block lecture (BV)	Furmans, Dörr, Mittwollen
Exams					
SS 2018	76-T-MACH-105379	Global Logistics		Prüfung (PR)	Golder
WS 18/19	76-T-MACH-105379	Global Logistics		Prüfung (PR)	Golder

Competence Certificate
oral exam (20 min)

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Global Logistics

3118095, SS 2018, 2 SWS, Open in study portal

Block lecture (BV)

Notes
The course takes place in form of a block event, i.e. all lectures will be given in one week. The dates of the lecture, i.e. the respective week, will be published on the IFL homepage.

Learning Content
Conveyor Systems

- Basic elements of conveyor systems
- Key figures
- Branching elements

- continuous/partially-continuous
- deterministic/stochastic switch

- Integration elements
- continuous/partially-continuous
- dispatching rules

Queueing Theory and Production Logistics

- Basic queueing systems
- Distributions
- M|M|1 and M|G|1 model
- Application on production logistics

Distribution Centers and Order Picking

- The location problem
- Distribution centers
- Inventory management
- Order picking

Vehicle Routing

- Types of vehicle routing problems
- Linear programming model and graph theoretic model
- Heuristics
- Supporting technologies

Optimization of Logistical Networks

- Objectives
- Cooperative strategies
- Supply chain management
- Implementation

Annotation
Attendance during lecture is required

Literature
Arnold, Dieter; Furmans, Kai : Materialfluss in Logistiksystemen; Springer-Verlag Berlin Heidelberg,

T 4.25 Course: Global Production Engineering (MEI) [T-MACH-106731]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103351 - SP A: Globales Produktionsmanagement

Type	Credits	Recurrence	Version
Prüfungsleistung mündlich	4	Each summer term	1

Events					
SS 2018	3150040	Global Production Engineering (MEI)	2 SWS	Lecture (V)	Lanza, Stricker
Exams					
WS 18/19	76-T-MACH-106731	Global Production Engineering (MEI)		Prüfung (PR)	Lanza

Competence Certificate
oral exam (45 min group examination with 3 students)

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Global Production Engineering (MEI)

3150040, SS 2018, 2 SWS, Open in study portal **Lecture (V)**

Learning Content
Target of the lecture is to depict the challenges of global operating companies and to give an overview of central aspects and methods in production planning. The lecture will regard site-related production factors and give the basic steps in site-selection, before the planning of manufacturing systems is focused. Herein, not only the planning phases are regarded, but also the methods used.

.

The topics are:

- Challenges of global production
- Establishing of new production sites
- The basic steps in manufacturing system planning
- Steps and methods of factory planning
- Manufacturing and assembly planning. Assembly panning will be focused.
- Layout and material flow of production sites
- Production planning and control basics

T 4.26 Course: Heat and Mass Transfer [T-MACH-105292]

Responsible: Prof. Dr.-Ing. Henning Bockhorn
Prof. Dr. Ulrich Maas

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103350 - SP B: Energietechnik

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	4	Each term	1

Events					
SS 2018	3122512	Heat and Mass Transfer	2 SWS	Lecture (V)	Bockhorn
WS 18/19	2165512	Heat and mass transfer	2 SWS	Lecture (V)	Maas
Exams					
SS 2018	76-T-MACH-105292	Heat and Mass Transfer		Prüfung (PR)	Maas
WS 18/19	76-T-MACH-105292	Heat and Mass Transfer		Prüfung (PR)	Maas

Competence Certificate
Written exam, 3 h

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Heat and mass transfer

2165512, WS 18/19, 2 SWS, Open in study portal **Lecture (V)**

Learning Content

- Steade stade and non-stready heat transfer in homogenous and compound materials; Plates, pipe sections and sperical shells
- Molecular, equimolecular and unilateral diffusion in gases; analogies between heat conduction and mass diffusion
- Convective, forced heatr transmission in passed through pipes/channesl and circulated around plate and profiles.
- Convective mass transfer, heat-/mass transfer analogy
- Multi phase convective heat transmission (ceondensation, evaporation)
- radiative transfer of solid bodies and gases

Annotation
Compulsory elective subject: 5 LP

Workload
General attendance: 22.5 h

Self-study: 97.5 h

Literature

- Bockhorn, H.; Vorlesungsskript "Wärme- und Stoffübertragung"
- Baehr, H.-D., Stephan, K.: "Wärme- und Stoffübertragung" , Springer Verlag, 1993
- Incropera, F., DeWitt, F.: "Fundamentals of Heat and Mass Transfer" , John Wiley & Sons, 1996
- Bird, R., Stewart, W., Lightfoot, E.: "Transport Phenomena" , John Wiley & Sons, 1960

T 4.27 Course: Machine Dynamics [T-MACH-105210]

Responsible: Prof. Dr.-Ing. Carsten Proppe
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103349 - SP C: Kraftfahrzeugtechnik

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	5	Each summer term	1

Events					
SS 2018	2161224	Machine Dynamics	2 SWS	Lecture (V)	Proppe
SS 2018	2161225	Machine Dynamics (Tutorial)	1 SWS	Practice (Ü)	Proppe, Koebele
Exams					
SS 2018	76-T-MACH-105210	Machine Dynamics		Prüfung (PR)	Proppe
WS 18/19	76-T-MACH-105210	Machine Dynamics		Prüfung (PR)	Proppe

Competence Certificate
written exam, 180 min.

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Machine Dynamics

2161224, SS 2018, 2 SWS, Open in study portal — **Lecture (V)**

Learning Content
1. Introduction
2. Machine as mechatronic system
3. Rigid rotors: equations of motion, transient and stationary motion, balancing
4. Flexible rotors: Laval rotor (equations of motion, transient and stationary behavior, critical speed, secondary effects), refined models)
5. Slider-crank mechanisms: kinematics, equations of motion, mass and power balancing

Workload
Lectures and exercices: 32 h

Studies: 118 h

Literature
Biezeno, Grammel: Technische Dynamik, 2. Edition, 1953

Holzweißig, Dresig: Lehrbuch der Maschinendynamik, 1979

Dresig, Vulfson: Dynamik der Mechanismen, 1989

V Machine Dynamics (Tutorial)

2161225, SS 2018, 1 SWS, Open in study portal — **Practice (Ü)**

Learning Content
Excercises related to the lecture

T 4.28 Course: Machines and Processes [T-MACH-105208]

Responsible: Prof. Dr.-Ing. Hans-Jörg Bauer
Dr.-Ing. Heiko Kubach
Prof. Dr. Ulrich Maas
Dr. Balazs Pritz

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102566 - Maschinen und Prozesse

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	7	Each term	1

Events					
SS 2018	3134140	Machines and Processes	4 SWS	Lecture / Practice (VÜ)	Bauer, Maas, Kubach, Pritz
WS 18/19	2185000	Machines and Processes	4 SWS	Lecture / Practice (VÜ)	Bauer, Kubach, Maas, Pritz
Exams					
SS 2018	76-T-MACH-105208	Machines and Processes, Prerequisite		Prüfung (PR)	Kubach, Gabi, Bauer, Maas
WS 18/19	76-T-MACH-105208	Machines and Processes		Prüfung (PR)	Kubach, Maas, Gabi, Bauer

Competence Certificate
written exam (duration: 120 min)

Prerequisites
Taking part at the exam is possible only when lab course has been successfully completed

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-105232 - Machines and Processes, Prerequisite must have been passed.

Below you will find excerpts from events regarding this course:

V Machines and Processes

2185000, WS 18/19, 4 SWS, Open in study portal — **Lecture / Practice (VÜ)**

Description
Media:

slides to download

Documentation of the labcourse

Learning Content
basics of thermodynamics

thermal fluid machines

- steam turbunes
- gas turbines
- combined-cycle plants
- turbines and compressors
- aircraft engines

hydraulic fluid machines

- oerating performance
- characterization
- control
- cavitation
- wind turbines, propellers

internal combustion engines

- characteristic parameters
- engine parts
- kinematics
- engine processes
- emissions

Annotation
Lab course and lecture take place in summer and winter semester.

In the SS the lecture is held in English. The lab course is always bilingual.

Workload
regular attendance: 48 h, self-study: 160 h

T 4.29 Course: Machines and Processes, Prerequisite [T-MACH-105232]

Responsible: Prof. Dr.-Ing. Hans-Jörg Bauer
Dr.-Ing. Heiko Kubach
Prof. Dr. Ulrich Maas
Dr. Balazs Pritz

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102566 - Maschinen und Prozesse

Type	Credits	Recurrence	Version
Studienleistung	0	Each term	1

Events					
SS 2018	2187000	Machinery and Processes	1 SWS	Practical course (P)	Bauer, Kubach, Maas, Pritz
WS 18/19	2187000	Machinery and Processes	1 SWS	Practical course (P)	Bauer, Kubach, Maas
Exams					
SS 2018	76-T-MACH-105232	Machines and Processes, Prerequisite		Prüfung (PR)	Kubach, Gabi, Bauer, Maas
WS 18/19	76-T-MACH-105232	Machines and Processes, Prerequisite		Prüfung (PR)	Kubach, Maas, Bauer, Gabi

Competence Certificate
successful completed training course

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Machinery and Processes

2187000, SS 2018, 1 SWS, Open in study portal — **Practical course (P)**

Description
Media:

slides to download

Documentation of the labcourse

Learning Content
basics of thermodynamics

thermal fluid machines

- steam turbunes
- gas turbines
- combined-cycle plants
- turbines and compressors
- aircraft engines

hydraulic fluid machines

- oerating performance
- characterization
- control
- cavitation
- wind turbines, propellers

internal combustion engines

- characteristic parameters
- engine parts
- kinematics
- engine processes
- emissions

Annotation
Lab course and lecture take place in summer and winter semester.

In the SS the lecture is held in English. The lab course is always bilingual.

Workload
regular attendance: 48 h, self-study: 160 h

V Machinery and Processes

2187000, WS 18/19, 1 SWS, Open in study portal

Practical course (P)

Description
Media:

slides to download

Documentation of the labcourse

Learning Content
basics of thermodynamics

thermal fluid machines

- steam turbunes
- gas turbines
- combined-cycle plants
- turbines and compressors
- aircraft engines

hydraulic fluid machines

- oerating performance
- characterization
- control
- cavitation
- wind turbines, propellers

internal combustion engines

- characteristic parameters
- engine parts
- kinematics
- engine processes
- emissions

Annotation
Lab course and lecture take place in summer and winter semester.

In the SS the lecture is held in English. The lab course is always bilingual.

Workload
regular attendance: 48 h, self-study: 160 h

T 4.30 Course: Materials Science I & II [T-MACH-105145]

Responsible: Dr.-Ing. Jens Gibmeier
Prof. Dr.-Ing. Martin Heilmaier
Prof. Dr.-Ing. Kay Weidenmann

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102562 - Werkstoffkunde

Type	Credits	Recurrence	Version
Prüfungsleistung mündlich	11	Each winter term	2

Events					
SS 2018	2174560	Materials Science and Engineering II for mach, phys	3 SWS	Lecture (V)	Heilmaier, Ulrich
SS 2018	3174015	Materials Science and Engineering II (Lecture)	3 SWS	Lecture (V)	Gibmeier
SS 2018	3174026	Materials Science and Engineering II (Tutorials)	1 SWS	Practice (Ü)	Gibmeier, Mitarbeiter
WS 18/19	2173550	Materials Science and Engineering I for mach, phys	4 SWS	Lecture (V)	Seifert, Ulrich, Pundt, Heilmaier
WS 18/19	3173008	Materials Science and Engineering I (Lecture)	4 SWS	Lecture (V)	Gibmeier
WS 18/19	3173009	Materials Science and Engineering I (Tutorial)	1 SWS	Practice (Ü)	Gibmeier
Exams					
SS 2018	76-T-MACH-105145	Materials Science I, II		Prüfung (PR)	Heilmaier
SS 2018	76-T-MACH-105145-2	Materials Science I, II		Prüfung (PR)	Heilmaier
SS 2018	76-T-MACH-105145-English	Materials Science I & II		Prüfung (PR)	Heilmaier
SS 2018	76-T-MACH-105145-W	Materials Science I & II		Prüfung (PR)	Heilmaier
WS 18/19	76-T-MACH-105145	Materials Science I, II		Prüfung (PR)	Heilmaier

Competence Certificate
oral exam, about 25 minutes

Prerequisites
Lab course must be finished successfully prior to the registration for the oral exam.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-105146 - Materials Science Lab Course must have been passed.

Annotation
The workload for the lecture Materials Science I & II is 165 h per semester and consists of the presence during the lectures (WS: 4 SWS, SS: 2SWS) and the exercises (1 SWS per WS and 1 SWS per SS) as well as preparation and rework time at home.

Below you will find excerpts from events regarding this course:

V Materials Science and Engineering II for mach, phys

2174560, SS 2018, 3 SWS, Open in study portal **Lecture (V)**

Learning Content
Ferrous materials

Non-ferrous metals and alloys

Engineering ceramics

Glasses

Polymers

Composites

Workload
regular attendance: 42 hours
self-study: 108 hours

Literature
Lecture Notes; Problem Sheets;

Shackelford, J.F.
Werkstofftechnologie für Ingenieure
Verlag Pearson Studium, 2005

V Materials Science and Engineering I for mach, phys

2173550, WS 18/19, 4 SWS, Open in study portal

Lecture (V)

Learning Content
Atomic structure and atomic bonds

Structures of crystalline solids

Defects in crystalline solids

Structure of amorphous and semi-crystalline solids

Alloys

Transport and transformation phenomena in the solid state

Microscopy methods

Characterization by means of X-rays, Neutrons and Electrons

Nondestructive testing of materials

Mechanical testing of materials

Workload
regular attendance: 53 hours
self-study: 157 hours

Literature
Lecture Notes; Problem Sheets;

Shackelford, J.F.
Werkstofftechnologie für Ingenieure
Verlag Pearson Studium, 2005

T 4.31 Course: Materials Science Lab Course [T-MACH-105146]

Responsible: Prof. Dr.-Ing. Martin Heilmaier
Prof. Dr. Anton Möslang
Prof. Dr.-Ing. Kay Weidenmann

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102562 - Werkstoffkunde

Type	Credits	Recurrence	Version
Studienleistung praktisch	3	Each summer term	1

Events					
SS 2018	2174597	Experimental Lab Course in Material Science	3 SWS	Practical course (P)	Gibmeier, Weidenmann, Lang, Heilmaier, Dietrich
SS 2018	3174016	Materials Science and Engineering Lab Course	3 SWS	Practical course (P)	Gibmeier, Weidenmann, Lang, Heilmaier, Dietrich
Exams					
SS 2018	76-T-MACH-105146	Materials Science, Lab Course		Prüfung (PR)	Heilmaier
WS 18/19	76-T-MACH-105146	Materials Science and Engineering, Lab Course		Prüfung (PR)	Heilmaier

Competence Certificate
Oral colloquium at the beginning of each topic; certificate of successful attendance.

Prerequisites
none

Annotation
The workload for the lab course Materials Science is 90 h in total and consists of the presence during the 10 experiments (one week half-time, 4 hours per day) as well as preparation and rework time at home.

Below you will find excerpts from events regarding this course:

V Experimental Lab Course in Material Science

2174597, SS 2018, 3 SWS, Open in study portal — **Practical course (P)**

Learning Content
Performing and evaluating of two laboratory experiments in each of the following topics:

Mechanical testing of materials
Nonmetallic materials
Microstructure and properties
Cyclic loading / fatigue
Influence of manufacturing technique on materials

Workload
regular attendance: 22 hours
self-study: 68 hours

Literature
Laboratory script;

Shackelford, J.F.
Werkstofftechnologie für Ingenieure
Verlag Pearson Studium, 2005

T 4.32 Course: Mechanical Design I & II [T-MACH-105286]

Responsible: Prof. Dr.-Ing. Albert Albers
Norbert Burkardt
Prof. Dr.-Ing. Sven Matthiesen

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102573 - Maschinenkonstruktionslehre

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	7	Each winter term	1

Events					
SS 2018	2146178	Mechanical Design II	2 SWS	Lecture (V)	Albers, Behrendt
SS 2018	3146017	Mechanical Design II Lecture	2 SWS	Lecture (V)	Albers, Burkardt
WS 18/19	2145178	Mechanical Design I	2 SWS	Lecture (V)	Albers, Behrendt, Matthiesen
WS 18/19	3145186	Mechanical Design I (Lecture)	2 SWS	Lecture (V)	Albers, Burkardt
Exams					
SS 2018	76-T-MACH-105286	Mechanical Design I & II		Prüfung (PR)	Albers, Burkardt
WS 18/19	76T-MACH-105286	Mechanical Design I & II		Prüfung (PR)	Albers, Burkardt

Competence Certificate
written exam, graded, duration: 60 min

Prerequisites
Admission to the exam only with successful completion of the T-MACH-105282 - Mechanical Design I, prerequisites and T-MACH-105283 - Mechanical Design II, prerequisites.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-105282 - Mechanical Design I, prerequisites must have been passed.
2. The course T-MACH-105283 - Mechanical Design II, prerequisites must have been passed.

Below you will find excerpts from events regarding this course:

V Mechanical Design II

2146178, SS 2018, 2 SWS, Open in study portal — **Lecture (V)**

Description
Media:

Beamer

Visualizer

Mechanical components

Learning Content
Bearings

Sealings

Design

Tolerances and fittings

Shaft-hub connections

Tutorials take place in concomitant to the lectures.

Annotation
Lecture notes:

The Productdevelopment knowledge base PKB will be provided in digital form for registered students. All lecture notes and additional slides will be provided in Ilias.

Workload
regular attendance: 42 h

self-study: 80 h

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X ,

also available as electronic paper at the KIT catalogue.

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8)

V Mechanical Design I

2145178, WS 18/19, 2 SWS, Open in study portal **Lecture (V)**

Description
Media:

Beamer

Visualizer

Mechanical components

Learning Content
Introduction in product development

Tools for visualization (technical drawing)

Product generation as a problem solving process

Technical systems for Product generation

- systems theory
- Contact and Channel Approach C&C²-A

Basics of selected technical components

- springs
- bearings

Concommitant to the lectures tutorials take place with the following contents:

Gear workshop

Tutorial "tools of visualization (technical drawing)"

Tutorial "technical systems product development, sytem theory, Contact and Channel Approach - C&C²-A"

Tutorial "springs"

Tutorial "bearing and bearing arrangements"

Annotation
Lecture notes:

The Productdevelopment knowledge base PKB will be provided in digital form for registered students. All lecture notes and additional slides will be provided in ILIAS.

Workload
regular attendance: 42 h

self-study: 80 h

Literature
Lecture notes:

The lecture notes can be downloaded via the eLearning platform Ilias.

Literature:

Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

or per full text access provided by university library

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

V Mechanical Design I (Lecture)

3145186, WS 18/19, 2 SWS, Open in study portal

Lecture (V)

Description
Media:

Beamer

Visualizer

Mechanical components

Learning Content
Introduction in product development

Tools for visualization (technical drawing)

Product generation as a problem solving process

Technical systems for Product generation

- systems theory
- Contact and Channel Approach C&C²-A

Basics of selected technical components

- springs
- bearings

Concommitant to the lectures tutorials take place with the following contents:

Gear workshop

Tutorial "tools of visualization (technical drawing)"

Tutorial "technical systems product development, sytem theory, Contact and Channel Approach - C&C²-A"

Tutorial "springs"

Tutorial "bearing and bearing arrangements"

Annotation
Lecture notes:

The Productdevelopment knowledge base PKB will be provided in digital form for registered students. All lecture notes and additional slides will be provided in ILIAS.

Workload
regular attendance: 42 h

self-study: 80 h

Literature
Lecture notes:

The lecture notes can be downloaded via the eLearning platform Ilias.

Literature:

Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

or per full text access provided by university library

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

T 4.33 Course: Mechanical Design I, prerequisites [T-MACH-105282]

Responsible: Prof. Dr.-Ing. Albert Albers
Prof. Dr.-Ing. Sven Matthiesen

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102573 - Maschinenkonstruktionslehre

Type	Credits	Recurrence	Version
Studienleistung	0	Each winter term	1

Events					
WS 18/19	2145185	Tutorials Mechanical Design I	1 SWS	Practice (Ü)	Albers, Matthiesen, Mitarbeiter
WS 18/19	3145187	Mechanical Design I (Tutorial)	2 SWS	Practice (Ü)	Albers, Burkardt
Exams					
SS 2018	76-T-MACH-105282	Mechanical Design I		Prüfung (PR)	Albers, Burkardt
WS 18/19	76-T-MACH-105282	Mechanical Design I		Prüfung (PR)	Albers, Matthiesen

Competence Certificate
Concomitant to the lecture, a workshop with 3 workshop sessions takes place over the semester. During the workshop the students are divided into groups and their mechanical design knowledge will be tested during a colloquium at the beginning of every single workshop session. The attendance is mandatory and will be controlled. The pass of the colloquia and the process of the workshop task are required for the successful participation.

Furthermore an online test is carried out.

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Tutorials Mechanical Design I

2145185, WS 18/19, 1 SWS, Open in study portal — **Practice (Ü)**

Description
Media:

Beamer

Visualizer

Gear box (Workshop)

Learning Content
Gear workshop

Tutorial "tools of visualization (technical drawing)"

Tutorial "technical systems product development, sytem theory, Contact and Channel Approach - C&C²-A"

Tutorial "springs"

Tutorial "bearing and bearing arrangements"

Workload
lectures: 10.5 h

preparation to exam: 49.5 h

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

V Mechanical Design I (Tutorial)

3145187, WS 18/19, 2 SWS, Open in study portal

Practice (Ü)

Description
Media:

Beamer

Visualizer

Gear box (Workshop)

Learning Content
Gear workshop

Tutorial "tools of visualization (technical drawing)"

Tutorial "technical systems product development, sytem theory, Contact and Channel Approach - C&C²-A"

Tutorial "springs"

Tutorial "bearing and bearing arrangements"

Workload
lectures: 10.5 h

preparation to exam: 49.5 h

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

T 4.34 Course: Mechanical Design II, prerequisites [T-MACH-105283]

Responsible: Prof. Dr.-Ing. Albert Albers
Prof. Dr.-Ing. Sven Matthiesen

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102573 - Maschinenkonstruktionslehre

Type	Credits	Recurrence	Version
Studienleistung	0	Each summer term	1

Events					
SS 2018	2146185	Tutorials Mechanical Design II	2 SWS	Practice (Ü)	Albers, Behrendt, Mitarbeiter
SS 2018	3146018	Mechanical Design II Tutorials	2 SWS	Practice (Ü)	Albers, Mitarbeiter
Exams					
SS 2018	76-T-MACH-105283	Mechanical Design II		Prüfung (PR)	Albers, Burkardt
WS 18/19	76-T-MACH-105283	Mechanical Design II		Prüfung (PR)	Albers, Burkardt

Competence Certificate
Concomitant to the lecture, 2 online tests are carried out and the knowledge from the lecture will be tested. The knowledge from mechanical design I and II will further be controlled with a design and a CAD task.

Prerequisites
None

Below you will find excerpts from events regarding this course:

V Tutorials Mechanical Design II

2146185, SS 2018, 2 SWS, Open in study portal — **Practice (Ü)**

Description
Media:
Beamer
Visualizer
model box (Workshop)

Learning Content
Bearings
Sealings
Design
Tolerances and fittings
Shaft-hub connections

Workload
lectures: 21 h
preparation to exam: 39 h

Literature

Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

T 4.35 Course: Mechanical Design III & IV [T-MACH-104810]

Responsible: Prof. Dr.-Ing. Albert Albers
Norbert Burkardt
Prof. Dr.-Ing. Sven Matthiesen

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102573 - Maschinenkonstruktionslehre

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	13	Each winter term	2

Events					
SS 2018	2146177	Mechanical Design IV	2 SWS	Lecture (V)	Matthiesen
SS 2018	3146020	Mechanical Design IV Lecture	2 SWS	Lecture (V)	Albers, Burkardt
WS 18/19	2145151	Mechanical Design III	2 SWS	Lecture (V)	Albers, Matthiesen, Mitarbeiter
WS 18/19	3145016	Mechanical Design III (Lecture)	2 SWS	Lecture (V)	Albers, Burkardt
Exams					
SS 2018	76-T-MACH-104810	Mechanical Design III & IV		Prüfung (PR)	Albers, Burkardt
WS 18/19	76-T-MACH-104810	Mechanical Design III & IV		Prüfung (PR)	Albers, Burkardt

Competence Certificate
written exam consisting of:

- written part duration 60 min and
- design part duration 180 min

Sum: 240 min

Prerequisites
Admission to the exam only with successful completion of the T-MACH-105284 - Mechanical Design III, Constructing the Team and T-MACH-105285 - Mechanical Design IV, Constructing the Team.

Modeled Conditions
You have to fulfill one of 2 conditions:

1. The course T-MACH-105284 - Mechanical Design III, Constructing the Team must have been passed.
2. The course T-MACH-105285 - Mechanical Design IV, Constructing the Team must have been passed.

Below you will find excerpts from events regarding this course:

V Mechanical Design IV

2146177, SS 2018, 2 SWS, Open in study portal **Lecture (V)**

Description
Media:

Beamer

Visualizer

Mechanical components

Learning Content
Basic connections - part 2

Coupling fundamentals

Function and working principles
Significant characteristics and classification
Non-shiftable shaft couplings
Shiftable shaft couplings
Elastic couplings

Gear transmission fundamentals

Function and working principles
Fundamentals of gear transmissions
Significant characteristics and classification
Selection criteria
Fundamentals of further gear drives
Fundamentals of lubrication and lubricants

Tooth system fundamentals

Function and working principles
Tooth pitch characters
Cycloid as slope curve
Evolvent as slope curve
Manufacturing technologies
Transverse contact ratio
Profile offset
Application limits and technical defects
Dimensioning
Root bearing
Flank bearing

Hydraulic fundamentals

Basic functions and working principles
Significant characteristics and classification
Model types and characteristics
Selection criteria
Application
Dimensioning

Annotation
Lecture notes:

The product development knowledge base PKB will be provided in digital form for registered students. All lecture notes and additional slides will be provided in Ilias.

Workload
regular attendance: 42 h

self-study: 80 h

Literature
Lecture notes:

The lecture notes can be downloaded via the eLearning platform Ilias.

Literature:

Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von
Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

or per full text access provided by university library

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3(für Fortgeschrittene)

V **Mechanical Design III** **Lecture (V)**
2145151, WS 18/19, 2 SWS, Open in study portal

Description
Media:

Beamer

Visualizer

Mechanical components

Learning Content
component connection

Tolerances and fittings

gears

Annotation
Lecture notes:

The Productdevelopment knowledge base PKB will be provided in digital form for registered students. All lecture notes and additional slides will be provided in Ilias.

Workload
regular attendance: 42 h

self-study: 80 h

Literature
Lecture notes:

The lecture notes can be downloaded via the eLearning platform Ilias.

Literature:

Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

or per full text access provided by university library

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3(für Fortgeschrittene)

V Mechanical Design III (Lecture)

3145016, WS 18/19, 2 SWS, Open in study portal

Lecture (V)

Description
Media:

Beamer

Visualizer

Mechanical components

Learning Content
component connection

Tolerances and fittings

gears

Annotation
Lecture notes:

The Productdevelopment knowledge base PKB will be provided in digital form for registered students. All lecture notes and additional slides will be provided in Ilias.

Workload
regular attendance: 42 h

self-study: 80 h

Literature
Lecture notes:

The lecture notes can be downloaded via the eLearning platform Ilias.

Literature:

Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

or per full text access provided by university library

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3(für Fortgeschrittene)

T 4.36 Course: Mechanical Design III, Constructing the Team [T-MACH-105284]

Responsible: Prof. Dr.-Ing. Albert Albers
Prof. Dr.-Ing. Sven Matthiesen

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102573 - Maschinenkonstruktionslehre

Type	Credits	Recurrence	Version
Studienleistung	0	Each winter term	2

Events					
WS 18/19	2145153	Tutorials Mechanical Design III	2 SWS	Practice (Ü)	Albers, Matthiesen, Mitarbeiter
WS 18/19	2145154	Mechanical Design III Workshop	1 SWS	Practice (PÜ)	Albers Assistenten
WS 18/19	3145017	Mechanical Design III (Tutorial)	2 SWS	Practice (Ü)	Albers, Burkardt
WS 18/19	3145018	Mechanical Design III (Workshop)	SWS	Seminar / Practical course (S/P)	Albers, Burkardt
Exams					
SS 2018	76-T-MACH-105284	Mechanical Design III,Constructing the Team		Prüfung (PR)	Albers, Burkardt
WS 18/19	76-T-MACH-105284	Mechanical Design III,Constructing the Team		Prüfung (PR)	Albers, Burkardt

Competence Certificate
Concomitant to the lecture, a workshop with 3 workshop sessions takes place over the semester. During the workshop the students are divided into groups and their mechanical design knowledge will be tested during a colloquium at the beginning of every single workshop session. The attendance is mandatory and will be controlled. The pass of the colloquia and the process of the workshop task are required for the successful participation.

Prerequisites
None

Below you will find excerpts from events regarding this course:

V Tutorials Mechanical Design III

2145153, WS 18/19, 2 SWS, Open in study portal **Practice (Ü)**

Description
Media:

Beamer

Visualizer

model box (Workshop)

Learning Content
component connection

Tolerances and fittings

gears

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

V Mechanical Design III Workshop

2145154, WS 18/19, 1 SWS, Open in study portal

Practice (PÜ)

Learning Content
Interrogation of the purchased knowledge in mechanical design by means of the workshop task.

Annotation
Bonus

The student can achieve an extra bonus for the mechanical design exam.

The bonus amounts to 0,3 exam points and it can only be achieved in case of passed MD-exam (lowest passing grade 4,0).

More details will be announced in mechanical design III and IV.

Workload
regular attendance: 21 h

self-study: 39 h

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

V Mechanical Design III (Tutorial)

3145017, WS 18/19, 2 SWS, Open in study portal

Practice (Ü)

Description
Media:

Beamer

Visualizer

model box (Workshop)

Learning Content
component connection

Tolerances and fittings

gears

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

V Mechanical Design III (Workshop)

3145018, WS 18/19, SWS, Open in study portal

Seminar / Practical course (S/P)

Learning Content
Interrogation of the purchased knowledge in mechanical design by means of the workshop task.

Annotation
Bonus

The student can achieve an extra bonus for the mechanical design exam.

The bonus amounts to 0,3 exam points and it can only be achieved in case of passed MD-exam (lowest passing grade 4,0).

More details will be announced in mechanical design III.

Workload
regular attendance: 21 h

self-study: 39 h

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

T 4.37 Course: Mechanical Design IV, Constructing the Team [T-MACH-105285]

Responsible: Prof. Dr.-Ing. Albert Albers
Prof. Dr.-Ing. Sven Matthiesen

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102573 - Maschinenkonstruktionslehre

Type	Credits	Recurrence	Version
Studienleistung	0	Each summer term	2

Events					
SS 2018	2146184	Tutorials Mechanical Design IV	2 SWS	Practice (Ü)	Matthiesen, Mitarbeiter
SS 2018	2146187	Workshop 'Mechanical Design IV'	1 SWS	Practice (PÜ)	Matthiesen, Mitarbeiter
SS 2018	3146021	Mechanical Design IV Tutorials	1 SWS	Practice (Ü)	Albers, Mitarbeiter
SS 2018	3146022	Mechanical Design IV Workshop	1 SWS	Practice (PÜ)	Albers, Mitarbeiter
Exams					
SS 2018	76-T-MACH-105285	Mechanical Design IV, Constructing the Team		Prüfung (PR)	Albers, Burkardt
WS 18/19	76-T-MACH-105285	Mechanical Design IV, Constructing the Team		Prüfung (PR)	Albers, Burkardt

Competence Certificate
Concomitant to the lecture, a workshop with 3 workshop sessions takes place over the semester. During the workshop the students are divided into groups and their mechanical design knowledge will be tested during a colloquium at the beginning of every single workshop session. The attendance is mandatory and will be controlled. The pass of the colloquia and the process of the workshop task are required for the successful participation.

Prerequisites
None

Below you will find excerpts from events regarding this course:

V Tutorials Mechanical Design IV

2146184, SS 2018, 2 SWS, Open in study portal — **Practice (Ü)**

Description
Media:

Beamer

Visualizer

Model box (Workshop)

Learning Content
Basic connections - part 2

Coupling fundamentals

Gear transmission fundamentals

Tooth system fundamentals

Hydraulic fundamentals

Workload
lectures: 10.5 h

preparation to exam: 49.5 h

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

V Workshop 'Mechanical Design IV'

2146187, SS 2018, 1 SWS, Open in study portal

Practice (PÜ)

Learning Content
Interrogation of the purchased knowledge in mechanical design by means of the workshop task.

Annotation
Bonus

The student can achieve an extra bonus for the mechanical design exam.

The bonus amounts to 0,3 exam points and it can only be achieved in case of passed MD-exam (lowest passing grade 4,0).

More details will announce in mechanical design IV.

Workload
lectures: 10.5 h

preparation to exam: 19.5 h

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

T 4.38 Course: Presentation [T-MACH-108684]

Responsible: Prof. Dr.-Ing. Martin Heilmaier
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-103722 - Bachelorarbeit

Type	Credits	Recurrence	Version
Studienleistung	3	Each term	1

Exams				
WS 18/19	76-T-MACH-108684	Presentation	Prüfung (PR)	

Competence Certificate
The colloquium presentation must be held within 6 weeks after the submission of the bachelor thesis. The presentation should last around 20 minutes followed by a scientific discussion with the present expert audience. The students should show that they are able to independently present and discuss the content of their bachelor thesis according to scientific criteria.

Prerequisites
Bachelor Thesis has been started

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-108685 - Bachelor Thesis must have been started.

Annotation
The workload for the presentation of the bachelor thesis is about 90 hours.

T 4.39 Course: Production Operations Management [T-MACH-100304]

Responsible: Prof. Dr.-Ing. Kai Furmans
Prof. Dr.-Ing. Gisela Lanza
Prof. Dr. Frank Schultmann

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-100297 - Betriebliche Produktionswirtschaft

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	3	Each winter term	2

Events					
SS 2018	2110085	Production Operations Management	4 SWS	Lecture / Practice (VÜ)	Furmans, Lanza
WS 18/19	2110085	Production Operations Management	2 SWS	Lecture / Practice (VÜ)	Furmans, Lanza
WS 18/19	3118031	Production Operations Management	3 SWS	Lecture / Practice (VÜ)	Furmans, Lanza
Exams					
SS 2018	76-T-MACH-100304	Production Operations Management		Prüfung (PR)	Furmans, Lanza
WS 18/19	76-T-MACH-100304	Production Operations Management		Prüfung (PR)	Furmans, Lanza, Deml

Competence Certificate
written exam (duration: 90 min)

Prerequisites
T-MACH-108734 - Production Operations Management-Project must have been completed successfully.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-108734 - Production Operations Management-Project must have been passed.

Below you will find excerpts from events regarding this course:

V Production Operations Management

2110085, SS 2018, 4 SWS, Open in study portal — **Lecture / Practice (VÜ)**

Description
Media:

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).

Learning Content
The lecture is given in cooperation by the Institute for Conveying Technologies and Logistics (IFL) and the Institute of Production Science (wbk).Basic skills are taught about the planning and operation of a production system. Contents of the lecture are the basics of operational and supply chain management as well as business administration basics for accounting, investment calculation and legal forms.

Annotation
None

Workload
regular attendance: 42 hours
self-study: 108 hours

Literature
Lecture Notes

V

Production Operations Management

2110085, WS 18/19, 2 SWS, Open in study portal

Lecture / Practice (VÜ)

Description
Media:

Lecture notes will be provided in ilias (https://ilias.studium.kit.edu/).

Learning Content
The lecture covers the basics of operations and supply chain management as well as business management basics in accounting, investment calculation and legal forms.

Annotation
It is a joint lecture of the Institute of Materials Handling and Logistics (IFL) and the Institute of Production Science (WBK). The institutes alternate with each cycle.

Workload
regular attendance: 25 hours
self-study: 65 hours

Literature
F. Robert Jacobs, Richard B. Chase (2014): Operations and supply chain management

T 4.40 Course: Production Operations Management-Project [T-MACH-108734]

Responsible: Prof. Dr.-Ing. Kai Furmans
Prof. Dr.-Ing. Gisela Lanza

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-100297 - Betriebliche Produktionswirtschaft

Type	Credits	Recurrence	Version
Prüfungsleistung anderer Art	2	Each winter term	1

Events					
WS 18/19	2110086	Production Operations Management-Project	1 SWS	Project (PRO)	Furmans, Lanza
WS 18/19	3118032	Production Operations Management-Project	1 SWS	Project (PRO)	Furmans, Lanza
Exams					
WS 18/19	76-T-MACH-100305	Production Operations Management-Project		Prüfung (PR)	Furmans, Lanza

Competence Certificate
Assignments during the semester consisting of solving 5 and presenting 2 case studies, whereof:

- 80% assessment of the case study as group work
- 20% oral examination during case study colloquiums

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Production Operations Management-Project

2110086, WS 18/19, 1 SWS, Open in study portal — **Project (PRO)**

Learning Content
Students are divided into groups for this course. Five case studies will be carried out in these groups. The results of the group work will be presented and evaluated in writing. In addition, selected groups will present and defend their results. In the defences, the understanding of the models dealt with in the lecture is also tested.

The participation of all members of the selected groups in the oral defences is compulsory and controlled. Four written submissions must be passed and the best four out of five will be evaluated. For the written submission the group receives a common mark, in the defense each group member is evaluated individually. The defences are fully included in the evaluation, but they do not have to be passed in order to pass the lecture. The final score of the event consists of 80% of the written submissions and 20% of the defence evaluation.

Annotation
It is a joint lecture of the Institute of Materials Handling and Logistics (IFL) and the Institute of Production Science (WBK). The institutes alternate with each cycle.

Workload
Attendance time: 17 hours,

Self-study: 43 hours

Literature
F. Robert Jacobs, Richard B. Chase (2014): Operations and supply chain management

T 4.41 Course: Project and Operations Management [T-WIWI-108295]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-MACH-103322 - Internationales Projektmanagement und Überfachliche Qualifikationen

Type	Credits	Recurrence	Version
Studienleistung	2	Each winter term	1

Events					
WS 18/19	2550489	Project and Operations Management	2 SWS	Lecture (V)	Nickel

Competence Certificate
Ungraded, the valuation is composed of:

- 50% written exam
- 25% workshop
- 25% case study

Prerequisites
None

Annotation
Description:

Operations management (OM) describes the process of planning and controlling the resources needed to produce a company's products or services. While OM focuses on ongoing operations, project management (PM) is concerned with planning and controlling a set of activities with a defined start and end state. The objective of the first part (PM) of the course is to acquaint students with quantitative planning methods to analyze the network structure of large projects, i.e., to identify "critical" project activities, interdependencies between them, and their impact on key performance indicators (e.g., time and cost).

In the second part (OM) of the lecture, two major operational issues are discussed, inventory management and operations scheduling. Students will learn about basic decisions arising in inventory management and operations scheduling, and typical constraints (such as demand or capacity constraints) which have to be taken into account. Throughout the course, students will be given the opportunity to gain practical problem solving skills in short cases and exercises. They will be taught how to use modeling languages in combination with current software tools in order to implement and solve real-world mixed-integer programming models.

Content:

Students will learn how to structure planning problems occurring in a company's operations or in international projects. Moreover, they are introduced to fundamental quantitative planning techniques and tools for solving real-world project and operations management problems.

Topics of the lecture include:

- Introduction to optimization
- Network planning techniques (CPM, PERT, stochastic time analysis etc.)
- Inventory management (single- and multi-period models etc.)
- Operations scheduling (single and parallel machine scheduling etc.)

Learning Targets:

Participants are capable of

- Formulating basic optimization problems frequently occurring in project and operations management contexts (including linear and integer programming, dynamic programming).
- Systematically examining the network structure of large projects (including identification of relationships between project activities, analysis of time-critical activities, computing expected project duration and costs etc.).
- Distinguishing between the different types and uses of inventory as well as the relevant costs associated with inventory.
- Recognizing the fundamental trade-offs in inventory management.
- Calculating order quantities in case of constant and time-varying demand.
- Classifying various kinds of scheduling problems in short-term production planning
- Sequencing jobs based on priority rules
- Developing schedules for single, parallel, and multiple machines.

T 4.42 Course: SmartFactory@Industry (MEI) [T-MACH-106733]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103351 - SP A: Globales Produktionsmanagement

Type	Credits	Recurrence	Version
Prüfungsleistung anderer Art	4	Each summer term	1

Events					
SS 2018	3150044	SmartFactory@Industry	2 SWS	Seminar / Practical course (S/P)	Lanza
Exams					
WS 18/19	76-T-MACH-106733	SmartFactory@Industry (MEI)		Prüfung (PR)	Lanza

Competence Certificate
alternative test achievement (graded)

- colloquium (approx. 15 min)
- presentation (approx. 20 min)

Prerequisites
Successful completion of the following courses:

- M-MACH-102563 - Computer Science
- MACH-102573 - Mechanical Design

Modeled Conditions
The following conditions have to be fulfilled:

1. The module M-MACH-102563 - Computer Science must have been passed.
2. The module M-MACH-102573 - Mechanical Design must have been passed.

Below you will find excerpts from events regarding this course:

V SmartFactory@Industry

3150044, SS 2018, 2 SWS, Open in study portal

Seminar / Practical course (S/P)

Learning Content
The students will get to know different real industrial tasks and problems and will learn how to address them with the methods they got to know and even beyond these.

Annotation
For organizational reasons the number of participants for the course is limited. Hence a selection process will take place.

The course is held as block modules.

T 4.43 Course: Technical Thermodynamics and Heat Transfer I [T-MACH-104747]

Responsible: Prof. Dr. Ulrich Maas
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102574 - Technische Thermodynamik

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	8	Each winter term	2

Events					
WS 18/19	2165501	Technical Thermodynamics and Heat Transfer I	4 SWS	Lecture (V)	Maas
WS 18/19	3165014	Technical Thermodynamics and Heat Transfer I	4 SWS	Lecture (V)	Schießl, Maas
Exams					
SS 2018	76-T-MACH-104747	Technical Thermodynamics and Heat Transfer I		Prüfung (PR)	Maas
WS 18/19	76-T-MACH-104747	Technical Thermodynamics and Heat Transfer I		Prüfung (PR)	Maas
WS 18/19	76-T-MACH-104747-english	Technical Thermodynamics and Heat Transfer I		Prüfung (PR)	Maas
WS 18/19	76-T-MACH-104747-Wiederholer	Technical Thermodynamics and Heat Transfer I		Prüfung (PR)	Maas

Competence Certificate
Written exam [duration: 180 min]

Prerequisites
Successful participation in the tutorial (T-MACH-105204 - Excercises in Technical Thermodynamics and Heat Transfer I)

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-105204 - Excercises in Technical Thermodynamics and Heat Transfer I must have been passed.

Below you will find excerpts from events regarding this course:

V Technical Thermodynamics and Heat Transfer I

2165501, WS 18/19, 4 SWS, Open in study portal **Lecture (V)**

Description
Media:

Blackboard and Powerpoint presentation

Learning Content
System, properties of state
Absolute temperature, model systems
1st law of thermodynamics for resting and moved systems
Entropy and 2nd law of thermodynamics
Behavior of real substances described by tables, diagrams and equations of state
Machine processes

Workload
Regular attendance: 56.3 h

Self-study: 183.8 h

Literature
Course note packet

Elsner, N.; Dittmann, A.: Energielehre und Stoffverhalten (Grundlagen der technischen Thermodynamik Bd. 1 und 2), 8. Aufl., Akademie-Verlag, 680 S. 1993.

Baehr, H.D.: Thermodynamik: eine Einführung in die Grundlagen und ihre technischen Anwendungen, 9. Aufl., Springer-Verlag, 460 S., 1996.

T 4.44 Course: Technical Thermodynamics and Heat Transfer II [T-MACH-105287]

Responsible: Prof. Dr. Ulrich Maas
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102574 - Technische Thermodynamik

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	7	Each summer term	1

Events					
SS 2018	2166526	Technical Thermodynamics and Heat Transfer II	3 SWS	Lecture (V)	Maas
SS 2018	3166526	Technical Thermodynamics and Heat Transfer II	3 SWS	Lecture (V)	Schießl
Exams					
SS 2018	76-T-MACH-105287	Technical Thermodynamics and Heat Transfer II		Prüfung (PR)	Maas
WS 18/19	76-T-MACH-105287	Technical Thermodynamics and Heat Transfer II		Prüfung (PR)	Maas
WS 18/19	76-T-MACH-105287-english	Technical Thermodynamics and Heat Transfer II		Prüfung (PR)	Maas
WS 18/19	76-T-MACH-105287-Wiederholer	Technical Thermodynamics and Heat Transfer II		Prüfung (PR)	Maas

Competence Certificate
Written exam [duration: 180 min]

Prerequisites
Successful participation in the tutorial (T-MACH-105288 - Exercises in Technical Thermodynamics and Heat Transfer II)

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-105288 - Excercises in Technical Thermodynamics and Heat Transfer II must have been passed.

Below you will find excerpts from events regarding this course:

V Technical Thermodynamics and Heat Transfer II

2166526, SS 2018, 3 SWS, Open in study portal — **Lecture (V)**

Description
Media:

Blackboard and Powerpoint presentation

Learning Content
Repetition of the topics of "Thermodynamics and Heat Transfer I"
Mixtures of ideal gases
Moist air
Behaviour of real substances described by equations of state
Applications of the laws of thermodynamics to chemical reactions

Workload
Regular attendance: 52,5 hours

Self-study: 142,5 hours

Literature
Course notes

Elsner, N.; Dittmann, A.: Energielehre und Stoffverhalten (Grundlagen der technischen Thermodynamik Bd. 1 und 2), 8. Aufl., Akademie-Verlag, 680 S. 1993.

Baehr, H.D.: Thermodynamik: eine Einführung in die Grundlagen und ihre technischen Anwendungen, 9. Aufl., Springer-Verlag, 460 S., 1996.

T 4.45 Course: Tutorial Engineering Mechanics I [T-MACH-100528]

Responsible: Prof. Dr.-Ing. Thomas Böhlke
Dr.-Ing. Tom-Alexander Langhoff

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102572 - Technische Mechanik

Type	Credits	Recurrence	Version
Studienleistung	0	Each winter term	2

Events					
WS 18/19	2161246	Tutorial Engineering Mechanics I	2 SWS	Practice (Ü)	Görthofer, Prahs, Böhlke
WS 18/19	3161011	Engineering Mechanics I (Tutorial)	2 SWS	Practice (Ü)	Pallicity, Langhoff
Exams					
SS 2018	76-T-MACH-100528	Tutorial Engineering Mechanics I		Prüfung (PR)	Böhlke, Langhoff
WS 18/19	76-T-MACH-100528	Tutorial Engineering Mechanics I		Prüfung (PR)	Böhlke, Langhoff
WS 18/19	76-T-MACH-100528-englisch	Tutorial Engineering Mechanics I		Prüfung (PR)	Böhlke, Langhoff

Competence Certificate
Attestations have to be achieved in the following four categories: mandatory written homework problems, written homework problems, computational homework problems, colloquia.

This course is passed if all mandatory written homework problems are passed and if in the other three categories (written homework problems, computational homework problems, colloquia) in total at most three attestations have been finally not passed, at most one in each of the three categories.

Succesful participation in this course allows for registration to the Exam "Engineering Mechanics I" (see T-MACH-100282)

Prerequisites
None

Below you will find excerpts from events regarding this course:

V Tutorial Engineering Mechanics I

2161246, WS 18/19, 2 SWS, Open in study portal — **Practice (Ü)**

Learning Content
see lecture Engineering Mechanics I

Workload
time of attendance: 21h; self-study: 49h

Literature
see lecture Engineering Mechanics I

T 4.46 Course: Tutorial Engineering Mechanics II [T-MACH-100284]

Responsible: Prof. Dr.-Ing. Thomas Böhlke
Dr.-Ing. Tom-Alexander Langhoff

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102572 - Technische Mechanik

Type	Credits	Recurrence	Version
Studienleistung schriftlich	0	Each summer term	2

Events					
SS 2018	2162251	Tutorial Engineering Mechanics II	2 SWS	Practice (Ü)	Prahs, Görthofer, Böhlke
SS 2018	3162011	Engineering Mechanics II (Tutorial)	2 SWS	Practice (Ü)	Pallicity, Langhoff
Exams					
SS 2018	76-T-MACH-100284	Tutorial Engineering Mechanics II		Prüfung (PR)	Langhoff, Böhlke
WS 18/19	76-T-MACH-100284	Tutorial Engineering Mechanics II		Prüfung (PR)	Böhlke, Langhoff
WS 18/19	76-T-MACH-100284-englisch	Tutorial Engineering Mechanics II		Prüfung (PR)	Böhlke, Langhoff

Competence Certificate
Attestations have to be achieved in the following four categories: mandatory written homework problems, written homework problems, computational homework problems, colloquia.

This course is passed if all mandatory written homework problems are passed and if in the other three categories (written homework problems, computational homework problems, colloquia) in total at most two attestations have been finally not passed, at most one in each of the three categories.

Succesful participation in this course allows for registration to the Exam "Engineering Mechanics II" (see T-MACH-100283)

Prerequisites
None

Below you will find excerpts from events regarding this course:

V Tutorial Engineering Mechanics II

2162251, SS 2018, 2 SWS, Open in study portal — **Practice (Ü)**

Learning Content
see lecture Engineering Mechanics II

Workload
time of attendance: 21h; self-study: 49h

Literature
see lecture Engineering Mechanics II

T 4.47 Course: Tutorial Engineering Mechanics III [T-MACH-105202]

Responsible: Prof. Dr.-Ing. Wolfgang Seemann
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102572 - Technische Mechanik

Type	Credits	Recurrence	Version
Studienleistung schriftlich	0	Each winter term	2

Events					
WS 18/19	2161204	Engineering Mechanics III (Tutorial)	2 SWS	Practice (Ü)	Seemann, Becker, Yüzbasioglu
WS 18/19	3161013	Engineering Mechanics III (Tutorial)	2 SWS	Practice (Ü)	Seemann, Becker, Yüzbasioglu
Exams					
SS 2018	76-T-MACH-105202	Tutorial Engineering Mechanics III		Prüfung (PR)	Seemann
WS 18/19	76-T-MACH-105202	Tutorial Engineering Mechanics III		Prüfung (PR)	Seemann

Competence Certificate
Attestations, succesful accomplishment of exercise sheets

Prerequisites
None

Below you will find excerpts from events regarding this course:

V Engineering Mechanics III (Tutorial)

2161204, WS 18/19, 2 SWS, Open in study portal **Practice (Ü)**

Learning Content
In the Tutorial excercises for the corresponding subjects of the lecture are presented. During the tutorial part of the tutorial excercises are presented and instructions for those excercises are given which have to be done as homework.

The homework is mandatory and is corrected by the tutors. A successful elaboration of the homework is necessary to take part in the final exam.

Workload
time of attendance: 21h; self-study: 39h

Literature
Hibbeler: Technische Mechanik 3, Dynamik, München, 2006

Gross, Hauger, Schnell: Technische Mechanik Bd. 3, Heidelberg, 1983

Lehmann: Elemente der Mechanik III, Kinetik, Braunschweig, 1975

Göldner, Holzweissig: Leitfaden der Technischen Mechanik.

Hagedorn: Technische Mechanik III.

T 4.48 Course: Tutorial Engineering Mechanics IV [T-MACH-105203]

Responsible: Prof. Dr.-Ing. Wolfgang Seemann
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102572 - Technische Mechanik

Type	Credits	Recurrence	Version
Studienleistung schriftlich	0	Each summer term	1

Events					
SS 2018	2162232	Engineering Mechanics IV (Tutorial)	2 SWS	Practice (Ü)	Seemann, Kapelke, Schröders
SS 2018	3162013	Engineering Mechanics 4 (Tutorial)	2 SWS	Practice (Ü)	Seemann, Kapelke, Schröders
Exams					
SS 2018	76-T-MACH-105203	Tutorial Engineering Mechanics IV		Prüfung (PR)	Seemann
WS 18/19	76-T-MACH-105203	Tutorial Engineering Mechanics IV		Prüfung (PR)	Seemann

Competence Certificate
Attestations, succesful accomplishment of exercise sheets

Below you will find excerpts from events regarding this course:

V Engineering Mechanics IV (Tutorial)

2162232, SS 2018, 2 SWS, Open in study portal **Practice (Ü)**

Learning Content
In the Tutorial excercises for the corresponding subjects of the lecture are presented. During the tutorial part of the excercises are presented and instructions are given for those excercises which have to be done as homework.

The homework is mandatory and is corrected by the tutors. A successful elaboration of the homework is necessary to take part in the final exam.

Workload
time of attendance: 21h; self-study: 39h

Literature
Hibbeler: Technische Mechanik 3, Dynamik, München, 2006
Marguerre: Technische Mechanik III, Heidelberger Taschenbücher, 1968
Magnus: Kreisel, Theorie und Anwendung, Springer-Verlag, Berlin,
1971 Klotter: Technische Schwingungslehre, 1. Bd. Teil A, Heidelberg

T 4.49 Course: Vehicle Comfort and Acoustics I [T-MACH-105154]

Responsible: Prof. Dr. Frank Gauterin
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103349 - SP C: Kraftfahrzeugtechnik

Type	Credits	Recurrence	Version
Prüfungsleistung mündlich	4	Each winter term	1

Events					
SS 2018	2114856	Vehicle Ride Comfort & Acoustics I	2 SWS	Lecture (V)	Gauterin
WS 18/19	2113806	Vehicle Comfort and Acoustics I	2 SWS	Lecture (V)	Gauterin
Exams					
SS 2018	76-T-MACH-105154	Vehicle Comfort and Acoustics I		Prüfung (PR)	Gauterin
WS 18/19	76-T-MACH-105154	Vehicle Comfort and Acoustics I		Prüfung (PR)	Gauterin

Competence Certificate
Oral Examination

Duration: 30 up to 40 minutes

Auxiliary means: none

Prerequisites
Can not be combined with lecture T-MACH-102206

Below you will find excerpts from events regarding this course:

V Vehicle Ride Comfort & Acoustics I

2114856, SS 2018, 2 SWS, Open in study portal **Lecture (V)**

Learning Content
1. Perception of noise and vibrations

3. Fundamentals of acoustics and vibrations

3. Tools and methods for measurement, computing, simulation and analysis of noise and vibrations

4. The relevance of tire and chasis for the acoustic and mechanical driving comfort:
phenomena, influencing parameters, types of construction, optimization of components and systems, conflict of goals, methods of development

An excursion will give insights in the development practice of a car manufacturer or a system supplier.

Workload
regular attendance: 22,5 hours
self-study: 97,5 hours

Literature
1. Michael Möser, Technische Akustik, Springer, Berlin, 2005

2. Russel C. Hibbeler, Technische Mechanik 3, Dynamik, Pearson Studium, München, 2006

3. Manfred Mitschke, Dynamik der Kraftfahrzeuge, Band B: Schwingungen, Springer, Berlin, 1997

The script will be supplied in the lectures

V

Vehicle Comfort and Acoustics I

2113806, WS 18/19, 2 SWS, Open in study portal

Lecture (V)

Learning Content
1. Perception of noise and vibrations

3. Fundamentals of acoustics and vibrations

3. Tools and methods for measurement, computing, simulation and analysis of noise and vibrations

4. The relevance of tire and chasis for the acoustic and mechanical driving comfort:
phenomena, influencing parameters, types of construction, optimization of components and systems, conflict of goals, methods of development

An excursion will give insights in the development practice of a car manufacturer or a system supplier.

Workload
regular attendance: 22,5 hours
self-study: 97,5 hours

Literature
1. Michael Möser, Technische Akustik, Springer, Berlin, 2005

2. Russel C. Hibbeler, Technische Mechanik 3, Dynamik, Pearson Studium, München, 2006

3. Manfred Mitschke, Dynamik der Kraftfahrzeuge, Band B: Schwingungen, Springer, Berlin, 1997

The script will be supplied in the lectures

T 4.50 Course: Vehicle Comfort and Acoustics II [T-MACH-105155]

Responsible: Prof. Dr. Frank Gauterin
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103349 - SP C: Kraftfahrzeugtechnik

Type	Credits	Recurrence	Version
Prüfungsleistung mündlich	4	Each summer term	1

Events					
SS 2018	2114825	Vehicle Comfort and Acoustics II	2 SWS	Lecture (V)	Gauterin
SS 2018	2114857	Vehicle Ride Comfort & Acoustics II	2 SWS	Lecture (V)	Gauterin
Exams					
SS 2018	76-T-MACH-105155	Vehicle Comfort and Acoustics II		Prüfung (PR)	Gauterin
WS 18/19	76-T-MACH-105155	Vehicle Comfort and Acoustics II		Prüfung (PR)	Gauterin

Competence Certificate
Oral Examination

Duration: 30 up to 40 minutes

Auxiliary means: none

Prerequisites
Can not be combined with lecture T-MACH-102205

Below you will find excerpts from events regarding this course:

V Vehicle Comfort and Acoustics II

2114825, SS 2018, 2 SWS, Open in study portal — **Lecture (V)**

Learning Content
1. Summary of the fundamentals of acoustics and vibrations

2. The relevance of road surface, wheel imperfections, springs, dampers, brakes, bearings and bushings, suspensions, engines and drive train for the acoustic and mechanical driving comfort:
- phenomena
- influencing parameters
- types of construction
- optimization of components and systems
- conflicts of goals
- methods of development

3. Noise emission of motor vehicles
- noise stress
- sound sources and influencing parameters
- legal restraints
- optimization of components and systems
- conflict of goals
- methods of development

Workload
regular attendance: 22,5 hours
self-study: 97,5 hours

Literature
The script will be supplied in the lectures.

V

Vehicle Ride Comfort & Acoustics II

2114857, SS 2018, 2 SWS, Open in study portal

Lecture (V)

Notes
The lecture starts in June 2016. Exact date of beginning: see homepage of institute.

Learning Content
1. Summary of the fundamentals of acoustics and vibrations

2. The relevance of road surface, wheel imperfections, springs, dampers, brakes, bearings and bushings, suspensions, engines and drive train for the acoustic and mechanical driving comfort:
- phenomena
- influencing parameters
- types of construction
- optimization of components and systems
- conflicts of goals
- methods of development

3. Noise emission of motor vehicles
- noise stress
- sound sources and influencing parameters
- legal restraints
- optimization of components and systems
- conflict of goals
- methods of development

Workload
regular attendance: 22,5 hours
self-study: 97,5 hours

Literature
The script will be supplied in the lectures.

T 4.51 Course: Virtual Engineering (Specific Topics) [T-MACH-105381]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103351 - SP A: Globales Produktionsmanagement

Type	Credits	Recurrence	Version
Prüfungsleistung mündlich	4	Each summer term	1

Events					
SS 2018	3122031	Virtual Engineering (Specific Topics)	2 SWS	Lecture (V)	Ovtcharova, Mitarbeiter
Exams					
SS 2018	76-T-MACH-105381	Virtual Engineering (Specific Topics)		Prüfung (PR)	Ovtcharova
WS 18/19	76-T-MACH-105381	Virtual Engineering (Specific Topics)		Prüfung (PR)	Ovtcharova

Competence Certificate
oral exam, 20 min.

Prerequisites
none

T 4.52 Course: Wave and Quantum Physics [T-PHYS-108322]

Responsible: Prof. Dr. Gernot Goll
Prof. Dr. Bernd Pilawa
Organisation: KIT Department of Physics
Part of: M-PHYS-104030 - Physik

Type	Credits	Recurrence	Version
Prüfungsleistung schriftlich	5	Each summer term	1

Events					
SS 2018	4040411	Wellen und Quantenphysik	2 SWS	Lecture (V)	Pilawa
SS 2018	4040412	Übungen zu Wellen und Quantenphysik	1 SWS	Practice (Ü)	Pilawa, N.
SS 2018	4040431	Wave and Quantum Physics	2 SWS	Lecture (V)	Goll
SS 2018	4040432	Exercises to Wave and Quantum Physics	1 SWS	Practice (Ü)	Goll, Hervé
Exams					
SS 2018	7800123	Wellen und Quantenphysik (Exam in German)		Prüfung (PR)	
SS 2018	7800124	Wave and Quantum Physics (Exam in English)		Prüfung (PR)	Goll
WS 18/19	7800123	Wellen- und Quantenphysik (Exam in German)		Prüfung (PR)	Pilawa
WS 18/19	7800124	Wave and Quantum Physics (Exam in English)		Prüfung (PR)	Goll

Competence Certificate
Written exam (usually about 180 min)

Prerequisites
none

T 4.53 Course: Working Methods in Mechanical Engineering [T-MACH-105296]

Responsible: Prof. Dr.-Ing. Barbara Deml
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103322 - Internationales Projektmanagement und Überfachliche Qualifikationen

Type	Credits	Recurrence	Version
Studienleistung	4	Each summer term	1

Events					
SS 2018	2110969	Working Methods in Mechanical Engineering	1 SWS	Lecture (V)	Deml
SS 2018	2174970	Working Methods in Mechanical Engineering	1 SWS	Lecture (V)	Deml
Exams					
SS 2018	76-T-MACH-105296	Working Techniques for Mechanical Engineering		Prüfung (PR)	Deml
WS 18/19	76-T-MACH-105296	Working Techniques for Mechanical Engineering		Prüfung (PR)	Deml

Competence Certificate
Tests within the workshop sessions concerning the topics of the online-lecture as well as active participation during all four workshop sessions.

Prerequisites
none

Below you will find excerpts from events regarding this course:

V Working Methods in Mechanical Engineering

2110969, SS 2018, 1 SWS, Open in study portal **Lecture (V)**

Learning Content

1. Time- and self-management
2. Literature research
3. Team work
4. Scientific writing
5. Scientific presentation

Workload
The amount of work accounts for 60 h (=2 ECTS).

Literature
The script as well as further literature resources are available on ILIAS.

Curriculum of the KIT Faculty for Mechanical Engineering, for the Bachelor Course Mechanical Engineering (International) according to SPO (Study and Examination Regulations) 2017

Release/edition dated July 27, 2016

Contents

0 List of abbreviations

Semester:	WS	Winter semester
	SS	Summer semester
Major subjects:	CA, CCA (K, KP)	Components of the core area, if necessary compulsory core area component
	CS (E)	Components of the major subject supplementary area
Credits:	CP (LP)	Credit points
	Ex (Pr)	Examination
	(oEx) mPr	Oral examination
	(wEx) sPr	Written examination
	(othEx) PraA	Other examinations
	Cer (Schein)	Certificate/unmarked module performance
	C (TL)	Component/Partial Performance
	W (Gew)	Weight of an examination performance within a module or in the final result mark
Other:	B.Sc.	academic title: Bachelor of Science
	SER (SPO)	Study and examination regulations
	CSW (SWS)	Classes per semester week
	o (w)	optional
	c (p)	compulsory

1 Curriculum, Modules and Examinations

The credit points (CP) are awarded in accordance with the „European Credit Transfer and Accumulation System“ (ECTS) and are based on the workload to be completed by students.

1.1 Examination Modalities

In each semester at least one examination date is offered for written examinations and at least two dates for oral examinations. Examination dates and deadlines for examination registration are determined by the examination board. Registration for the exams usually takes place at least one week before the exam. Enrolment and examination dates will be announced in due time, in the case of written examinations at least 6 weeks before the examination.

The examiner decides which aids may be used in an examination. A list of the approved aids will be published together with the examination date.

The following rules apply to performance reviews in the major subject modules:
The concrete form of the examinations is laid down in the Study and Examination Regulations § 6 paragraph 3.

It is possible to take the core area examinations separately. The core area examination mark is based as the average value of the components/partial performance weighted by the credit points. Changing the component/partial performance of the core area is no longer possible after the component/partial performance examinations have started. It is recommended to take the core area examinations in blocks.

In the case of major subject oral examinations, the duration of the examination should be 5 minutes per credit point. If an oral examination for a specific subject awards more than 12 CP, the duration of the examination should be 60 minutes.

1.2 Bachelor Course Modules

The module handbook indicates whether pre-requisites in the form of course achievements are required for module examinations or module component/partial performance examinations. The duration of written exams is specified in hours. Examination results are included in the module mark or the overall mark with the specified weight (W).

Fach/Subject	Modul/Module	LP/ Modul /CP module	Teilleistungen (TL)/ Components	LP/ TL/ C	Koordinator/Coordinator	Type of performance revue (C)		Pr (h)/ Ex (h)	Weightage
						Academic performance	Examination performance		
Ingenieurwissenschaftliche Grundlagen *Fundamentals in Engineering*	Höhere Mathematik *Advanced Mathematics*	21	Höhere Mathematik I Vorleistungen *Advanced Mathematics I prerequisites*		Aksenovich	Cert			
			Höhere Mathematik I *Advanced Mathematics I*	7			wEx	2	7
			Höhere Mathematik II Vorleistungen *Advanced Mathematics II prerequisites*			Cert			
			Höhere Mathematik II *Advanced Mathematics II*	7			wEx	2	7
			Höhere Mathematik III Vorleistungen *Advanced Mathematics III prerequisites*			Cert			
			Höhere Mathematik III *Advanced Mathematics III*	7			wEx	2	7
	Technische Mechanik *Engineering Mechanics*	23	Technische Mechanik I Vorleistungen *Engineering Mechanics I prerequisites*		Böhlke	Cert			
			Technische Mechanik I *Engineering Mechanics I*	7			wEx	1,5	7
			Technische Mechanik II Vorleistungen *Engineering Mechanics II prerequisites*			Cert			
			Technische Mechanik II *Engineering Mechanics II*	6			wEx	1,5	6
			Technische Mechanik III Vorleistungen *Engineering Mechanics III prerequisites*		Seemann	Cert			
			Technische Mechanik IV Vorleistungen *Engineering Mechanics IV prerequisites*			Cert			
			Technische Mechanik III / IV *Engineering Mechanics III / IV*	10			wEx	3	10
	Fertigungsprozesse Manufacturing Processes	4	Grundlagen der Fertigungstechnik *Basics in Manufacturing Technology*	4	Schulze		wEx	1	4
	Werkstoffkunde *Materials Science*	14	Werkstoffkunde-Praktikum *Materials Science Lab Course*	3	Heilmaier	Cert			3
			Werkstoffkunde I & II *Materials Science I & II*	11			oEx	ca. 0,5	11

Fach /Subject	Modul/Module	LP/ Modul/CP module	Teilleistungen (TL)/ Components	LP/ TL/ C	Koordinator/Coordinator	Type of performance revue (C)		Pr(h)/ Ex(h)	Weightage
						Academic performance	Examination performance		
Ingenieurwissenschaftliche Grundlagen *Fundamentals in Engineering*	Technische Thermodynamik *Technical Themodynamics*	15	Thermodynamik und Wärmeübertragung I Vorleistungen *Technical Thermodynamics and Heat Transfer I Prerequisites*		Maas	Cert			
			Thermodynamik und Wärmeübertragung II Vorleistungen *Technical Thermodynamics and Heat Transfer II prerequisites*			Cert			
			Thermodynamik und Wärmeübertragung I *Technical Thermodynamics and Heat Transfer I*	8			wEx	3	15
			Thermodynamik und Wärmeübertragung II *Technical Thermodynamics and Heat Transfer II*	7				3	
	Strömungslehre *Fluid Mechanics*	8	Strömungslehre I & II *Fluid Mechanics I & II*	8	Frohnapfel		wEx	3	8
	Physik *Physics*	5	Wellen- und Quantenphysik Wave and Quantum Physics	5	Goll		wEx	3	5
	Elektrotechnik *Electrical Engineering*	8	Elektrotechnik und Elektronik *Electrical Engineering and Electronics*	8	Becker		wEx	3	8
	Mess- und Regelungstechnik *Measurement and Control Systems*	7	Grundlagen der Mess- und Regelungstechnik *Basics in Measurement and Control Systems*	7	Stiller		wEx	2,5	7
	Informatik *Computer Science*	6	Informatik im Maschinenbau Vorleistungen *Computer Science in Mechanical Engineering prerequisites*		Ovtcharova	Cert			
			Informatik im Maschinenbau *Computer Science in Mechanical Engineering*	6			wEx	3	6
	Maschinenkonstruktionslehre *Mechanical Design*	20	Maschinenkonstruktionslehre I Vorleistungen *Mechanical Design I prerequisites*		Albers	Cert			
			Maschinenkonstruktionslehre II Vorleistungen *Mechanical Design II prerequisites*			Cert			
			Maschinenkonstruktionslehre I / II *Mechanical Design I / II*	7			wEx	1	7
			Maschinenkonstruktionslehre III Vorleistungen *Mechanical Design III prerequisites*			Cert			
			Maschinenkonstruktionslehre IV Vorleistungen *Mechanical Design IV prerequisites*			Cert			
			Maschinenkonstruktionslehre III / IV *Mechanical Design III / IV*	13			wEx	4	13

Fach/Subject	Modul/Module	LP/ Modul /CP module	Teilleistungen (TL)/ Components	LP/ TL/ C	Koordinator/Coordinator	Type of performance revue (C)		Pr (h)/ Ex(h)	Weightage
						Academic performance	Examination performance		
Ingenieurwissenschaftliche Grundlagen *Fundamentals in Engineering*	Maschinen und Prozesse *Machines and Processes*	7	Maschinen und Prozesse Vorleistungen *Machines and Processes prerequisites*		Kubach	Cert			
			Maschinen und Prozesse *Machines and Processes*	7			wEx	3	7
	Betriebliche Produktionswirtschaft *Production Operations Management*	5	Betriebliche Produktionswirtschaft *Production Operations Management*	3	Furmans		wEx	1,5	5
			Betriebliche Produktionswirtschaft, Projekt *Production Operations Management, Projects*	2			othEx		
Vertiefung im Maschinenbau (International) *Majors in Mechanical Engineering (International)*	Schwerpunkt *Major Field*	16	Kernbereich, wählbare TL s. Modulhandbuch *Core, selectable TL see Module Handbook*	8	SP-Verantwortlicher		oEx	ca. 0,7	8
			Ergänzungsbereich, wählbare TL s. Modulhandbuch *Additional area, selectable TL see Module Handbook*	8	SP-Verantwortlicher		oEx	ca. 0,3	8
Internationales Projektmanagement und Überfachliche Qualifikationen *International Project Management and Soft Skills*	Internationales Projektmanagement und Überfachliche Qualifikationen *International Project Management and Soft Skills*	6	Arbeitstechniken im Maschinenbau *Working Methods in Mechanical Engineering*	4	Deml	Cert			4
			Projekt und Operations Management *Project and Operations Management*	2	Nickel	Cert			2
Bachelorarbeit *Bachelor Thesis*	Modul Bachelorarbeit *Module Bachelor Thesis*	15	Bachelorarbeit *Bachelor Thesis*	12			othEx		30
			Präsentation *Presentation*	3					

Only one major subject can be chosen. The partial outputs in the core and supplementary areas for the individual major subjects can be found in the module handbook. For further information on the module focus, see Section 2 of this curriculum.

1.3 Curriculum

Components/partial performances 1. to 4. Semester	WS 1. Sem.			SS 2. Sem.			WS 3. Sem.			SS 4. Sem.		
	V	Ü	P	V	Ü	P	V	Ü	P	V	Ü	P
Höhere Mathematik I-III *Advanced Mathematics I-III*	4	2		4	2		4	2				
Grundlagen der Fertigungstechnik *Basics in Manufacturing Technology*	2											
Wellen- und Quantenphysik Wave and Quantum Physics										2	1	
Technische Mechanik I-IV *Engineering Mechanics I-IV*	3	2		3	2		2	2		2	2	
Werkstoffkunde I, II *Materials Science I, II*	4	1		3	1							
Werkstoffkunde-Praktikum[1] *Materials Science Lab Course*						2						
Technische Thermodynamik und Wärmeübertragung I, II / *Technical Thermodynamics and Heat Transfer I, II*							4	2		3	2	
Maschinenkonstruktionslehre I-IV *Mechanical Design I-IV*	2	1		2	2		2	2	1	2	1	1
Informatik im Maschinenbau *Computer Science in Mechanical*				2	2	2						
Elektrotechnik und Elektronik *Electrical Engineering and Electronics*							4	2				
Strömungslehre I *Fluid Mechanics I*										2	1	
Maschinen und Prozesse Machines and Processes										(2)		(2)
Arbeitstechniken im Maschinenbau *Working Methods in Mechanical Engineering*										2		2

Components/partial performances 5. bis 6. Semester	WS 5. Sem.			SS 6. Sem.		
	V	Ü	P	V	Ü	P
Grundlagen der Mess- und Regelungstechnik *Basics in Measurement and Control Systems*	3	1				
Strömungslehre II *Fluid Mechanics II*	2	1				
Maschinen und Prozesse *Machines and Processes*				2		2
Betriebliche Produktionswirtschaft + BPW-Projekte *Production Operations Management + POM-Projects*	3	1				
Internationales Projekt und Operations Management *International Project and Operations Management*	2					
Schwerpunkt (8/9 SWS, variabel) / Major Field/Specialization	4 (5)			4		

[1] The Materials Science Lab Course takes place during one week in the lecture break between SS and WS.

1.4 Bachelor Thesis

The performance and marking of the bachelor thesis is regulated in § 14 of the study and examination regulations for the bachelor's degree course Mechanical Engineering (International). Further information about module description can be found in the module handbook.

2 Major Subjects/Specialization Subjects

Major subjects approved by the faculty council are listed in the module handbook.

2.1 Major/Specialization Subject Options

For the major subject, components amounting to 16 CP are chosen, of which at least 8 CP are acquired in the core area (CA). Compulsory core area component (CCA) means that the component is mandatory in the core module area, if it has not already been taken. The remaining 8 credit points can come from the supplementary area. In the context of internships, a maximum of 4 CPs may be earned as study achievements if this is an option of a major subject.

Completion of the major subject module with more than 16 LP is only permitted if the addition of the credit points of the selected sub-module examinations within the major subject module does not add up to 16 CP. Participation in further sub-module examinations is not permitted if 16 CP have already been achieved or exceeded.

The main subject mark is based on the component module exams completed with a mark. All component module marks are weighted according to their credit points. When forming the overall mark, the major subject is evaluated with 16 CP. The description of major subjects with regard to content and qualification goals as well as the components contained therein can be found in the current module handbook of the Bachelor's program.

3 Revision history (from July 20, 2016)

May 22, 2017	Division of the subject International project management and interdisciplinary qualifications into two modules (1.2), editorial changes
November 13, 2017	Changes to the list of abbreviations, removal of the module "Fundamentals of Production Engineering" (1.2), adjustment of the type of success control and the examination time for the supplementary section (1.2), adjustment of the weighting and type of success control in the module "Bachelorarbeit" (1.2), editorial changes
July 27, 2018	Correction of SWS for Specialization (1.3) from 16 SWS to 8 SWS, additional editorial changes

Studienplan der KIT-Fakultät für Maschinenbau für den Bachelorstudiengang Mechanical Engineering (International) gemäß SPO 2017

Fassung vom 27.07.2016

Inhaltsverzeichnis

0 Abkürzungsverzeichnis

Semester:	WS	Wintersemester
	SS	Sommersemester
Schwerpunkte:	K, KP	Teilleistung im Kernbereich, ggf. Pflicht des Schwerpunkts
	E	Teilleistung im Ergänzungsbereich des Schwerpunkts
Leistung:	LP	Leistungspunkte
	Pr	Prüfung
	mPr	mündliche Prüfung
	sPr	schriftliche Prüfung
	PraA	Prüfungsleistung anderer Art
	Schein	unbenotete Modulleistung
	TL	Teilleistung
	Gew	Gewichtung einer Prüfungsleistung im Modul bzw. in der Gesamtnote
Sonstiges:	B.Sc.	akademischer Grad: Bachelor of Science
	SPO	Studien- und Prüfungsordnung
	SWS	Semesterwochenstunden
	w	wählbar
	p	verpflichtend

1 Studienplan, Module und Prüfungen

Die Angabe der Leistungspunkte (LP) erfolgt gemäß dem „European Credit Transfer and Accumulation System“ (ECTS) und basiert auf dem von den Studierenden zu absolvierenden Arbeitspensum.

1.1 Prüfungsmodalitäten

In jedem Semester werden für schriftliche Prüfungen mindestens ein Prüfungstermin und für mündliche Prüfungen mindestens zwei Termine angeboten. Prüfungstermine sowie Termine, zu denen die Anmeldung zu den Prüfungen spätestens erfolgen muss, werden vom Prüfungsausschuss festgelegt. Die Anmeldung für die Prüfungen erfolgt in der Regel mindestens eine Woche vor der Prüfung. Anmelde- und Prüfungstermine werden rechtzeitig durch Anschlag bekanntgegeben, bei schriftlichen Prüfungen mindestens 6 Wochen vor der Prüfung.

Über Hilfsmittel, die bei einer Prüfung benutzt werden dürfen, entscheidet der Prüfer. Eine Liste der zugelassenen Hilfsmittel wird gleichzeitig mit der Ankündigung des Prüfungstermins bekanntgegeben.

Für die Erfolgskontrollen in den Schwerpunkt-Modulen gelten folgende Regeln:

Die konkrete Durchführungsform der Prüfungen ist in der Studien- und Prüfungsordnung § 6 Absatz 3 festgelegt.
Es ist möglich, die Kernbereichsprüfung getrennt abzulegen. Die Note der Kernbereichsprüfung ergibt sich aus dem mit den Leistungspunkten gewichteten Mittelwert der Teilprüfungen. Der Wechsel einer Teilleistung des Kernbereichs ist nicht mehr möglich, sobald eine Teilprüfung angetreten wurde. Es wird empfohlen, die Kernbereichsprüfung im Block abzulegen.
Bei mündlichen Prüfungen im Schwerpunkt soll die Prüfungsdauer 5 Minuten pro Leistungspunkt betragen. Erstreckt sich eine mündliche Prüfung über mehr als 12 LP soll die Prüfungsdauer 60 Minuten betragen.

1.2 Module des Bachelorstudiums

Dem Modulhandbuch ist zu entnehmen, ob für Modulprüfungen bzw. Modulteilprüfungen Zulassungsvoraussetzungen in Form von Studienleistungen bestehen. Schriftliche Prüfungen werden als Klausuren mit der angegebenen Prüfungsdauer in Stunden abgenommen. Prüfungsleistungen gehen mit dem angegebenen Gewicht (Gew) in die Modulnote bzw. die Gesamtnote ein.

Fach	Modul	LP/ Modul	Teilleistungen (TL)	LP/ TL	Koordinator	Art der Erfolgskontrolle (TL)		Pr (h)	Gew
						Studienleistungen	Prüfungsleistungen		
Ingenieurwissenschaftliche Grundlagen *Fundamentals in Engineering*	Höhere Mathematik *Advanced Mathematics*	21	Höhere Mathematik I Vorleistungen *Advanced Mathematics I prerequisites*		Aksenovich	Schein			
			Höhere Mathematik I *Advanced Mathematics I*	7			sPr	2	7
			Höhere Mathematik II Vorleistungen *Advanced Mathematics II prerequisites*			Schein			
			Höhere Mathematik II *Advanced Mathematics II*	7			sPr	2	7
			Höhere Mathematik III Vorleistungen *Advanced Mathematics III prerequisites*			Schein			
			Höhere Mathematik III *Advanced Mathematics III*	7			sPr	2	7
	Technische Mechanik *Engineering Mechanics*	23	Technische Mechanik I Vorleistungen *Engineering Mechanics I prerequisites*		Böhlke	Schein			
			Technische Mechanik I *Engineering Mechanics I*	7			sPr	1,5	7
			Technische Mechanik II Vorleistungen *Engineering Mechanics II prerequisites*			Schein			
			Technische Mechanik II *Engineering Mechanics II*	6			sPr	1,5	6
			Technische Mechanik III Vorleistungen *Engineering Mechanics III prerequisites*		Seemann	Schein			
			Technische Mechanik IV Vorleistungen *Engineering Mechanics IV prerequisites*			Schein			
			Technische Mechanik III / IV *Engineering Mechanics III / IV*	10			sPr	3	10
	Fertigungsprozesse Manufacturing Processes	4	Grundlagen der Fertigungstechnik *Basics in Manufacturing Technology*	4	Schulze		sPr	1	4
	Werkstoffkunde *Materials Science*	14	Werkstoffkunde-Praktikum *Materials Science Lab Course*	3	Heilmaier	Schein			3
			Werkstoffkunde I & II *Materials Science I & II*	11			mPr	ca. 0,5	11

Fach	Modul	LP/ Modul	Teilleistungen (TL)	LP/ TL	Koordinator	Art der Erfolgskontrolle (TL)		Pr (h)	Gew
						Studienleistungen	Prüfungsleistungen		
Ingenieurwissenschaftliche Grundlagen *Fundamentals in Engineering*	Technische Thermodynamik *Technical Themodynamics*	15	Thermodynamik und Wärmeübertragung I Vorleistungen *Technical Thermodynamics and Heat Transfer I Prerequisites*		Maas	Schein			
			Thermodynamik und Wärmeübertragung II Vorleistungen *Technical Thermodynamics and Heat Transfer II prerequisites*			Schein			
			Thermodynamik und Wärmeübertragung I *Technical Thermodynamics and Heat Transfer I*	8			sPr	3	15
			Thermodynamik und Wärmeübertragung II *Technical Thermodynamics and Heat Transfer II*	7			sPr	3	
	Strömungslehre *Fluid Mechanics*	8	Strömungslehre I & II *Fluid Mechanics I & II*	8	Frohnapfel		sPr	3	8
	Physik *Physics*	5	Wellen- und Quantenphysik Wave and Quantum Physics	5	Goll		sPr	3	5
	Elektrotechnik *Electrical Engineering*	8	Elektrotechnik und Elektronik *Electrical Engineering and Electronics*	8	Becker		sPr	3	8
	Mess- und Regelungstechnik *Measurement and Control Systems*	7	Grundlagen der Mess- und Regelungstechnik *Basics in Measurement and Control Systems*	7	Stiller		sPr	2,5	7
	Informatik *Computer Science*	6	Informatik im Maschinenbau Vorleistungen *Computer Science in Mechanical Engineering prerequisites*		Ovtcharova	Schein			
			Informatik im Maschinenbau *Computer Science in Mechanical Engineering*	6			sPr	3	6
	Maschinenkonstruktionslehre *Mechanical Design*	20	Maschinenkonstruktionslehre I Vorleistungen *Mechanical Design I prerequisites*		Albers	Schein			
			Maschinenkonstruktionslehre II Vorleistungen *Mechanical Design II prerequisites*			Schein			
			Maschinenkonstruktionslehre I / II *Mechanical Design I / II*	7			sPr	1	7
			Maschinenkonstruktionslehre III Vorleistungen *Mechanical Design III prerequisites*			Schein			
			Maschinenkonstruktionslehre IV Vorleistungen *Mechanical Design IV prerequisites*			Schein			
			Maschinenkonstruktionslehre III / IV *Mechanical Design III / IV*	13			sPr	4	13

Fach	Modul	LP/ Modul	Teilleistungen (TL)	LP/ TL	Koordinator	Art der Erfolgskontrolle (TL)		Pr (h)	Gew
						Studienleistungen	Prüfungsleistungen		
Ingenieurwissenschaftliche Grundlagen *Fundamentals in Engineering*	Maschinen und Prozesse *Machines and Processes*	7	Maschinen und Prozesse Vorleistungen *Machines and Processes prerequisites*		Kubach	Schein			
			Maschinen und Prozesse *Machines and Processes*	7			sPr	3	7
	Betriebliche Produktionswirtschaft *Production Operations Management*	5	Betriebliche Produktionswirtschaft *Production Operations Management*	3	Furmans		sPr	1,5	5
			Betriebliche Produktionswirtschaft, Projekt *Production Operations Management, Projects*	2			PraA		
Vertiefung im Maschinenbau (International) *Majors in Mechanical Engineering (International)*	Schwerpunkt *Major Field*	16	Kernbereich, wählbare TL s. Modulhandbuch *Core, selectable TL see Module Handbook*	8	SP-Verantwortlicher		mPr	ca. 0,7	8
			Ergänzungsbereich, wählbare TL s. Modulhandbuch *Additional area, selectable TL see Module Handbook*	8	SP-Verantwortlicher		mPr	ca. 0,3	8
Internationales Projektmanagement und Überfachliche Qualifikationen *International Project Management and Soft Skills*	Internationales Projektmanagement und Überfachliche Qualifikationen *International Project Management and Soft Skills*	6	Arbeitstechniken im Maschinenbau *Working Methods in Mechanical Engineering*	4	Deml	Schein			4
			Projekt und Operations Management *Project and Operations Management*	2	Nickel	Schein			2
Bachelorarbeit *Bachelor Thesis*	Modul Bachelorarbeit *Module Bachelor Thesis*	15	Bachelorarbeit *Bachelor Thesis*	12			PraA		30
			Präsentation *Presentation*	3					

Es ist nur ein Schwerpunkt zu wählen. Die in den einzelnen Schwerpunkten vorgesehenen Teilleistungen im Kern- und Ergänzungsbereich sind dem Modulhandbuch zu entnehmen. Weitere Erläuterungen zum Modul Schwerpunkt siehe Abschnitt 2 dieses Studienplans.

1.3 Studienplan

Teilleistungen 1. bis 4. Semester	WS 1. Sem.			SS 2. Sem.			WS 3. Sem.			SS 4. Sem.		
	V	Ü	P	V	Ü	P	V	Ü	P	V	Ü	P
Höhere Mathematik I-III *Advanced Mathematics I-III*	4	2		4	2		4	2				
Grundlagen der Fertigungstechnik *Basics in Manufacturing Technology*	2											
Wellen- und Quantenphysik Wave and Quantum Physics										2	1	
Technische Mechanik I-IV *Engineering Mechanics I-IV*	3	2		3	2		2	2		2	2	
Werkstoffkunde I, II *Materials Science I, II*	4	1		3	1							
Werkstoffkunde-Praktikum[1] *Materials Science Lab Course*						2						
Technische Thermodynamik und Wärmeübertragung I, II / *Technical Thermodynamics and Heat Transfer I, II*							4	2		3	2	
Maschinenkonstruktionslehre I-IV *Mechanical Design I-IV*	2	1		2	2		2	2	1	2	1	1
Informatik im Maschinenbau *Computer Science in Mechanical*				2	2	2						
Elektrotechnik und Elektronik *Electrical Engineering and Electronics*							4	2				
Strömungslehre I *Fluid Mechanics I*										2	1	
Maschinen und Prozesse Machines and Processes										(2)		(2)
Arbeitstechniken im Maschinenbau *Working Methods in Mechanical Engineering*										2		2

Teilleistungen 5. bis 6. Semester	WS 5. Sem.			SS 6. Sem.		
	V	Ü	P	V	Ü	P
Grundlagen der Mess- und Regelungstechnik *Basics in Measurement and Control Systems*	3	1				
Strömungslehre II *Fluid Mechanics II*	2	1				
Maschinen und Prozesse *Machines and Processes*				2		2
Betriebliche Produktionswirtschaft + BPW-Projekte *Production Operations Management + POM-Projects*	3	1				
Projekt und Operations Management *Project and Operations Management*	2					
Schwerpunkt (8/9 SWS, variabel) / Major Field	4 (5)			4		

[1] Das Werkstoffkunde-Praktikum findet in der vorlesungsfreien Zeit zwischen SS und WS statt und beansprucht eine Woche.

1.4 Bachelorarbeit

Die Durchführung und Benotung der Bachelorarbeit ist in § 14 der Studien- und Prüfungsordnung für den Bachelorstudiengang Mechanical Engineering (International) geregelt. Weitere Informationen können der Modulbeschreibung im Modulhandbuch entnommen werden.

2 Schwerpunkte

Die vom Fakultätsrat genehmigten Schwerpunkte sind im Modulhandbuch angegeben.

2.1 Wahlmöglichkeiten für den Schwerpunkt

Für den Schwerpunkt werden Teilleistungen im Umfang von 16 LP gewählt, davon werden mindestens 8 LP im Kernbereich (K) erworben. „KP“ bedeutet, dass die Teilleistung im Kernmodulbereich Pflicht ist, sofern sie nicht bereits belegt wurde. Die übrigen 8 Leistungspunkte können aus dem Ergänzungsbereich kommen. Dabei dürfen im Rahmen von Praktika höchstens 4 LP als Studienleistungen erbracht werden, falls dies in einem Schwerpunkt als Möglichkeit vorgesehen ist.

Ein Absolvieren des Schwerpunktmoduls mit mehr als 16 LP ist nur im Fall, dass die Addition der Leistungspunkte der gewählten Teilmodulprüfungen innerhalb des Schwerpunktmoduls nicht auf 16 LP aufgeht, erlaubt. Nicht zulässig ist die Teilnahme an weiteren Teilmodulprüfungen, wenn bereits 16 LP erreicht oder überschritten wurden.

Das Bilden der Schwerpunktnote erfolgt anhand der mit einer Benotung abgeschlossenen Teilmodulprüfungen. Dabei werden alle Teilmodulnoten gemäß ihrer Leistungspunkte gewichtet. Beim Bilden der Gesamtnote wird der Schwerpunkt mit 16 LP gewertet. Die Beschreibung der Schwerpunkte hinsichtlich der Inhalte und Qualifikationsziele sowie der darin enthaltenen Teilleistungen ist im aktuellen Modulhandbuch des Bachelorstudiengangs nachzulesen.

3 Änderungshistorie (ab 20.07.2016)

22.05.2017	Teilung des Faches Internationales Projektmanagement und Überfachliche Qualifikationen in zwei Module (1.2), redaktionelle Änderungen
13.11.2017	Änderungen im Abkürzungsverzeichnis, Entfernung des doppelt aufgeführten Moduls „Grundlagen der Fertigungstechnik“ (1.2), Anpassung der Art der Erfolgskontrolle und der Prüfungszeit im Ergänzungsbereich (1.2), Anpassung der Gewichtung und Art der Erfolgskontrolle im Modul „Bachelorarbeit“ (1.2), redaktionelle Änderungen
27.07.2018	SWS für Schwerpunkt (1.3) von 16 SWS auf 8 SWS korrigiert, weitere redaktionelle Änderungen