DEGGENDORF INSTITUTE OF TECHNOLOGY

Module Handbook

Programme

Mechanical Engineering
(Bachelor)

Faculty

Faculty of Mechanical Engineering
and Mechatronics

Table of Contents

Module	D-01
Module Name	Principles of Mathematics
Module Block (LV)	D1101 Analytical Principles for the Study of Engineering
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	5
Evaluation Method	Final Examination: 90 minute written exam or 30 minute oral exam
Professor	Prof. Dr. rer. nat. Stefan Schulte
Prerequisites	---
Educational Objectives	○ acquisition of the principles of mathematics (i.e. terms and model solutions) necessary for the semester specific lectures. ○ to serve as an introduction to the independent acquisition of engineering mathematical solutions.

Course	D1101
Name	Analytical Principles for the Study of Engineering
Instructor	Prof. Dr. rer. nat. Stefan Schulte
Module	D-01 Principles of Mathematics
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	1
Semester hours	4
Credit Points (ECTS)	5
Time Distribution	150h: 60h Presentation and lecture, 60h Independent study, 30h Test preparation
Exam Accreditation	See Module
Final Grade Accumulation	See Module
Language	German
Lesson Format	Seminar instruction/practice, independent study
Media	Script and blackboard
Literature	Introduced in the lecture
Responsible Course Supervisor	Prof. Dr. rer. nat. Stefan Schulte
Course Contents	○ principles (i.e. real and complex numbers, concept mapping, …) ○ linear systems of equations, matrices, determinants ○ sequence and series (real numbers) ○ functions with a real variable ○ (plane) curves and their mathematical description ○ multivariable functions ○ comments on functions in multi-dimensional space

Module	D-02
Module Name	Engineering Mathematics
Module Block (LV)	D2101 Engineering Mathematics 1 D3101 Engineering Mathematics 2
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	10
Evaluation Method	Final Examination: 90 minute written exam or 30 minute oral exam
Professor	Prof. Dr. rer. nat. Stefan Schulte
Prerequisites	---
Educational Objectives	○ To gain an understanding of the mathematical approach to solving technical engineering questions and the application and solution of common differential equations (particularly the handling of differential equations in a technical context and the use of analytical models to interpret the results observed). ○ To gain team working skills in a subject oriented dimension (i.e. the creation of required dialogs with peers about natural sciences, engineering, and economics) ○ The student learns the basis and meanings of the fundamental mathematical models that form integral parts of the simulation programs that are becoming more and more important in the field of engineering. Themes from the fields of measurement and process technology, heat transfer, and fluid mechanics are emphasized.

Course	D2101
Name	Engineering Mathematics 1
Instructor	Prof. Dr. rer. nat. Stefan Schulte
Module	D-01 Advanced Mathematics
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	2
Semester hours	4
Credit Points (ECTS)	5
Time Distribution	150h: 60h Presentation and lecture, 60h Independent study, 30h Test preparation
Exam Accreditation	See Module
Final Grade Accumulation	See Module
Language	German
Lesson Format	Seminar instruction/practice, independent study
Media	Script and blackboard
Literature	Introduced in the lecture
Responsible Course Supervisor	Prof. Dr. rer. nat. Stefan Schulte
Course Contents	○ differential calculus (for functions with one variable) ○ integral calculus ○ power series ○ principles of two dimensional differential geometry ○ calculation of areas with arbitrary shape ○ multivariable differential functions ○ optimization, least squares method ○ multiple integrals ○ Fourier series

Course	D3101
Name	Engineering Mathematics 2
Instructor	Prof. Dr. rer. nat. Stefan Schulte
Module	D-02 Advanced Mathematics
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	3
Semester hours	4
Credit Points (ECTS)	5
Time Distribution	See Module
Exam Accreditation	See Module
Final Grade Accumulation	German
Language	Seminar instruction/practice, independent study
Lesson Format	Script and blackboard
Media	Introduced in the lecture
Literature	See Module
Responsible Course Supervisor	Prof. Dr. rer. nat. Stefan Schulte
Course Contents	○ ordinary differential equations ○ examples of methods to numerically solve ordinary differential equations ○ applications in science and technology

Module	D-03
Module Name	Principles of Construction
Module Block (LV)	D1106 Descriptive Geometry D1107 Construction 1 D1108 Project Management
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	8
Evaluation Method	The final grade of the module is based on the grades of each individual module; weighted according to the corresponding ECTS points.
Professor	Prof. Dr.-Ing Josef Stettmer
Prerequisites	---
Educational Objectives	○ to gain knowledge of the geometric spatial principles ○ the ability to draft a machine part and explain the standards in a technical drawing. ○ the ability to point out the functional and technical aspects of machine parts

Course	D1106
Name	Descriptive Geometry
Instructor	Dipl.-Ing. Dietmar Rieger
Module	D-03 Principles of Construction
Curriculum	Mechanical Engineering(Bachelor)
Major	General
Semester	1
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 20h Independent study, 10h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice
Media	Predominantly presentations of solved construction operations with PowerPoint and projector, blackboard, overhead projector, and demonstrations of constructions with many models
Literature	Detailed Scripts Vogelmann J. (2002), *Descriptive Geometry*, 5. Aufl., Vogel, Würzburg E-learning project on Moodle
Responsible Course Supervisor	Prof. Dr.-Ing. Josef Stettmer
Course Contents	○ introduction / definition of terms ○ project types, basic construction ○ points, lines, and planes in space ○ tracing points, lines, and axes of planes ○ the slope of lines and planes in space ○ cross sectional planes of a spatial body ○ orthographic projections – axonometric projections – other forms of graphical projection methods ○ axis affinity – cone and cone cross sections ○ ellipse construction with tangents, contour-contact points, tangential and normal planes ○ circles in space, point rotation on a circle or ellipse ○ shadow boundary areas on a tilted cone ○ developed views with intersecting curves and tangents ○ intersection methods of a base body ○ tangents to spatial curves, surface curvature

Course	D1107
Name	Construction 1
Instructor	Prof. Dr.-Ing. Josef Stettmer
Module	D-03 Principles of Construction
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	1
Semester hours	4
Credit Points (ECTS)	4
Time Distribution	120h: 60h Presentation and lecture, 40h Independent study, 20h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice, independent study
Media	Blackboard instruction and overhead projector
Literature	Conrad, K. J. (1998), *Grundlagen der Konstruktionslehre*, Hanser, München Hoischen, H. (1998), *Technisches Zeichnen*, Cornelsen, Berlin Klein, P. (2001), *Introduction in die DIN-Normen*, Beuth Berlin, Wien, Zürich
Responsible Course Supervisor	Prof. Dr.-Ing. Josef Stettmer
Course Contents	○ basic geometric construction ○ orthogonal projection (3D projection) ○ axonometric projection / freehand drawing ○ standard dimensions ○ preparation of production data ○ screw connection ○ measurement tolerances and clearances ○ geometric tolerances ○ surface finish ○ preferred numbers and ranks ○ systematic arrangement of drawings

Course	D1108
Name	Project Management / Work Techniques
Instructor	Dipl.-Ing. Raimund Seip
Module	D-03 Principles of Construction
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	1
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Attendance, 15h Independent Study, 15h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice
Media	Projector and blackboard instruction in combination with the class script
Literature	Kerzner H. (2008), *Projektmanagement - Ein system-orientierter Ansatz zur Planung und Steuerung*, 2.dt. Aufl., mitp, Landsberg Kerzner H. (2004), *Projektmanagement – Fallstudien*, mitp, Landsberg Madauss B. (1994), *Handbuch Projektmanagement*, 5. Aufl., Schäffer-Poeschel, Stuttgart Kessler H., Winkelhofer G. (2002), *Projektmanagement – Leitfaden zur Steuerung und Führung von Projekten*, 3. Aufl., Springer, Berlin Küpper H.-U. (1999), *Projektmanagement als kundenorientierte Führungskonzeption*, Schäffer-Poeschel, Stuttgart
Responsible Course Supervisor	Prof. Dr.-Ing. Josef Stettmer
Course Contents	○ independently structure a project and an accompanying time plan with realistic milestones as well as conduct progress control. ○ establish realistic project goals with the adoption of resource, cost, and use analysis ○ planning steps in the project ○ control of project scheduling ○ controlling the achievement of objectives, backup solutions

Module	D-04
Module Name	Applied Physics
Module Block (LV)	D1104 Applied Physics D2104 Practical Course in Physics
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	7
Evaluation Method	The final grade of the module is based on the grades of each individual module weighted according to the corresponding ECTS points.
Professor	Prof. Dr. rer. nat. Robert Geigenfeind
Prerequisites	No formal prerequisites but a basic knowledge of differential and integral calculus is recommended
Educational Objectives	○ gaining an insight into physics as the basis for engineering work ○ the ability to solve physical problems with formulas, equipment, and measurement results ○ the ability to work with formulas concerning SI (the international system of units): physical quantities and units ○ mechanics (kinematics and dynamics of mass points) ○ mechanics of fixed and deformable bodies ○ thermodynamics ○ harmonics and waves ○ optics ○ a deepening of one's understanding through work experience (i.e. through the personal application of the shared knowledge in the lecture the student should gain a better understanding of the theory)

Course	D1104
Name	Applied Physics
Instructor	Prof. Dr. rer. nat. Robert Geigenfeind
Module	D-04 Applied Physics
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	1
Semester hours	4
Credit Points (ECTS)	5
Time Distribution	150h: 60h Presentation and lecture, 70h Independent study, 20h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice
Media	Blackboard, overhead projector / projector
Literature	Leute U. (2004), *Physik und ihre Anwendungen in Technik und Umwelt*, 2. Aufl., Hanser, München Halliday D., Resnick R., Walker J. (2007), *Physik. Bachelor-Edition*, Wiley-VCH, Weinheim
Responsible Course Supervisor	Prof. Dr. rer. nat. Robert Geigenfeind
Course Contents	o mechanics (kinematics and dynamics of mass points) o mechanics of fixed and deformable bodies o thermodynamics o electrical phenomenon o harmonics and waves o acoustics o optics

Course	D2104
Name	Practical Course in Physics
Instructor	Prof. Dr. rer. nat. Robert Geigenfeind
Module	D-04 Applied Physics
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	2
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 20h Independent study, 10h Test preparation
Exam Accreditation	Performance evaluation: successful participation in practical course; 90 minute written exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Practical training
Media	Individual experiments
Literature	Walcher W. (2004), *Practical training der Physik*, 8.Aufl., Teubner, Stuttgart
Responsible Course Supervisor	Prof. Dr. rer. nat. Robert Geigenfeind
Course Contents	○ Experiments in mechanics - ballistics pendulum - moment of inertia ○ Experiments in optics - optical devices - diffraction - polarization ○ Experiments in thermodynamics - gas laws - heat conduction - heat transfer ○ Experiments in surface tension

Module	D-05
Module Name	Principles of Mechanics
Module Block (LV)	D1102 Technical Mechanics 1 (Statics) D2102 Technical Mechanics 2 (Material Mechanics)
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	10
Evaluation Method	Cumulative module test: 90 minute written exam or 30 minute oral exam
Professor	Prof. Dr.-Ing. Franz Bergbauer
Prerequisites	D1101 Analytical Principles for the Study of Engineering
Educational Objectives	The students should be able to: o interpret substituted mechanical systems, apply the method of sections, set up equilibrium conditions, and solve the resulting system of equations; o compute the inner stresses and strains of a mechanical system; o ascertain the center of gravity and account for the effects of friction; o ascertain stresses and deformations in substituted mechanical systems for the three main types of loads applied (tension/compression, bending, and torsion); o answer simple questions about multidimensional stress and deformation conditions; o accordingly apply the working concepts of statics and elaststatics to simple questions; and o calculate elementary flexural buckling (Eulers)

Course	D1102
Name	D1102 Technical Mechanics 1 (Statics)
Instructor	Prof. Dr.-Ing. Franz Bergbauer
Module	D-05 Principles of Mechanics
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	1
Semester hours	4
Credit Points (ECTS)	5
Time Distribution	150h: 60h Lecture Time, 60h Exercises (from which 30h of supervised exercises will be offered), 30h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice
Media	Blackboard, exercises and supplementary lecture material provided on PC network
Literature	Gross D., Hauger W., Schröder, Wall (2009), *Technische Mechanik 1*, 10. Aufl., Springer, Berlin
Responsible Course Supervisor	Prof. Dr.-Ing. Franz Bergbauer
Course Contents	o fundamental terms o forces with combined working points o forces and equilibrium with combined rigid bodies o focal points o positioning response o framework o internal force variables of beams, frames, and arcs o work o adhesive force and friction

Course	D2102
Name	D2102 Technical Mechanics 2 (Material Mechanics)
Instructor	Prof. Dr.-Ing. Franz Bergbauer
Module	D-05 Principles of Mechanics
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	2
Semester hours	4
Credit Points (ECTS)	5
Time Distribution	150h: 60h Lecture time, 60h Exercises (from which 30h of supervised exercises will be offered), 30h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice
Media	Blackboard, exercises and supplementary lecture material provided on PC network
Literature	Gross D., Hauger W., Schröder, Wall (2009), *Technische Mechanik 2*, 10. Aufl., Springer, Berlin
Responsible Course Supervisor	Prof. Dr.-Ing. Franz Bergbauer
Course Contents	○ tension and compression in bar stock ○ stress conditions, state of strain, and stress-strain relationship ○ beam bending ○ torsion ○ working concepts in elastostatics ○ buckling

Module	D-06
Module Name	D-06 Principles of the Engineering Sciences
Module Block (LV)	D1103 Computer Science for Engineering Applications 1 D2103 Computer Science for Engineering Applications 2
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	10
Evaluation Method	Cumulative Module Test: 90 minute written exam or 30 minute oral exam
Professor	Prof. Dr.-Ing. Stefan Götze
Prerequisites	---
Educational Objectives	○ Students should gain a basic understanding of the functioning of data processing equipment in numbering systems, coding, Boolean Algebra, algorithms, and programming. ○ With the introduction of hardware and peripherals, students should be able to evaluate technical data with certainty. Topics such as the organization of software projects or the introduction of internet/web technologies should enable the students to form an opinion in discussions on operational information management as well as enable them to develop their own ideas. ○ The introduction to macro and database programming should lower the threshold to develop independent, individual software tools with existing applications in order to work more efficiently in day-to-day professional life.

Course	D1103
Name	Computer Science for Engineering Applications 1
Instructor	Prof. Dr.-Ing. Stefan Götze
Module	D-06 Principles of the Engineering Sciences
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	1
Semester hours	4
Credit Points (ECTS)	5
Time Distribution	150h: 60h Presentation and lecture, 60h Follow-up (partly as homework) 30h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice / practical training
Media	Blackboard, exercises, script, script of slides, PC/Laptop, projector, practical training on PC
Literature	Claus V., Schwill A. (2006), *Duden Informatik A-Z – Fachlexikon für Studium und Praxis*, 4. Aufl., Bibliographisches Institut, Mannheim
Responsible Course Supervisor	Prof. Dr.-Ing. Stefan Götze
Course Contents	○ history of informatics ○ number systems: coding and code protection, binary system, octal and hexadecimal systems, conversion between numbers systems, basic arithmetic operations in binary system ○ Boolean algebra: operators and laws of Boolean algebra, logic circuits, half-adder ○ algorithms and programs: characteristics of algorithms, forms of notation, programming languages, software engineering, V-Model ○ technical informatics: von-Neumann architecture, microprocessors, bus system, assembler, memory, mass storage, monitors and printers, color systems, file formats, interfaces, operating systems ○ networks: topologies, protocols, Internet / Internet services ○ web: Data encryption, virus protection, data protection, software rights ○ applications: PC practical training (introduction to MATLAB)

Course	D2103
Name	Computer Science for Engineering Applications 2
Instructor	Prof. Dr.-Ing. Stefan Götze
Module	D-06 Principles of the Engineering Sciences
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	2
Semester hours	4
Credit Points (ECTS)	5
Time Distribution	150h: 60h Presentation and lecture, 60h Follow-up (partly as homework) 30h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice / practical training
Media	Blackboard, practical exercises, script, script of slides, PC/laptop, projector, practical training on the PC
Literature	Rechenberg P. (2000), *Was ist Informatik?*, 3. Aufl., Hanser, München Langtangen H.P. (2009), *Python Scripting for Computational Science,* 3. Aufl., Springer, Berlin Online-Tutorials
Responsible Course Supervisor	Prof. Dr.-Ing. Stefan Götze
Course Contents	○ software engineering: procedure models, organization of software projects, programming guidelines ○ theoretical informatics: computer models with minimal effort (with regard to hardware and software), computability, ○ development environments: Visual Basic 2005, event controlling, windows, control elements, properties of control elements, Python (command line oriented) ○ data types, data structures: whole numbers, Boolean variables, figures/strings, vectors and fields ○ arithmetic operators, comparisons, logical operators, string handling and string functions ○ control structures: loops and branches, procedures, functions, recursions ○ comparison of the concepts of VB and Python ○ VB graphic programming ○ VBA: EXCEL macro programming

Module	D-07
Module Name	Machine Elements
Module Block (LV)	D2106 Machine Elements 1 D3106 Machine Elements 2
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	10
Evaluation Method	The final grade of the module is based on the grades of each individual module weighted according to the corresponding ECTS points.
Professor	Prof. Dr.-Ing. Josef Stettmer
Prerequisites	---
Educational Objectives	○ sound knowledge of technical charts and standards ○ independent performance of strength tests ○ knowledge of the design and functionality of essential machine elements ○ design of rotating machine elements

Course	D2106
Name	Machine Elements 1
Instructor	Prof. Dr.-Ing. Josef Stettmer
Module	D-07 Machine Elements
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	2
Semester hours	4
Credit Points (ECTS)	5
Time Distribution	150h: 60h Presentation and lecture, 60h Preparation and follow-up, 30h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice
Media	Lecture accompanied by visualization
Literature	Roloff H., Matek W., Muhs D. (2007), *Maschinenelemente*, 18. Aufl., Vieweg, Braunschweig Niemann G. (2005), *Maschinenelemente 1*, 4. Aufl., Springer, Berlin
Responsible Course Supervisor	Prof. Dr.-Ing. Josef Stettmer
Course Contents	○ In addition to the strength calculation of mechanical engineering components, the focus of this course lies in joining techniques. ○ The following techniques: bonding, soldering, riveting, welding and mounting screws and bolts will be presented in detail. ○ Particular emphasis is placed on the computational dimensioning of machine elements in accordance with standards, norms and design specifications. ○ Knowledge of the selection and application of machine elements according to functional and constructional principles and according to economic requirements shall be trained. ○ The respective function, computational, and constructional characteristics of machine elements will be discussed.

Course	D3103
Name	Machine Elements 2
Instructor	Prof. Dr.-Ing. Josef Stettmer
Module	D-10 Machine Elements
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	3
Semester hours	4
Credit Points (ECTS)	5
Time Distribution	150h: 60h Presentation and lecture, 60h Independent study, 30h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice
Media	Overhead projector
Literature	Roloff H., Matek W., Muhs D. (2007), *Maschinenelemente*, 18. Aufl., Vieweg, Braunschweig Niemann G. (2003), *Maschinenelemente 2*, 2. Aufl., Springer, Berlin
Responsible Course Supervisor	Prof. Dr.-Ing. Josef Stettmer
Recommended Previous Learning	D1102 Technical Mechanics 1 (Statics)
Course Contents	o axles, shafts, pins o shaft-hub connection o couplings o roller bearings o slide bearings o belt drives o chain drives o involute toothing

Module	D-08
Module Name	Principles of Materials
Module Block (LV)	D1105 Chemistry D2105 Materials Technology
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	6
Evaluation Method	The final grade of the module is based on the grades of each individual module weighted according to the corresponding ECTS points.
Professor	Prof. Dr.-Ing. Thomas Petersmeier
Prerequisites	---
Educational Objectives	○ understanding of the composition of matter and thus the derivation of the structure-property relationships of mechanical engineering relevant materials such as plastics, ceramics and metals; mechanical, thermal and electrical properties of matter can be inferred from bonding relations ○ Through the teaching of chemical reactions, such as acid-base reactions or redox reactions, the chemical process of many everyday reactions such as, for example, the solubility of metals in acids or rusting can be concluded. ○ Subject matter such as chemical equilibrium and kinetics allow for a quantitative description of chemical processes. ○ ability to access the behavior of materials ○ specifically adjust mechanical properties with the help of microstructure modifications ○ understanding of the basic structure/property correlations ○ ability to select appropriate material and material combinations taking into account the profile of properties, component geometry and component load ○ understanding of various stress situations and their impact on strength

Course	D1105
Name	Chemistry
Instructor	Prof. Dr. rer. nat. Martin Aust
Module	D-08 Principles of Materials
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	1
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 20h Independent study, 10h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice
Media	Blackboard, overhead projector / projector
Literature	Forst D., Kolb M., Roßwag H. (1993), *Chemie für Ingenieure*, 1.Aufl., VDI-Verlag, Düsseldorf Vinke A.,Marbach G.,Vinke J. (2008), *Chemie für Ingenieure*, 2. Aufl., Oldenbourg, München
Responsible Course Supervisor	Prof. Dr.-Ing. Thomas Petersmeier
Course Contents	○ composition of matter: elementary particles, radioactivity, atomic structure (shell model, orbitals), derivation of the periodic table of elements ○ chemical bonding: covalent, ionic and metallic bonding, semiconductors, secondary valences (Van der Waals' interactions, hydrogen bonds) ○ chemical equations: acid/base reactions, redox reactions ○ chemical equilibrium: law of mass action, pH-value and strength of acids/bases, solubility, general gas equations

Course	D2105
Name	Materials Technology
Instructor	Prof. Dr.-Ing. Thomas Petersmeier
Module	D-08 Principles of Materials
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	2
Semester hours	4
Credit Points (ECTS)	4
Time Distribution	120h: 60h Presentation and lecture, 30h Independent study, 30h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice
Media	Blackboard, overhead projector / projector
Literature	Bergmann W. (2008), *Werkstofftechnik*, 6. Aufl., Hanser, München Bargel H.-J., Schulze (2008), *Werkstoffkunde*, 10. Aufl., Springer, Berlin Schatt W., Worch (2003), *Werkstoffwissenschaft*, 9. Aufl., Wiley-VCH, Weinheim Berns H. (1993), *Stahlkunde für Ingenieure*, 2. Aufl., Springer, Berlin
Responsible Course Supervisor	Prof. Dr.-Ing. Thomas Petersmeier
Course Contents	○ classification of materials ○ crystalline state ○ elastic and plastic behavior of metals ○ thermally activated processes ○ phase transformation, alloy formation, equilibrium diagrams ○ iron carbon phase diagram ○ heat treatment of steels ○ age hardening ○ mechanically destructive test procedures ○ brief description of iron and steel

Module	D-09
Module Name	Construction and CAD
Module Block (LV)	D-2107 Construction 2 D-3107 Introduction to 3D CAD
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	6
Evaluation Method	The final grade of the module is based on the grades of each individual module weighted according to the corresponding ECTS points.
Professor	Prof. Dr.-Ing. Josef Stettmer
Prerequisites	D-03 Principles of Construction
Educational Objectives	○ Ability to design a component ○ list of requirements ○ concept ○ calculation ○ design ○ draft ○ ability to apply a 2D CAD system for the standardized illustration of an assembly group and of individual parts ○ ability to apply a 3zD CAD system for the standardized illustration of an assembly group and of individual parts

Course	D2107
Name	Construction 2
Instructor	Prof. Dr.-Ing. Josef Stettmer
Module	D-09 Construction and CAD
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	2
Semester hours	4
Credit Points (ECTS)	4
Time Distribution	120h: 60h Presentation and lecture, 60h Independent study
Exam Accreditation	Student research project
Final Grade Accumulation	Course-accompanied student research project necessary for the final grade
Language	German
Lesson Format	Seminar Instruction / practical training, independent study
Media	Calculations: blackboard / slides CAD exercises: visualization using projector
Literature	Roloff H., Matek W., Muhs D. (2007), *Maschinenelemente*, 18. Aufl., Vieweg, Braunschweig Eichenseer A. (2007),*Autodesk AutoCAD*, Herdt, Bodenheim Firmenkataloge: Normteile / Lager usw.
Responsible Course Supervisor	Prof. Dr.-Ing. Josef Stettmer
Course Contents	○ general design process ○ creation of design documents suitable for production ○ application of specific computing methods ○ design suitable for production ○ design which respects tolerances ○ design prepared for welding ○ use of standard parts and catalogs ○ basics of 2D CAD

Course	D3107
Name	Introduction to 3D CAD
Instructor	Prof. Dr.-Ing. Rudolf Strohmayr Prof. Dr.-Ing. Karl Hain
Module	D-09 Construction and CAD
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	3
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presence, 30h Extra work / exercises
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction / practical training
Media	Calculations: blackboard / slides CAD exercises: visualization using projector
Literature	Vogel H. (2007), *Solid Works 2007 Skizzen, Bauteile, Baugruppen*, 2. Aufl., Hanser, München Behnisch S. (2003), *Digital Mockup mit CATIA V5*, Hanser, München
Responsible Course Supervisor	Prof. Dr.-Ing. Josef Stettmer
Course Contents	○ basic skills in dealing with a modern 3D CAD system ○ component modeling ○ modeling of assemblies ○ compiling drawings of 3D models ○ a look at programming variants and the kinematics simulation

Module	D-10
Module Name	Kinematics and Fluid Mechanics
Module Block (LV)	D3104 Technical Fluid Mechanics D3105 Technical Mechanics 3 (Dynamics)
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	9
Evaluation Method	The final grade of the module is based on the grades of each individual module weighted according to the corresponding ECTS points.
Professor	Prof. Dr.-Ing. Klaus Nitsche, M.Sc.
Prerequisites	Multivariable functions, differential and integral calculus
Educational Objectives	○ Students are to become familiar with the basic laws of the dynamics of solids and flowing fluids thus acquiring a deeper understanding of the transport processes of mass, momentum and energy involved in technical processes. ○ grasp the idea of the interaction of force and motion in mechanical systems ○ apply the basic principles of fluid mechanics; solve problems of hydrostatics and stationary pipe flow; resistance to the flow of simple bodies; insights into two and three-dimensional flows; view of the Navier-Stokes equations and of compressible isentropic nozzle flow

Course	D3104
Name	Technical Fluid Mechanics
Instructor	Prof. Dr.-Ing. Klaus Nitsche, M.Sc.
Module	D-10 Kinematics and Fluid Mechanics
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	3
Semester hours	4
Credit Points (ECTS)	4
Time Distribution	120h: 60h Presentation and lecture, 45h Homework, 15h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice, independent study
Media	Presentation on projector, blackboard, additional materials on PC network
Literature	Böswirth L. (2007), *Technische Strömungslehre*, 7. Aufl., Vieweg, Wiesbaden
Responsible Course Supervisor	Prof. Dr.-Ing. Klaus Nitsche, M.Sc.
Course Contents	○ hydrostatics ○ Bernoulli equation ○ stationary pipe flow and pressure similarity ○ principles of angular momentum and linear momentum ○ basics of potential flows ○ boundary layer, flows, resistance ○ insight into compressible flows

Course	D3105
Name	Technical Mechanics 3 (Dynamics)
Instructor	Prof. Dr.-Ing. Stefan Götze
Module	D-10 Kinematics and Fluid Mechanics
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	3
Semester hours	4
Credit Points (ECTS)	5
Time Distribution	150h: 60h Presentation and lecture, 60h Follow-up (partly as homework) 30h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice
Media	Blackboard, exercises, script, script of slides, PC/laptop, projector
Literature	Hauger W., Schnell W., Gross D. (2008), *Technische Mechanik 3 – Kinetik*, 10. Aufl., Springer, Berlin Meriam J.L., Kraige L.G. (2007), *Engineering Mechanics 2 - Dynamics*, 6. Aufl., Wiley, New York Kerle H., Pittschellis R., Corves B. (2007), *Introduction in die Getriebelehre*, 3. Aufl.,Teubner, Wiesbaden
Responsible Course Supervisor	Prof. Dr.-Ing. Klaus Nitsche, M.Sc.
Course Contents	○ movement of a particle: ○ kinematics - speed and acceleration in Cartesian coordinates, rectilinear motion, plane motion, polar coordinates ○ kinetics – free movement, throw, guided movement, principle of work and energy, potential energy, law of conservation of energy ○ systematic non-uniform transmission gearing mechanisms: setup of a gearing mechanism, kinematic chains, planar mechanisms ○ geometric-kinematic analysis of planar mechanisms: graphical analysis of mechanisms ○ numerical analysis of mechanisms ○ kinetostatic analysis of planar mechanisms: joint force method ○ synthesis of planar polynomial (esp. quadrinomial) joint mechanisms

Module	D-11
Module Name	Statistics and Quality Management
Module Block (LV)	D4101 Statistics and Quality Management
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	4
Evaluation Method	Cumulative module test: 90 minute written exam or 30 minute oral exam
Professor	Prof. Dr. rer. nat. Stefan Schulte
Prerequisites	---
Educational Objectives	The student is able to ○ independently solve simple statistical problems from the practical field of engineering; ○ employ statistical methods in quality management

Course	D4101
Name	Statistics and Quality Management
Instructor	Prof. Dr. rer. nat. Stefan Schulte
Module	D-11 Statistics and Quality Management
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	4
Semester hours	4
Credit Points (ECTS)	4
Time Distribution	120h: 60h Presentation and lecture, 45h Homework, 15h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice, independent study
Media	Blackboard in combination with script
Literature	Will be announced in the lecture
Responsible Course Supervisor	Prof. Dr. rer. nat. Stefan Schulte
Course Contents	Introduction to the methods of statistics insofar as engineering applications are applicable in the fields of experiment, development, design, quality management, measurement, production engineering and so on: o introduction/overview o descriptive statistics o fundamental terms of probability calculation o analytical statistics o examples of application/use from practical experience in engineering (e.g. quality assurance, FMEA, design of experiments and test analysis)

Module	D-12
Module Name	English for Engineers
Module Block (LV)	D4107 English for Engineers
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	2
Evaluation Method	Cumulative module test: 90 minute written exam or 30 minute oral exam
Professor	Various instructors from the Language Center
Prerequisites	---
Educational Objectives	Students are in the position to: o make themselves understood using technical English (written and spoken), o orally summarize reading and audio texts, o make commentaries in discussions, o give short presentations, o read technical texts fluently and speedily and distinguish global and detailed knowledge, o to expand and apply general technical and business vocabulary, o optimize written expression

Course	D4107
Name	English for Engineers
Instructor	Various instructors from the Language Center
Module	D-12 English for Engineers
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	4
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 15h Homework, 15h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice, independent study
Media	Blackboard in combination with script
Literature	Praglowski-Leary, K.-D. (2004), *Englisch für technische Berufe*, Klett, Stuttgart
Responsible Course Supervisor	Language Center
Course Contents	○ technical English (written and spoken) ○ analysis of audio texts set in a technical or business context ○ analysis of global and detailed information ○ summary of reading and listening texts ○ commentary in discussions ○ short presentations ○ fluent/speedy reading of technical texts

Module	D-13
Module Name	Elective Course
Module Block (LV)	D3102 General academic compulsory elective D4103 Study program-specific compulsory elective
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	4
Evaluation Method	The final grade of the module is based on the grades of each individual module weighted according to the corresponding ECTS points.
Professor	Prof. Dr.-Ing. Karl Hain
Prerequisites	---
Educational Objectives	○ acquisition of general skills ○ acquisition of key qualifications ○ insight into the topics, methods, and ways of thinking of current related disciplines and fields ○ ability to assess interdisciplinary topics and applications

Course	D3102
Name	General academic compulsory elective
Instructor	Various instructors
Module	D-13 Elective course
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	3
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 15h Homework, 15h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice, independent study
Media	Blackboard in combination with script
Literature	Will be announced in the lecture
Responsible Course Supervisor	Prof. Dr.-Ing. Karl Hain
Course Contents	○ insight into the topics, methods, and ways of thinking in general scientific fields ○ acquisition of key skills such as for example the ability to work in a team, language skills, etc,. ○ ability to assess interdisciplinary topics and applications ○ acquisition of intercultural and social competences

Course	D4103
Name	Study program-specific compulsory elective
Instructor	Various instructors
Module	D-13 Elective course
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	4
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 15h Homework, 15h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice, independent study
Media	Blackboard in combination with script
Literature	Will be announced in the lecture
Responsible Course Supervisor	Prof. Dr.-Ing. Karl Hain
Course Contents	○ insight into the topics, methods, and ways of thinking in course (study program) specific fields ○ insight into the current problems and developments of fields related to the course of studies

Module	D-14
Module Name	Electrical Engineering
Module Block (LV)	D3103 Basics of Electrical Engineering D4104 Instrumentation D4105 Electrical Drives
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	8
Evaluation Method	The final grade of the module is based on the grades of each individual module weighted according to the corresponding ECTS points.
Professor	Prof. Dr.-Ing. Peter Fröhlich
Prerequisites	Basic knowledge of physics and mathematics
Educational Objectives	○ Principles of electrical engineering ○ knowledge and understanding of electrical engineering, underlying physical laws and mathematical calculation methods ○ ability to apply this knowledge to technical problems ○ Electrical drives ○ knowledge and understanding of the fundamental properties of electrical machines and drive systems ○ knowledge of the technically important variants of electrical machines ○ ability to apply this knowledge to technical problems ○ Measurement engineering ○ knowledge of the principles of measurement engineering ○ application of bridge circuits for the evaluation of sensor signals ○ describe systematic and random errors; estimate the influence of several sources of error on a measurement result

Course	D3103
Name	Principles of Electrical Engineering
Instructor	Prof. Dr.-Ing. Peter Firsching
Module	D-14 Electrical Engineering
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	3
Semester hours	4
Credit Points (ECTS)	4
Time Distribution	120h: 60h Presentation and lecture, 30h Independent study, 30h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice
Media	Script, blackboard
Literature	Frohne H., Löcherer, Müller (2008), *Moeller, Grundlagen der Elektrotechnik*, 21. Aufl.,Teubner, Wiesbaden Bernstein H. (2004), *Elektrotechnik, Elektronik für Maschinenbau*, Vieweg, Wiesbaden
Responsible Course Supervisor	Prof. Dr.-Ing. Peter Fröhlich
Course Contents	o electrical base items o electrical charges and circuit o current density, types of current, voltage o Ohm's law o DC circuit, indication of direction system o passive two terminal network, active two terminal network o ideal sources, real linear sources o determination of load points, line match o calculation of DC circuits o Kirchhoff's circuit laws o serial and parallel connection of resistors o voltage and current measurement o networks with a source, superposition o alternative sources, delta-wye conversion o fundamental terms in AC current technology o periodic time functions, sine values o complex AC calculation o operation of ideal passive two terminal networks with sine values o sine current networks

Course	D4104
Name	Instrumentation
Instructor	Prof. Dr. Roswitha Giedl-Wagner
Module	D-14 Electrical Engineering
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	4
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 15h Independent study, 15h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice
Media	Presentation with projector, blackboard
Literature	Parthier, R. (2008), *Messtechnik*, 4. Aufl., Vieweg, Wiesbaden Unbehauen, H. (2007), *Regelungstechnik I*, 14. Aufl., Vieweg, Wiesbaden
Responsible Course Supervisor	Prof. Dr.-Ing. Peter Fröhlich
Course Contents	○ measurements: measured quantities, system of measurement ○ measuring signals: classification and conversion, characterization ○ methods of measurements: deflection, discrepancy principle, compensation ○ measuring device: basic structure, static and dynamic characteristic variables ○ evaluation of measurement results: deviations, error propagation of systematic and random deviations; error types ○ measurement of electrical variables: current, voltage, output, resistors, capacitor, inductor, time, frequency ○ measurement of non-electrical variables: measuring chains, sensors for geometry, force, vibration, temperature and flow measurement; coordinate metrology

	○ automated measuring systems

Course	D4105
Name	Electrical Drives
Instructor	Prof. Dr.-Ing. Peter Firsching
Module	D-14 Electrical Engineering
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	4
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 15h Independent study, 15h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice
Media	Script, blackboard
Literature	Merz H. (2008), *Elektrische Maschinen und Antriebe*, 2. Aufl., VDE-Verlag, Berlin
Responsible Course Supervisor	Prof. Dr.-Ing. Peter Fröhlich
Course Contents	○ introduction/variants of electrical machines ○ basic principles of electromagnetic power conversion, power flow – energy conversion efficiency ○ characteristic variables of electrical machines ○ structure and description of a general drive system ○ magnetic field in the air gap of electrical machines – physical principles and effects ○ DC machine (functional principle) ○ three-phase machines ○ asynchronous machines ○ electronically computated machines ○ modern drive systems ○ actuators ○ electronically controlled drives (inverters, frequency converters) ○ distributed drives ○ drive control via PLC

Module	D-15
Module Name	Project Module
Module Block (LV)	D4109 Project Work D5110 Construction Project
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	12
Evaluation Method	The final grade of the module is based on the grades of each individual module weighted according to the corresponding ECTS points.
Professor	Prof. Dr.-Ing. Karl Hain
Prerequisites	D1108 Project Management / Work Techniques D-09 Construction and CAD
Educational Objectives	○ getting to know the method and procedure of project management ○ analyzing and organizing solutions to problems in small teams; distributing tasks among members of the team/group as well as handling them; reaching plausible results and presenting them ○ practical application of knowledge gained in courses; you know the methodological approach for this from course D1108 ○ In the team, complex tasks are split into work packages and should be dealt with together and parallel to other tasks. The exchange of information between team members demands both the ability to communicate and cooperate (ability to work in a team). ○ The independent formulation of concrete objectives based on intermediate results (suggestions for change/reorganization) and the discussion thereof requires strategic review and assessment of one's own team contribution. ○ Dealing with one's own task, the required documentation and the presentation of results in groups requires teamwork and the keeping of deadlines. ○ methodical and systematic approach to the processing of extensive, complex tasks/problems using computerized tools

Course	D4109
Name	Project Work
Instructor	Various instructors: Reclassification (semester start) for each project group
Module	D-15 Project Work
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	4
Semester hours	4
Credit Points (ECTS)	6
Time Distribution	180h: 60h Assisted Presentation and lecture, 120h additional work involved
Exam Accreditation	Attendance/ tests and student research project
Final Grade Accumulation	Project results are final-grade forming; course-related student research project
Language	German
Lesson Format	Project work, with individual tasks for each student
Media	Group meetings, midterm and final presentations
Literature	Project-specific
Responsible Course Supervisor	Prof. Dr.-Ing. Karl Hain
Course Contents	○ Projects and/or subtasks of a project can be theoretical (e.g. literature research, program development, data collection, project management), experimental (e.g. measurements) or constructive in nature. ○ The project tasks will be announced at the beginning of the semester; shortly thereafter project groups will be formed. ○ Students compile results, which they will document in the form of a report and introduce in a presentation.

Course	D5110
Name	Construction Project
Instructor	Prof. Dr.-Ing. Karl Hain, Dipl.-Ing. Arnold Wietzke Reclassification (semester start) for each project group
Module	D-15 Project module
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	5
Semester hours	4
Credit Points (ECTS)	6
Time Distribution	180h: 60h Presentation and lecture, 120h additional work involved
Exam Accreditation	Attendance/ tests and student research project
Final Grade Accumulation	Project results are final-grade forming; course-related student research project
Language	German
Lesson Format	Tuition in seminars / project, lectures
Media	Blackboard, slides; Presentations: visualization using projector
Literature	Roloff H., Matek W., Muhs D. (2007), *Maschinenelemente*, 18. Aufl., Vieweg, Braunschweig Looman J. (1996), *Zahnradgetriebe*, 3. Aufl., Springer-, Belin Verband der Technischen Überwachungs-Vereine e.V. (2002), *AD-Merkblätter*, Heymann, Berlin Firmenkataloge: Normteile / Lager usw.
Responsible Course Supervisor	Prof. Dr.-Ing. Karl Hain
Course Contents	○ project: design and construction of a gearbox for special applications ○ topics in the context of the series of lectures from a gearbox manufacturer ○ gear technology ○ driveline technology for agricultural engines ○ construction (machinery) gearboxes ○ construction (machinery) axles ○ driveline technology for buses ○ automobile acoustics ○ project: design and construction of a process facility (heat exchanger) ○ etcetera

Module	D-16
Module Name	Thermodynamics
Module Block (LV)	D4108 Technical Thermodynamics D5109 Heat Transfer
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	11
Evaluation Method	The final grade of the module is based on the grades of each individual module weighted according to the corresponding ECTS points.
Professor	Prof. Dr.-Ing. Klaus Nitsche, M.Sc.
Prerequisites	Multivariable functions, differential and integral calculus
Educational Objectives	○ Students are to become acquainted with the basic laws of thermodynamics and heat transfer thus acquiring a deeper understanding of the transport processes of mass, momentum, and energy involved in thermal machines, plants and nature, as well. ○ Students should be able to model technical machinery as abstract systems and to balance mass, energy and momentum at the appropriate system boundaries. At the same time, problem-solving skills are taught. ○ Setting-up of stationary mass and energy balances for technical systems, solving of the equation for stationary changes of state in the case of cycles, moist air, and combustion ○ Students should become familiar with the basics of heat transfer in terms of a comprehensive understanding of heat transfer in engineering devices and systems. You should be able to clearly recognize and mathematically describe the underlying transport mechanisms in order to be able to specifically design and optimize technical systems. With reference to thermal issues, analytical problem-solving skills shall be learned.

Course	D4108
Name	Technical Thermodynamics
Instructor	Prof. Dr.-Ing. Klaus Nitsche, M.Sc.
Module	D-16 Thermodynamics
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	4
Semester hours	6
Credit Points (ECTS)	7
Time Distribution	210h: 90h Presentation and lecture, 80h Homework, 40h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 120 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice, Independent study, labor practical training
Media	Presentation on beamer, blackboard, supplementary lecture material provided on PC network
Literature	Langeheinecke, K., Jany, P., Thieleke, G. (2008), *Thermodynamik für Ingenieure*, 7. Aufl., Vieweg, Wiesbaden
Responsible Course Supervisor	Prof. Dr.-Ing. Klaus Nitsche, M.Sc.
Course Contents	○ real, ideal material behavior ○ mass and energy balance ○ first and second fundamental theorems ○ exergy ○ cycles ○ moist air ○ air treatment systems ○ combustion, fuels ○ air and combustion gas balance ○ energy balance

Course	D5109
Name	Heat Transfer
Instructor	Prof. Dr.-Ing. Rudi Marek Prof. Dr.-Ing. Klaus Nitsche, M.Sc.
Module	D-16 Thermodynamics
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	5
Semester hours	4
Credit Points (ECTS)	4
Time Distribution	120h: 60h Presentation and lecture, 40h Homework, 20h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 120 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice, independent study and eLearning
Media	Presentation on projector, blackboard, supplementary lecture material provided on PC network
Literature	Marek R., Nitsche K. (2007), *Praxis der Wärmeübertragung*, Hanser, München
Responsible Course Supervisor	Prof. Dr.-Ing. Klaus Nitsche, M.Sc.
Course Contents	○ overview of the heat transfer mechanisms ○ principles of thermal conduction (differential form of Fourier's Law of thermal conduction, initial and boundary conditions, solutions, electrical analogy) ○ 1D - 3D transient thermal conduction ○ forced and free convection ○ ribs, needles, critical insulation thickness ○ heat exchangers ○ thermal radiation including multi-body systems ○ transient energy balances

Module	D-17
Module Name	Control Engineering and Feedback Control Systems
Module Block (LV)	D4106 Principles of Feedback Control Systems D5103 Mechanical Engineering Practical Training D5104 Control Engineering D5105 Feedback Control Systems
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	9
Evaluation Method	Cumulative module test: 120 minute written exam or 30 minute oral exam
Professor	Prof. Dr.-Ing. Christoph Rappl
Prerequisites	D-01 Fundamental Mathematical Principles Differential and Integral Calculus
Educational Objectives	○ The student is able to model simple controlled systems, linearize and convert the state space equation into a transfer function. With the help of the Laplace transformation, he or she can easily determine system responses in the time domain. ○ Students are in the position to carry out stability analyses with the help of Hurwitz and Nyquist's methods and are also able to determine static controller errors from closed loops. ○ With the help of the Bode diagram and the locus root method, simple issues relating to control loop synthesis can be handled. ○ In addition, the student can differentiate between open loop controls and closed loop controls as well as apply Boolean algebra to simple analysis and synthesis tasks in binary control technology. Also, he or she is in the position to simplify Boolean variables (insofar as possible) with the help of the Karnaugh map. ○ He or she knows examples of applications of different flipflops and meter types and can integrate them in control tasks. The same goes for interrupt timers. ○ The student knows the basic functionality of a SPS and can define the logic diagram of a sequence based on the problem. ○ He or she will learn the skills necessary to perform tests on machines and equipment, those necessary for the production, analysis and critical interpretation of test charts and those necessary to link practical results with the theoretical topics which are taught.

Course	D 4106
Name	Principles of Feedback Control Systems
Instructor	Prof. Dr.-Ing. Klaus Nitsche
Module	D-17 Control Engineering and Feedback Control Systems
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	4
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 15h Independent study, 15h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice
Media	Presentation on beamer, blackboard
Literature	Parthier, R. (2008), Messtechnik, 4. Aufl., Vieweg, Wiesbaden Unbehauen, H. (2007), Regelungstechnik I, 14. Aufl., Vieweg, Wiesbaden
Responsible Course Supervisor	Prof. Dr.-Ing. Christoph Rappl
Course Contents	○ examples of controlled systems, modeling ○ feedback control systems ○ differential equations, system of differential equations first order, time range ○ Laplace transform ○ standard transmission elements ○ Bode and Nyquist diagram ○ stability (Hurwitz's theory) ○ behavior of continuous linear feedback control systems

Course	D5103
Name	Mechanical Engineering Practical Training
Instructor	Dipl.-Ing. (FH) Johannes Schneider
Module	D-17 Control Engineering and Feedback Control Systems
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	5
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 25h Preparation and follow-up, 5h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Lab, practical training sessions in small groups(data acquisition and preparation)
Media	Experiments on teaching models (e.g. Kaplan turbine) and real manufacturing and measuring machines; Documents relating to the experiments available on the network
Literature	Trial specific, announced during group assignment
Responsible Course Supervisor	Prof. Dr.-Ing. Christoph Rappl
Course Contents	○ NC programming ○ work on test stands ○ work on manufacturing and measuring machines ○ data analysis, error calculation ○ depiction of measurement results

Course	D5104
Name	Control Engineering
Instructor	Prof. Dr.-Ing. Stefan Götze
Module	D-17 Control Engineering and Feedback Control Systems
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	5
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 15h Independent study, 15h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice, practical training: design methods of control engineering
Media	Blackboard, laptop / projector
Literature	Wellenreuther, G., Zastrow, D. (2008), *Automatisieren mit SPS - Theorie und Praxis*, Vieweg, Wiesbaden
Responsible Course Supervisor	Prof. Dr.-Ing. Christoph Rappl
Course Contents	○ introduction to control engineering ○ binary and digital numbers ○ logical operations ○ Boolean algebra ○ rules of simplification ○ Karnaugh map ○ memory functions ○ numerators ○ construction and operation of a PLC ○ program examples in logic diagram ○ implementation of sequence control systems using sequencers

Course	D5105
Name	Feedback Control Systems
Instructor	Prof. Dr.-Ing. Christoph Rappl
Module	D-17 Control Engineering and Feedback Control Systems
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	5
Semester hours	2
Credit Points (ECTS)	3
Time Distribution	90h: 30h Presentation and lecture 30h Independent study, 30h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice, Demonstration of drafting methods of feedback control systems
Media	Blackboard, laptop/projector
Literature	Unbehauen, H. (2007), *Regelungstechnik I*, 14. Aufl., Vieweg, Wiesbaden
Responsible Course Supervisor	Prof. Dr.-Ing. Christoph Rappl
Course Contents	○ root locus according to Evans ○ design of linear controller using root locus on a dominant pole pair ○ design using frequency characteristics and the Nichols diagram ○ influence of non-cutting time on design ○ design of prefilters to optimize the dynamics of the closed loop ○ design of multiloop controllers

Module	D-18
Module Name	Production Technology
Module Block (LV)	D3108 Machine Manufacturing Technology D4110 Non-cutting Technology
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	4
Evaluation Method	Cumulative module test: 90 minute written exam or 30 minute oral exam
Professor	Prof. Dr.-Ing. Rolf Rascher
Prerequisites	---
Educational Objectives	○ The courses are designed as a basic course so that the prospective mechanical engineer understands and can evaluate the meaning of modern production as well as potential difficulties in handling/design of production facilities. ○ relaying of basic knowledge of current manufacturing methods and their procedures ○ ability to conceptualize and design production facilities with technical expertise ○ ability to optimally dimension procedures (that meet the requirements) for the production task

Course	D3108
Name	Machine Manufacturing Technology
Instructor	Prof. Dr.-Ing. Helmut Hansmaier
Module	D-18 Production Technology
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	3
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 15h Independent study, 15h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice
Media	Overhead projector
Literature	Script
Responsible Course Supervisor	Prof. Dr.-Ing. Rolf Rascher
Course Contents	○ chip formation ○ frame of reference ○ wear ○ cutting materials ○ cutting forces ○ lathing, drilling, broaching, planing, buffering, milling ○ sharpening

Course	D4110
Name	Non-cutting Technology
Instructor	Prof. Dr.-Ing. Rolf Rascher
Module	D-18 Production Technology
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	4
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 15h Preparation and follow-up work, 15h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice
Media	Lecture with visualization
Literature	Various pieces of literature (list in script)
Responsible Course Supervisor	Prof. Dr.-Ing. Rolf Rascher
Course Contents	○ Production technology using a non-cutting working procedure in the manufacturing of simple and complex components generally in larger/mass quantities. The purpose of this lecture is to convey knowledge of the technology and application of modern methods of non-cutting production technology. ○ The respective process-oriented fundamentals and those dealing with procedures of calculation as well as peculiarities will be discussed. ○ With the acquired knowledge and process-oriented production fundamentals, the ability to select a production method according to economic conditions and for the execution of the operations scheduling shall be achieved with the help of one's acquired knowledge and procedure-based fundamentals in production. ○ Focus is placed on the process of casting as well as selected processes in both sheet and mass forming.

Module	D-19
Module Name	Business Administration
Module Block (LV)	D5106 Business Administration D5107 Law D5108 Business Accounting
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	6
Evaluation Method	Cumulative module test: 120 minute written exam or 30 minute oral exam
Professor	Dr. Jutta Hübscher
Prerequisites	---
Educational Objectives	○ relaying of a comprehensive overview of business-related issues and achieving a fundamental understanding of issues and problems related to business - The student should also build on his/her basic knowledge in the various business disciplines so that during his/her studies and/or later on in his/her professional career, he/she can deepen this knowledge when needed. ○ teaching of skills which will allow students to take over business-related tasks in projects or management activities in middle management ○ Participants should be put in the position to discover legal risks which are typical for companies; provide concrete solution proposals; as well as be able to verify fundamental legal risks in the various departments of a company. Students are not trained to be lawyers with knowledge of individual cases; rather, they are sensitized to the issues. In their future professional career, they should be able to recognize if legal issues are able to be solved internally or if lawyers should be involved and, if so, according to which aspects they should be selected and how to be able to “control” their work. ○ Furthermore, students should become familiar with the methods used to calculate economic profitability.

Course	D5106
Name	Business Administration
Instructor	Dr. Jutta Hübscher
Module	D-19 Business Studies
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	5
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 15h Independent study, 15h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice
Media	Script, blackboard, presentations
Literature	Wöhe G. (2008), *Introduction in die Generale Betriebswirtschaftslehre*, 23. Aufl., Vahlen, München Steven M. (2008), *BWL für Ingenieure*, 3. Aufl., Oldenbourg, München Schneider, D. (2000), *Unternehmensführung und strategisches Controlling*, 2. Aufl., Hanser, München Thommen, J.-P., Achleitner, A.-K. (2007), *Generale Betriebswirtschaftslehre Arbeitsbuch*, 5. Auflage, Gabler, Wiesbaden Busse von Colbe, W. (2007), *Betriebswirtschaft für Führungskräfte*, 3. Aufl., Schäffer-Poeschel, Stuttgart
Responsible Course Supervisor	Dr. Jutta Hübscher
Course Contents	○ the business process ○ basic principles in accounting ○ cost accounting accompanied by exercises ○ introduction to balance sheets and how to analyze them ○ sources of funding/financing for businesses ○ overview of legal structures ○ basics of tax law ○ principles of materials management and logistics ○ introduction to market research and marketing ○ fundamental terms in human resource management and organization ○ implementation of the most important decision-making techniques

Course	D5107
Name	Law
Instructor	Prof. Dr. Josef Scherer
Module	D-19 B Business Studies
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	5
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 15h Independent study, 15h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice
Media	PowerPoint / flipchart / blackboard
Literature	Scherer J., Mühlbauer, Unterwiener (2007), *Den Rücken frei: No risk, much fun*, rtw medien, Düsseldorf Scherer J., Friedrich (2006), *Wer den Schaden hat…. Band 1+2*, 2. Aufl., rtw medien, Düsseldorf Scherer J.(2005), *Verträge*, rtw medien, Düsseldorf
Responsible Course Supervisor	Dr. Jutta Hübscher
Course Contents	○ risk and compliance management ○ guidelines, regulations and standards ○ potential risk areas of product reliability and feasible solution approaches for the practical field ○ contract management ○ legal standards in the field of commercial law, law of partnership for private and incorporated companies and intellectual property law, especially those standards and laws which are the most important engineers ○ overview of claims management, manager liability, commercial criminal law, bankruptcy law

Course	D5108
Name	Business Accounting
Instructor	Prof. Dr.-Ing. Rolf Rascher
Module	D-19 Business Studies
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	5
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 15h Preparation and follow-up, 15h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice
Media	Lecture with visualization
Literature	Various pieces of literature (list in script)
Responsible Course Supervisor	Dr. Jutta Hübscher
Course Contents	○ aspects of the economy ○ methods of investment calculation as part of the field of business accounting and operational information and controlling systems ○ fundamentals of cost accounting ○ generally applied procedures of static and dynamic investment calculation with examples ○ application of procedures / decisions (e.g. investments, make or buy, etc.) ○ controlling in terms of consulting and support in technical management ○ system of financial control, product and customer analysis as well as the cooperation of controlling in corporate planning

Module	D-20
Module Name	Advanced Materials Technology
Module Block (LV)	D5101 Advanced Materials Technology / Plastics Technology D5102 Operational Stability / Damage Analysis
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	7
Evaluation Method	The final grade of the module is based on the grades of each individual module weighted according to the corresponding ECTS points.
Professor	Prof. Dr. rer. nat. Martin Aust
Prerequisites	D1105 Chemistry D2105 Materials Technology
Educational Objectives	○ Students will get to know the material plastic, its manufacturing, processing and properties. Students should be able to classify different types of plastic according to their applicability in practical cases of application. In addition, plastic-oriented design and the choice of processing will be discussed. ○ Furthermore, knowledge with respect to the analysis of damage in the field of metallurgy will be built upon. Suitable analytical methods will be introduced and applied to practical cases.

Course	D5101
Name	Advanced Materials Technology / Plastics Technology
Instructor	Prof. Dr. rer. nat. Martin Aust
Module	D-20 Materials Technology
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	5
Semester hours	4
Credit Points (ECTS)	5
Time Distribution	150h: 60h Presentation and lecture, 60h Independent study, 30h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and exercises
Media	Blackboard, overhead projector, and projector
Literature	Schwarz O., Ebeling E.-W., Furth B (1999), *Kunststoffverarbeitung*, 8. Aufl., Vogel, Würzburg Schwarz O. (2000), *Kunststoffkunde*, 6. Aufl., Vogel, Würzburg Michaeli W. (1999), *Introduction in die Kunststoffverarbeitung*, 4. Aufl., Hanser, München Elias H.G. (1999), *Makromoleküle, Band 1+2*, 6. Aufl., Wiley-VCH, Weinheim
Responsible Course Supervisor	Prof. Dr. rer. nat. Martin Aust
Course Contents	○ knowledge of the main types of plastics and their application ○ overview of the production and processing ○ overview of structure: macromolecule, binding forces, chain structure, influence of additives ○ knowledge of the characteristic properties of application areas: mechanical, thermal, electrical, optical, chemical properties and their testing ○ overview of production: polymerization, polycondensation, polyaddition ○ fundamentals of polymer processing (e.g. injection molding, extrusion, thermoforming, connection technology) ○ ability to select the best manufacturing process for selected examples

Course	D5102
Name	Operational Stability / Damage Analysis

Instructor	Prof. Dr.-Ing. Thomas Petersmeier
Module	D-20 Materials Technology
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	5
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 15h Independent study, 15h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice
Media	Blackboard, overhead projector / projector
Literature	Haibach E. (2006), *Betriebsfestigkeit*, 3. Aufl., Springer, Berlin Lange G. (1997), *Systematische Beurteilung technischer Schadensfälle*, 4. Aufl., DGM, Oberursel Naubereit H. (1999), *Introduction in die Ermüdungsfestigkeit*, Hanser, München Bürgel R. (2005), *Festigkeitslehre und Werkstoffmechanik Band 1 und 2*, Vieweg, Wiesbaden Rösler J., Harders H., Bäker M. (2008), *Mechanisches Verhalten der Werkstoffe*, 3. Aufl., Vieweg, Wiesbaden
Responsible Course Supervisor	Prof. Dr. rer. nat. Martin Aust
Course Contents	○ damage events and causes ○ definition of operational stability ○ experiments ○ description of fatigue tests ○ fatigue and microstructure ○ fracture behavior ○ principles of fracture mechanics ○ design strength

Module	D-21
Module Name	Practical Module
Module Block (LV)	D6101 Practical Seminar D6102 Elected Topic from Practice 1 D6103 Elected Topic from Practice 2
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	6
Evaluation Method	For more detailed information see study plan
Professor	Prof. Dr. Martin Aust
Prerequisites	Minimum of 90 ECTS
Educational Objectives	Students should: ○ discover the current state of technology and share this with peers in the form of a presentation; ○ gain new insight into different companies, practical training opportunities and the key skills necessary for these, as well as gain knowledge of new processes/methods and developments; ○ learn content which has a direct relationship to practical tasks; ○ be in the position to present their tasks and findings from their industrial practical training; ○ acquire elegance and didactic delivery; and, ○ acquire specific skills in a practice-oriented field (e.g. pneumatics/hydraulics.

Course	D6101
Name	Practical Seminar
Instructor	Prof. Dr. Martin Aust
Module	D-21 Practical Module
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	6
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 30h Preparation
Exam Accreditation	Presentation (length: 20 minutes) Successful completion of the practical seminar is a pre-requisite for passing the course D-22 “Industrial Practical Training Course“ as well as for the recognition of the ECTS points awarded for the practical training.
Final Grade Accumulation	Successful participation equals a passing grade
Language	German
Lesson Format	Presentation
Media	Blackboard, projector/slides, presentations
Literature	Various pieces of literature, internet research
Responsible Course Supervisor	Prof. Dr. Martin Aust
Course Contents	○ Preparation of a presentation and report about the students’ tasks and responsibilities that were carried out in the course of their practical training. As a result, all students will have the benefit of gaining information about the new developments, processes and accomplishments, which are being carried out/made in various companies. ○ Through their presentations students should provide more information to their peers about companies in the surrounding area. Students will gain insight into various companies and their key qualifications and specialties as well as information on the manufacturing of products and services of individual companies.

Course	D6102
Name	Elected Topic from Practice 1
Instructor	Albert Schreiner
Module	D-21 Practical Module
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	6
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h Presentation and lecture: 40h Lecture and simulation on PC 20h Practical training with the equipment
Exam Accreditation	Participation is mandatory
Final Grade Accumulation	Successful participation equals a passing grade
Language	German
Lesson Format	Lecture including computing exercises and simulations on PC
Media	Blackboard Projections (projector, slides) Presentations with the Fluidsim software Exercises with Fluidsim Exercises at training facilities
Literature	diverse
Responsible Course Supervisor	Prof. Dr. Martin Aust
Course Contents	○ introduction to control engineering ○ differences as well as advantages and disadvantages of pneumatics and hydraulics ○ print design, print production and preparation with pneumatics ○ pneumatic drives, construction, design, application areas and mounting of cylinders, control elements, control valves, flow control valves, check valves, pressure control valves, unidirectional valves, and shuttle valves ○ preparation of functional diagrams ○ construction of hydraulic power units, hydraulic pumps and designs ○ hydraulic control and work elements ○ dimensioning of pneumatic and hydraulic elements and systems including storage

Course	D6103
Name	Elected Topic from Practice 2
Instructor	Prof. Dr. Martin Aust
Module	D-21 Practical Module
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	6
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h Presentation and lecture
Exam Accreditation	Participation is mandatory
Final Grade Accumulation	Successful participation equals a passing grade
Language	German
Lesson Format	Lectures, presentations and company visits Introduction of current projects by a recently-graduated engineer
Media	Blackboard Projections (projector, slides) Presentations
Literature	diverse
Responsible Course Supervisor	Prof. Dr. Martin Aust
Course Contents	External speakers from industry will speak about general topics in mechanical engineering, for example: ○ machining and cutting production, mounting, stretch forming, hydroforming reshaping, various hardening processes, paint shop, body shop, sintering process and their application; tool construction ○ digital distance measuring technique, automatization technology, robot gripper technique and their design and calculation; clamping technology ○ special machinery construction, special mechanical engineering of customer wishes all the way through to implementation ○ seminar on elastomers and the production and processing of elastomers, construction and seals ○ gear design, manufacturing and calculation ○ Presentations will be selected carefully and will be followed by a discussion. Company visits will also be made during the course of the semester. Both new technical developments and procedures as well as organizational and personnel matters will be addressed.

Module	D-22
Module Name	Industrial Practical Training Course
Module Block (LV)	D6104 Practical course
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	24
Evaluation Method	Successful participation equals a passing grade and is confirmed with a reference letter from the respective employer
Professor	Prof. Dr. Martin Aust
Prerequisites	Minimum of 90 ECTS, Participation in: D6102 Elected Topic from Practice 1
Educational Objectives	○ The general goal is to give the students an early opportunity to apply their acquired knowledge in a practical setting and at the same time get to know the operational processes in a company. ○ practical application of knowledge acquired in other modules. ○ application, embedding and broadening of the already acquired knowledge with reference to engineering tasks in the practical world ○ improvement of cooperation and communication skills; becoming acquainted with the meaning of team work ○ targeted presentation of the tasks of the practical training and the results obtained ○ Practical training in a company during one's studies and the resulting knowledge of the operational processes are a key competitive advantage of the graduates of our institute.

Module	D-23
Module Name	Systematic Construction
Module Block (LV)	D7103 Construction Methods and CAx Methods
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	Development and Construction
Credit Points (ECTS)	8
Evaluation Method	Cumulative module test: 120 minute written exam or 30 minute oral exam
Professor	Prof. Dr.-Ing. Karl Hain
Prerequisites and Recommend Previous Learning	D-07 Machine Elements D-09 Construction and CAD
Educational Objectives	Students o should be able to work systematically on a construction project (list of requirements, concept, calculation, design, development, presentation) o have an overview of the computer-aided tools and are able to use computer-aided tools and methods for the development and presentation of the solution

Course	D7103
Name	Construction Methods and CAx Methods
Instructor	Prof. Dr.-Ing. Karl Hain (Construction Methods) Prof. Dr.-Ing. Stefan Götze (CAx Methods)
Module	D-23 Systematic Construction
Curriculum	Mechanical Engineering (Bachelor)
Major	Development and Construction
Semester	7
Semester hours	8
Credit Points (ECTS)	8
Time Distribution	240h: 120h Presentation and lecture, 100h Project work, 20h Test preparation
Exam Accreditation	Performance evaluation (see study plan), See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Tuition in seminars, project work
Media	Blackboard / slides
Literature	Pahl G., Beitz W. (2007), *Konstruktionslehre, Methoden und Anwendung*, 7. Aufl., Springer, Berlin Roth K. (2000), *Konstruieren mit Konstruktionskatalogen Bd. 1-3*, 3. Aufl., Springer, Berlin
Responsible Course Supervisor	Prof. Dr.-Ing. Karl Hain
Course Contents	Construction Methods o methodology of the construction process o clarification of the task, list of requirements o function analysis and structure o tools and methods for finding solutions o evaluation and selection of potential solutions o draft: basic rules, principles and guidelines of the design of CAx methods CAx Methods o introduction of computer-aided tools in construction o data models in CAD systems o interfaces o simulation o reverse engineering, virtual reality, rapid prototyping o lifetime calculation method o databases o numbering systems and PPS o management of product data o type series development

Module	D-24
Module Name	Computer-Aided Engineering
Module Block (LV)	D-7104 Computer-Aided Design (CAD) D-7105 Computer-Aided Simulation / Applied FEM
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	Development and Construction
Credit Points (ECTS)	8
Evaluation Method	Cumulative module test: 90 minute written exam or 30 minute oral exam
Professor	Prof. Dr.-Ing Rudolf Strohmayr
Prerequisites	---
Educational Objectives	○ ability to apply computer-aided development tools for the creating, saving, and modifying of digital information as part of the construction process and production ○ ability to apply selected CA technologies for simulation, as part of the product development and production

Course	D7104
Name	Computer-Aided Design (CAD)
Instructor	Prof. Dr.-Ing. Rudolf Strohmayr
Module	D-24 Computer Aided Engineering
Curriculum	Mechanical Engineering (Bachelor)
Major	Development and Construction
Semester	7
Semester hours	4
Credit Points (ECTS)	4
Time Distribution	120h: 60h Presentation and lecture, 40h Extra work 20h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Tuition in seminars / practical training on the PC, independent study
Media	Calculations: blackboard / slides CAD exercises: visualization using projector
Literature	Adewale, A.,O.: Solid Modeling using Pro/Engineer Wildfire. Condoor, S.: Modeling using Pro/Engineer Wildfire. Köhler P.(2004), *CATIA V5-Practical training*, 2. Aufl., Vieweg, Wiesbaden Köhler P., Bechthold, J. (2006), *Pro-ENGINEER-Practical training*, 4. Aufl., Vieweg, Wiesbaden Rosemann B.(2005), *Pro/Engineer. Bauteile, Baugruppen, Zeichnungen*, Hanser, München Toogood, R.: Pro/Engineer Wildfire (Advanced) Tutorial. Trzesniowski M. (2002), *CAD mit CATIA V5*, Vieweg Braunschweig Wyndorps, P.T. (2008), *3D-Konstruktion mit Pro/Engineer – Wildfire*, 4. Aufl., Europa-Lehrmittel
Responsible Course Supervisor	Prof. Dr.-Ing. Rudolf Strohmayr
Course Contents	○ CAD workstation configurations ○ standard software packages, CAD components ○ draft, construction and detailing of parts, components, and finished products; ○ preparation of drawings with a CAD system; application of commonly used libraries / standard parts libraries; application of computer-aided calculation programs as part of the construction process

Course	D7105
Name	Computer-Aided Simulation / Applied FEM
Instructor	Prof. Dr.-Ing. Rudolf Strohmayr
Module	D-24 Computer Aided Engineering
Curriculum	Mechanical Engineering (Bachelor)
Major	Development and Construction
Semester	7
Semester hours	4
Credit Points (ECTS)	4
Time Distribution	120h: 60h Presentation and lecture, 40h Extra work, 20h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Tuition in seminars / practical training on the PC, independent study
Media	Calculations: blackboard / slides CAD exercises: Visualization using projector
Literature	Deger Y. (2007), *Die Methode der Finiten Elemente*, 4. Aufl., Expert, R Renningen; Faires, D. (1994), *Numerische Methoden*, Spektrum, Heidelberg Knothe K., Wessel H. (2008), *Finite Elemente*, 4. Aufl., Springer, Berlin Kunow, A. (1998), *Finite Elemente Methode*, Hüthig, Heidelberg Rieg, F. (2009), *Finite Elemente Analyse für Ingenieure*, 3. Aufl., Hanser, München
Responsible Course Supervisor	Prof. Dr.-Ing. Rudolf Strohmayr
Course Contents	○ applications of simulation ○ simulation in the integrated product and process design ○ basic principles of modeling methods and simulation technology of high-performing CAD/CAM systems ○ application of CAE modules in all phases of product development

Module	D-25
Module Name	Energy Technology and Trade
Module Block (LV)	D7106 Regenerative Energy and Material Sciences / Recycling / Biomass D7107 Energy Industry / Emissions trading
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	Energy Technology / Industrial and Building Systems
Credit Points (ECTS)	8
Evaluation Method	The final grade of the module is based on the grades of each individual module weighted according to the corresponding ECTS points.
Professor	Prof. Dr. rer. nat. Robert Geigenfeind.
Prerequisites	---
Educational Objectives	Student should: ○ become familiar with all forms of renewable energy and their potential; ○ become familiar with common recycling practices and waste disposal systems; ○ develop waste disposal concepts; ○ become familiar with the processes of recycling; be able to set up the appropriate mass and energy balances and become familiar with the relevant environmental protection regulations; ○ gain the required knowledge in biology, methods engineering and installation engineering for the construction and operation of biogas plants ○ collect extensive practical experience in the relevant laboratory analysis ○ become able to plan facility projects and assess their profitability. Students should be able to: ○ classify types of energies according to their performance classes; estimate the future demand for energy according to the tertiary sectors; ○ calculate the costs of various generating plants and transport systems; ○ to see through the structures of energy markets, in particular those from liberalized markets; ○ recognize the relationship between ecology and economy; get to know economic dimensions of today's environmental policy; ○ discuss dimensions (mass and energy balances, market prices); ○ evaluation of emission certificates in annual financial statements and/or in the tax balance sheet; develop and understand trading strategies

Course	D7106
Name	Regenerative Energy and Material Sciences / Recycling / Biomass
Instructor	Prof. Dr. rer. nat. Robert Geigenfeind
Module	D-25 Energy Technology and Trade
Curriculum	Mechanical Engineering (Bachelor)
Major	Energy Technology / Industrial and Building Systems
Semester	7
Semester hours	6
Credit Points (ECTS)	6
Time Distribution	180h: 90h Presentation and lecture, 70h Preparation and follow-up, 20h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Tuition in seminars / lab work
Media	Blackboard, supplementary lecture material provided on PC network, lab work, excursion
Literature	---
Responsible Course Supervisor	Prof. Dr. rer. nat. Robert Geigenfeind
Course Contents	Regenerative Energy and Material Sciences: o water power plants, solar energy, wind energy, geothermal energy o future prospects in energy supply Recycling: o overview of recycling methods and disposal systems o knowledge of the technical processes o setting-up of material / energy balances o development of disposal concepts Biomass: o potential use of biogas, o biological process engineering o microscopy of bacteria, determination of the concentration of dry matter and fatty acids o establishment and operation of a biogas plant o profitability of biogas plants

Course	D7107
Name	Energy Industry / Emissions trading
Instructor	Prof. Dr. Birgit. Eitel, Dipl.-Ing. Erich Maurer
Module	D-25 Energy Technology and Trade
Curriculum	Mechanical Engineering (Bachelor)
Major	Energy Technology / Industrial and Building Systems
Semester	7
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 20h Preparation and follow-up, 10h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice, independent study
Media	Blackboard, projector, supplementary lecture material provided on PC network, lab work
Literature	---
Responsible Course Supervisor	Prof. Dr. rer. nat. Robert Geigenfeind
Course Contents	○ fundamental terms relating to energy and the energy industry ○ development of energy consumption according to sectors: national and international ○ energy – calculation of probability ○ legal fundamentals of the energy industry ○ liberalized energy market for electricity and gas ○ economic evaluation of damages to the environment and environmental goods, environmental policy instruments for the implementation of environmental goals, dos and don'ts, duties and certificates ○ examples of application: EU-wide and worldwide emissions trading, legal fundamentals, implementation of the EU Emissions Trading Directive, implementation of the UN Framework Convention on Climate Change , fusion of different emissions trading

Module	D-26
Module Name	Systems Engineering
Module Block (LV)	D7108 Process Engineering D7109 Building Services Technology
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	Energy Technology / Industrial and Building Systems
Credit Points (ECTS)	8
Evaluation Method	Cumulative module test: 90 minute written exam or 30 minute oral exam
Professor	Prof. Dr.-Ing. Klaus Nitsche, M.Sc.
Prerequisites	D4108 Technical Thermodynamics
Educational Objectives	○ On the basis of the principles of material transmission and the analogy of heat transfer, students should obtain a reliable basis of the understanding of the construction and operation of engineering equipment and machines. ○ They should gain an overview of the established methods and processes in methods and environmental engineering. They should be able to model simple systems and analyze their performance; whereby, simulations on the computer will also come into play. ○ Students should gain insight into the planning and design principles of technical building services in the field of heating, ventilation and air-conditioning systems, whereby particular emphasis will be placed on holistic aspects of and interfaces to other disciplines within the scope of planning processes. A central role in equipping futuristic buildings with technical machinery and equipment is the rational use of energy in conjunction with optimal technical equipment in order to achieve lower investment and operating costs.

Course	D7108
Name	Process Engineering
Instructor	Dipl.-Ing. Wietzke, Dipl.-Ing. Andreas Grasmann
Module	D-26 Systems Engineering
Curriculum	Mechanical Engineering (Bachelor)
Major	Energy Technology / Industrial and Building Systems
Semester	7
Semester hours	4
Credit Points (ECTS)	4
Time Distribution	120h: 60h Presentation and lecture, 50h Exercises at home/in lab, 10h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice, independent study
Media	Presentation on beamer, blackboard, supplementary lecture material provided on PC network
Literature	---
Responsible Course Supervisor	Prof. Dr.-Ing. Klaus Nitsche, M.Sc.
Course Contents	○ introduction, definition of fundamental concepts (machine, equipment, procedure, unit operations, batch processing and continuous processing), process flow diagram ○ principles of mass transfer and the analogy between matter and heat transfer ○ mechanical methods of surface enlargement, fluid separation, separation of solid mixtures, material connections ○ thermal methods of solid separation and separation of fluids, introduction to chemical reaction engineering ○ creation of energy and material balances of simple systems with concentrated parameters, modeling with differential equations ○ essential features of the computer simulation of simple engineering processes

Course	D7109
Name	Building Services Technology
Instructor	Peter Schöftenhuber, Stefan Frisch
Module	D-26 Systems Engineering
Curriculum	Mechanical Engineering (Bachelor)
Major	Energy Technology / Industrial and Building Systems
Semester	7
Semester hours	4
Credit Points (ECTS)	4
Time Distribution	120h: 60h Presentation and lecture, 45h Homework, 15h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Seminar instruction and practice, independent study and eLearning
Media	Presentation on beamer, blackboard, supplementary lecture material provided on PC network
Literature	---
Responsible Course Supervisor	Prof. Dr.-Ing. Klaus Nitsche, M.Sc.
Course Contents	○ tasks and accomplishments of supply engineering ○ Official Scale of Fees for Services by Architects and Engineers (HOAI) ○ heating systems requirements, systems, heat generators, burners, safety technology, exhaust systems, heating systems, space heating radiators, domestic water heating, calculating of design, investment and operation costs ○ ventilation and air-conditioning technology (HVAC), HVAC systems, Mollier diagram, components of HVAC systems, air distribution, air conveyance, design, structural measures, chilled ceiling systems and active storage systems, investment and operation costs ○ refrigeration technology ○ compression and absorption refrigeration process, components, refrigerants, water recooling, regenerative cooling, cold storage, structural measures

Module	D-27
Module Name	Metals Technology
Module Block (LV)	D7110 Material Selection (Metal) D7111 Material Analysis und Microscopy D7112 Welding Technology
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	Metals and Plastics Technology
Credit Points (ECTS)	10
Evaluation Method	The final grade of the module is based on the grades of each individual module weighted according to the corresponding ECTS points.
Professor	Prof. Dr.-Ing. Thomas Petersmeier
Prerequisites and Recommended Previous Learning	D-08 Principles of Materials
Educational Objectives	○ knowledge of the microstructure of various metallic materials ○ assessment of the influence of various heat treatments on structures and the mechanical properties of various metallic materials ○ assessment of the correlation between microstructure and areas of application ○ knowledge of the effect of strength mechanisms ○ classification of metallic materials with respect to structure and application ○ knowledge of the function and areas of application of each welding process ○ advantages and disadvantages of each welding process ○ error evaluation and its assessment on welding ○ assessment and evaluation of microstructural changes of various metallic materials during welding and their effect on mechanical properties ○ suitability of welding of various metallic materials

Course	D7110
Name	Material Selection (Metal)
Instructor	Prof. Dr.-Ing. Thomas Petersmeier
Module	D-27 Metals Technology
Curriculum	Mechanical Engineering (Bachelor)
Major	Metals and Plastics Technology
Semester	7
Semester hours	4
Credit Points (ECTS)	4
Time Distribution	120h: 60h Presentation and lecture, 30h Independent study, 30h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice
Media	Blackboard, overhead projector, and projector
Literature	Berns H., Scheer L. (1980), *Was ist Stahl?*, 15. Aufl., Springer, Berlin Schulze G., Krafka H., Neumann P. (1996), *Schweißtechnik*, 2. Aufl., VDI, Düsseldorf Jäniche W. (1985), *Werkstoffkunde Stahl, Bd. 1+2*, Springer, Berlin
Responsible Course Supervisor	Prof. Dr.-Ing. Thomas Petersmeier
Course Contents	○ structural constitution ○ heat treatment and properties of steel ○ mild steels – not intended for heat treatment ○ mild steels – intended for heat treatment ○ tool steels ○ chemical-resistant steels ○ heat-resistant steels

Course	D7111
Name	Material Analysis und Microscopy
Instructor	Prof. Dr.-Ing. Thomas Petersmeier
Module	D-27 Metals Technology
Curriculum	Mechanical Engineering (Bachelor)
Major	Metals and Plastics Technology
Semester	7
Semester hours	4
Credit Points (ECTS)	4
Time Distribution	120h: 60h Presentation and lecture, 30h Independent study, 30h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice
Media	Blackboard, overhead projector, and projector
Literature	Schumann H. (1991), *Metallographie*, 13. Aufl., Dt. Verlag für Grundstoffindustrie, Stuttgart Schatt W., Blukmenauer H. (2003), *Werkstoffwissenschaft*, 9. Aufl., Wiley-VCH, Weinheim Askeland D.R. (1996), *Materialwissenschaften*, Spektrum, Heidelberg Lange G. (1997), *Systematische Beurteilung technischer Schadensfälle*, 4. Aufl., DGM, Oberursel (1997) *Erscheinungsformen von Rissen und Brüchen metallischer Werkstoffe*, 2. Aufl., Stahleisen, Düsseldorf
Responsible Course Supervisor	Prof. Dr.-Ing. Thomas Petersmeier
Course Contents	○ metallographic processes ○ light microscopy and scanning electron microscopy of metallic materials ○ forms of fractures of metallic materials

Course	D7112
Name	Welding Technology
Instructor	Prof. Dr.-Ing. Thomas Petersmeier
Module	D-27 Metals Technology
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	7
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 15h Independent study, 15h Test preparation
Exam Accreditation	Performance evaluation (see study plan), 90 minute written exam or 30 minute oral exam
Final Grade Accumulation	Written exam worth 100% of final grade or oral exam worth 100% of final grade
Language	German
Lesson Format	Seminar instruction and practice
Media	Blackboard, overhead projector, and projector
Literature	Schulze G., Krafka H., Neumann P. (1996), *Schweißtechnik*, 2. Aufl., VDI, Düsseldorf Boese U. (1995), *Das Verhalten der Stähle beim Schweißen Teil 1 und 2*, 4. Aufl., DVS Media, Düsseldorf Fahrenwaldt H.J. (1994), *Schweißtechnik*, 3. Aufl., Vieweg, Braunschweig Schulze G. (2004), *Die Metallurgie des Schweißens*, 3. Aufl., Springer, Berlin Ruge J. (1991), *Handbuch der Schweißtechnik*, 3. Aufl., Springer, Berlin
Responsible Course Supervisor	Prof. Dr.-Ing. Thomas Petersmeier
Course Contents	○ introduction to welding technology ○ gas welding ○ arc welding by hand and power sources ○ gas-shielded welding ○ sub-merged arc welding ○ weldability ○ suitability of steels for welding and the impact of a heat source ○ heat-affected zone ○ non-alloyed, low carbon steels ○ fine-grained steels ○ higher carbon steels ○ heat-resistant steels ○ corrosion-resistant steels

Module	D-28
Module Name	Plastics Technology
Module Block (LV)	D7113 Plastics Processing Technology 1 (Injection Molding & Tool Manufacture) D7114 Plastics Processing Technology 2 (Extrusion Technology)
Major	Mechanical Engineering (Bachelor)
Credit Points (ECTS)	6
Evaluation Method	Cumulative module test: 90 minute written exam or 30 minute oral exam
Professor	Prof. Dr. rer. nat. Robert Geigenfeind
Prerequisites	Knowledge regarding the structure of matter and concepts of bonding in molecules
Educational Objectives	○ becoming familiar with the typical methods of plastic processing, injection molding and extrusion ○ becoming familiar with the basics of tool making

Course	D7113
Name	Plastics Processing Technology 1 (Injection Molding & Tool Manufacture)
Instructor	Dipl.-Ing. Kurt Jander
Module	D-28 Plastics Technology
Curriculum	Mechanical Engineering (Bachelor)
Major	Metal and Plastics Technology
Semester	7
Semester hours	4
Credit Points (ECTS)	4
Time Distribution	120h: 60h Presentation and lecture, 40h Independent study, 20h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Tuition in seminars, practical exercises
Media	Blackboard, overhead projector, and projector
Literature	Schwarz O., Ebeling E.-W., Furth B (1999), *Kunststoffverarbeitung*, 8. Aufl., Vogel, Würzburg Schwarz O. (2000), *Kunststoffkunde*, 6. Aufl., Vogel, Würzburg Michaeli W. (1999), *Introduction in die Kunststoffverarbeitung*, 4. Aufl., Hanser, München Elias H.G. (1999), *Makromoleküle, Band 1+2*, 6. Aufl., Wiley-VCH, Weinheim
Responsible Course Supervisor	Prof. Dr. rer. nat. Robert Geigenfeind
Course Contents	○ assembly and functionality of an injection molding machine ○ course of the procedure ○ influence of the parameters of a procedure on the plastic component ○ analysis of injection molding errors ○ concepts of tool making ○ cost considerations in tool making and injection molding

Course	D7114
Name	Plastics Processing Technology 2 (Extrusion Technology)
Instructor	Dipl.-Ing. Anton Kreiner
Module	D-28 Plastics Technology
Curriculum	Mechanical Engineering (Bachelor)
Major	Metals and Plastics Technology
Semester	7
Semester hours	2
Credit Points (ECTS)	2
Time Distribution	60h: 30h Presentation and lecture, 20h Independent study, 10h Test preparation
Exam Accreditation	See module
Final Grade Accumulation	See module
Language	German
Lesson Format	Tuition in seminars, practical exercises
Media	Blackboard, overhead projector / projector
Literature	Schwarz O., Ebeling E.-W., Furth B (1999), *Kunststoffverarbeitung*, 8. Aufl., Vogel, Würzburg Schwarz O. (2000), *Kunststoffkunde*, 6. Aufl., Vogel, Würzburg Michaeli W. (1999), *Introduction in die Kunststoffverarbeitung*, 4. Aufl., Hanser, München Elias H.G. (1999), *Makromoleküle, Band 1+2*, 6. Aufl., Wiley-VCH, Weinheim
Responsible Course Supervisor	Prof. Dr. rer. nat. Robert Geigenfeind
Course Contents	○ assembly and functionality of an extruder ○ course of the procedure ○ influence of the parameters of a procedure on the plastic component ○ cost considerations in extrusion ○ various processing methods (extrusion blow molding)

Module	D-29
Module Name	Bachelor Module
Module Block (LV)	D7101 Bachelor's Thesis D7102 Bachelor Seminar
Assignment of Curriculum	Mechanical Engineering (Bachelor)
Major	General
Credit Points (ECTS)	14
Evaluation Method	Evaluation by two different reviewers, final decision made by the examination board
Professor	Prof. Dr.-Ing. Karl Hain
Prerequisites	---
Educational Objectives	Under guidance of a supervisor, students should acquire the ability to work independently and document a complex, practical problem in the field of mechanical engineering using scientific engineering methods within a given time frame.

Course	D7101
Name	Bachelor's Thesis
Instructor	----
Module	D-29 Bachelor Module
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	7
Semester hours	Assistance from advisor: 0.2 semester hours per week
Credit Points (ECTS)	12
Time Distribution	360h
Exam Accreditation	Written thesis, no oral exam
Final Grade Accumulation	See course description
Language	German, upon agreement with advisor, thesis may also be written in English
Lesson Format	Independent work
Media	----
Literature	Subject specific
Responsible Course Supervisor	Prof. Dr.-Ing. Karl Hain
Course Contents	Theoretical and / or experimental work to solve practical problems

Course	D7102
Name	Bachelor Seminar
Instructor	Prof. Dr.-Ing. Karl Hain
Module	D-29 Bachelor Module
Curriculum	Mechanical Engineering (Bachelor)
Major	General
Semester	7
Semester hours	1
Credit Points (ECTS)	2
Time Distribution	30h
Exam Accreditation	Oral exam of 20 minutes (presentation), written exam (poster)
Final Grade Accumulation	Presentation on final thesis: 50%; poster: 50%
Language	German
Lesson Format	Seminar
Media	Lectures; presentations using projector
Literature	Eco, U. (2007), *Wie man eine wissenschaftliche Abschlussarbeit schreibt*, 12. Aufl., UTB Heidelberg Von Werder, L. (1995), *Grundkurs des wissenschaftlichen Schreibens*, Schibri-Verlag, Milow (Uckerland)
Responsible Course Supervisor	Prof. Dr.-Ing. Karl Hain
Course Contents	○ preparation of the drafting of a Bachelor's thesis ○ structure and writing of a scientific paper ○ presentations, discussions and evaluation of work progress ○ final presentation and preparation of a poster