Course Handbook Mechanical and Process Engineering Bachelor

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Head of Studies	Prof. Dr. Bernd Heidemann
Deputy Head of Studies	Prof. Dr. Jürgen Griebsch
Chairman of Examination	Prof. Dr.-Ing. Christian Gierend
Deputy Chairman of Examination	Prof. Dr. Marco Günther

Qualifikation Goals of Study Programme

Mechanical and Process Engineering Bachelor - mandatory courses (overview)

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Additive Manufacturing and Generative Design	MAB_19_IP_5.03.AGF	P241-0225, P241-0226	5	1V+1P	2	Prof. Dr. Jürgen Griebsch
Applying for an Engineering Job	MAB_19_A_3.03.AEJ	P241-0229	3	1SU	1	Prof. Dr. Christine Sick
Applying of Numerical Methods	MAB_19_A_4.01.ANM	P241-0228	4	2V+2U	5	Prof. Dr. Marco Günther
Automation Technology in Mechanical Engineering	MAB_19_M_5.17.AUM	P241-0230, P241-0231	5	3V+1LU	5	Prof. Dr.-Ing. Michael Sauer, M.Sc.
Automation Technology in Process Engineering	MAB_19_V_5.16.AUV	P241-0232, P241-0233	5	3V+1LU	5	Prof. Dr.-Ing. Michael Sauer, M.Sc.
Bachelor Thesis (12) and Colloquium (3)	MAB_19_A_6.02.BAK	T241-0234	6	-	15	Studienleitung
Business English for Mechanical Engineers	MAB_19_A_1.05.BEM	P241-0238	1	2S	2	Prof. Dr. Christine Sick
CAD 3D Modeling	MAB_19_A_2.01.CAD	P241-0224	2	2V+2P	4	Prof. Dr. Bernd Heidemann

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Design Project in English	MAB_19_PE_5.12.DPE	P241-0239, P241-0240	5	2PA+1S	3	Prof. Dr. Bernd Heidemann
Dimensioning Components	MAB_19_M_3.06.BTD	P241-0235	3	3SU+1U	5	Prof. Dr.-Ing. Ramona Hoffmann
Electrical Engineering für Mechanical Engineering und Process Engineering	MAB_19_A_2.07.ELT	P241-0241, P241-0242	2	2V+1U+1LU	5	Prof. Dr.-Ing. Michael Sauer, M.Sc.
Energy Efficiency and Sustainability	MAB_19_V_4.09.EEN	P241-0243	4	2V+1U+1P	5	Prof. Dr.-Ing. Michael Sauer, M.Sc.
Engineering Basics	MAB_19_A_1.07.ENB	P241-0244, P241-0245	1	1V+3P	5	Studienleitung
Engineering Design (with Project)	MAB_19_M_4.04.MK2	P241-0259	4	1SU+3PA	5	Prof. Dr. Bernd Heidemann
Engineering Fluid Mechanics, Piston Engines, Compressors and Turbines	MAB_19_A_3.04.SKS	P241-0285	3	3V+1U	5	Prof. Dr. Marco Günther
Engineering Mechanics - Kinetics	MAB_19_M_3.07.TMK	P241-0283	3	4V	5	Prof. Dr.-Ing. Heike Jaeckels
Engineering Mechanics - Statics	MAB_19_A_1.02.TMS	P241-0284	1	2V+2S	5	Prof. Dr.-Ing. Heike Jaeckels
Environmental and Bioprocess Engineering (with Lab Course)	MAB_19_V_4.08.BUV	P241-0236, P241-0237	4	3V+1P	5	Prof. Dr. Timo Gehring
Environmental Process Technology and Circular Economies	MAB_19_V_5.13.UVK	P241-0289	5	4V+1LU	6	Prof. Dr. Timo Gehring

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Fundamental Elements of Plant Construction	MAB_19_V_3.10.GEA	P241-0252	3	3V+1U	5	Prof. Dr. Bernd Heidemann
Fundamentals of Biotechnology	MAB_19_V_3.08.GBT	P241-0254	3	4V	5	Prof. Dr. Timo Gehring
Fundamentals of Chemistry (with Lab Course)	MAB_19_V_3.09.GCL	P241-0255, P241-0256	3	3V+1P	5	Dr. Patrick Maurer
Fundamentals of Product Development	MAB_19_PE_5.08.GPE	P241-0257	5	2SU	2	Prof. Dr. Bernd Heidemann
Heat Transfer and Fluid Mechanics	MAB_19_A_4.02.WFL	P241-0290	4	3V+1U+1P	5	Prof. Dr. Marco Günther
Joining Techniques with Integrated Lab Course	MAB_19_IP_5.04.FML	P241-0248, P241-0249	5	1V+1P	3	Prof. Dr. Jürgen Griebsch
Machine Dynamics	MAB_19_M_4.05.MDY	P241-0266	4	4V	5	Prof. Dr.-Ing. Heike Jaeckels
Machine Elements and Design 1	MAB_19_M_3.05.MK1	P241-0267	3	3SU+1U	5	Prof. Dr. Bernd Heidemann
Machine Tools - Advanced Aspects	MAB_19_IP_5.06.VWZ	P241-0201, P241-0203	5	1V+1P	3	Prof. Dr. Jürgen Griebsch
Manufacturing Process Technology (with Lab Course)	MAB_19_A_2.02.TFL	P241-0286, P241-0287	2	3V+1U+1LU	5	Prof. Dr. Jürgen Griebsch
Manufacturing Project in English (1)	MAB_19_IP_5.07.MPE	P241-0264, P241-0265	5	2PA+1S	3	Prof. Dr. Jürgen Griebsch
Materials Science with Lab Exercises	MAB_19_A_1.03.WSK	P241-0206, P241-0291	1	4V+1P	5	Prof. Dr. Moritz Habschied

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Mathematics 1	MAB_19_A_1.04.MA1	P241-0271	1	2V+2U	5	Prof. Dr. Marco Günther
Mathematics 2	MAB_19_A_2.04.MA2	P241-0002	2	2V+2U	5	Prof. Dr. Marco Günther
Physical Process Engineering with Practical Case Studies	MAB_19_V_4.10.PVT	P241-0273, P241-0274	4	4V	5	Prof. Dr. Matthias Faust
Plant Planning and Project Execution	MAB_19_V_4.11.APP	P241-0099, P241-0376	4	4V	5	Prof. Dr. Matthias Faust
Principles of Engineering Drawing and the Representation of Machine Elements (with Machine Analysis Lab)	MAB_19_A_1.01.MDM	P241-0269, P241-0270	1	2SU+1U+1P	5	Prof. Dr. Bernd Heidemann
Process Engineering Project in English (1)	MAB_19_V_5.15.PEP	P241-0276, P241-0277	5	2PA+1S	3	Prof. Dr.-Ing. Christian Gierend
Production and Quality Management	MAB_19_IP_5.05.MST	P241-0278, P241-0279	5	2V+1P	3	Prof. Dr. Jürgen Griebsch
Production-Optimized Component Design	MAB_19_M_4.07.FBG	P241-0246	4	2V+1PA	3	Prof. Dr. Bernd Heidemann
Project Management and Business Economics	MAB_19_M_4.06.PMB	P241-0280	4	2V	2	Prof. Dr.-Ing. Christian Köhler
Technical Communication and Documentation	MAB_19_A_1.06.TKD	P241-0282	1	1V+1U	2	Prof. Dr. Bernd Heidemann
Technical English for Mechanical Engineers and Professional Presentations	MAB_19_A_2.06.TEM	P241-0281	2	2S	2	Prof. Dr. Christine Sick

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
The Finite Element Method (FEM)	MAB_19_PE_5.11.FEM	P241-0247	5	1SU+1P	2	Prof. Dr.-Ing. Ramona Hoffmann
Work Experience Phase	MAB_19_A_6.01.PRA	S241-0275	6	1SU	15	Studienleitung

(44 modules)

Mechanical and Process Engineering Bachelor - optional courses (overview)

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
CAX Basics and Applications	MAB_19_4.2.1.38	P223-0006	3	2V+2U	5	Prof. Dr.-Ing. Pascal Stoffels
Digital Skills for Engineers	MAB_19_4.2.1.35	P213-0187	5	2V+2P	5	Andreas Schaffhauser, M.Sc.
Experimental Performance Characterization of Solar Thermal Systems	MAB_19_4.2.6.16	P241-0400	-	1V+3P	5	Prof. Dr. Marc Deissenroth-Uhrig
Interfacial Process Engineering and Fuel Cell Technology	MAB_19_4.2.1.34	P241-0404	4	2SU	3	Prof. Dr. Matthias Faust
Kinematic Principles of Robotics	MAB_19_4.2.1.39	P221-0197	5	3V+1U	5	Prof. Dr. Michael Kleer
Oral and General Presentation Skills in the	MAB_19_.4.2.1.31		-	1V+1U	2	Studienleitung

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Engineering Sciences						
Practising English Online with a Tandem Partner	MAB_19_4.2.1.32	P241-0399	-	-	1	Prof. Dr. Christine Sick
Preparing for the IELTS Test	MAB_19_2.1.2.24	P213-0041	-	2VU	2	Prof. Dr. Christine Sick
The Impact of Gender and Diversity on Careers and Studies	MAB_19_4.2.1.31	P241-0411	-	2V+2S	5	Sandra Wiegand, M.A.
The Impact of Gender and Diversity on Careers and Studies (Submodule)	MAB_19_4.2.1.37	P213-0188	-	-	3	Sandra Wiegand, M.A.

(10 modules)

Mechanical and Process Engineering Bachelor - mandatory courses

Additive Manufacturing and Generative Design

Module name (EN): Additive Manufacturing and Generative Design
Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019
Module code: MAB_19_IP_5.03.AGF
Hours per semester week / Teaching method: 1V+1P (2 hours per week)
ECTS credits: 2

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 90 min.

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_IP_5.03.AGF (P241-0225, P241-0226) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 5, mandatory course, Specialization Industrial Production

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_2.01.CAD CAD 3D Modeling
MAB_19_A_2.02.TFL Manufacturing Process Technology (with Lab Course)
MAB_19_M_4.07.FBG Production-Optimized Component Design

[*updated 06.04.2020*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Jürgen Griebsch

Lecturer:
M.Eng. Tobias Häfele

[*updated 06.04.2020*]

Learning outcomes:
After successfully completing this part of the module, students will be familiar with additive manufacturing technologies and be able to apply their knowledge about it.
They will be familiar with the typical fields of application for different procedures and also their limits.
Students will be proficient in the production-ready design (CAD; bionic principles) of components manufactured using an additive process. They will be able to evaluate the feasibility of existing designs or drawings and to recognize cost drivers of generative manufacturing processes and thus, to name the most economically reasonable production method for components.

[*updated 05.11.2020*]

Module content:
Introduction to additive manufacturing / basic concepts and terms
- Introductions to the various technologies and areas of application
- Visits to view selected processes within the htw saar
- Specialization laser-sintering technology (plastics)
- Introduction to RP Software
- Effects of additive manufacturing on the product development process
- Production-oriented design for additive manufacturing processes
- Feasibility study
- Profitability calculation
- Quality considerations

[*updated 05.11.2020*]

Teaching methods/Media:
Instruction with practically-oriented exercise segments, laboratory in small groups

[*updated 05.11.2020*]

Recommended or required reading:
[1] Gebhardt A.; Additive Fertigungsverfahren _ Additive Manufacturing und 3D-Drucken für Prototyping _ Tooling _ Produktion; Hanser Verlag; 2016
[2] Breuninger J., Becker R., Wolf A., Rommel S.; Generative Fertigung mit Kunststoffen; Springer Verlag; 2013
[3] Gibson I., Rosen D., Stucker B.; Additive Manufacturing Technologies _ 3D-Printing, Rapid Prototyping, and Direct Digital Manufacturing

[*updated 05.11.2020*]

Applying for an Engineering Job

Module name (EN): Applying for an Engineering Job

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_3.03.AEJ

Hours per semester week / Teaching method:
1SU (1 hour per week)

ECTS credits:
1

Semester: 3

Mandatory course: yes

Language of instruction:
English/German

Assessment:
Written exam 70 min.

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_A_3.03.AEJ (P241-0229) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course
MAB_24_A_3.03.AEJ Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 3, mandatory course

Workload:
15 class hours (= 11.25 clock hours) over a 15-week period.
The total student study time is 30 hours (equivalent to 1 ECTS credits).
There are therefore 18.75 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.05.BEM Business English for Mechanical Engineers
MAB_19_A_2.06.TEM Technical English for Mechanical Engineers and Professional Presentations

[*updated 18.02.2020*]

Recommended as prerequisite for:
MAB_19_IP_5.07.MPE Manufacturing Project in English (1)
MAB_19_PE_5.12.DPE Design Project in English
MAB_19_V_5.15.PEP Process Engineering Project in English (1)

[*updated 18.02.2020*]

Module coordinator:
Prof. Dr. Christine Sick

Lecturer: Prof. Dr. Christine Sick

[*updated 28.05.2018*]

Learning outcomes:
The modules _Business English for Mechanical Engineers_, _Technical English for Mechanical Engineers and Professional Presentations_, _Applying for an Engineering Job_ and _Design / Manufacturing / Process Engineering Project in English_ should be seen in conjunction with one another. They offer students a framework to further develop their English language skills in a professionally related area from the desired entry level B1 to level B2.

The _Applying for an Engineering Job_ module focuses on the skills required for successfully applying for jobs in an international context.

After successfully completing this module, students will be familiar with the differences between application procedures in Germany and in the English speaking world. They will be able to describe the various professional fields that are suitable for them as graduates of the Bachelor´s program and will be able to write their own profile. They will be able to understand English-language job advertisements and will be able to apply for a job in English with an international company for the practical study phase or after graduation as

an engineer. Students will be able to prepare appropriate application documents, i.e. CV and cover letter, and apply strategies for job interviews (face to face and on the phone). In doing so, they will be able to take cultural differences into account.

[*updated 05.10.2020*]

Module content:
- Describing typical occupational fields in mechanical and process engineering
- Describing one´s own profile, with professional background, professional knowledge and skills, as well as soft skills
- Reading and analyzing job advertisements
- Writing an application letter and tailoring it to the respective job advertisement
- Writing a resume
- Preparing for job interviews (face to face and on the phone) and training for them through role playing

[*updated 05.10.2020*]

Teaching methods/Media:
Learning objectives will be achieved through integrated training of the four basic skills (listening comprehension, reading comprehension, speaking and writing) in relevant communication situations supported by multimedia, as well as the repetition of basic grammar and vocabulary.

Target group-specific teaching/learning materials (print, audio, video), as well as multimedia CALL and e&mLearning materials will be used.

[*updated 05.10.2020*]

Recommended or required reading:
Students will receive a list of recommended teaching and learning materials.

The following materials are free of charge for students of the htw saar. We recommend their use for independent learning:

Christine Sick (2015): TechnoPlus Englisch VocabApp (Mobile-Learning-Angebot insbesondere zum Grundwortschatz, alle Niveaustufen), EUROKEY.

Christine Sick, unter Mitarbeit von Miriam Lange (2011): TechnoPlus Englisch 2.0 (Multimediales Sprachlernprogramm für Technisches und Business Englisch, Niveau B1-B2+), EUROKEY.

Christine Sick, unter Mitarbeit von Lisa Rauhoff und Miriam Wedig (seit 2016): Online Extensions zu TechnoPlus Englisch, EUROKEY.
m&eLanguageLearningPortal@CAS

[*updated 05.10.2020*]

Applying of Numerical Methods

Module name (EN): Applying of Numerical Methods

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_4.01.ANM

Hours per semester week / Teaching method:
2V+2U (4 hours per week)

ECTS credits:
5

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 120 min.

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_A_4.01.ANM (P241-0228) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course
MAB_24_A_4.01.ANM Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 4, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_3.01.MA3

[*updated 10.03.2020*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Marco Günther

Lecturer: Prof. Dr. Marco Günther

[*updated 28.05.2018*]

Learning outcomes:
After successfully completing this module, students will be familiar with important topics and application examples of numerical computing. They will be able to implement simple algorithms using the calculation tool Octave/Matlab and solve simple problems numerically. Students will understand central solution approaches from selected topics in numerical mathematics.

[*updated 05.11.2020*]

Module content:
Numerical methods for solving linear systems of equations with application examples in engineering, Numerical methods for solving nonlinear equations, Octave/Matlab on the computer, Interpolation (polynomial, spline interpolation), Equalization calculation, Numerical differentiation and integration, Numerical treatment of ordinary differential equations (initial value problems, boundary value problems), Introduction to Simulink on the computer (dynamic systems).

[*updated 05.11.2020*]

Teaching methods/Media:
Lecture, integrated exercises, exercises for self-study;
Computer lab, interactive tablet, transparencies, exercises

[*updated 05.11.2020*]

Recommended or required reading:
A. Bosl: Einführung in Matlab/Simulink
O. Beucher: Matlab und Simulink
M. Knorrenschild: Numerische Mathematik
H.R. Schwarz, N. Köckler: Numerische Mathematik

[*updated 05.11.2020*]

Automation Technology in Mechanical Engineering

Module name (EN): Automation Technology in Mechanical Engineering

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_M_5.17.AUM

Hours per semester week / Teaching method:
3V+1LU (4 hours per week)

ECTS credits:
5

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 120 min. and lab evaluation (ungraded) (report)

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_M_5.17.AUM (P241-0230, P241-0231) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 5, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.04.MA1 Mathematics 1
MAB_19_A_2.04.MA2 Mathematics 2
MAB_19_A_2.07.ELT Electrical Engineering für Mechanical Engineering und Process Engineering

[*updated 05.03.2020*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr.-Ing. Michael Sauer, M.Sc.

Lecturer:
Prof. Dr.-Ing. Michael Sauer, M.Sc.

[*updated 05.03.2020*]

Learning outcomes:
After successfully completing this course, students will be able to handle, use and apply programmable logic controllers as well as system-theoretical methods for solving practice-oriented control and regulation tasks in the field of mechanical engineering. They will be able to select controllers and their settings in a practice-oriented manner. Students will be familiar with the problems involved in selecting and setting control loops. Introduction of modern tools for problem solving, modeling and simulating automation tasks.

[*updated 05.11.2020*]

Module content:
- Boolean algebra and switching functions
- Implementing switching functions and their simplification
- Sequential control systems
- Design and functionality of control systems
- introduction to control eingineering
- Transfer functions
- The static and dynamic behavior of control loops
- Control loop elements and system behavior
- PID controller and derivable types
- Tuning rules, optimization, experimental analysis
- Modified control loop structures
- Stability considerations
- Introduction to simulation tools for control loop design

[*updated 05.11.2020*]

Teaching methods/Media:
Lecture with integrated exercises, lab experiments in small groups

[*updated 05.11.2020*]

Recommended or required reading:
Lutz/Wendt: Taschenbuch der Regelungstechnik,
Schneider: Praktische Regelungstechnik,
Wellenreuther/Zastrow: Automatisieren mit SPS - Theorie und Praxis

[*updated 05.11.2020*]

Automation Technology in Process Engineering

Module name (EN): Automation Technology in Process Engineering

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_V_5.16.AUV

Hours per semester week / Teaching method:
3V+1LU (4 hours per week)

ECTS credits:
5

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 120 min. and lab evaluation (ungraded) (Report)

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_V_5.16.AUV (P241-0232, P241-0233) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 5, mandatory course, Specialization Process Engineering
UI-T-AUV (P241-0232, P241-0233) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 5, mandatory course, technical
UI-T-AUV (P241-0232, P241-0233) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 5, mandatory course, technical

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.04.MA1 Mathematics 1
MAB_19_A_2.04.MA2 Mathematics 2
MAB_19_A_2.07.ELT Electrical Engineering für Mechanical Engineering und Process Engineering

[*updated 05.03.2020*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr.-Ing. Michael Sauer, M.Sc.

Lecturer:
Prof. Dr.-Ing. Michael Sauer, M.Sc.

[*updated 05.03.2020*]

Learning outcomes:
After successfully completing this course, students will be able to handle, use and apply programmable logic controllers as well as system-theoretical methods for solving practice-oriented control and regulation tasks in the field of process engineering. They will be able to select controllers and their settings in a practice-oriented manner. Students will be familiar with the problems involved in selecting and setting control loops. Introduction of modern tools for problem solving, modeling and simulating automation tasks.

[*updated 05.11.2020*]

Module content:
_ Boolean algebra and switching functions
_ Implementing switching functions and their simplification
_ Sequential control systems
_ Design and functionality of control systems
_ introduction to control eingineering
_ Transfer functions
_ The static and dynamic behavior of control loops
_ Control loop elements and system behavior
_ PID controllers and derivable types
_ Tuning rules, optimization, experimental analysis
_ Modified control loop structures
_ Stability considerations
_ Introduction to simulation tools for control loop design

[*updated 05.11.2020*]

Teaching methods/Media:
Lecture with integrated exercises, lab experiments in small groups

[*updated 05.11.2020*]

Recommended or required reading:
Lutz/Wendt: Taschenbuch der Regelungstechnik,
Schneider: Praktische Regelungstechnik,
Wellenreuther/Zastrow: Automatisieren mit SPS - Theorie und Praxis

[*updated 05.11.2020*]

Bachelor Thesis (12) and Colloquium (3)

Module name (EN): Bachelor Thesis (12) and Colloquium (3)

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_6.02.BAK

Hours per semester week / Teaching method:
-

ECTS credits:
15

Semester: 6

Mandatory course: yes

Language of instruction:
German

Assessment:
Bachelor thesis and colloquium

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_A_6.02.BAK (T241-0234) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 6, mandatory course

Workload:
The total student study time for this course is 450 hours.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Studienleitung

Lecturer:
Professoren HTW

[*updated 18.02.2020*]

Learning outcomes:

After successfully completing this module, students will be able to work work on complex mechanical engineering tasks in an industrial or scientific environment.
They will be able to present their approach, solutions and results using scientific methods.

[*updated 05.10.2020*]

Module content:
- Solving mechanical engineering and related tasks scientifically
- Project-related application of different principles in their interaction
- Consolidation and further development of theoretical knowledge

[*updated 05.10.2020*]

Recommended or required reading:
Depends on topic

[*updated 05.10.2020*]

Business English for Mechanical Engineers

Module name (EN): Business English for Mechanical Engineers

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_1.05.BEM

Hours per semester week / Teaching method:
2S (2 hours per week)

ECTS credits:
2

Semester: 1

Mandatory course: yes

Language of instruction:
English/German

Assessment:
Written exam 120 min.

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_A_1.05.BEM (P241-0238) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 1, mandatory course
MAB_24_A_1.05.BEM Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 1,

mandatory course

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
MAB_19_A_2.06.TEM Technical English for Mechanical Engineers and Professional Presentations
MAB_19_A_3.03.AEJ Applying for an Engineering Job
MAB_19_IP_5.07.MPE Manufacturing Project in English (1)
MAB_19_PE_5.12.DPE Design Project in English
MAB_19_V_5.15.PEP Process Engineering Project in English (1)

[*updated 18.02.2020*]

Module coordinator:
Prof. Dr. Christine Sick

Lecturer: Prof. Dr. Christine Sick

[*updated 28.05.2018*]

Learning outcomes:
The modules _Business English for Mechanical Engineers_, _Technical English for Mechanical Engineers and Professional Presentations_, _Applying for an Engineering Job_ and "Design / Manufacturing / Process Engineering Project in English" should be seen in conjunction with one another. They offer students a framework to further develop their English language skills in a professionally related area from the desired entry level B1 to level B2.

The focus of the _Business English for Mechanical Engineers_ module is to provide students with business English skills that will enable them to master basic business situations in an intercultural environment.

After successfully completing this module, students will possess the communicative means of speech and behavior required for basic business situations and will be able to apply them appropriately in given oral communication situations. They will be able to understand and write various business documents. They will be sensitized to different language registers and can apply them adequately within the framework of written communication situations with international business partners. They will be able to recognize potential difficulties and conflicts in intercultural communication situations and can draw conclusions for their own behaviour in international contexts.

[*updated 05.10.2020*]

Module content:
- Socializing: Greetings, introductions and small talk
- Business travel: Business trips
- Talking about work: Describing a company, their field of activity and professional career
- Making appointments: Arranging an appointment
- Telephoning: Making phone calls in a professional context and taking telephone messages
- Types of business documents: Different types of business documents

- Business correspondence: Understanding business correspondence and corresponding with business partners (emails and letters)

In addition, we will work on:
- Independent repetition of standard vocabulary
- Expanding the Business English vocabulary relevant for the students
- Repetition of relevant grammatical structures (especially questions and the use of tenses)
- Raising awareness for functional language use and registers
- Intercultural aspects

[*updated 05.10.2020*]

Teaching methods/Media:
Learning objectives will be achieved through integrated training of the four basic skills (listening comprehension, reading comprehension, speaking and writing) in relevant communication situations supported by multimedia, as well as the repetition of basic grammar and vocabulary.

Target group-specific teaching/learning materials (print, audio, video), as well as multimedia CALL and e&mLearning materials will be used.

[*updated 05.10.2020*]

Recommended or required reading:
Students will receive a list of recommended teaching and learning materials.

The following materials are free of charge for students of the htw saar. We recommend their use for independent learning:

Susanne Ley, Christine Sick: prep course English m&eLanguageLearningPortal@CAS (e&m-Learning-Angebot zur Unterstützung der Studierenden beim Englischlernen am Campus Alt-Saarbrücken der htw saar)
Christine Sick (2015): htw saar TechnoPlus Englisch VocabApp (Mobile-Learning-Angebot insbesondere zum Grundwortschatz, alle Niveaustufen), EUROKEY.

Christine Sick, unter Mitarbeit von Miriam Lange (2011): TechnoPlus Englisch 2.0 (Multimediales Sprachlernprogramm für Technisches und Business Englisch, Niveau B1-B2+), EUROKEY.

[*updated 05.10.2020*]

CAD 3D Modeling

Module name (EN): CAD 3D Modeling

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_2.01.CAD

Hours per semester week / Teaching method:
2V+2P (4 hours per week)

ECTS credits:
4

Semester: 2

Mandatory course: yes

Language of instruction:
German

Assessment:
CAD: Exam at computer 120 min.

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_A_2.01.CAD (P241-0224) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 2, mandatory course
MAB_24_A_2.01.CAD Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 2, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 120 hours (equivalent to 4 ECTS credits).
There are therefore 75 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
MAB_19_IP_5.03.AGF Additive Manufacturing and Generative Design
MAB_19_IP_5.05.MST Production and Quality Management
MAB_19_IP_5.07.MPE Manufacturing Project in English (1)
MAB_19_M_4.04.MK2 Engineering Design (with Project)

[*updated 06.04.2020*]

Module coordinator:
Prof. Dr. Bernd Heidemann

Lecturer:
Dipl.-Ing. Bernd Gaspard

[*updated 03.03.2020*]

Learning outcomes:
After successfully completing this course, students will be able to model components using a CAD system with basic functions.
Students will be aware of the importance of taking production process into account when modeling

components.

[*updated 05.11.2020*]

Module content:
Fundamentals of 3D-CAD technology.
Current state of the art and future developments.
Its use in mechanical and process engineering.
Basic applications and functions: Components, assembly, drawing derivation, exploded-view drawings.
Standardized designation of structural components, elements and detailed surfaces (undercut, groove, chamfer, pocket, collar, heel, etc.)
Consideration of the individual production steps suitable for manufacturing the components with their detailed surfaces and rough planning of the sequences in terms of a production process.

[*updated 05.11.2020*]

Recommended or required reading:

[*still undocumented*]

Design Project in English

Module name (EN): Design Project in English

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_PE_5.12.DPE

Hours per semester week / Teaching method:
2PA+1S (3 hours per week)

ECTS credits:
3

Semester: 5

Mandatory course: yes

Language of instruction:
German/English

Assessment:
Assessment methods:
Project documentation in German
Abstract in Englisch
Presentation in English 15 min.

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_PE_5.12.DPE (P241-0239, P241-0240) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 5, mandatory course, Specialization Product Development

Workload:
45 class hours (= 33.75 clock hours) over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 56.25 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.05.BEM Business English for Mechanical Engineers
MAB_19_A_2.06.TEM Technical English for Mechanical Engineers and Professional Presentations
MAB_19_A_3.03.AEJ Applying for an Engineering Job

[*updated 18.02.2020*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Bernd Heidemann

Lecturer:
Lehrbeauftragte
Sebastian Barth, M.A.
Professoren der Fakultät

[*updated 18.02.2020*]

Learning outcomes:
Learning outcomes "Design Project":
Students will be able to develop a topic-specific, methodical approach to a technical problem in a team, work on the problem in a structured and timely manner, develop solutions, and document and present their procedure and results in a report.

Learning outcomes "English":
The modules _Business English for Mechanical Engineers_, _Technical English for Mechanical Engineers_ and Professional Presentations_, _Applying for an Engineering Job_ as well as _Design / Manufacturing/Process Engineering Project in English_ should be seen in conjunction with one another. They offer students a framework to further develop their English language skills in a professionally related area from the desired entry level B1 to level B2.
The focus of the _Design/Manufacturing/Process Engineering Project in English_ module will be on the presenting project results in English and writing an English abstract for the documentation that is to be written in German.

Students will be familiar with various reading strategies and will be able to work independently on a topic using English technical texts and videos.
They will improve and deepen the presentation knowledge and skills acquired in the _Technical English for Mechanical Engineers and Professional Presentations_ modules and be able to apply them to a final presentation of their project results in English. The main focus will be an academically educated audience,

which, however, is not exclusively composed of experts on the respective topic.
Students will also be able to write an English abstract on the documentation to be prepared in German.

[*updated 05.10.2020*]

Module content:
Forming a team (2-4 students) and contacting your supervisor.

Defining a technical project topic: The topic should be formulated to fit the interdisciplinary field of (product) development and design.

Developing a procedure for processing (agreeing on methodology, setting up a schedule, defining work packages, organizing the team (internal communication and information exchange with the appropriate media).

Processing is based on the methodical procedure of the general work methodology:
Clarify the task,
Research the state of the art (literature, patents, analyze comparative/reference examples, ...),
Identify and structure sub-problems,
Develop solutions for sub-problems,
Develop and evaluate concepts (combinations of partial solutions),
Suggest, present and defend the overall solution,
Conduct regular work meetings with the respective supervisor, preferably in English,
Create a documentation in German,
Write abstract in English, see below.
Hold a presentation in English, see below.

The English language content will be closely related to the technical projects. Content:
- Strategies for acquiring the technical vocabulary relevant to the respective projects
- Text work with technical texts and videos relevant to the respective projects
- Repetition of the structure and language of English presentations in order to present project results
- Describing diagrams, tables, images, numbers, cause and effect correlations, and trends
- Presentation slides
- Dealing with questions and body language
- Preparing and practicing English presentations in order to present project results in front of an "educated audience"
- Introduction to abstracts (structure, style, idioms, writing strategies)
- Writing abstracts

[*updated 05.10.2020*]

Teaching methods/Media:
Supervised/coached teamwork with regular work meetings in English.

The learning goals (with regard to language competence) will be achieved through integrated training of the four basic skills (listening comprehension, reading comprehension, speaking and writing) supported by the use of multimedia. Group work and working in pairs, as well as peer review will play an important role. During the workshop-like phases, students will also have the opportunity to practice their presentations and receive appropriate feedback.

Target group-specific teaching/learning materials (print, audio, video), as well as multimedia CALL and e&mLearning materials will be used.

[*updated 05.10.2020*]

Recommended or required reading:
Recommended or required reading for "Design Project":
Pahl/Beitz: Konstruktionslehre - Methoden und Anwendung erfolgreicher Produktentwicklung. Springer Vieweg, Heidelberg.
Pahl/Beitz: Engineering Design - A Systematic Approach. Springer-Verlag, London.
Ehrlenspiel, K.; Meerkamm, H.: Integrierte Produktentwicklung - Denkabläufe, Methodeneinsatz, Zusammenarbeit. Carl Hanser Verlag, München.

Recommended or required reading "English":
- Christine Sick, unter Mitarbeit von Miriam Lange: TechnoPlus Englisch 2.0. Ein multimediales Sprachlernprogramm für Technisches Englisch und Business English. EUROKEY.
- Christine Sick, unter Mitarbeit von Lisa Rauhoff und Miriam Wedig (seit 2016): Online Extensions zu TechnoPlus Englisch, EUROKEY.
- Christine Sick: TechnoPlus Englisch VocabApp. EUROKEY.

- M. Ibbotson: Professional English in Use: Engineering. Technical English for Professionals. CUP.
- C. Sowton: 50 Steps to Improving Your Academic Writing. Garnet Education.
- B. Rosenberg: Spring into Technical Writing for Engineers and Scientists. Addison-Wesley.
- D. Beer, D. McMurrey: A Guide to Writing as an Engineer. Wiley.
- K. Budinsky: Engineers_ Guide to Technical Writing. ASM International.

[*updated 05.10.2020*]

Dimensioning Components

Module name (EN): Dimensioning Components

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_M_3.06.BTD

Hours per semester week / Teaching method:
3SU+1U (4 hours per week)

ECTS credits:
5

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 180 min.

[*updated 26.01.2023*]

Applicability / Curricular relevance:

MAB_19_M_3.06.BTD (P241-0235) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.02.TMS Engineering Mechanics - Statics
MAB_19_A_1.03.WSK Materials Science with Lab Exercises
MAB_19_A_2.03.GBD

[*updated 04.01.2024*]

Recommended as prerequisite for:
MAB_19_M_4.03.MK2
MAB_19_M_4.04.MK2 Engineering Design (with Project)
MAB_19_PE_5.11.FEM The Finite Element Method (FEM)

[*updated 08.03.2022*]

Module coordinator:
Prof. Dr.-Ing. Ramona Hoffmann

Lecturer:
N.N.

[*updated 03.03.2020*]

Learning outcomes:
After successfully completing this module, students will:
-- be able to distinguish and describe static and dynamic stresses, in particular on real components, by analyzing the stress situation in order to then be able to decide which criteria can be used for safety assessment and dimensioning.

-- describe and characterize multi-axial stress and distortion states by determining the existing load stresses and calculating and graphically representing the principal stresses and principal stress directions in order to subsequently assess the stress state with regard to the strength and safety of the component.

-- be able to select a suitable strength hypothesis by analyzing the material and the stress situation and calculate an equivalent stress in order to be able to draw conclusions about the safety of the component later or to design components with a specified safety level.

-- take into account geometric and material variables influencing the dynamic component strength by reducing the permissible stresses with the help of design factors in order to be able to design real components to withstand stresses.

-- dimension complex components under composite, multi-axial loads for static and dynamic load cases

using the appropriate strength hypotheses and taking into account geometric and material variables in order to apply their skills in the context of a future job.

-- be able to examine simple components for possible instabilities by tracing the load case back to the Euler critical load cases in order to obtain a statement about the permissible buckling load.

-- be able to restructure their knowledge from the course Fundamentals of Structural Analysis (Grundlagen der Baustatik) by applying energy methods to solve simple problems in elastomechanics in order to be able to analyze more complex statically indeterminate load situations.

-- be able to formulate questions and give speeches in front of larger groups and justify their decisions in front of groups.

[*updated 11.01.2024*]

Module content:
Dynamic loads
-- Fatigue test according to Wöhler, Wöhler curves
-- Smith and Haigh fatigue strength diagrams
-- Influence of component size, surface, notches on fatigue strength
-- Static and dynamic strength analysis
Multi-axial stress state and distortion state
Linear elasticity
Strength hypotheses
Dimensioning a shaft under bending and torsional loads
Instabilities
Elastostatics energy methods

[*updated 26.01.2023*]

Recommended or required reading:
Groß, Hauger, Schröder, Wall: Technische Mechanik 2 Elastostatik, Springer-Verlag.
Holzmann, Meyer, Schumpich: Technische Mechanik Festigkeitslehre, Springer Vieweg Verlag.
Läpple: Einführung in die Festigkeitslehre, Vieweg+Teubner Verlag.
Böge: Technische Mechanik, Springer Vieweg Verlag.
Hibbeler: Technische Mechanik 2 Festigkeitslehre, Pearson Verlag.
Kabus: Mechanik und Festigkeitslehre, Hanser Verlag.

[*updated 26.01.2023*]

Electrical Engineering für Mechanical Engineering und Process Engineering

Module name (EN): Electrical Engineering für Mechanical Engineering und Process Engineering

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_2.07.ELT

Hours per semester week / Teaching method:

2V+1U+1LU (4 hours per week)

ECTS credits:
5

Semester: 2

Mandatory course: yes

Language of instruction:
German

Assessment:
Exam

[*updated 16.11.2023*]

Applicability / Curricular relevance:

MAB_19_A_2.07.ELT (P241-0241, P241-0242) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 2, mandatory course
MAB_24_A_2.07.ELT Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 2, mandatory course
UI-ELT (P251-0017, P251-0018) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 2, mandatory course
UI-ELT (P251-0017, P251-0018) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 2, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.04.MA1 Mathematics 1

[*updated 05.03.2020*]

Recommended as prerequisite for:
MAB_19_A_5.02.MTE
MAB_19_M_5.17.AUM Automation Technology in Mechanical Engineering
MAB_19_V_4.09.EEN Energy Efficiency and Sustainability
MAB_19_V_5.16.AUV Automation Technology in Process Engineering

[*updated 05.03.2020*]

Module coordinator:
Prof. Dr.-Ing. Michael Sauer, M.Sc.

Lecturer:
Prof. Dr.-Ing. Vlado Ostovic (lecture)

[*updated 05.03.2020*]

Learning outcomes:
After successfully completing this module, students will be familiar with the basic passive and active components of electrical engineering and understand their operating behavior and interaction. They will be familiar with the basics of electrical engineering and its connection to magnetism. They will observe the basic rules for handling electricity. Students will be able to perform basic electrical design tasks, understand electrical circuits and calculate simple networks. They will understand the differences between direct and alternating current systems.
Furthermore, students will be familiar with the basic structure and function of electrical machines. Based on the example of synchronous and asynchronous machines in motor and generator operation, they will be able to explain the function and power electronics required and select the appropriate machines.

[*updated 16.11.2023*]

Module content:

Electrical quantities and basic laws
Kirchhoff´s rules
Measuring current, voltage, power
DC circuits, calculating networks
Electric field, capacitor, capacity
Magnetic field
Magnetic field strength, magnetic flux density, magnetic flux
Ampère´s circuital law
Forces in the magnetic field
Faraday´s law of induction, Lenz s law
Self-induction, inductance
Generating stress by rotation and transformation
Eddy currents and applications
Alternating current circuits
Circuits with resistors, capacitors, inductors, resonant circuits
Active power, reactive power, apparent power, work
Three-phase systems
Semiconductor components Diodes, transistors and operational amplifiers
Electrical machines in motor and generator operation
Design and basic function of synchronous and asynchronous motors
Basic function of a frequency converter

[*updated 16.11.2023*]

Teaching methods/Media:
Lecture, descriptions of lab experiments;
Lab experiments with assistance where required,
Independently written lab reports in accordance with specifications on content and form

[*updated 16.11.2023*]

Recommended or required reading:
Hermann Linse, Rolf Fischer: Elektrotechnik für Maschinenbauer
Rudolf Busch: Elektrotechnik für Maschinenbauer und Verfahrenstechniker

Eckbert Hering, Jürgen Gutekunst, Rolf Martin: Elektrotechnik für Maschinenbauer
Eckbert Hering, Jürgen Gutekunst, Rolf Martin: Elektrotechnik für Ingenieure
G. Fliegel: : Elektrotechnik für Maschinenbauer

[*updated 16.11.2023*]

Energy Efficiency and Sustainability

Module name (EN): Energy Efficiency and Sustainability

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_V_4.09.EEN

Hours per semester week / Teaching method:
2V+1U+1P (4 hours per week)

ECTS credits:
5

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Oral examination 25 min.

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_V_4.09.EEN (P241-0243) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course, Specialization Process Engineering
MAB_24_V_4.09.EEN Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 4, mandatory course, Specialization Process Engineering

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_2.07.ELT Electrical Engineering für Mechanical Engineering und Process Engineering
MAB_19_A_3.02.THE
MAB_19_A_3.04.SKS Engineering Fluid Mechanics, Piston Engines, Compressors and Turbines

[*updated 05.03.2020*]

Recommended as prerequisite for:
MAB_19_V_5.14.KTV

[*updated 02.03.2020*]

Module coordinator:
Prof. Dr.-Ing. Michael Sauer, M.Sc.

Lecturer:
Prof. Dr.-Ing. Michael Sauer, M.Sc.

[*updated 05.03.2020*]

Learning outcomes:
After successfully completing this course, students will be familiar with simple procedures for determining energy requirements. They will understand the function of different energy converters with the corresponding conversion efficiencies.
Design issues for simple heat exchangers.
Selection of suitable energy converters for the energy supply of buildings and industrial plants. They will be able to evaluate the application possibilities of a combined heat, power and cooling system in terms of efficiency, emissions and economy.
Students will understand technologies for using renewable energy sources and be able to develop supply concepts in combination with conventional methods of energy supply.

They will be able to carry out energy balances for different energy converters independently in the lab and write lab reports.

[*updated 05.10.2020*]

Module content:
Methods of time-resolved determination and presentation of energy demand (basics of calculating energy demand); Load curves and annual duration curves; Performance ranges and efficiencies of different aggregates for the supply of power and heat/cooling and their operating behavior including basic knowledge about the function and performance spectra of regenerative systems such as thermal power plants and heat pumps. Solar plants and biomass utilization plants, geothermal, photovoltaic and wind power plants.
Selecting the right plants/systems for supplying energy to buildings and plants (satisfying a load profile).
Execution and evaluation of approx. four suitable lab tests for carrying out energy balance calculations for energy converters (e.g.: pumps, fans, if necessary solar power system and model heat exchanger)

[*updated 05.10.2020*]

Teaching methods/Media:
Lecture with lecture notes; Experiment descriptions; Lab experiments with assistance where required
Independently written lab reports in accordance with specifications on content and form, a short presentation with subsequent discussion

[*updated 05.10.2020*]

Recommended or required reading:
Herbrik, R.: Energie- und Wärmetechnik, Teubner, Stuttgart.

Quaschning,V.: Regenerative Energiesysteme, Hanser.
Kaltschmitt,M. et all: Erneuerbare Energien, Springer.
Kaltschmidt,M.et all: Energie aus Biomasse, Springer.
Khartchenko, N.V.: Thermische Solaranlagen, Springer.
Zahoransky,A.: Energietechnik, Vieweg.

[*updated 05.10.2020*]

Engineering Basics

Module name (EN): Engineering Basics

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_1.07.ENB

Hours per semester week / Teaching method:
1V+3P (4 hours per week)

ECTS credits:
5

Semester: 1

Mandatory course: yes

Language of instruction:
German

Assessment:

This module is based on projects described in a "guideline" (scope of work approx. 60 time hours for 6-7 work meetings with preparation / follow-up) from the fields of mechanical and process engineering:

Each student must prepare a documentation / an experiment protocol / a report for each project:
5 to 6 pages of content (= text in font size 11 with informative illustrations, at least one table with explanations, at least one diagram with explanations) plus indexes. To do so, students will use what they have learned and the WORD template from the "Technical Documentation" module. Deadline: 31.03.2024.

Students must create an informative, entertaining video clip (duration 1 to 2 minutes) for each project. The clip should be suitable for an "application". The video clip is teamwork.

Feedback discussion with supervisor.

In a presentation (duration 15 minutes) students will present the results of their second project to an audience (= students of the semester and teachers) in an appealing manner and show the video clip of their first project. Each member of the project group must present something during the presentation.

[*updated 21.12.2023*]

Applicability / Curricular relevance:

MAB_19_A_1.07.ENB (P241-0244, P241-0245) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 1, mandatory course
MAB_24_A_1.07.ENB Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 1, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
MAB_19_A_3.04.SKS Engineering Fluid Mechanics, Piston Engines, Compressors and Turbines
MAB_19_A_4.02.WFL Heat Transfer and Fluid Mechanics
MAB_19_V_3.08.GBT Fundamentals of Biotechnology
MAB_19_V_4.08.BUV Environmental and Bioprocess Engineering (with Lab Course)

[*updated 21.01.2022*]

Module coordinator:
Studienleitung

Lecturer:
N.N.
Professor/innen des Studiengangs

[*updated 27.11.2023*]

Learning outcomes:

Students will be familiar with the curriculum and be able to explain its structure and contribution to mechanical/process engineering education.
Students will be aware of the interdisciplinary connections between the individual courses in the study program (modules).

They will receive initial insight into practical engineering activities.
They will be able to integrate themselves into a group, organize projects and develop independent working methods.
Students will be familiar with the standard work methodology and be able to apply it.
Students will be able to approach simple technical problems, solve them, and reach a conclusion.

Students will be able to give a short presentation in front of an audience.

[*updated 30.10.2023*]

Module content:

Informative, introductory lectures:
Introduction to mechanical engineering" lecture (90 - 120 minutes)
Introduction to process engineering" lecture (90 - 120 minutes)
"Engineering activities in professional mechanical engineering practice" company lecture (90 - 120 minutes)
"Engineering activities in professional process engineering practice" company lecture (90 - 120 minutes)

Several short presentations (45 - 90 minutes) from faculty members outlining the content and importance of the subject/modules represented in the degree program for the students engineering education. If possible, further presentations from professional engineering practice.

Two projects per team as described above.

[*updated 30.10.2023*]

Teaching methods/Media:

In small groups, students will work on projects described in a "guideline" by means of simple tasks that demonstrate the range of mechanical engineering / process engineering content and typical activities carried out in the fields.
The projects promote creativity and analytical skills. They are designed to allow students to experience how much fun these activities are and the how rewarding it is to achieve results.

With simple structures, built/developed by themselves, they will analyze engineering-relevant topics and thus, create connections to the curriculum s content. Students will be encouraged to actively seek any other knowledge they require from other teaching staff members at the htw saar.

The projects will be accompanied and supervised by teachers who, as a point of reference, can also provide mentoring.

[*updated 30.10.2023*]

Recommended or required reading:
Project-specific literature
Johannes Müller: Arbeitsmethoden der Technikwissenschaften

[*updated 30.10.2023*]

Engineering Design (with Project)

Module name (EN): Engineering Design (with Project)

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_M_4.04.MK2

Hours per semester week / Teaching method:
1SU+3PA (4 hours per week)

ECTS credits:
5

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Presentation of project results (the working machine) at an "exhibition".
Presentation explaining the project results in terms of constructional details.

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_M_4.04.MK2 (P241-0259) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.01.MDM Principles of Engineering Drawing and the Representation of Machine Elements (with Machine Analysis Lab)
MAB_19_A_1.02.TMS Engineering Mechanics - Statics
MAB_19_A_1.03.WSK Materials Science with Lab Exercises
MAB_19_A_1.06.TKD Technical Communication and Documentation
MAB_19_A_2.01.CAD CAD 3D Modeling
MAB_19_A_2.02.TFL Manufacturing Process Technology (with Lab Course)
MAB_19_A_2.03.GBD
MAB_19_M_3.05.MK1 Machine Elements and Design 1
MAB_19_M_3.06.BTD Dimensioning Components

[*updated 28.04.2019*]

Recommended as prerequisite for:
MAB_19_PE_5.08.GPE Fundamentals of Product Development

[*updated 18.07.2022*]

Module coordinator:
Prof. Dr. Bernd Heidemann

Lecturer:
Prof. Dr. Bernd Heidemann
Daniel Kelkel, M.Sc.
M.Eng. Oliver Müller

[*updated 28.04.2019*]

Learning outcomes:
After successfully completing this course, students will be familiar with common rules for designing components, assemblies and machines.
They will be able to construct a machine for a given task in a methodically planned procedure and assemble it in a functional manner.
SoK Students will be able to cooperate and communicate with other students in a team, and both present and defend their ideas. They will be able to discuss and evaluate the ideas of others objectively.

[*updated 05.11.2020*]

Module content:
A methodical approach to design _ From main functional components to standard parts
Force flow-oriented and material-economical design
Assembly-ready design
Component design for additive, generative manufacturing processes

"X-Würfel" project: Machine design and construction in a team according to a defined task The task will be announced in an annual guideline with specification sheet.
The components designed within the framework of the project must also be suitable for production (see the "Fertigungsgerechte Bauteilgestaltung" module).

[*updated 05.11.2020*]

Recommended or required reading:
Decker, K.-H.: Maschinenelemente. Carl Hanser Verlag, München.

Hoenow, G., Meißner, T.: Entwerfen und Gestalten im Maschinenbau. Bauteile _ Baugruppen _ Maschinen. Carl Hanser Verlag, München.

Hoischen, H., Hesser, W.: Technisches Zeichnen. Grundlagen, Normen, Beispiele, Darstellende Geometrie. Cornelsen Verlag Scriptor GmbH & Co. KG, Berlin.

Jorden, W.: Form- und Lagetoleranzen. Carl Hanser Verlag, München.

Muhs, D., e.a.: Roloff/Matek Maschinenelemente. Normung, Berechnung, Gestaltung. Vieweg + Teubner Verlag, Wiesbaden.

Muhs, D., e.a.: Roloff/Matek Maschinenelemente. Tabellen. Vieweg + Teubner Verlag, Wiesbaden.

Trumpold, H., Beck, Ch., Richter, G.: Toleranzsysteme und Toleranzdesign _ Qualität im Austauschbau. Carl Hanser Verlag, München Wien.

[*updated 05.11.2020*]

Engineering Fluid Mechanics, Piston Engines, Compressors and Turbines

Module name (EN): Engineering Fluid Mechanics, Piston Engines, Compressors and Turbines

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_3.04.SKS

Hours per semester week / Teaching method:
3V+1U (4 hours per week)

ECTS credits:
5

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 120 min.

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_A_3.04.SKS (P241-0285) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course
MAB_24_A_3.04.SKS Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 3, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.07.ENB Engineering Basics
MAB_19_A_2.04.MA2 Mathematics 2

[*updated 10.03.2020*]

Recommended as prerequisite for:
MAB_19_V_4.09.EEN Energy Efficiency and Sustainability

[*updated 05.03.2020*]

Module coordinator:
Prof. Dr. Marco Günther

Lecturer:
Prof. Dr. Marco Günther
Prof. Dr.-Ing. Thomas Heinze

[*updated 10.03.2020*]

Learning outcomes:
After successfully completing this module, students will be familiar with the basics of fluid mechanical quantities and laws. They will be able to apply the laws of fluid mechanics to simple practical problems in hydrostatics and hydrodynamics.
Students will be able to describe well-known types of pistons and turbomachinery, including their basic structure, function, application possibilities and operating behavior.

[*updated 05.11.2020*]

Module content:
Fluid Mechanics:
Fluid statics:
fluid properties, state variables, pressure concept and distribution, effects of force on container walls, buoyancy and thermal lift
Frictionless flows (incompressible):
current filament theory, equations of motion for a fluid element, conservation laws of the stationary current filament theory (conservation of mass, energy theorem), pressure and velocity measurement
Flows with friction (incompressible):
frictional influence, mechanical similarity and characteristics, laminar and turbulent flow, stationary pipe flow

Piston engines and flow machines:
Piston engines:
- Basics, mode of operation, operating behavior with regard to:
  - Piston compressors
  - Piston pumps
  - Piston steam engines
  - Internal combustion engines

Fluid flow machines:
- Basics, mode of operation, operating behavior with regard to:
  - Axial and radial compressors
  - Axial and radial pumps
  - Steam turbines
  - Water turbines
  - Gas turbines

[*updated 05.11.2020*]

Teaching methods/Media:
- Lecture with integrated exercises, exercises for self-study
Blackboard, transparencies, lecture notes, exercises

[*updated 05.11.2020*]

Recommended or required reading:
Technical fluid mechanics:
Bohl: Tech. Strömungslehre; v. Böckh: Fluidmechanik; Herwig: Strömungsmechanik; Herwig: Strömungsmechanik A-Z; Kümmel: Technische Strömungsmechanik; Oertel, Böhle, Dohrmann: Strömungsmechanik

Kolben- und Strömungsmaschinen:
Küttner: Kolbenmaschinen; Beitz, Grote - Hrsg.: Dubbel-Taschenbuch für den Maschinenbau, Kapitel Kolbenmaschinen, Kapitel Strömungsmaschinen; Urlaub: Verbrennungsmotoren; Bohl, Elmendorf: Strömungsmaschinen 1

[*updated 05.11.2020*]

Engineering Mechanics - Kinetics

Module name (EN): Engineering Mechanics - Kinetics

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_M_3.07.TMK

Hours per semester week / Teaching method:
4V (4 hours per week)

ECTS credits:
5

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 120 min.

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_M_3.07.TMK (P241-0283) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course

Workload:

60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.02.TMS Engineering Mechanics - Statics

[*updated 21.09.2023*]

Recommended as prerequisite for:
MAB_19_M_4.05.MDY Machine Dynamics
MAB_19_PE_5.09.GTL
MAB_19_PE_5.10.HPL

[*updated 04.03.2020*]

Module coordinator:
Prof. Dr.-Ing. Heike Jaeckels

Lecturer:
Prof. Dr.-Ing. Heike Jaeckels

[*updated 18.02.2020*]

Learning outcomes:
After successfully completing this course, students will be able to:
* describe plane motion of rigid bodies mathematically
* analyze and calculate dynamic rigid bodies
* model simple vibrating systems and calculate parameters

[*updated 05.11.2020*]

Module content:

Kinematics of a rigid body
Kinematics of mass point
Kinetics of a rigid body, work and energy, collisions
Introduction to mechanical vibrations

[*updated 05.11.2020*]

Teaching methods/Media:
Course with seminaristic components

[*updated 05.11.2020*]

Recommended or required reading:
Berger J. : Technische Mechanik für Ingenieure 3, Vieweg Verlag, latest edition
Gloistehn H. H. : Lehr- und Übungsbuch der Technischen Mechanik 3, 1992
Gross D. et al. : Technische Mechanik, Bd.3, Springer Verlag, latest edition
Hibbeler et al. : Technische Mechanik , Pearson Verlag, München, latest edition
Holzmann G. et al. : Technische Mechanik, Kinematik und Kinetik, Teubner Verlag, latest edition

[*updated 05.11.2020*]

Engineering Mechanics - Statics

Module name (EN): Engineering Mechanics - Statics

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_1.02.TMS

Hours per semester week / Teaching method:
2V+2S (4 hours per week)

ECTS credits:
5

Semester: 1

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 120 min.

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_A_1.02.TMS (P241-0284) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 1, mandatory course
MAB_24_A_1.02.TMS Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 1, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
MAB_19_A_2.03.GBD
MAB_19_M_3.05.MK1 Machine Elements and Design 1
MAB_19_M_3.06.BTD Dimensioning Components
MAB_19_M_3.07.TMK Engineering Mechanics - Kinetics
MAB_19_M_4.03.MK2
MAB_19_M_4.04.MK2 Engineering Design (with Project)
MAB_19_PE_5.09.GTL
MAB_19_PE_5.10.HPL
MAB_19_PE_5.11.FEM The Finite Element Method (FEM)

[*updated 04.01.2024*]

Module coordinator:
Prof. Dr.-Ing. Heike Jaeckels

Lecturer:
Prof. Dr.-Ing. Heike Jaeckels

[*updated 18.02.2020*]

Learning outcomes:
After successfully completing this course, students will be able to:
* describe the terms force and moment
* apply free body diagrams
* write down equilibrium conditions and solve systems of equations
* calculate and represent internal forces and moments in structures
* consider adhesion and friction in the analysis of static rigid body systems
* mathematically describe planar movements of mass points

[*updated 05.11.2020*]

Module content:

Central, spatial force systems
General, spatial force systems
Internal forces and moments
Adhesion and friction
Kinematics outlook

[*updated 05.11.2020*]

Teaching methods/Media:
Lecture with seminaristic elements

[*updated 05.11.2020*]

Recommended or required reading:
Berger J. : Technische Mechanik für Ingenieure 1 (Statik), Vieweg Verlag, latest edition
Gloistehn H. H. : Lehr- und Übungsbuch der Technischen Mechanik, Bd. 1, 1992

Gross D. et al. : Technische Mechanik, Bd.1 Statik, Springer Verlag, latest edition
Hibbeler et al. : Technische Mechanik 1, Pearson Verlag, München, latest edition
Holzmann G. et al. : Technische Mechanik 1, Teubner Verlag, latest edition

[*updated 05.11.2020*]

Environmental and Bioprocess Engineering (with Lab Course)

Module name (EN): Environmental and Bioprocess Engineering (with Lab Course)

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_V_4.08.BUV

Hours per semester week / Teaching method:
3V+1P (4 hours per week)

ECTS credits:
5

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 180 min., graded report for practical course

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_V_4.08.BUV (P241-0236, P241-0237) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course, Specialization Process Engineering
UI-T-BUV Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 6, mandatory course, technical
UI-T-BUV Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 6, mandatory course, technical

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.07.ENB Engineering Basics
MAB_19_A_2.05.KWL
MAB_19_V_3.08.GBT Fundamentals of Biotechnology
MAB_19_V_3.09.GCL Fundamentals of Chemistry (with Lab Course)

[*updated 18.02.2020*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Timo Gehring

Lecturer: Prof. Dr. Timo Gehring

[*updated 28.05.2018*]

Learning outcomes:
After successfully completing this course, students will be familiar with and be able to understand and explain the basic principles of genetic engineering and the microbial production of valuable substances. They will have an overview of the potential of microorganisms and their possible uses and be able to explain them. They will be familiar with and be able to explain methods for handling, preventing and mass producing microorganisms. Students will be familiar with and be able to explain essential methods of up- and downstream processing.

[*updated 05.11.2020*]

Module content:

Upstream processing, bioreactors, ideal and real stirred tank and tube reactors, CSTR, Q/D diagram, continuous reactors, batch reactors, methods of downstream processing; protein as a product

Gene expression, gene regulation, plasmids, vectors, introduction to genetic engineering, genetic fingerprint, PCR, Southern and Northern blot, sequencing according to Sanger, restiction enzymes, expression vectors, expression of eukaryotic genes in prokaryotes, introduction to virology, production of monoclonal antibodies

Lab exercises on selected topics in biotechnology,
Presentations on selected topics from food biotechnology, biotechnology and environmental technology

[*updated 05.11.2020*]

Teaching methods/Media:
Lecture mit blackboard and transparencies; practical lab exercises, class presentations, talks by external guests, study trip

[*updated 05.11.2020*]

Recommended or required reading:
Brock et.al.: Biology of Microorganisms, Prentice Hall
Forst et al.: Chemie für Ingenieure
Löwe: Biochemie, Benke
Thiemann und Palladino: Biotechnologie, Pearson

[*updated 05.11.2020*]

Environmental Process Technology and Circular Economies

Module name (EN): Environmental Process Technology and Circular Economies

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_V_5.13.UVK

Hours per semester week / Teaching method:
4V+1LU (5 hours per week)

ECTS credits:
6

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam (80%) 180 min. and PA (L) (20%)

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_V_5.13.UVK (P241-0289) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 5, mandatory course, Specialization Process Engineering
UI-T-UVK (P241-0413, P241-0414) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 5, mandatory course, technical
UI-T-UVK (P241-0413, P241-0414) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 5, mandatory course, technical

Workload:
75 class hours (= 56.25 clock hours) over a 15-week period.
The total student study time is 180 hours (equivalent to 6 ECTS credits).
There are therefore 123.75 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Timo Gehring

Lecturer:
Prof. Dr. Timo Gehring

[*updated 18.02.2020*]

Learning outcomes:
After successfully completing this course, students will be familiar with and be able to explain how plants for biological wastewater treatment and water purification work, as well as the role of the main microorganisms involved. They will be able to design the main parts of plants for waste water treatment and water purification. They will be able to explain how anaerobic plants (biogas plants, anaerobic wastewater treatment, etc.) and dimension them. Students will, in addition, be able to explain and compare current sustainable processes. They will be able to handle microorganisms in theory and practice. Students will be familiar with and be able to handle analytical instruments. They will be able to apply laboratory measuring methods in water and wastewater technology.

[*updated 05.11.2020*]

Module content:
Importance of microorganisms in the ecosystem, basics of limnology and soil ecology, stratification of lakes, self-purification of water systems
Chemolithoautotrophy, nitrification, sulfur bacteria, anoxic and oxigenic photosynthesis, anaerobic respiration, denitrification
Water and drinking water treatment,
Designing and dimensioning biological wastewater treatment plants, BOD5, COD, TOC, AOX, ISV, nitrification, denitrification, phosphate removal, sludge treatment, exhaust air purification, flue gas purification, flocculation, water treatment, drinking water production, water treatment, anaerobic digestion chain, sulfate reducing microorganisms, methane bacteria, sludge digestion, sewage sludge treatmentsewage sludge utilization routes routes, biogas plants, anaerobic wastewater treatment, biogas desulfurization, flue gas cleaning, composting, soil remediation, sludge treatment, air pollution control,
Current sustainable processes for environmental, climate and resource protection, sustainable production processes for fuels, food and recyclable materials, Power to X, recycling management, bio-economy.
Practical lab experiments in small groups with supervision.
Lab safety/working techniques; selected experiments in environmental biotechnology and environmental metrology

[*updated 05.11.2020*]

Recommended or required reading:
DWA and DVGW Arbeitsblätter: A131 etc.
ATV Handbuch: Biologische Abwassernigung
Brock et.al.: Mikrobiologie
Ottow et.al.: Umweltbiotechnologie;
Fleischhauer et.al.: Angewandte Umwelttechnik;

[*updated 05.11.2020*]

Fundamental Elements of Plant Construction

Module name (EN): Fundamental Elements of Plant Construction

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_V_3.10.GEA

Hours per semester week / Teaching method:

3V+1U (4 hours per week)

ECTS credits:
5

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 120 min.

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_V_3.10.GEA (P241-0252) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course, Specialization Process Engineering
MAB_24_V_3.10.GEA Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 3, mandatory course, Specialization Process Engineering

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
MAB_19_V_5.14.KTV

[*updated 02.03.2020*]

Module coordinator:
Prof. Dr. Bernd Heidemann

Lecturer:
Daniel Kelkel, M.Sc.

[*updated 03.03.2020*]

Learning outcomes:
After successfully completing this module, students will be familiar with basic design elements and will be able to use them to design simple process engineering constructions.

[*updated 05.11.2020*]

Module content:
Methodical approach to plant development: Develop a list of requirements, carry out a system analysis and synthesis, develop a catalog of variants, apply evaluation procedures.
Overview of design elements:
Designing and dimensioning connections (bolts and screw connections, welded connections)
Designing and dimensioning lines (hose lines, pipelines, connecting elements)
Designing and dimensioning pressure vessels (cylindrical vessel, flat bottoms, domed arches)
Designing and dimensioning shut-off and control elements
Designing and dimensioning seals
Overview of plant safety in accordance with the Machinery Directive

[*updated 05.11.2020*]

Recommended or required reading:
Roloff, Matek: Maschinenelemente, Springer Vieweg Verlag
Haberhauer: Maschinenelemente, Springer-Verlag
Decker: Maschinenelemente, Hanser Verlag
Böge: Handbuch Maschinenbau, Springer-Verlag
Klapp: Festigkeit im Apparate- und Anlagenbau
Bernecker: Planung und Bau verfahrenstechnischer Anlagen, Springer-Verlag

[*updated 05.11.2020*]

Fundamentals of Biotechnology

Module name (EN): Fundamentals of Biotechnology

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_V_3.08.GBT

Hours per semester week / Teaching method:
4V (4 hours per week)

ECTS credits:
5

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 180 min.

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_V_3.08.GBT (P241-0254) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course, Specialization Process Engineering

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.07.ENB Engineering Basics
MAB_19_A_2.05.KWL

[*updated 18.02.2020*]

Recommended as prerequisite for:
MAB_19_V_4.08.BUV Environmental and Bioprocess Engineering (with Lab Course)

[*updated 18.02.2020*]

Module coordinator:
Prof. Dr. Timo Gehring

Lecturer: Prof. Dr. Timo Gehring

[*updated 28.05.2018*]

Learning outcomes:
After successfully completing this course, students will be able to:
- explain the building blocks of living organisms and their function,
- map the structure of cells and their functional carriers,
- explain the potential of microorganisms and their possible uses,
- demonstrate methods for handling, preventing and mass producing microorganisms,
- describe and apply measurement and detection methods. The will have an overview of organic chemistry, biochemistry and everyday chemistry. Students will be able to explain the building blocks of living organisms and their respective functions. They will be able to explain the structure of cells and their functional carriers

They will be able to explain the potential of microorganisms, their ecology, their dangers and their possible uses.

Students will be able to explain and apply essential methods for handling, preventing and mass producing microorganisms, as well as essential measurement and detection methods.

[*updated 05.11.2020*]

Module content:
Hydrocarbons, alkanes, alkenes, ethers, esters, functional groups, aromatics, heterocycles, sugars, carbohydrates, carboxylic acids, pH, buffer systems, calcium carbonate balance, fats, soaps, cell structure, eukaryotes, prokaryotes, organelle evolution, amino acids, proteins, membrane proteins, enzymes, enzyme kinetics, nucleic acids, RNA, DNA,

Methods: paper chromatography, GC, HPLC, DC, gel ectophoresis, photometry, ion exchangers
Characteristic measurement technology: Gravimetry, titrimetry, potentiometry, chromatography, ampherometric photometry, enzyme test; Sterile technique: preparing culture media, buffer systems, pouring agar plates, dilution smears, enrichment culture, pure culture; Microbiological tests and working methods: disk diffusion test, zone of inhibition tests, viable bacteria count, sterile filter technology, microscopy, strain maintenance;

Handling microorganisms, preventing microbial growth, introduction to hygiene, enrichment conditions, pure cultures, culture media, culture conditions, culture methods, viable bacteria count, sterility control, streaking, disk diffusion test, antibiotics, selective energy conversion of organisms, metabolism types chemoorganoheterotrophy: glycolysis, citric acid cycle, respiratory chain, fermentation, anaerobic respiration, chemolithoautotrophy, phototrophy; Introduction to microbial ecology, ecology in lakes, seas, rivers, soils,
hygiene, waterborn and foodborn deseases, food preservation; Introduction to food biotechnology: beer, wine, cheese etc...

[*updated 05.11.2020*]

Teaching methods/Media:
Lecture with blackboard; copies of the slides used in the lecture

[*updated 05.11.2020*]

Recommended or required reading:
Brock et.al.: Biology of Microorganisms, Prentice Hall
Forst et al.: Chemie für Ingenieure
Löwe: Biochemie, Benke

[*updated 05.11.2020*]

Fundamentals of Chemistry (with Lab Course)

Module name (EN): Fundamentals of Chemistry (with Lab Course)

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_V_3.09.GCL

Hours per semester week / Teaching method:
3V+1P (4 hours per week)

ECTS credits:
5

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 180 min., practical training (graded)

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_V_3.09.GCL (P241-0255, P241-0256) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course, Specialization Process Engineering
UI-GCL (P241-0255, P241-0256, P251-0023, P251-0054) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 1, mandatory course
UI-GCL (P241-0255, P241-0256, P251-0023, P251-0054) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 1, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
MAB_19_V_4.08.BUV Environmental and Bioprocess Engineering (with Lab Course)
MAB_19_V_4.10.PVT Physical Process Engineering with Practical Case Studies

[*updated 12.04.2023*]

Module coordinator:
Dr. Patrick Maurer

Lecturer:
Dr. Patrick Maurer

[*updated 15.10.2021*]

Learning outcomes:
After successfully completing this part of the module, students will be familiar with the basics of chemistry and applications relevant to process engineering.
They will understand elementary chemical processes and material properties.
They will know how to deal with hazardous substances both theoretically and practically and will be familiar with the relevant legal regulations.
In addition, students will have improved their independent, methodical, goal-oriented learning and study skills.

The practical training component will help students understand the content of the course, consolidate their knowledge and promote transferability by applying their acquired knowledge in practice.
1.

[*updated 05.11.2020*]

Module content:
Introduction (substances and mixtures of substances, separation methods, units of measurement, measurands, dose)

2. Atom theory (atom theory/atomic structure, atom symbols, isotopes, atomic masses)

3. Stoichiometry (molecules and ions, mol/molar mass, reaction equations)

4. Energy conversion in chemical reactions (energy measures, temperature and heat, enthalpy of reaction, reaction energy, Hess´s law, binding enthalpies, binding energies)

5. Atomic structure, atomic properties, periodic table

6. Bonds (ionic bond, covalent bond, molecular structure, metal bond)

7. Material classes (gases, liquids, solids, solutions)

8. Reactions in aqueous solutions (ion reactions (metathesis reactions), reduction-oxidation reactions (redox reactions), acid-base reactions
9.

Chemical kinetics and the chemical equilibrium (chemical kinetics, catalysis, chemical equilibrium, the principle of least constraint)
10.

Acid - base equilibria (acid-base definition according to Brönsted, acid-base equilibria, pH value calculations, acid-base titration)
11.

Electrochemistry (electrolytic conduction, electrolysis, Faraday´s law and electroplating, galvanic cell, Nernst equation, potentiometry, battery types, corrosion)
12.

Organic chemistry (alkanes, alkenes and alkynes, aromatics, functional groups)

13. Plastics (manufacturing process for plastics: polymerization, polyaddition, polycondensation, material properties of polymers, plastic processing)
14.

Hazardous Substances Ordinance, working safely in a lab

[*updated 05.11.2020*]

Teaching methods/Media:
Lecture: Video projector, experiments, blackboard
Lab course

[*updated 05.11.2020*]

Recommended or required reading:
C. E. Mortimer, U. Müller and J. Beck, Chemie: das Basiswissen der Chemie, Thieme, 2014.

Additional literature:

W. D. Callister, D. G. Rethwisch, M. Krüger and H. J. Möhring, Materialwissenschaften und Werkstofftechnik: Eine Einführung, VCH, 2012.
K. P. C. Vollhardt, H. Butenschön and N. E. Schore, Organische Chemie, VCH, 2011.

H. R. Horton, Biochemistry Pearson Studium, 2008.
A. F. Holleman, E. Wiberg and N. Wiberg, Lehrbuch der anorganischen Chemie, de Gruyter, 2007.
P. W. Atkins, J. de Paula, M. Bär, A. Schleitzer and C. Heinisch, Physikalische Chemie, Wiley, 2006.
C. H. Hamann and W. Vielstich, Electrochemistry, Wiley, 2005.

[*updated 05.11.2020*]

Fundamentals of Product Development

Module name (EN): Fundamentals of Product Development

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_PE_5.08.GPE

Hours per semester week / Teaching method:
2SU (2 hours per week)

ECTS credits:
2

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:
Term paper

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_PE_5.08.GPE (P241-0257) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 5, mandatory course, Specialization Product Development

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_M_4.04.MK2 Engineering Design (with Project)

[*updated 18.07.2022*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Bernd Heidemann

Lecturer:
Prof. Dr. Bernd Heidemann

[*updated 18.07.2022*]

Learning outcomes:
After successfully completing this course, students will be able to explain, characterize and differentiate technical products in terms of their benefits and sustainability.
Students will be able to organize a product development process using a basic methodical approach and work through it accordingly.
They will be able to develop a product using a methodical procedure and present and explain it.
Socail skills: Students will be able to formulate questions in front of a large group and present and defend both procedural and solution-related technical ideas.

[*updated 05.11.2020*]

Module content:
The technical product _ Definitions, demands and requirements, individual benefits and sustainability
The product development process and its sub-phases.
The general working methodology as a basis for a planned procedure
Clarify the task and develop a list of requirements
Conception: Identify and formulate overall function and sub-functions (abstract)
Develop and vary functional structures
Create an ordering scheme (morphological box) for functions and solutions.
Identify solutions
Research and vary solution properties.
Reduce solution variety: Selection and evaluation of solutions and total solutions
Combining (partial) solutions to create complete solutions
Present (visualize) and explain the overall solution as a concept

[*updated 05.11.2020*]

Teaching methods/Media:
Interactive, seminaristic instruction with tutorials/exercises. The tutorial will be based on a written guide that we will discuss at the beginning of the course.

[*updated 05.11.2020*]

Recommended or required reading:
Pahl/Beitz: Konstruktionslehre - Methoden und Anwendung erfolgreicher Produktentwicklung. Springer Vieweg, Heidelberg.
Pahl/Beitz: Engineering Design - A Systematic Approach. Springer-Verlag, London.
Ehrlenspiel, K.; Meerkamm, H.: Integrierte Produktentwicklung - Denkabläufe, Methodenein-satz, Zusammenarbeit. Carl Hanser Verlag, München.

[*updated 05.11.2020*]

Heat Transfer and Fluid Mechanics

Module name (EN): Heat Transfer and Fluid Mechanics

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_4.02.WFL

Hours per semester week / Teaching method:
3V+1U+1P (5 hours per week)

ECTS credits:
5

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 150 min.

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_A_4.02.WFL (P241-0290) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course
MAB_24_A_4.02.WFL Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 4, mandatory course

Workload:
75 class hours (= 56.25 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 93.75 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.04.MA1 Mathematics 1
MAB_19_A_1.07.ENB Engineering Basics
MAB_19_A_2.04.MA2 Mathematics 2
MAB_19_A_2.05.KWL
MAB_19_A_3.02.THE

[*updated 21.01.2022*]

Recommended as prerequisite for:
MAB_19_V_5.14.KTV

[*updated 02.03.2020*]

Module coordinator:
Prof. Dr. Marco Günther

Lecturer:
Prof. Dr. Marco Günther (lecture)
Gerhard Braun (lecture)

[*updated 21.01.2022*]

Learning outcomes:
Heat Transfer:
1. Lecture
After successfully completing this part of the course, students will:
- be able to explain the advanced basics of heat transport,
- be able to describe and characterize special heat transfer processes,
- be able to take and assess new, reactive approaches to heat transfer,
- be able to demonstrate and explain the application of convective heat transfer, thermal conduction and thermal radiation,
- be able to justify and evaluate their selection of technical equipment and components for heat transfer.

2. Tutorial
After successfully completing this part of the course, students will:
- be able to identify heat transfer mechanisms and select calculation methods,
- be able to determine process engineering and heat engineering quantities,
- be able to calculate heat transfer tasks,
- be able to show connections between special material data and dimensionless quantities

Heat Transfer (Professional skills):
After successful completion of the course, students will be proficient in the basics of thermodynamics in order to specifically describe the mechanisms of heat transfer. In the lecture, students will acquire the skills to handle empiric formulas based on material quantities, thermal process variables, thermal state variables and material-dependent property values.

Heat Transfer (Methodological skills):
By applying solution algorithms in a targeted manner, students will be able to reliably differentiate at which control variables a technical heat transfer process must be balanced or quantified and which optimization options (process engineering, mechanical engineering, fluid-mechanical or in material selection) are applicable using the available material data properties of pressure, temperature and volume specification.

Heat Transfer (Social competence):
Students will be able to discuss in small groups and develop solutions.
They will be able to define tasks independently, develop the knowledge they require based on the knowledge they have acquired, use suitable means of implementation.

Active exercise units during the lecture are designed to enable the students to competently evaluate stationary and quasi-stationary heat transfer problems in a communicative manner. These active practice units will deepen the learning and work techniques (professional heat transfer skills) previously acquired and promote skills for independently reviewing the knowledge received during their studies (also in small study

groups). Students will be able to deepen this knowledge with the help of the interactive exercise units, exchange information in study groups about the basics of heat transfer, as well as methodical problem solving of learning and working techniques and confidently present their developments and findings.

Heat Transfer (Personal competence):
Students will be able to compare their results based on different approaches (purely empirical algorithms in the similarity theory of heat transfer based on dimensionless quantities), explain and calculate different approaches, discuss the likelihood of implementation based on their knowledge of the natural, technical or financial limits to which a process may be subjected. Students will be able to classify selection criteria for heat transfer analogys (intentional, e.g. sweating in functional clothing, or those that must be prevented, e.g. frost limit shifting in damp supporting masonry) for various technical applications and present their results using algorithms.

Students will be familiar with the basics of heat transfer mechanisms, thermal conduction, convection, radiation, evaporation and condensation. They will be able to solve heat transfer problems in technical fields. Students will be proficient in methodical procedures through sketches, balances, kinetics. They will be able to apply different approaches to heat transfer processes.

After successfully completing this module, students will:
- be familiar with and understand the calculation equations for heat exchangers and be able to design and recalculate heat exchangers,
- be familiar with and understand methods for the analysis of complex thermal processes and will be able to apply these methods.

Professional and methodological skills 60%, Social skills 15%, Personal competence 25%

"Fluid Mechanics":
After successfully completing this part of the course, students will learn the extended physical basics for the calculation of incompressible and especially compressible flows. Students will be familiar with the essential elements of a flow calculation and have some basic experience in operating calculation tool. Through exercises, students will be able to classify fluid dynamic processes and their effects, taking into account the influencing variables, and to calculate them from an engineering perspective.

[*updated 05.11.2020*]

Module content:
"Heat Transfer":
Fourier´s laws of heat conduction, thermal conductivity of fluids and solids, heat transfer coefficient.
- Stationary tasks:
Heat transfer through flat, cylindrical and spherical walls (PÈCLET number.)
- Quasi one-dimensional and quasi-stationary problems:
Cooling of flowing fluids in pipelines, cooling of a fluid in a spherical reservoir, cooling of a continuous wire in a liquid bath, fins (finned walls, finned tubes)
- Similarity Theory:
Dimensionless quantities (Nu, Re, Pr, Gr etc.)
- Heat transfer in single-phase flows:
Forced convection: channel flows, bodies in cross flow, tube bundles, Natural convection: plane wall, horizontal cylinder
- Simple heat exchangers:
Recuperators, regenerators: direct current, counter current, cross current
- Heat transfer by radiation:
PLANCK´s radiation law, LAMBERT´s cosine law, STEFAN-BOLTZMANN law, KIRCHHOFF´s laws, radiation heat exchange between parallel surfaces, radiation shields, radiative transfer of enclosed surfaces.

"Fluid Mechanics":
- Incompressible fluids:
Steady flow in piping systems, outflow processes, principle of linear momentum, principle of angular momentum
- Compressible fluids:
Energy equation, outflow processes, supersonic flow
- Application:
Exemplary applications of CFD simulation software (like Ansys Fluent, Ansys CFX, Comsol Multiphysics)

[*updated 05.11.2020*]

Teaching methods/Media:
Heat Transfer: Lecture: 1.5 hours per semester week, Tutorials: 0.5 hour per semester week,
"Fluid Mechanics": Lecture: 1.5 hours per semester week, Tutorials: 0.5 hour per semester week,

Lecture guide, handouts, exercises, formula collection

[*updated 05.11.2020*]

Recommended or required reading:
Heat transfer:
v. Böckh, P.: Wärmeübertragung; Baehr, H.D., Stephan K.: Wärme- und Stoffübertragung
Elsner, N.; Dittmann A.: Grundlagen der Technischen Thermodynamik II, Wärmeübertragung, VDI Wärmeatlas
Energietechn. Arbeitsmappe
Rohsenow, W.M. et al.: Handbook of Heat Transfer Vol. I u. II

Fluid mechanics:
Bohl: Tech. Strömungslehre
v. Böckh: Fluidmechanik
Herwig: Strömungsmechanik
Herwig: Strömungsmechanik A-Z
Kümmel: Technische Strömungsmechanik
Oertel, Böhle, Dohrmann: Strömungsmechanik

[*updated 05.11.2020*]

Joining Techniques with Integrated Lab Course

Module name (EN): Joining Techniques with Integrated Lab Course

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_IP_5.04.FML

Hours per semester week / Teaching method:
1V+1P (2 hours per week)

ECTS credits:

3

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 90 min.

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_IP_5.04.FML (P241-0248, P241-0249) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 5, mandatory course, Specialization Industrial Production

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 67.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.03.WSK Materials Science with Lab Exercises
MAB_19_A_2.02.TFL Manufacturing Process Technology (with Lab Course)

[*updated 06.04.2020*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Jürgen Griebsch

Lecturer:
Lehrbeauftragte

[*updated 06.04.2020*]

Learning outcomes:
After successfully completing this module, students will be familiar with joining technique-related manufacturing processes based on the state of the art.
They will be able to assess their areas of application and potential for use or to differentiate between them.
They will be able to evaluate existing joints.

[*updated 05.10.2020*]

Module content:
Based on the module "Technologie der Fertigungsverfahren mit Labor", students will learn about joining technology-related manufacturing processes according to DIN 8550 with a focus on applications in the

metalworking industry.

- Selection and delimitation of the various procedures / advantages & disadvantages
- Material testing including strength analyses
- Group work and laboratory exercises with a test series and a comparison of joining technologies

[*updated 05.10.2020*]

Teaching methods/Media:
Instruction with practically-oriented exercise segments, laboratory in small groups

[*updated 05.10.2020*]

Recommended or required reading:
Geiger, Walter / Kotte, Willi; "Handbuch Qualität, Grundlagen und Elemente des Qualitätsmanagements: Systeme _ Perspektiven"; ISBN: 978-3-8348-0273-6
Keferstein, Claus P. / Dutschke, Wolfgang; "Fertigungsmesstechnik Praxisorientierte Grundlagen, moderne Messverfahren"; ISBN: 978-3-8351-0150-0
Tschätsch, Heinz; "Praxis der Zerspantechnik - Verfahren, Werkzeuge, Berechnung"; ISBN: 978-3-8348-0274-3
Westkämper, Engelbert / Warnecke, Hans-Jürgen; "Einführung in die Fertigungstechnik"; ISBN: 978-3-8351-0110-4
Habenicht, Gerd; "Kleben - erfolgreich und fehlerfrei - Handwerk, Praktiker, Ausbildung, Industrie"; ISBN: 978-3-8348-0019-0
Hügel, Helmut / Graf, Thomas; "Laser in der Fertigung (Arbeitstitel) - Strahlquellen, Systeme, Fertigungsverfahren; ISBN: 978-3-8351-0005-3
Ralf Berning; "Grundlagen der Produktion: Produktionsplanung und Beschaffungsmanagement (paperback)"; ISBN: 978-3464495131
König, Klocke; "Fertigungsverfahren 1-5: Fertigungsverfahren 1. Drehen, Fräsen, Bohren: Drehen, Fräsen, Bohren: Bd 1 (hardcover)"; ISBN: 978-3540234586
Fritz, Schulze; "Fertigungstechnik (VDI)"; ISBN: 978-3540766957
Rau, Koether; "Fertigungstechnik für Wirtschaftsingenieure (Broschiert)"; ISBN: 978-3446412743

[*updated 05.10.2020*]

Machine Dynamics

Module name (EN): Machine Dynamics

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_M_4.05.MDY

Hours per semester week / Teaching method:
4V (4 hours per week)

ECTS credits:
5

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 90 min.

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_M_4.05.MDY (P241-0266) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_M_3.07.TMK Engineering Mechanics - Kinetics

[*updated 18.02.2020*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr.-Ing. Heike Jaeckels

Lecturer:
Prof. Dr.-Ing. Heike Jaeckels

[*updated 18.02.2020*]

Learning outcomes:
After successfully completing this course, students will be able to analyze and calculate dynamically stressed machines and machine parts and approximate important parameters.

They will have improved their interdisciplinary methodological competence.

[*updated 05.10.2020*]

Module content:
Elements of vibrating mechanical structures ; elastic elements, energy-dissipating elements
Equations of motion for vibrating structures
Natural oscillations of linear systems with one degree of freedom
Forced osciallations of systems with one degree of freedom; Resonance, vibration isolation
Rotating unbalance; Unbalance correction
Free oscillations of systems with several degrees of freedom; Estimation of the natural angular frequency

Free oscillations of systems with several degrees of freedom; Vibration damping
Simple, free continuum oscillations; Bending oscillations, torsional oscillations

[*updated 05.10.2020*]

Teaching methods/Media:
Course with seminaristic components

[*updated 05.10.2020*]

Recommended or required reading:
Jürgler, Maschinendynamik
Holzweissig et al., Lehrbuch der Maschinendynamik

[*updated 05.10.2020*]

Machine Elements and Design 1

Module name (EN): Machine Elements and Design 1

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_M_3.05.MK1

Hours per semester week / Teaching method:
3SU+1U (4 hours per week)

ECTS credits:
5

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 180 min.

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_M_3.05.MK1 (P241-0267) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course

Workload:

60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.01.MDM Principles of Engineering Drawing and the Representation of Machine Elements (with Machine Analysis Lab)
MAB_19_A_1.02.TMS Engineering Mechanics - Statics
MAB_19_A_1.03.WSK Materials Science with Lab Exercises
MAB_19_A_2.02.TFL Manufacturing Process Technology (with Lab Course)
MAB_19_A_2.03.GBD

[*updated 03.03.2020*]

Recommended as prerequisite for:
MAB_19_M_4.03.MK2
MAB_19_M_4.04.MK2 Engineering Design (with Project)
MAB_19_PE_5.09.GTL

[*updated 04.03.2020*]

Module coordinator:
Prof. Dr. Bernd Heidemann

Lecturer:
Prof. Dr. Bernd Heidemann

[*updated 03.03.2020*]

Learning outcomes:
After successfully completing this course, students will be able to classify technical systems into technical products and machines.
Students will be able to analyze and justify technical systems in terms of function and element design.
Students will be familiar with basic construction methods, joining techniques and elements and will be able to develop constructive solutions with these.
They will be able to constructively design simple elements (e.g. grippers, pliers, presses, jigs and fixtures) for basic requirements (functional, manufacturable) and present them in handmade drawings.
Social skills: Students will be able to formulate questions and present constructive ideas in front of a large group.

[*updated 05.11.2020*]

Module content:
Introduction: Definitions of _Machine and _Machine elements_
Classification: "Constructing" as an activity within a product development process.
The basic requirements for a construction/technical product
Systems engineering and systems engineering analysis (The input variables energy, material, information for a technical system, couplings in a technical system.)
Form and position tolerances
Housings and frames: construction methods and constructive designs

Fixed couplings - fastenings and techniques:
Welding and construction suitable for welding.
Bonding and adhesive construction.
Rivets, bolts, pins and the design of typical connections.
Screws and the design of prestressed bolt connections.

[*updated 05.11.2020*]

Recommended or required reading:
Decker, K.-H.: Maschinenelemente. Carl Hanser Verlag, München.

Hoenow, G., Meißner, T.: Entwerfen und Gestalten im Maschinenbau. Bauteile _ Baugruppen _ Maschinen. Carl Hanser Verlag, München.

Hoischen, H., Hesser, W.: Technisches Zeichnen. Grundlagen, Normen, Beispiele, Darstellende Geometrie. Cornelsen Verlag Scriptor GmbH & Co. KG, Berlin.

Jorden, W.: Form- und Lagetoleranzen. Carl Hanser Verlag, München.

Muhs, D., e.a.: Roloff/Matek Maschinenelemente. Normung, Berechnung, Gestaltung. Vieweg + Teubner Verlag, Wiesbaden.

Muhs, D., e.a.: Roloff/Matek Maschinenelemente. Tabellen. Vieweg + Teubner Verlag, Wiesbaden.

Trumpold, H., Beck, Ch., Richter, G.: Toleranzsysteme und Toleranzdesign _ Qualität im Austauschbau. Carl Hanser Verlag, München Wien.

[*updated 05.11.2020*]

Machine Tools - Advanced Aspects

Module name (EN): Machine Tools - Advanced Aspects

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_IP_5.06.VWZ

Hours per semester week / Teaching method:
1V+1P (2 hours per week)

ECTS credits:
3

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 90 min.

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_IP_5.06.VWZ (P241-0201, P241-0203) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 5, mandatory course, Specialization Industrial Production

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 67.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_2.02.TFL Manufacturing Process Technology (with Lab Course)

[*updated 06.04.2020*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Jürgen Griebsch

Lecturer:
M.Eng. Pascal Paulus

[*updated 06.04.2020*]

Learning outcomes:
After successfully completing this course, students will be familiar with the structure and elements of machine tools.
They will be able to assess the importance of the individual elements for manufacturing accuracy and select suitable machine tools for a given manufacturing task.

[*updated 05.10.2020*]

Module content:
- Machine tool requirements and definition
- Frames: geometries and materials
- Guides
- Drives
- Machine tool design

[*updated 05.10.2020*]

Teaching methods/Media:
Instruction with practically-oriented exercise segments, laboratory in small groups

[*updated 05.10.2020*]

Recommended or required reading:
HIRSCH, Andreas: Werkzeugmaschinen Grundlagen, Auslegung, Ausführungsbeispiele. Wiesbaden, Vieweg+Teubner Verlag, 2012

BAHMANN, Prof. Dr.-Ing. Werner: Werkzeugmaschinen kompakt _ Baugruppen, Einsatz und Trends, Wiesbaden, Springer Vieweg, 2013

BRECHER, Christian; Weck Manfred: Werkzeugmaschinen Fertigungssysteme Konstruktion, Berechnung und messtechnische Beurteilung Band 2, Berlin Heidelberg, Springer Vieweg, 2017

KLEIN, Bernd: FEM - Grundlagen und Anwendungen der Finite-Element-Methode im Maschinen- und Fahrzeugbau; Wiesbaden, Springer Vieweg, 2012

NEUGEBAUER, Prof. Reimund: Werkzeugmaschinen Aufbau, Funktion und Anwendung von Spanenden und abtragenden Werkzeugmaschinen, Berlin Heidelberg, Springer Vieweg, 2012

[*updated 05.10.2020*]

Manufacturing Process Technology (with Lab Course)

Module name (EN): Manufacturing Process Technology (with Lab Course)

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_2.02.TFL

Hours per semester week / Teaching method:
3V+1U+1LU (5 hours per week)

ECTS credits:
5

Semester: 2

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 120 min. (graded)
Lab experiment (evaluated)

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_A_2.02.TFL (P241-0286, P241-0287) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 2, mandatory course
MAB_24_A_2.02.TFL Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 2, mandatory course
PRI-TFL (P241-0286, P241-0287) Production Informatics, Bachelor, ASPO 01.10.2023 , semester 2,

mandatory course

Workload:
75 class hours (= 56.25 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 93.75 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
MAB_19_IP_5.03.AGF Additive Manufacturing and Generative Design
MAB_19_IP_5.04.FML Joining Techniques with Integrated Lab Course
MAB_19_IP_5.05.MST Production and Quality Management
MAB_19_IP_5.06.VWZ Machine Tools - Advanced Aspects
MAB_19_IP_5.07.MPE Manufacturing Project in English (1)
MAB_19_M_3.05.MK1 Machine Elements and Design 1
MAB_19_M_4.03.MK2
MAB_19_M_4.04.MK2 Engineering Design (with Project)
MAB_19_M_4.07.FBG Production-Optimized Component Design

[*updated 20.11.2023*]

Module coordinator:
Prof. Dr. Jürgen Griebsch

Lecturer:
Prof. Dr. Jürgen Griebsch

[*updated 06.04.2020*]

Learning outcomes:
After successfully completing this course, students will be familiar with important manufacturing processes and the machine tools used.
They will be familiar with the characteristics and possible applications of the manufacturing processes according to DIN 8550.
Students will be able to select a process based on technical criteria for a production task and by weighing up the advantages and disadvantages.
They will be able to outline manufacturing chains for simple tasks.
Students will be familiar with the practical application of selected manufacturing processes according to DIN 8550.

[*updated 05.11.2020*]

Module content:
The quality and efficiency of industrial production depends on choosing the right manufacturing process and understanding that process. That is why knowledge about the various technologies is one of a production engineers important tools.
Basic components of manufacturing processes according to DIN 8550 are:
- Primary processing (e.g. casting)
- Forming
- Cutting

- Coating
- Modifying
We will also discuss joining to a limited extent, but it is one of the main focuses of the 5th semester in the lecture "Joining Techniques with Integrated Lab Course".

The content of the course is based on a roughly defined industrial process and will prepare students for the production engineering lab that accompanies the lecture.

The lecture will be combined with smaller practical exercises where students can work on topics, present them briefly and then discussion them.

[*updated 05.11.2020*]

Teaching methods/Media:
- Lecture with exercises and calculations on the blackboard
- Lab - Practical course

[*updated 05.11.2020*]

Recommended or required reading:
Spur, G.; Handbuch Fertigungstechnik in 5 Bänden; Hanser Verlag, 2016

Fritz, A.-H.; Fertigungstechnik; Springer Verlag, 2018; ISBN: 978-3-662-56535-3

Gebhardt, A.; Additive Fertigungsverfahren; Hanser Verlag, 2016; ISBN: 978-3-446-44539-0

Geiger, Walter / Kotte, Willi; "Handbuch Qualität, Grundlagen und Elemente des Qualitätsmanagements: Systeme _ Perspektiven"; ISBN: 978-3-8348-0273-6

Keferstein, Claus P. / Dutschke, Wolfgang; "Fertigungsmesstechnik Praxisorientierte Grundlagen, moderne Messverfahren"; ISBN: 978-3-8351-0150-0

Tschätsch, Heinz; "Praxis der Zerspantechnik - Verfahren, Werkzeuge, Strahlquellen, Systeme, Fertigungsverfahren; ISBN: 978-3-8351-0005-3

Ralf Berning; "Grundlagen der Produktion: Produktionsplanung und Beschaffungsmanagement (Taschenbuch)"; ISBN: 978-3464495131

König, Klocke; "Fertigungsverfahren 1-5: Fertigungsverfahren 1. Drehen, Fräsen, Bohren: Drehen, Frasen, Bohren: Bd 1 (Gebundene Ausgabe)"; ISBN: 978-3540234586

Fritz, Schulze; "Fertigungstechnik (VDI)"; ISBN: 978-3540766957

Westkämper, Engelbert / Warnecke, Hans-Jürgen; "Einführung in die Fertigungstechnik"; ISBN: 978-3-8351-0110-4

Habenicht, Gerd; "Kleben - erfolgreich und fehlerfrei - Handwerk, Praktiker, Ausbildung, Industrie"; ISBN: 978-3-8348-0019-0

Hügel, Helmut / Graf, Thomas; "Laser in der Fertigung (Arbeitstitel)- Strahlquellen, Systeme, Fertigungsverfahren; ISBN: 978-3-8351-0005-3

Ralf Berning; "Grundlagen der Produktion: Produktionsplanung und Beschaffungsmanagement

(Taschenbuch)"; ISBN: 978-3464495131

König, Klocke; "Fertigungsverfahren 1-5: Fertigungsverfahren 1. Drehen, Fräsen, Bohren: Drehen, Frasen, Bohren: Bd 1 (Gebundene Ausgabe)"; ISBN: 978-3540234586

[*updated 05.11.2020*]

Manufacturing Project in English (1)

Module name (EN): Manufacturing Project in English (1)

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_IP_5.07.MPE

Hours per semester week / Teaching method:
2PA+1S (3 hours per week)

ECTS credits:
3

Semester: 5

Mandatory course: yes

Language of instruction:
German/English

Assessment:
Assessment methods:
Project documentation in German
Abstract in Englisch
Presentation in English 15 min.

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_IP_5.07.MPE (P241-0264, P241-0265) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 5, mandatory course, Specialization Industrial Production

Workload:
45 class hours (= 33.75 clock hours) over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 56.25 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.05.BEM Business English for Mechanical Engineers

MAB_19_A_2.01.CAD CAD 3D Modeling
MAB_19_A_2.02.TFL Manufacturing Process Technology (with Lab Course)
MAB_19_A_2.06.TEM Technical English for Mechanical Engineers and Professional Presentations
MAB_19_A_3.03.AEJ Applying for an Engineering Job

[*updated 18.02.2020*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Jürgen Griebsch

Lecturer:
Sebastian Barth, M.A.
Professor/innen des Studiengangs

[*updated 18.02.2020*]

Learning outcomes:
After successfully completing this course, students will be able to solve a task given to them using analytical procedures and thereby expand their problem-solving competence.
Student creativity will be encouraged.

Students will be able to work in a team in order to complete a task successfully.
They will be able to manage time and resources (project management).

They will be able to use communication techniques to ensure successful communication in projects.
Students will be familiar with various reading strategies and will be able to work independently on a topic using English technical texts and videos.

They will improve and deepen the presentation knowledge and skills acquired in the _Technical English for Mechanical Engineers and Professional Presentations_ modules and be able to apply them to a final presentation of their project results in English. The main focus will be an academically educated audience, which, however, is not exclusively composed of experts on the respective topic.
Students will also be able to write an English abstract on the documentation to be prepared in German.

[*updated 05.10.2020*]

Module content:
- Production-oriented design, planning and implementation of a task (example product from an industrial application)
- Documentation and presentation of results in English

A team of students, supported by targeted coaching, will work on an interdisciplinary task and compile the results in the form of a technical documentation. They will also present their results. The team itself will be responsible for delegating tasks and organization.

They will prepare a design and cost report based on the "Formula Student" approach.
The will defend/present their results in a presentation by a specific date.

The task will be supplemented by a "real case": After evaluating the submitted cost report, students will receive a real-case scenario. In this scenario, they must make suggestions for a more cost-efficient solution for a selected component of the product.

The content will be closely related to the technical project. Content:
- Strategies for acquiring the technical vocabulary relevant to the respective projects
- Text work with technical texts and videos relevant to the respective projects
- Repetition of the structure and language of English presentations in order to present project results
- Describing diagrams, tables, images, numbers, cause and effect correlations, and trends
- Presentation slides
- Dealing with questions and body language
- Preparing and practicing English presentations in order to present project results
- Introduction to abstracts (structure, style, idioms, writing strategies)
- Writing abstracts

[*updated 05.10.2020*]

Teaching methods/Media:
Teaching methods/Media:
PJ=Project work _ Workshop character

The learning goals will be achieved through integrated training of the four basic skills (listening comprehension, reading comprehension, speaking and writing) supported by the use of multimedia. Group work and working in pairs, as well as peer review will play an important role. During the workshop-like phases, students will have the opportunity to practice their presentations and receive appropriate feedback.

Target group-specific teaching/learning materials (print, audio, video), as well as multimedia CALL and e&mLearning materials will be used.

[*updated 05.10.2020*]

Recommended or required reading:
König, Klocke; "Fertigungsverfahren 1-5: Fertigungsverfahren 1. Drehen, Fräsen, Bohren: Drehen, Frasen, Bohren: Bd 1 (Gebundene Ausgabe)"; ISBN: 978-3540234586
Fritz, Schulze; "Fertigungstechnik (VDI)"; ISBN: 978-3540766957
Rau, Koether; "Fertigungstechnik für Wirtschaftsingenieure (Broschiert)"; ISBN: 978-3446412743
Westkämper, Engelbert / Warnecke, Hans-Jürgen; "Einführung in die Fertigungstechnik"; ISBN: 978-3-8351-0110-4
Ralf Berning; "Grundlagen der Produktion: Produktionsplanung und Beschaffungsmanagement (Taschenbuch)"; ISBN: 978-3464495131

Christine Sick, unter Mitarbeit von Miriam Lange: TechnoPlus Englisch 2.0. Ein multimediales Sprachlernprogramm für Technisches Englisch und Business English. EUROKEY.
Christine Sick, unter Mitarbeit von Lisa Rauhoff und Miriam Wedig (seit 2016): Online Extensions zu TechnoPlus Englisch, EUROKEY.
Christine Sick: TechnoPlus Englisch VocabApp. EUROKEY.

M. Ibbotson: Professional English in Use: Engineering. Technical English for Professionals. CUP.
C. Sowton: 50 Steps to Improving Your Academic Writing. Garnet Education.

B. Rosenberg: Spring into Technical Writing for Engineers and Scientists. Addison-Wesley.
D. Beer, D. McMurrey: A Guide to Writing as an Engineer. Wiley.
K. Budinsky: Engineers_ Guide to Technical Writing. ASM International.

[*updated 05.10.2020*]

Materials Science with Lab Exercises

Module name (EN): Materials Science with Lab Exercises

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_1.03.WSK

Hours per semester week / Teaching method:
4V+1P (5 hours per week)

ECTS credits:
5

Semester: 1

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 180 min.

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_A_1.03.WSK (P241-0206, P241-0291) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 1, mandatory course
MAB_24_A_1.03.WSK Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 1, mandatory course

Workload:
75 class hours (= 56.25 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 93.75 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
MAB_19_A_2.03.GBD
MAB_19_A_2.05.KWL
MAB_19_IP_5.04.FML Joining Techniques with Integrated Lab Course
MAB_19_M_3.05.MK1 Machine Elements and Design 1
MAB_19_M_3.06.BTD Dimensioning Components
MAB_19_M_4.03.MK2
MAB_19_M_4.04.MK2 Engineering Design (with Project)
MAB_19_V_5.14.KTV

[*updated 04.01.2024*]

Module coordinator:
Prof. Dr. Moritz Habschied

Lecturer:
Prof. Dr. Moritz Habschied (lecture)
M.Eng. Marc Allenbacher (practical training)

[*updated 25.04.2022*]

Learning outcomes:
After successfully completing this course, students will be familiar with the tensile test, hardness test methods and the charpy impact test and will be able to determine and interpret the corresponding characteristic values. They will be able to attribute specific material behavior to the respective microstructure.
Students will be familiar with the basics of elastic and plastic deformation, the microstructure of metals and basic mechanisms for increasing strength. They can correlate these with the material entanglement observed.

Students will be familiar with the basic types of phase diagrams in binary systems, as well as iron-cement and the connection to cooling curves. They will be able to derive the evolution of the microstructure and correlate it with real structures. They will be able to calculate proportions and phases depending on the concentration.

Students will understand the effect of steel production on the properties of steels. They will be able to select the annealing and hardening processes required to achieve desired properties. They will also be able to select suitable surface hardening methods.

Students will be able to determine the microstructure of steel structures.

In practical exercises, they will learn to work in teams to acquire new knowledge and to work on interdisciplinary test tasks. They will be able to reflect their opinions and defend them with factual arguments.

[*updated 05.10.2020*]

Module content:
- Load types (axial, shear, bending, torsion)
- Tensile testing
- Basic terms: strength-deformation-breakage

- Brittle and ductile behavior and external influences
- Test procedures

Hardness test
Charpy impact test
Fatigue test, Wöhler curve and Smith chart

- Metallurgy
  - Crystal structure and microstructure
  Crystallographic defects and their significance for deformability and strength

- Basics of materials technology
  Nucleation and solidification
  Diffusion
  Alloy and precipitation formation
  Microstructure change and influence through diffusion-controlled processes

- Phase diagrams
  Cooling curves
  Basic types with segregation and formation of eutectics and intermetallic phases
  Schematic diagrams of microstructural development

  Calculating quantities

- Cementite phase diagram
  Derivation of the microstructure development
  Schematic and real microstructural development
  Calculating quantities

- Steel production and alloy adjustment

- Heat treatment processes
  Stress relief annealing
  Recrystallization annealing
  Soft annealing
  Normalizing
  Coarse-grain annealing
  Homogenization annealing

- Basics of hardening and tempering
- Formation and adjustment of martensite, intermediate stage and microstructure of the lower pearlite stage
- TTT diagram and cooling chart

- Influence of C-content and alloying elements on hardening and tempering ability and the TTT diagram
- Formation, properties and effect of retained austenite

- Surface hardening process with changes in the chemical composition
  Case hardening
  Nitriding
  Carbonitriding

- Steel designations

[*updated 05.10.2020*]

Teaching methods/Media:
Interactive, seminaristic lecture
Practical training in the lab in small groups

[*updated 05.10.2020*]

Recommended or required reading:
Bargel, Schulze: Werkstoffe
Bergmann: Werkstofftechnik Teil 1
Heine, Werkstoffprüfung

[*updated 05.10.2020*]

Mathematics 1

Module name (EN): Mathematics 1

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_1.04.MA1

Hours per semester week / Teaching method:
2V+2U (4 hours per week)

ECTS credits:
5

Semester: 1

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 120 min.

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_A_1.04.MA1 (P241-0271) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 1, mandatory course
MAB_24_A_1.04.MA1 Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 1, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).

There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
MAB_19_A_2.04.MA2 Mathematics 2
MAB_19_A_2.07.ELT Electrical Engineering für Mechanical Engineering und Process Engineering
MAB_19_A_3.02.THE
MAB_19_A_4.02.WFL Heat Transfer and Fluid Mechanics
MAB_19_M_5.17.AUM Automation Technology in Mechanical Engineering
MAB_19_V_5.16.AUV Automation Technology in Process Engineering

[*updated 21.01.2022*]

Module coordinator:
Prof. Dr. Marco Günther

Lecturer:
Dipl.-Math. Christian Leger

[*updated 10.03.2020*]

Learning outcomes:
After successfully completing this module, students will have a basic technical and methodological command of mathematics in order to understand engineering methods.

They will be familiar with vector calculus and its applications to problems in geometry and mechanics. They will be able to carry out simple calculations using the methods of linear algebra and analysis with regard to applications in mechanical engineering/process technology. Students will be able to solve simple mathematical problems using a software tool.

[*updated 05.10.2020*]

Module content:
Vector calculus, linear systems of equations, matrices, differential- integral calculus with a variable, Taylor series, curves, introduction to a mathematical software tool like Octave/Matlab, wxMaxima

[*updated 05.10.2020*]

Teaching methods/Media:
Lecture, tutorials, exercises;
Blackboard, handouts, transparencies, examples, exercises

[*updated 05.10.2020*]

Recommended or required reading:
H.-J. Bartsch: Taschenbuch mathematischer Formeln für Ingenieure und Naturwissenschaftler
L. Papula: Mathematik für Ingenieure und Naturwissenschaftler, Band 1+2
W.Preuß, G.Wenisch: Mathematik 1
J.Koch, M.Stämpfle: Mathematik für das Ingenieurstudium

[*updated 05.10.2020*]

Mathematics 2

Module name (EN): Mathematics 2

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_2.04.MA2

Hours per semester week / Teaching method:
2V+2U (4 hours per week)

ECTS credits:
5

Semester: 2

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 120 min.

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_A_2.04.MA2 (P241-0002) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 2, mandatory course
MAB_24_A_2.04.MA2 Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 2, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.04.MA1 Mathematics 1

[*updated 10.03.2020*]

Recommended as prerequisite for:
MAB_19_A_3.01.MA3
MAB_19_A_3.04.SKS Engineering Fluid Mechanics, Piston Engines, Compressors and Turbines
MAB_19_A_4.02.WFL Heat Transfer and Fluid Mechanics
MAB_19_M_5.17.AUM Automation Technology in Mechanical Engineering

MAB_19_V_5.16.AUV Automation Technology in Process Engineering

[*updated 21.01.2022*]

Module coordinator:
Prof. Dr. Marco Günther

Lecturer:
Dipl.-Math. Christian Leger

[*updated 10.03.2020*]

Learning outcomes:
After successfully completing this module, students will have broadened their technical and methodological knowledge of mathematics with a view to a wider field of application in mechanical engineering/process engineering.

They will understand the importance of coordinate transformations and will be able to apply them in a specific field, e.g. in the strength of materials field.
Students will be able to handle complex numbers and have insight into a variety of applications, e.g. in electrical engineering. Students will be able to convert mathematical methods in the context of linear algebra and analysis involving functions with multiple variables and implement them using a mathematical tool.

[*updated 05.10.2020*]

Module content:
Determinants, functions and coordinate systems, eigenwerte and eigenvectors, complex numbers, 2nd order curves and surfaces, arc length, curvature, differential and integral calculus for functions with multiple variables (e.g. moments of area, moments of inertia), use of a mathematical software tool such as Octave/Matlab, wxMaxima

[*updated 05.10.2020*]

Teaching methods/Media:
Lecture, exercises in the lecture, self-study exercises;
Blackboard, handouts, transparencies, exercises

[*updated 05.10.2020*]

Recommended or required reading:
H.-J. Bartsch: Taschenbuch mathematischer Formeln für Ingenieure und Naturwissenschaftler
L. Papula: Mathematik für Ingenieure und Naturwissenschaftler, Band 1+2
J. Koch, M. Stämpfle: Mathematik für das Ingenieurstudium

[*updated 05.10.2020*]

Physical Process Engineering with Practical Case Studies

Module name (EN): Physical Process Engineering with Practical Case Studies

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_V_4.10.PVT

Hours per semester week / Teaching method:
4V (4 hours per week)

ECTS credits:
5

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 90 min. + ungraded presentation

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_V_4.10.PVT (P241-0273, P241-0274) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course, Specialization Process Engineering
UI-T-PVT Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 6, mandatory course, technical
UI-T-PVT Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 6, mandatory course, technical

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_3.02.THE
MAB_19_V_3.09.GCL Fundamentals of Chemistry (with Lab Course)

[*updated 12.04.2023*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Matthias Faust

Lecturer:
Prof. Dr. Matthias Faust

[*updated 21.01.2022*]

Learning outcomes:
After successfully completing this course, students will be able to draw up and calculate energy balances and material balances, know, understand, explain and calculate basic operations of mechanical process engineering, know, understand, explain and calculate selected basic operations of thermal and interface process engineering.

[*updated 05.11.2020*]

Module content:
General basics:
- Principle of basic operations
- Balances and the transport of material, energy and impulse
- Process evaluation
- Parameters for process performance
- Parameters for the quality of material separation

Fundamentals of mechanical process engineering
- Introduction and basic terms
- Disperse systems, particle diameter, particle size distribution
- Properties of solids, liquids and gases

Fundamentals of mechanical process engineering
- Storage, transport, fluid bed technology
- Sedimentation
- Centrifugation
- Elutriation
- Flow through packed beds
- Filtration
- Mixing/Stirring
- Comminution

Fundamentals of thermal process engineering, e.g.:
- Introduction and basic terms
- Dalton s, Raoult s and Henry s laws

Basic operations of thermal process engineering, e.g.
- Evaporation
- Crystallization
- Sublimation

Basic operations of interfacial process engineering, e.g.
- Gas separation
- Extraction from solids
- Ion exchange

[*updated 19.05.2023*]

Teaching methods/Media:
Lecture with exercises and assignments, student presentations, lecture guide, formula collection, exercises for lecture, exercises for worksheets and presentation

[*updated 05.11.2020*]

Recommended or required reading:
- Stieß, Matthias: Mechanische Verfahrenstechnik - Partikeltechnologie 1, Springer 2009;
- Löffler, Raasch: Grundlagen der mechanischen Verfahrenstechnik 1992; Hemming: Verfahrenstechnik, 1993;
- Sattler: Thermische Trennverfahren, 2001;
- Cussler: Diffusion, mass transfer in fluid systems 1984;
- Mulder: Basic Principles of Membrane Technology 1997

[*updated 19.05.2023*]

Plant Planning and Project Execution

Module name (EN): Plant Planning and Project Execution

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_V_4.11.APP

Hours per semester week / Teaching method:
4V (4 hours per week)

ECTS credits:
5

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 180 min.

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_V_4.11.APP (P241-0099, P241-0376) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course, Specialization Process Engineering

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Matthias Faust

Lecturer:
Prof. Dr. Matthias Faust
N.N.

[*updated 05.04.2023*]

Learning outcomes:
Plant Planning and Project Execution: After successfully completing this course, students will be familiar with, understand and be able to explain the main steps of plant design from specification to detail engineering. Students will be familiar with, undertand and be able to explain the exemplary project sequence, consisting of:

- Phase 1: Project definition, brainstorming
- Phase 2: Planning,
- Decision: Order, execution, yes/no?,
- Phase 3: Execution
- Phase 4: Project completion

They will be familiar with, understand and be able to explain calculations, cost tracking and different project types. They will be able to create customer-oriented offers. Students will be familiar with, understand, as well as be able to explain and apply project management methods.
Public procurement and planning law: Students will be familiar with and be able to use HOAI, VOL, VOB. They will be familiar with, understand and be able to explain international procurement procedures and environmental impact assessments.
Team leadership: Students will be familiar with, understand, as well as be able to explain and apply basic team leadership methods.

[*updated 05.10.2020*]

Module content:
Plant planning and project execution: Defining a project, main steps of plant design, basic engineering, basic flow chart, process development and plant design, process flow chart, process planning and plant design, detail engineering, P&I flow chart, executing a project, checklists, commissioning and production, presentation of some product requirements, safety, comfort, lifetime, implementing product requirements, specification sheet, functional specification, comparing bids, recording customer requirements and boundary conditions, brainstorming, project types (operator model, turnkey plants, planning), preparing bids effectively, tracking project costs, pricing, project structure, project flow chart, project schedule critical path, commissioning plants, warranties
Public procurement and planning law: tender procedures, HOAI, VOL, VOB, international award procedures, environmental impact assessment, pricing
Team leadership: basic theory and methods of team leadership, leadership styles, team development, communication and moderation techniques, conflict management, negotiation tactics

[*updated 05.10.2020*]

Teaching methods/Media:
Lecture with exercises, student presentations, lecture guide, exercises for lecture, exercises for worksheets and presentation, transparencies as handouts

[*updated 05.10.2020*]

Recommended or required reading:

- Bernecker Gerhard, Planung und Bau verfahrenstechnischer Anlagen 1984;
- Ullrich, Hansjürgen, Wirtschaftliche Planung und Abwicklung verfahrenstechnischer Anlagen 1996,
- VDI; Auftragsabwicklung im Maschinen- und Anlagenbau 1991;
- Hirschberg, Hans Günther, Verfahrenstechnik und Anlagenbau 1999;
- Wagner, Walter, Planung im Anlagenbau 1998;
- Rautenbach, Robert, Anlagenplanung, Prozess Design

[*updated 05.10.2020*]

Principles of Engineering Drawing and the Representation of Machine Elements (with Machine Analysis Lab)

Module name (EN): Principles of Engineering Drawing and the Representation of Machine Elements (with Machine Analysis Lab)

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_1.01.MDM

Hours per semester week / Teaching method:
2SU+1U+1P (4 hours per week)

ECTS credits:
5

Semester: 1

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 120 min. + practical exam with term paper + lab experiment

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_A_1.01.MDM (P241-0269, P241-0270) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 1, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
MAB_19_M_3.05.MK1 Machine Elements and Design 1
MAB_19_M_4.03.MK2
MAB_19_M_4.04.MK2 Engineering Design (with Project)

[*updated 03.03.2020*]

Module coordinator:
Prof. Dr. Bernd Heidemann

Lecturer:
Daniel Kelkel, M.Sc.
M.Eng. Oliver Müller

[*updated 03.03.2020*]

Learning outcomes:
After successfully comnpleting this course, students will be familiar with techniques, standards and terms for the graphical representation of mechanical engineering components and structures.
They will be able to draw and dimension individual components and assemblies by hand according to standards.
Students will be able to transform spatial concepts into two-dimensional (component) views.
They will be able to read more complex assembly drawings.
Student will be able to disassemble a simple machine system in an organized manner, classify it in terms of system technology and explain the design of the components in terms of both function and production technology.

[*updated 05.11.2020*]

Module content:
Motivation: Technical drawing as a means of communication (as a way to store and pass on technical information) in engineering practice.
The benefits of a hand drawing in engineering practice
Drawing everyday objects freehand
Projection drawing everyday objects by hand and using a ruler
Tasks and methods of descriptive geometry: Projection methods, multiview projection, "spatial thinking"
Standard-compliant representation (and reading) of individual technical (construction) components: views, sections, breakouts
The technical designation of constructive details (chamfer, groove, recess, heel, etc.)
Standard-compliant dimensioning of components in technical drawings: component dimensions and dimensional tolerances, ISO tolerance system Production, test or function-oriented dimensioning Form and position tolerances, tolerance principles, surface specifications
Standard-compliant display of individual machine and standard elements: threads, gears, pins, bolts, axles, shafts, welding seams or connections.
Standard-compliant display of assemblies: views, sections
The structure of a technical drawing: Sheet division, title block, scale, differences between individual part and assembly drawing, parts list.
Standard-compliant dimensioning of components in technical drawings: component dimensions and dimensional tolerances, ISO tolerance system Production, test or function-oriented dimensioning Form and position tolerances, tolerance principles, surface specifications

Machine lab:
Diassembling and classifying (smaller) machine systems (e.g. electric hand machine tools) with regards to system technology
Analyzing components in terms of function, geometry and production technology
Drawing and dimensioning components by hand
Developing and documenting assembly instructions

[*updated 05.11.2020*]

Teaching methods/Media:
Seminaristic instruction with integrated drawing exercises by hand with pencil on paper
Manual-haptic laboratory exercise to "grasp" and "understand" real components in the literal sense

[*updated 05.11.2020*]

Recommended or required reading:
Bayer, W.K.: Technische Kommunikation, Technisches Zeichnen. Verlag Dr.-Ing. Paul Christiani GmbH & Co. KG, Konstanz.
Fucke, R., Kirch, K., Nickel, H.: Darstellende Geometrie für Ingenieure. Methoden und Beispiele. Carl Hanser Verlag, München.
Grollius, Horst-W.: Technisches Zeichnen für Maschinenbauer. Fachbuchverlag Leipzig im Carl Hanser Verlag. München, 2017.
Hoenow, G., Meißner, T.: Entwerfen und Gestalten im Maschinenbau. Bauteile _ Baugruppen _ Maschinen. Carl Hanser Verlag, München.
Hoischen, H., Hesser, W.: Technisches Zeichnen. Grundlagen, Normen, Beispiele, Darstellende Geometrie. Cornelsen Verlag Scriptor GmbH & Co. KG, Berlin.
Jorden, W.: Form- und Lagetoleranzen. Carl Hanser Verlag, München.
Kurz, U.: Wittel, H.: Böttcher/Forberg Technisches Zeichnen. Grundlagen, Normung, Darstellendes Geometrie und Übungen. Vieweg + Teubner Verlag, Wiesbaden.
Muhs, D., e.a.: Roloff/Matek Maschinenelemente. Normung, Berechnung, Gestaltung. Vieweg + Teubner Verlag, Wiesbaden.
Muhs, D., e.a.: Roloff/Matek Maschinenelemente. Tabellen. Vieweg + Teubner Verlag, Wiesbaden.
Trumpold, H., Beck, Ch., Richter, G.: Toleranzsysteme und Toleranzdesign _ Qualität im Austauschbau. Carl Hanser Verlag, München Wien.

[*updated 05.11.2020*]

Process Engineering Project in English (1)

Module name (EN): Process Engineering Project in English (1)

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_V_5.15.PEP

Hours per semester week / Teaching method:
2PA+1S (3 hours per week)

ECTS credits:
3

Semester: 5

Mandatory course: yes

Language of instruction:
English

Assessment:
Assessment methods:
Project documentation in German

Abstract in Englisch
Presentation in English 15 min.

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_V_5.15.PEP (P241-0276, P241-0277) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 5, mandatory course, Specialization Process Engineering

Workload:
45 class hours (= 33.75 clock hours) over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 56.25 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.05.BEM Business English for Mechanical Engineers
MAB_19_A_2.05.KWL
MAB_19_A_2.06.TEM Technical English for Mechanical Engineers and Professional Presentations
MAB_19_A_3.03.AEJ Applying for an Engineering Job

[*updated 18.02.2020*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr.-Ing. Christian Gierend

Lecturer:
Sebastian Barth, M.A.
Professor/innen des Studiengangs

[*updated 18.02.2020*]

Learning outcomes:
Students will be able to develop a topic-specific, methodical approach to a technical problem in a team, work on the problem in a structured and timely manner, develop solutions, and document and present their procedure and results in a report.

The modules _Business English for Mechanical Engineers_, _Technical English for Mechanical Engineers_ and Professional Presentations_, _Applying for an Engineering Job_ as well as _Design / Manufacturing/Process Engineering Project in English_ should be seen in conjunction with one another. They offer students a framework to further develop their English language skills in a professionally related area from the desired entry level B1 to level B2.
The focus of the _Design/Manufacturing/Process Engineering Project in English_ module will be on the presenting project results in English and writing an English abstract for the documentation that is to be written in German.
Students will be familiar with various reading strategies and will be able to work independently on a topic using English technical texts and videos.
They will improve and deepen the presentation knowledge and skills acquired in the _Technical English for Mechanical Engineers and Professional Presentations_ modules and be able to apply them to a final presentation of their project results in English. The main focus will be an academically educated audience,

which, however, is not exclusively composed of experts on the respective topic.
Students will also be able to write an English abstract on the documentation to be prepared in German.

[*updated 05.10.2020*]

Module content:
Forming a team (2-4 students) and contacting your supervisor.

Defining a technical project topic: The topic should be formulated to fit the interdisciplinary field of process engineering.

Developing a procedure for processing (agreeing on methodology, setting up a schedule, defining work packages, organizing the team (internal communication and information exchange with the appropriate media).

The content will be closely related to the technical projects. Content:
- Strategies for acquiring the technical vocabulary relevant to the respective projects
- Text work with technical texts and videos relevant to the respective projects
- Repetition of the structure and language of English presentations in order to present project results
- Describing diagrams, tables, images, numbers, cause and effect correlations, and trends
- Presentation slides
- Dealing with questions and body language
- Preparing and practicing English presentations in order to present project results
- Introduction to abstracts (structure, style, idioms, writing strategies)
- Writing abstracts

[*updated 05.10.2020*]

Teaching methods/Media:
Supervised teamwork with regular work meetings in English.

The learning goals will be achieved through integrated training of the four basic skills (listening comprehension, reading comprehension, speaking and writing) supported by the use of multimedia. Group work and working in pairs, as well as peer review will play an important role. During the workshop-like phases, students will also have the opportunity to practice their presentations and receive appropriate feedback.

Target group-specific teaching/learning materials (print, audio, video), as well as multimedia CALL and e&mLearning materials will be used.

[*updated 05.10.2020*]

Recommended or required reading:
- Christine Sick, unter Mitarbeit von Miriam Lange: TechnoPlus English 2.0. Ein multimediales Sprachlernprogramm für Technisches Englisch und Business English. EUROKEY.
- Christine Sick, unter Mitarbeit von Lisa Rauhoff und Miriam Wedig (seit 2016): Online Extensions zu TechnoPlus Englisch, EUROKEY.
- Christine Sick: TechnoPlus Englisch VocabApp. EUROKEY.
- M. Ibbotson: Professional English in Use: Engineering. Technical English for Professionals. CUP.
- C. Sowton: 50 Steps to Improving Your Academic Writing. Garnet Education.
- B. Rosenberg: Spring into Technical Writing for Engineers and Scientists. Addison-Wesley.

- D. Beer, D. McMurrey: A Guide to Writing as an Engineer. Wiley.
- K. Budinsky: Engineers_ Guide to Technical Writing. ASM International.

[*updated 05.10.2020*]

Production and Quality Management

Module name (EN): Production and Quality Management

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_IP_5.05.MST

Hours per semester week / Teaching method:
2V+1P (3 hours per week)

ECTS credits:
3

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 90 min.

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_IP_5.05.MST (P241-0278, P241-0279) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 5, mandatory course, Specialization Industrial Production
PRI-PUQ (P223-0010) Production Informatics, Bachelor, ASPO 01.10.2023 , semester 5, mandatory course

Workload:
45 class hours (= 33.75 clock hours) over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 56.25 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_2.01.CAD CAD 3D Modeling
MAB_19_A_2.02.TFL Manufacturing Process Technology (with Lab Course)

[*updated 06.04.2020*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Jürgen Griebsch

Lecturer:
M.Eng. Marco Busse

[*updated 06.04.2020*]

Learning outcomes:
After successfully completing this module, students will be able to master tasks from the fields of technical investment and production planning using their knowledge about production management. They will be able to determine machine availability and machine utilization.

Students will be able to draw up key figure models and interpret them.
They will be familiar with common fields of application in industrial assembly and understand the different assembly principles.
Students will be familiar with the planning, construction and organization of assembly systems.
They will be familiar with the different feeding, transport, handling and gripping systems.
Students will be familiar with the basic principles of quality management and will be able to apply its methods and tools.
They will be able to analyze technical risks and problems.

[*updated 05.11.2020*]

Module content:
Introduction to production management
- Production systems
- Value stream design
- Machine availability
- Key figure systems

Assembly system technology:
- Industrial robots and handling technology
- Basic tasks of the assembly system technology
- Transport systems
- Assembly organization

Introduction to quality management
- Methods and tools for quality management
- Certification, auditing

Machine safety (CE conformity, machinery directive, hazard and risk analysis)

[*updated 05.11.2020*]

Teaching methods/Media:
Instruction with practically-oriented exercise segments, laboratory in small groups

[*updated 05.11.2020*]

Recommended or required reading:
Erlach, K.; Wertstromdesign - Der Weg zur schlanken Fabrik; Springer Verlag, 2010; ISBN:

978-3-540-89866-5

Dickmann, P.; Schlanker Materialfluss; Springer Verlag, 2015; ISBN 978-3-662-44869-4

Coenenberg, A.G., Fischer, T.M., Günther, T.; Kostenrechnung und Kostenanalyse; Schäffer-Poeschel, 2012; ISBN: 978-3-7910-3612-0

Haun, M.; Handbuch Robotik _ Programmieren und Einsatz intelligenter Roboter, Springer Verlag 2013; ISBN 978-3-642-39858-2

Hesse, S., Malisa, V.; Taschenbuch Robotik - Montage - Handhabung; Hanser Verlag, 2016; ISBN: 978-3-446-44365-5

Linß, G.; Qualitätsmanagement für Ingenieure; Hanser Verlag, 2018; ISBN: 978-3-446-44042-5

[*updated 05.11.2020*]

Production-Optimized Component Design

Module name (EN): Production-Optimized Component Design

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_M_4.07.FBG

Hours per semester week / Teaching method:
2V+1PA (3 hours per week)

ECTS credits:
3

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Project with a paper in conjunction with the "Konstruktion mit Projekt" module

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_M_4.07.FBG (P241-0246) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course

Workload:
45 class hours (= 33.75 clock hours) over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 56.25 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_2.02.TFL Manufacturing Process Technology (with Lab Course)

[*updated 20.11.2023*]

Recommended as prerequisite for:
MAB_19_IP_5.03.AGF Additive Manufacturing and Generative Design

[*updated 06.04.2020*]

Module coordinator:
Prof. Dr. Bernd Heidemann

Lecturer:
Prof. Dr. Bernd Heidemann
Julian Guckert
M.Eng. Oliver Müller

[*updated 20.11.2023*]

Learning outcomes:
After successfully completing this course, students will be familiar with the influences of production processes on the design of components using the example of machining production processes.
They will be able to design components with their functionally relevant functional surfaces for machining.
They will be able to transfer their knowledge to other production processes and independently familiarize themselves with technology-specific characteristics.

[*updated 05.11.2020*]

Module content:
Classification: Design and creation in the construction process
Designing for machining - general considerations
Clamping components on/in machine tools
Designing for drilling, countersinking, reaming, thread production
Designing for turning
Designing components with flat functional surfaces
Designed for machining on multi-axis drilling and milling centers
Manufacturing tolerances and their consideration in component design
Procedures for familiarizing oneself with production technology-specific component design

[*updated 05.11.2020*]

Recommended or required reading:
Hoenow, G.; Meißner. T.: Entwerfen und Gestalten im Maschinenbau. Fachbuchverlag Leipzig.
Hoenow, G.; Meißner. T.: Konstruktionspraxis im Maschinenbau. Hanser-Verlag.
Hintzen, Laufenberg, Kurz: Konstruieren, Gestalten, Entwerfen. Vieweg-Verlag.

[*updated 05.11.2020*]

Project Management and Business Economics

Module name (EN): Project Management and Business Economics

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_M_4.06.PMB

Hours per semester week / Teaching method:
2V (2 hours per week)

ECTS credits:
2

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 120 min.

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_M_4.06.PMB (P241-0280) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr.-Ing. Christian Köhler

Lecturer:
Prof. Dr.-Ing. Christian Köhler

[*updated 08.03.2021*]

Learning outcomes:
After successfully completing this course, students will be familiar with business administration principles

from selected areas, which are of practical relevance for technically oriented people. This will help budding engineers deal with economic questions in their professional life.

Selected topics will be explored in greater depth within the framework of a corporate project. This includes an overview of project management methods and procedures, as well as structuring a project, time management, solving critical situations in a project team and budgeting.

[*updated 05.11.2020*]

Module content:
Economic parameters and relationships, such as GDP, national debt, import and export performance, etc.
Corporate controlling with cost and performance accounting
Investment calculation and financing
Current economic topics from the daily press
Project management tasks
Time management using the network planning technique
Planning and scheduling (bar charts)
Time analysis and risk assessment
Project structure planning
Project organization and project team
Capacity and resource planning in network plans
Budgeting of costs and revenues in projects

[*updated 05.11.2020*]

Teaching methods/Media:
Lecture with tutorials, short presentations by students, role playing, exercises
Radio drama

[*updated 05.11.2020*]

Recommended or required reading:
Schwab: Managementwissen für Ingenieure, Führung, Organisation, Existenzgründung, 5.Aufl. 2014.
Grap (Hrsg.), Business-Management für Ingenieure, Beurteilen, Entscheiden, Gestalten 2007.
Oetinger: Skripte zur Vorlesung Betriebswirtschaftslehre für Ingenieure, 2018
Olfert, Klaus: Einführung in die Betriebswirtschaftslehre, Oktober 2017
Daily newspaper with a strong economic focus.
Oetinger: Skript zur Vorlesung _Projektmanagement_, 2018
De Marco: Der Termin - Ein Roman über Projektmanagement 2. Aufl. 2007.
De Marco: Der Termin, 2 Audio-CD s Ein Hörspiel über Projektmanagement, 130 Min., 2005.

[*updated 05.11.2020*]

Technical Communication and Documentation

Module name (EN): Technical Communication and Documentation

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_1.06.TKD

Hours per semester week / Teaching method:

1V+1U (2 hours per week)

ECTS credits:
2

Semester: 1

Mandatory course: yes

Language of instruction:
German

Assessment:
Written composition on a technical topic

[*updated 05.11.2020*]

Applicability / Curricular relevance:

MAB_19_A_1.06.TKD (P241-0282) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 1, mandatory course
MAB_24_A_1.06.TKD Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 1, mandatory course

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
MAB_19_M_4.04.MK2 Engineering Design (with Project)

[*updated 28.04.2019*]

Module coordinator:
Prof. Dr. Bernd Heidemann

Lecturer:
Daniel Kelkel, M.Sc.

[*updated 22.01.2020*]

Learning outcomes:
After successfully completing this course, students will be able to differentiate between data and information and convey technical information with a situationally appropriate data set.

They will be able to develop an oral presentation and present it to an audience.
Students will be able to explain technical information in writing in the form of documentation using suitable

illustrations, and generate it in a computer system.

They will be able to research specific topics in databases and examine the results critically.

[*updated 05.11.2020*]

Module content:
Basics of interpersonal communication: Models of communication
The difference between data and information
Presenting and describing technical information Meaning of texts, illustrations (also photos, films, video sequences), diagrams, tables

Tasks and types of communication pertaining to technical information: Talks, lectures, presentations, written documentation

Basic structure and variations of an oral presentation/a presentation on a technical subject

Tasks and types of written documentation on technical information
Basic structure and variations of written documentation

Methods for researching literature and sources in libraries and databases
Working correctly with sources (meaningful use, correct citation, creation of source and bibliography)

Basics of text and image processing with computer-aided systems, e.g. Microsoft WORD

[*updated 05.11.2020*]

Recommended or required reading:
Böglin: Wissenschaftliches Arbeiten Schritt für Schritt, UTB Fink Verlag.
Kornmeier: Wissenschaftlich schreiben leicht gemacht, UTB Fink.
Hering, Hering: Technische Berichte, Springer Vieweg.
Kollmann, Kuckertz, Stöckmann: Das 1x1 des Wissenschaftlichen Arbeitens, Springer Gabler.
Kellner: Reden Zeigen Überzeugen, Hanser Verlag.
Voigt: Erfolgreiche Rhetorik, Oldenbourg Verlag.

[*updated 05.11.2020*]

Technical English for Mechanical Engineers and Professional Presentations

Module name (EN): Technical English for Mechanical Engineers and Professional Presentations

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_2.06.TEM

Hours per semester week / Teaching method:
2S (2 hours per week)

ECTS credits:

2

Semester: 2

Mandatory course: yes

Language of instruction:
English/German

Assessment:
Written exam 120 min.

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_A_2.06.TEM (P241-0281) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 2, mandatory course
MAB_24_A_2.06.TEM Mechanical and Process Engineering, Bachelor, ASPO 01.10.2024 , semester 2, mandatory course

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.05.BEM Business English for Mechanical Engineers

[*updated 18.02.2020*]

Recommended as prerequisite for:
MAB_19_A_3.03.AEJ Applying for an Engineering Job
MAB_19_IP_5.07.MPE Manufacturing Project in English (1)
MAB_19_PE_5.12.DPE Design Project in English
MAB_19_V_5.15.PEP Process Engineering Project in English (1)

[*updated 18.02.2020*]

Module coordinator:
Prof. Dr. Christine Sick

Lecturer: Prof. Dr. Christine Sick

[*updated 28.05.2018*]

Learning outcomes:
The modules _Business English for Mechanical Engineers_, _Technical English for Mechanical Engineers and Professional Presentations_, _Applying for an Engineering Job_ and _Design / Manufacturing / Process Engineering Project in English_ should be seen in conjunction with one another. They offer students a framework to further develop their English language skills in a professionally related area from the desired

entry level B1 to level B2.

The module _Technical English for Mechanical Engineers and Professional Presentations_ focuses on developing listening and reading comprehension skills in the area of technical English relevant to the students´ study program, as well as business English presentation skills.

After successfully completing this module, students will be familiar with different reading strategies and will be able to apply them to course-specific specialist texts. They will also be able to follow technical lectures, presentations or lectures in English and organize the content of those lectures in notes.

In addition to training their listening and reading comprehension skills, students will repeat relevant grammatical structures and expand their technical vocabulary in selected areas of mechanical engineering and will be able to apply that vocabulary adequately.

After successfully completing this module, students will understand strategies for the creation of professional, subject-specific presentations in English. They will be able to structure English-language presentations and use typical verbal expressions in them.

[*updated 05.10.2020*]

Module content:
Technical English:
- Mechanical engineering studies and subjects
- Understanding course-specific technical texts in general and in detail (e.g. Engineering Materials, Materials in the Automotive Industry, Aluminium, Energy, Heat and Work)
- Understanding course-specific presentations, talks, lectures, videos in general and in detail (incl. note-taking techniques) (e.g. Mechanical Science, Shape Memory Alloys, Nickel Titanium, Wind Energy)
- Oral and written definition of technical terms
- Describing cause-and-effect relationships

Business English: Presentations
- Strategic knowledge
- Structure of a presentation in English
- Typical language of English presentations
- Structures for linguistic implementation
- Describing cause-and-effect relationships
- Describing trends
- Preparation and short presentation on a material science topic

In addition, we will work on:
- Building a technical vocabulary for technical English and presentations
- Repeating relevant grammatical structures (passive voice, relative clauses, adjectives and adverbs, cause and effect)

[*updated 05.10.2020*]

Teaching methods/Media:
Learning objectives will be achieved through integrated training of the four basic skills (listening comprehension, reading comprehension, speaking and writing) in relevant communication situations supported by multimedia, as well as the repetition of basic grammar and vocabulary.

Target group-specific teaching/learning materials (print, audio, video), as well as multimedia CALL and

e&mLearning materials will be used.

[*updated 05.10.2020*]

Recommended or required reading:
Students will receive a list of recommended teaching and learning materials.

The following materials are free of charge for students of the htw saar. We recommend their use for independent learning:

Susanne Ley, Christine Sick: prep course English m&eLanguageLearningPortal@CAS
(e&m-Learning-Angebot zur Unterstützung der Studierenden beim Englischlernen am Campus Alt-Saarbrücken der htw saar, Niveau A1-B1)
Christine Sick (2015): TechnoPlus Englisch VocabApp (Mobile-Learning-Angebot insbesondere zum Grundwortschatz, alle Niveaustufen), EUROKEY.

Christine Sick, unter Mitarbeit von Miriam Lange (2011): TechnoPlus Englisch 2.0 (Multimediales Sprachlernprogramm für Technisches und Business Englisch, Niveau B1-B2+), EUROKEY.

Christine Sick, unter Mitarbeit von Lisa Rauhoff und Miriam Wedig (seit 2016): Online Extensions zu TechnoPlus Englisch, EUROKEY.
m&eLanguageLearningPortal@CAS

[*updated 05.10.2020*]

The Finite Element Method (FEM)

Module name (EN): The Finite Element Method (FEM)

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_PE_5.11.FEM

Hours per semester week / Teaching method:
1SU+1P (2 hours per week)

ECTS credits:
2

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:

[*still undocumented*]

Applicability / Curricular relevance:

MAB_19_PE_5.11.FEM (P241-0247) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 5, mandatory course, Specialization Product Development

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
MAB_19_A_1.02.TMS Engineering Mechanics - Statics
MAB_19_A_2.03.GBD
MAB_19_M_3.06.BTD Dimensioning Components

[*updated 08.03.2022*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr.-Ing. Ramona Hoffmann

Lecturer:
Prof. Dr.-Ing. Ramona Hoffmann

[*updated 08.03.2022*]

Learning outcomes:

[*still undocumented*]

Module content:

[*still undocumented*]

Recommended or required reading:

[*still undocumented*]

Work Experience Phase

Module name (EN): Work Experience Phase

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_A_6.01.PRA

Hours per semester week / Teaching method:
1SU (1 hour per week)

ECTS credits:
15

Semester: 6

Mandatory course: yes

Language of instruction:
German

Assessment:
Colloquium

[*updated 05.10.2020*]

Applicability / Curricular relevance:

MAB_19_A_6.01.PRA (S241-0275) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 6, mandatory course
UI-PRA (S251-0038) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 4, mandatory course
UI-PRA (S251-0038) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 4, mandatory course

Workload:
15 class hours (= 11.25 clock hours) over a 15-week period.
The total student study time is 450 hours (equivalent to 15 ECTS credits).
There are therefore 438.75 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Studienleitung

Lecturer:
Professoren HTW

[*updated 23.02.2021*]

Learning outcomes:

After successfully completing this module, students will have experienced the practical working methods used in engineering professions by carrying out work independently and actively participating in various tasks.
In doing so, they will apply the theoretical and practical experience gained thus far and mirror it with their experience in concrete project work.

They will be able to present their approach, solutions and results in a colloquium.
They will get to know the many diferent interdependencies of the individual specialist areas and be able to integrate themselves into a team.

[*updated 05.10.2020*]

Module content:
Depends on the topic and institution in which the practical phase is completed.

[*updated 05.10.2020*]

Recommended or required reading:
Depends on topic

[*updated 05.10.2020*]

Mechanical and Process Engineering Bachelor - optional courses

CAX Basics and Applications

Module name (EN): CAX Basics and Applications

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_4.2.1.38

Hours per semester week / Teaching method:
2V+2U (4 hours per week)

ECTS credits:
5

Semester: 3

Mandatory course: no

Language of instruction:
German

Assessment:

[*updated 16.11.2023*]

Applicability / Curricular relevance:

KIB-CAX (P223-0006) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2021 , semester 3, optional course, technical

KIB-CAX (P223-0006) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2022 , semester 3, optional course, technical
MAB_19_4.2.1.38 (P223-0006) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 3, optional course, technical
MST2.CAX (P223-0006) Mechatronics and Sensor Technology, Bachelor, ASPO 01.10.2020 , semester 3, optional course
PIB-CAX (P223-0006) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 3, optional course, not informatics specific
PRI-CAX (P223-0006) Production Informatics, Bachelor, ASPO 01.10.2023 , semester 3, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr.-Ing. Pascal Stoffels

Lecturer: Prof. Dr.-Ing. Pascal Stoffels

[*updated 15.09.2023*]

Learning outcomes:
After successfully completing this module, students will: be able to model components using a CAD system - e.g. Siemens NX - with its basic functions and commands.
- Students will be aware of the production-oriented adherence to guidelines regarding the standardization of components.
- They will be familiar with the influences of manufacturing processes on the design of components - for example, for machining (turning/milling), forming (bending) or additive manufacturing (3D printing)
- They will be able to transfer their knowledge to other production processes and independently familiarize themselves with technology-specific characteristics.

[*updated 16.11.2023*]

Module content:
- Fundamentals of 3D-CAD technology; representations in 2D and 3D form (DIN 5/6); line types, penetration, drawing scales, title block, dimension entry in drawings, introduction to 3D-CAD software for designing components, introduction to selected machine elements, assembly exercise for the haptic experience of machine elements and assembly processes, surface marks, tolerance specifications, fit specifications, general tolerances, form and position tolerance, calculation of tolerance chains and definition of surface qualities

- Overview of the current state of the art and future developments.
- Basic applications and functions: Structural components, assemblies, drawing views, exploded-view drawings
- Standardized names of structural components, elements and detail surfaces (groove, chamfer, pocket, shaft, undercut, etc.).

- Consideration of the individual production steps suitable for manufacturing the components with their detailed surfaces
- Rough planning of the sequences in terms of a production process
- Manufacturing tolerances and their consideration in component design
- Procedures for designing components

[*updated 16.11.2023*]

Teaching methods/Media:
- Lecture using multimedia-supported training courses and integrated exercises.

[*updated 16.11.2023*]

Recommended or required reading:
- Hoenow, G.; Meißner. T.: Entwerfen und Gestalten im Maschinenbau. Fachbuchverlag Leipzig. - Hoenow, G.; Meißner. T.: Konstruktionspraxis im Maschinenbau. Hanser-Verlag.
- Hintzen, Laufenberg, Kurz: Konstruieren, Gestalten, Entwerfen. Vieweg-Verlag.
- Inventor 2020 Grundlagen, Herdt Verlag, ISBN: 978-3-86249-856-7
- Basiskurs für Autodesk Inventor 2020; Armin Gräf Verlag, www.armin-graef.de/shop
- Grundlagenkurs Inventor 2019, Carl Hanser Verlag GmbH & Co. KG zum Download aus der HTW Bücherei!
- Grundlagenkurs Inventor 2019, Carl Hanser Verlag GmbH & Co. KG zum Download aus der HTW Bücherei!
- Gebhardt A.; Additive Fertigungsverfahren Additive Manufacturing und 3D-Drucken für Prototyping Tooling Produktion; Hanser Verlag; 2016
- Breuninger J., Becker R., Wolf A., Rommel S.; Generative Fertigung mit Kunststoffen, Springer Verlag; 2013
- Gibson I., Rosen D., Stucker B.; Additive Manufacturing Technologies 3D-Printing, Rapid Prototyping, and Direct Digital Manufacturing

[*updated 16.11.2023*]

Digital Skills for Engineers

Module name (EN): Digital Skills for Engineers

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_4.2.1.35

Hours per semester week / Teaching method:
2V+2P (4 hours per week)

ECTS credits:
5

Semester: 5

Mandatory course: no

Language of instruction:
German

Assessment:
Oral examination

[*updated 09.11.2022*]

Applicability / Curricular relevance:

BMT2552.DSI (P213-0187) Biomedical Engineering, Bachelor, ASPO 01.10.2018 , semester 5, optional course
EE1536 (P213-0187) Energy system technology / Renewable energies, Bachelor, ASPO 01.10.2022 , semester 5, optional course
E2586 (P213-0187) Electrical Engineering and Information Technology, Bachelor, ASPO 01.10.2018 , semester 5, optional course
MAB_19_4.2.1.35 (P213-0187) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 5, optional course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Andreas Schaffhauser, M.Sc.

Lecturer: Andreas Schaffhauser, M.Sc.

[*updated 12.10.2022*]

Learning outcomes:
After successfully completing this module, students will be able to apply the basic digital skills they need as an engineer in their job. They will have developed their problem-solving skills by analyzing and developing solutions for subject-related problems in exercises. They will have developed their communication skills by presenting and discussing their individual solutions in plenary.

They will be able to consider the concepts, as well as the advantages and disadvantages of simple and complex data management mechanisms when applied to unfamiliar case studies.

Students will be able to transfer data sets into the respective data formats after having practiced this within the framework of practical exercises. They will be able to transform datasets into the appropriate forms using normalization rules. They will be able to store and manage transformed datasets in a database management system.

They will be able to apply the concepts of automation in common office applications to independently learn how to automate spreadsheets and text documents and solve simple problems on their own.

They will be able to identify the different advantages and disadvantages of local, centralized and

decentralized versioning systems. They will be able to apply concepts for effective source code management and versioning. They will be able to practice the process of versioning with source code that they have implemented themselves.

Students will be able to identify theoretical points of attack of an IT system. They will be able to describe possible measures to protect IT systems from these points of attack by practicing this on two topics.

[*updated 04.09.2023*]

Module content:

1 Introduction to Digital Skills für Ingenieure
1.1 Presentation of Future & Digital Skills competencies (technical, non-technical,...)
1.2 Raising awareness for non-technical competencies

2 Data formats
2.1 CSV
2.2 JSON
2.3 XML

3 (Relational) databases
3.1 CSV/Excel vs. databases
3.2 Structure of a DBMS (database system)
3.2.1 Data dictionary
3.2.2 Databases/Tables
3.2.3 DBMS (Database Management System)
3.2.4 Referential integrity
3.2.5 ACID
3.3 Database languages/SQL
3.3.1 Select statement
3.3.2 Joins
3.4 Development of a database schema
3.4.1 Specialist concept
3.4.2 Data processing concept
3.4.3 Implementation level
3.5 Specialist concept
3.6 Data processing concept
3.6.1 Model development
3.6.2 Chen Notation/ER model
3.6.3 Operations, relational algebra (projection, selection, ...)
3.6.4 Term relations
3.6.5 Normalization

4 Programming macros
4.1 Introduction to IDE
4.2 Variable types and declarations
4.3 Hungarian notation
4.4 Notation used in the lecture (UpperCamelCase)
4.5 Subroutines
4.6 Functions
4.7 Parameter transfer (Call by Reference/Call by Value)
4.8 Operators
4.9 Sequence control
4.10 Error handling with GoTo
4.11 Access to text documents
4.12 Access to tables

5 Version control
 5.1 History versioning
 5.2 Local/centralized/distributed version control
 5.3 Git
  5.3.1 The three states of Git
  5.3.2 Initializing a repository
  5.3.3 .gitignore (Using templates for ignoring files)
  5.3.4 README.md (Header, applications etc.)
  5.3.5 Basic commands
  5.3.6 Branches

6 Current IT security topics
 6.1 Information security
 6.2 CIA triad
 6.3 Safety
 6.4 Threats
  6.4.1 Malware
  6.4.2 Ransomware
  6.4.3 Social engineering
  6.4.4 Advance persistent threat
  6.4.5 Denial of service

[*updated 04.09.2023*]

Teaching methods/Media:
- Interfaces for programming applications for the respective tools
- Openly accessible teaching materials for the respective subject areas

All teaching materials and exercises are available from the instructor.

[*updated 09.11.2022*]

Recommended or required reading:
- Future Skills 2021 - 21 Kompetenzen für eine Welt im Wandel (https://www.stifterverband.org/download/file/fid/10547)
- Common Format and MIME Type for Comma-Separated Values (CSV) Files (https://datatracker.ietf.org/doc/html/rfc4180)
- The JavaScript Object Notation (JSON) Data Interchange Format (https://datatracker.ietf.org/doc/html/rfc8259)
- Extensible Markup Language (XML) 1.0 (Fifth Edition) (https://www.w3.org/TR/REC-xml/)
- Database system basics: Bachelor
- XAMPP (https://www.apachefriends.org/de/index.html)
- BASIC-Makros für OpenOffice und LibreOffice (https://www.uni-due.de/~abi070/files/OOo/OOME/OOME_3_0_deutsch.pdf)
- Pro Git (https://github.com/progit/progit2-de/releases/download/2.1.215/progit.pdf)

[*updated 09.11.2022*]

Experimental Performance Characterization of Solar Thermal Systems

Module name (EN): Experimental Performance Characterization of Solar Thermal Systems

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_4.2.6.16

Hours per semester week / Teaching method:
1V+3P (4 hours per week)

ECTS credits:
5

Semester: according to optional course list

Mandatory course: no

Language of instruction:
German

Assessment:
A (Lab report - 80%), K (written exam - 20%, Duration: 60 minutes)

[*updated 26.01.2023*]

Applicability / Curricular relevance:

EE535 Energy system technology / Renewable energies, Bachelor, ASPO 01.10.2012 , semester 6, optional course, engineering
EE-K2-547 Energy system technology / Renewable energies, Bachelor, ASPO 01.04.2015 , semester 6, optional course, engineering
EE1535 (P241-0400) Energy system technology / Renewable energies, Bachelor, ASPO 01.10.2022 , semester 6, optional course, technical
MAB_19_4.2.6.16 (P241-0400) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , optional course, specialisation

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Marc Deissenroth-Uhrig

Lecturer: Prof. Dr. Marc Deissenroth-Uhrig

[*updated 06.03.2019*]

Learning outcomes:
After successfully completing this module, students will:
- be familiar with different types/functionality of thermal solar collectors
- be able to implement a solar collector in a power test bench
- be able to carry out metrological tests according to internationally recognized standards (ISO 9806: Solar energy - Solar thermal collectors - Test methods)
- be able to evaluate measurement data and results and prepare a lab report according to ISO 9806

[*updated 26.01.2023*]

Module content:
1. Basics (Lecture: 12 hours)
- Design and function of different thermal solar collectors
- Performance characterization of solar collectors
- Characteristic values (thermal, optical) and their classification
- Introduction to testing and certification procedures in the field of solar thermal energy

2. Required measurement technology and hydraulics (lab experiment in small groups of 3-4 persons, 12 h)
- Measuring radiation (global, direct, diffuse solar radiation)
- Measuring temperatures (Immersion sensors in hydraulic lines, contact sensors, ...)
- Volume (magnetic-inductive) resp. mass flow measurement (Coriolis)
- Software-controlled data acquisition systems (Introduction to Keysight Vee Pro)
- Integrating the collector in a temperature-controlled hydraulic circuit

3. Experimental determination, evaluation and documentation (lab experiment in small groups, 36 h)
- of the conversion degree (optical efficiency) of the collector
- of the efficiency curve between 20 °C and 90 °C
- Determining the gross annual yield of the tested collector under reference conditions

[*updated 26.01.2023*]

Teaching methods/Media:
- Seminaristic instruction in the lab
- Self-study based on experiment documentation and recommended/required reading
- Lab experiments, analysis and documentation
- Creation of a lab report

[*updated 26.01.2023*]

Recommended or required reading:
- Volker Quaschning - Regenerative Energiesysteme - Technologie, Berechnung, Simulation
- Ursula Eicker - Solare Technologien für Gebäude
- ISO 9806: 2014: Solar energy - Solar thermal collectors - Test methods
- Handbuch zum Messdatenerfassungssystem Agilent 34970A

[*updated 26.01.2023*]

Interfacial Process Engineering and Fuel Cell Technology

Module name (EN): Interfacial Process Engineering and Fuel Cell Technology

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_4.2.1.34

Hours per semester week / Teaching method:
2SU (2 hours per week)

ECTS credits:
3

Semester: 4

Mandatory course: no

Language of instruction:
German

Assessment:

Presentation

[*updated 26.01.2023*]

Applicability / Curricular relevance:

MAB_19_4.2.1.34 (P241-0404) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 4, optional course

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 67.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Matthias Faust

Lecturer:
Prof. Dr. Matthias Faust

[*updated 13.02.2023*]

Learning outcomes:
After successfully completing this course, students will be able to:
- Describe applications of interfacial engineering and nanostructured materials.
- Understand the special mechanical, chemical, magnetic and biological properties of nanomaterials.
- Explain and evaluate physicochemical relationships at interfaces.
- Name the most important manufacturing processes and synthesis routes for surface active materials.
- Describe characterization methods for nanomaterials and surfactants.
- Describe the design and operation of the main types of fuel cells.
- Explain electrochemistry and the thermodynamics of fuel cells.
- Calculate and interpret fuel cell performance data.
- Describe areas of application for fuel cells.

[*updated 26.01.2023*]

Module content:
- Fields of application for interfacial process engineering and nanomaterials in the chemical/pharmaceutical industry, medical technology and environmental engineering
- Interface-dominated processes, such as heterogeneous catalysis, adsorption, and fuel cell technology.
- Nanomaterials manufacturing processes
- Determining particle size distributions of nanoparticles.
- Characterization methods for nanomaterials and nanoparticles
- Structure-function relationships in nanostructured materials.
- Hydrogen economy (processes for generation and storage)
- History of fuel cell technology
- Description of the design and operation of the main types of fuel cells.
- Thermodynamics, electrochemistry and mass transfer in polymer electrolyte membrane (PEM) fuel cells.
- Fuel cell catalysts and membranes
- Performance parameters of PEM fuel cells
- Important parameters influencing the operation of PEM fuel cells
- Scale up of fuel cells
- Practical examples
- Experiment

[*updated 26.01.2023*]

Teaching methods/Media:
Lecture with exercises. presentation and small experiment

[*updated 26.01.2023*]

Recommended or required reading:
Frano Barbir, PEM Fuel Cells, Elsevier, 2005.
Horst-Günther Rubahn, Nanophysik und Nanotechnologie, Springer 2004.

[*updated 26.01.2023*]

Kinematic Principles of Robotics

Module name (EN): Kinematic Principles of Robotics

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_4.2.1.39

Hours per semester week / Teaching method:
3V+1U (4 hours per week)

ECTS credits:
5

Semester: 5

Mandatory course: no

Language of instruction:
German

Assessment:

[*updated 19.12.2023*]

Applicability / Curricular relevance:

BMT2505.KGR (P221-0197) Biomedical Engineering, Bachelor, ASPO 01.10.2018 , semester 5, optional course
E2588 (P221-0197) Electrical Engineering and Information Technology, Bachelor, ASPO 01.10.2018 , semester 5, optional course
KIB-KGR (P221-0197) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2022 , semester 5, optional course
MAB_19_4.2.1.39 (P221-0197) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 5, optional course
MST2.KGR (P221-0197) Mechatronics and Sensor Technology, Bachelor, ASPO 01.10.2020 , semester 5, optional course
PIB-KGR (P221-0197) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 5, optional course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Michael Kleer

Lecturer: Prof. Dr. Michael Kleer

[*updated 24.10.2023*]

Learning outcomes:
Students will be able to demonstrate and apply the most important methods for describing and calculating robot systems. They will be able to independently explain and calculate the interaction of robot systems with several coordinate systems and the associated coordinate transformations in detail. In addition, students will be able to independently calculate the forward and inverse kinematics of typical industrial robots and solve path and trajectory planning tasks.

[*updated 19.12.2023*]

Module content:
1. Classifying robot workspaces
2. Principles of rotations, transformations, coordinate system representations
3. Introduction to homogeneous transformations
4. Introduction to the Denavit-Hartenberg transformation method
5. Forward and inverse kinematics of serial robots
6. Basics of the Jacobian matrix
7. The fundamentals of path and trajectory planning

[*updated 19.12.2023*]

Recommended or required reading:
Springer Handbook of Robotics, https://doi.org/10.1007/978-3-540-30301-5
Robot Modeling and Control, ISBN: 978-1-119-52404-5

[*updated 19.12.2023*]

Oral and General Presentation Skills in the Engineering Sciences

Module name (EN): Oral and General Presentation Skills in the Engineering Sciences

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_.4.2.1.31

Hours per semester week / Teaching method:
1V+1U (2 hours per week)

ECTS credits:
2

Semester: according to optional course list

Mandatory course: no

Language of instruction:
German

Assessment:
Seminar presentation

[*updated 08.01.2020*]

Applicability / Curricular relevance:

E2581 (P200-0019) Electrical Engineering and Information Technology, Bachelor, ASPO 01.10.2018 , semester 5, optional course, non-technical
MAB.4.2.1.31 Mechanical and Process Engineering, Bachelor, ASPO 01.10.2013 , optional course, general subject
MAB_19_.4.2.1.31 Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , optional course, general subject
MAM.2.1.1.19 (P241-0193, P610-0560) Engineering and Management, Master, ASPO 01.10.2013 , optional course, general subject

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Studienleitung

Lecturer: Studienleitung

[*updated 15.02.2019*]

Learning outcomes:
In this course, students will be introduced to the basics of rhetoric and presentation for technical professions and will be individually coached with regard to their verbal and non-verbal communication.

The course is very practice and training-oriented. It offers a mixture of lectures, individual and team work and targeted individual training.

After successfully completing this course, students will have deepened, consolidated and expanded the following skills:
- Finding/strengthening their own style of communication
- Structuring and coordinating information
- Developing/strengthening their own rhetorical skills
- Assessing communication partners and situations
- Giving and receiving feedback
- Using presentation techniques effectively

[*updated 05.10.2020*]

Module content:
1. Principles of rhetoric and presentation
2. Planning a presentation (organization/check list)
3. Content concept (order/structuring information)
4. Rhetorical practice (stylistic devices/argumentation strategies)
5. Visualization concept (working with media, designing slides)

6. Procedure (structure, phase structure)
7. Individual training (promotion of verbal and non-verbal communication)
8. Dealing with disruptions (dealing with disruptions and conflicts)

[*updated 05.10.2020*]

Teaching methods/Media:
Blackboard, overhead projector, projector, exercises and training units (with video recording)

[*updated 05.10.2020*]

Recommended or required reading:
Fey, Heinrich: Sicher und überzeugend präsentieren, Walhalla, 1996
Lackner T.: Die Schule des Sprechens. Rhetorik und Kommunikationstraining. Öbv & Hpt, 2000.
Schulz von Thun F., Ruppel J., Stratmann R.: Miteinander reden. Kommunikationspsychologie für Führungskräfte. Rowohlt 2003.

[*updated 05.10.2020*]

Practising English Online with a Tandem Partner

Module name (EN): Practising English Online with a Tandem Partner

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_4.2.1.32

Hours per semester week / Teaching method:
-

ECTS credits:
1

Semester: according to optional course list

Mandatory course: no

Language of instruction:
English/German

Assessment:
Written documentation, ungraded

[*updated 14.06.2021*]

Applicability / Curricular relevance:

MAB_19_4.2.1.32 (P241-0399) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , optional course, general subject

Workload:
The total student study time for this course is 30 hours.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Christine Sick

Lecturer: Prof. Dr. Christine Sick

[*updated 30.04.2021*]

Learning outcomes:
After successfully completing this tandem course with students from our partner univeristy, the University College Cork (UCC) in Ireland, students will have expanded their language and expression skills at level B2 of the Common European Framework of Reference for Languages acquired in the course of their Bachelor´s degree.

[*updated 14.06.2021*]

Module content:
There will be a joint introduction with the program managers of both universities and students from the htw saar and UCC.

At least 5 tandem online sessions via video conference

First session: warm-up/getting-to-know each other session
Background, studies, family, hobbies, experience abroad, experience with the other language, expectations for the tandem

Other sessions should be across a range of the following topic areas (academic, cultural, intercultural, professional, social):

1. Academic

Present your university, interactions in an academic setting (dos and don'ts), role of the university in the community, comparison of university systems.

2. Cultural

Music, sports, virtual visit to your city, a museum, theater, opera, historical building, concert etc. or any other aspect of culture.

3. Intercultural

Reflecting on cultures other than your own "home" culture, dos and don'ts, critical incidents.

4. Professional

Reflecting on events or interactions in a work situation, your dream job, the job application process, dos and don'ts, professional norms (e.g. punctuality, clothing, Anredeformen (first name vs surname and siezen vs duzen), how to say no, reading between the lines).

5. Social

Where do social gatherings happen?
What does it mean to "go out" in Germany/Ireland?
Culture around alcohol?
Culture around money?
Starting and continuing romantic and platonic relationships male/female?

Students will document their online sessions in the form of a portfolio with entries on the content,

intercultural and language aspects of each session.

[*updated 14.06.2021*]

Teaching methods/Media:
Teaching methods:
Self-directed and self-organized learning with the Tandem language learning method:
This involves combining students from the htw saar with students from our partner university UCC (University College Cork), Ireland, to form pairs or small groups.
They will meet online via videoconference for five or more thematically different sessions of at least one hour and document these sessions in writing.

Media:
Media selected by yourself (print, audio, video, internet),

[*updated 14.06.2021*]

Recommended or required reading:

[*still undocumented*]

Preparing for the IELTS Test

Module name (EN): Preparing for the IELTS Test

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_2.1.2.24

Hours per semester week / Teaching method:
2VU (2 hours per week)

ECTS credits:
2

Semester: according to optional course list

Mandatory course: no

Language of instruction:
German

Assessment:
Written exam (75%), oral examination (25%)

[*updated 05.10.2020*]

Applicability / Curricular relevance:

BMT2640.IELTS (P213-0041) Biomedical Engineering, Bachelor, ASPO 01.10.2018 , semester 6, optional course
KIB-IEL Computer Science and Communication Systems, Bachelor, ASPO 01.10.2021 , semester 6, optional course, non-technical
KIB-IEL Computer Science and Communication Systems, Bachelor, ASPO 01.10.2022 , semester 6, optional course, non-technical
MAB_19_2.1.2.24 (P213-0041) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , optional course, general subject
MST.IEL (P213-0041, P231-0133) Mechatronics and Sensor Technology, Bachelor, ASPO 01.10.2012 , semester 6, optional course
MST.IEL (P213-0041, P231-0133) Mechatronics and Sensor Technology, Bachelor, ASPO 01.10.2019 , semester 6, optional course
MST.IEL (P213-0041, P231-0133) Mechatronics and Sensor Technology, Bachelor, ASPO 01.10.2020 , semester 6, optional course
PIB-IEL Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 6, optional course, not informatics specific

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Christine Sick

Lecturer: Prof. Dr. Christine Sick

[*updated 31.03.2020*]

Learning outcomes:
Note:
The module is geared towards Bachelor and Master students in engineering who require the language test IELTS (International English Testing System), Volume 6.5, for admission to a Master´s program or as part of an application for a stay abroad and wish to prepare for it.

The module ends with an examination based on the format of the IELTS test. The examination consists of a written part (75%) on listening comprehension, reading comprehension and writing and an oral exam (25%). Each part must be passed with at least 40%.

The actual IELTS test must be taken at a certified IELTS test center

About this module:
Students will become familiar with the format, structure (reading, listening, writing and speaking) and the various types of exercises that are part of the IELTS test. In addition, they will learn to effectively apply their foreign language skills, as well as the test strategies they have earned to solving the tasks set in the examination.

[*updated 05.10.2020*]

Module content:
_ Structure and parts of the Academic IELTS test
_ Listening comprehension und listening comprehension strategies
_ Exercises on reading comprehension and reading comprehension strategies (scanning, skimming, reading for gist)
_ Writing exercises (writing short argumentative essays)
_ Writing exercises for describing graphics and trends
_ Structuring texts (coherence and cohesion)
_ Oral exercises to help students learn to present arguments logically
_ General vocabulary and grammar exercises

[*updated 05.10.2020*]

Teaching methods/Media:
The learning goals will be achieved through integrated training of the four basic skills (listening comprehension, reading comprehension, speaking and writing) supported by the use of multimedia. Communicative competence training will take place within the framework of learner-centred lessons in the multimedia computer language laboratory.

[*updated 05.10.2020*]

Recommended or required reading:
The course is based on the following textbook:
Cullen, Pauline, French, Amanda, Jakeman, Vanessa. The Official Cambridge Guide to IELTS. For Academic and General Training (with DVD and answer key). Cambridge University Press, 2014.

Other recommended learning materials: IELTS. Official IELTS Practice Materials 2. (incl. DVD). UCLES, 2010. Jakeman, Vanessa and Mc Dowell, Clare. Action Plan for IELTS (with Audio CD). Academic Module. Cambridge University Press, 2013.

[*updated 05.10.2020*]

The Impact of Gender and Diversity on Careers and Studies

Module name (EN): The Impact of Gender and Diversity on Careers and Studies

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_4.2.1.31

Hours per semester week / Teaching method:
2V+2S (4 hours per week)

ECTS credits:
5

Semester: according to optional course list

Mandatory course: no

Language of instruction:
German

Assessment:
Project (E-portfolio) with presentation (possible as group work)

[*updated 21.12.2023*]

Applicability / Curricular relevance:

KIB-GD (P241-0411) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2021 , optional course, non-technical
KIB-GD (P241-0411) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2022 , optional course, non-technical
MAB_19_4.2.1.31 (P241-0411) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , optional course, general subject
MST2.GDB (P241-0411) Mechatronics and Sensor Technology, Bachelor, ASPO 01.10.2020 , optional course
PIB-GD (P241-0411) Applied Informatics, Bachelor, ASPO 01.10.2017 , optional course, not informatics specific

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Sandra Wiegand, M.A.

Lecturer: Sandra Wiegand, M.A.

[*updated 15.10.2021*]

Learning outcomes:
After successfully completing this module, students will understand how gender and diversity influence how personal everyday life, society and science are structured. They will understand the relevance of gender and diversity issues for their studies, future profession, society and their social environment, as well as theories and concepts of diversity, difference and intersectionality. They will be familiar with the different diversity factors (age, ethnic origin & nationality, gender & gender identity, physical & mental abilities, religion & belief, sexual orientation and social origin etc.), as well as their interaction and the associated dominance structures and inequality relations. Students will be able to identify and classify current social issues and the problems resulting from them. They will become familiar with ways of dealing with problems and their possible solutions.

[*updated 22.05.2023*]

Module content:
Cross-faculty topics on diversity and equal opportunities in academic and professional life.

- Managing diversity in organizations
- Intersectionality in the context of gender and diversity
- The legal framework of gender and diversity

- The responsibility of design in society based on the example of gender & diversity
- Gender-sensitive construction
  Dealing with sexual harassment and discrimination
  Diversity as a factor - Inclusion - Opportunities and Challenges
  Gender identity and sexual orientation
  "Social origin" as a diversity dimension, based on the example of students from non-academic families
  Reconciling work and family - parenthood as a diversity dimension
  Diversity and economic success - A contradiction?
  Women at the helm - "How did I end up here?" - Occupational roles and stereotypes using the example of female pilots
  Gender equality in art and culture - How can we counteract the structural inequality suffered by women?
  Effects of study and career choices from a gender perspective

[*updated 22.05.2023*]

Recommended or required reading:
Will be announced in the course.

[*updated 22.05.2023*]

The Impact of Gender and Diversity on Careers and Studies (Submodule)

Module name (EN): The Impact of Gender and Diversity on Careers and Studies (Submodule)

Degree programme: Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019

Module code: MAB_19_4.2.1.37

Hours per semester week / Teaching method:
-

ECTS credits:
3

Semester: according to optional course list

Mandatory course: no

Language of instruction:
German

Assessment:
Project work (e-portfolio)

[*updated 19.12.2023*]

Applicability / Curricular relevance:

BMT2583.AGDT (P213-0188) Biomedical Engineering, Bachelor, ASPO 01.10.2018 , semester 5, optional course
EE1640 (P213-0188) Energy system technology / Renewable energies, Bachelor, ASPO 01.10.2022 ,

optional course
FT72 Automotive Engineering, Bachelor, ASPO 01.10.2019 , optional course
KIB-GDT (P213-0188) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2022 , optional course
MAB_19_4.2.1.37 (P213-0188) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , optional course
MST2.GDBT (P213-0188) Mechatronics and Sensor Technology, Bachelor, ASPO 01.10.2020 , optional course
PIB-GDT (P213-0188) Applied Informatics, Bachelor, ASPO 01.10.2017 , optional course

Workload:
The total student study time for this course is 90 hours.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Sandra Wiegand, M.A.

Lecturer: Sandra Wiegand, M.A.

[*updated 31.08.2023*]

Learning outcomes:

[*updated 19.12.2023*]

Module content:

[*updated 19.12.2023*]

Recommended or required reading:

[*updated 19.12.2023*]