Course Handbook Environmental Technologies Bachelor

created at 03.04.2024,09:48

Head of Studies	Prof. Dr.-Ing. Joachim Dettmar

Qualifikation Goals of Study Programme

Environmental Technologies Bachelor - mandatory courses (overview)

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Applied Metrology	UI-AMT	P241-0097, P241-0227	3	3V+1P	5	Prof. Dr.-Ing. Michael Sauer, M.Sc.
Applying for an Engineering Job and Professional Presentations	UI-AEJ	P251-0006	3	2S	2	Prof. Dr. Christine Sick
Automation Technology in Process Engineering	UI-T-AUV	P241-0232, P241-0233	5	3V+1LU	5	Prof. Dr.-Ing. Michael Sauer, M.Sc.
Bachelor Thesis	UI-BT	T251-0009	7	-	12	Studienleitung
Biology	UI-BIO	P251-0011	1	3V+1U	5	Prof. Dr. Timo Gehring
Biotechnology	UI-BTE	P251-0012	3	2V	3	Prof. Dr. Timo Gehring
Business English for Environmental Engineers	UI-BEE	P251-0013	1	2S	2	Prof. Dr. Christine Sick
CAD for Environmental Projects	UI-CAD	P251-0014	3	4V	5	Studienleitung
Concepts of Thermal Energy	UI-T-KTE	P251-0068	7	2V	3	Prof. Dr. Frank Ulrich Rückert

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Systems						
Data Structures and Databases	UI-DDB	P251-0015	3	4V	5	Prof. Dr. Damian Weber
Electrical Engineering für Mechanical Engineering und Process Engineering	UI-ELT	P241-0241, P241-0242, P251-0017, P251-0018	2	2V+1U+1LU	5	Prof. Dr. Marc Deissenroth-Uhrig
Energy Efficiency and Sustainability	UI-T-EN	P212-0024	6	3V+1P	5	Prof. Dr.-Ing. Michael Sauer, M.Sc.
Engineering Mechanics I	UI-TM1	P110-0181, P251-0044	1	4VU	5	Prof. Dr.-Ing. Christian Lang
Engineering Mechanics II	UI-TM2	P110-0081, P251-0045	2	4VU	4	Prof. Dr.-Ing. Christian Lang
Environmental and Bioprocess Engineering (with Lab Course)	UI-T-BUV	P241-0415, P241-0416	6	3V+1P	5	Prof. Dr. Timo Gehring
Environmental Process Technology and Circular Economies	UI-T-UVK	P241-0413, P241-0414	5	4V+1LU	6	Prof. Dr. Timo Gehring
Environmental Project I	UI-UP1	P251-0056	1	2PA	3	Studienleitung
Environmental Project II	UI-UP2	P251-0059	2	2PA	3	Studienleitung
Environmental Project III	UI-UP3		4	2PA	8	Studienleitung
Fundamentals of Chemistry (with Lab Course)	UI-GCL	P241-0255, P241-0256, P251-0023, P251-0054	1	3V+1P	5	Prof. Dr. Timo Gehring

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Fundamentals of Environmental Science I	UI-UG1	P251-0050	3	4V	5	Studienleitung
Fundamentals of Environmental Science II	UI-UG2	P251-0049	5	4V	5	Studienleitung
Geographic Information Systems	UI-GIS	P251-0021	6	3V+1U	5	Prof. Dr.-Ing. Alpaslan Yörük
Hydraulic Engineering I	UI-I-WB1	P110-0180	5	4VU+1LU	5	Prof. Dr.-Ing. Alpaslan Yörük
Hydraulic Engineering II	UI-I-WB2	P110-0184	6	4VU	5	Prof. Dr.-Ing. Alpaslan Yörük
Hydraulic Engineering III	UI-I-WB3	P110-0186	7	2VU	3	Prof. Dr.-Ing. Alpaslan Yörük
Hydromechanics	UI-HYD	P110-0042, P251-0024	2	5VU	6	Prof. Dr.-Ing. Alpaslan Yörük
Introduction to Thermodynamics, Heat Transfer and Fluid Technology	UI-T-TWF	P251-0016	6	3V+1U	5	Prof. Dr. Frank Ulrich Rückert
Mathematics I	UI-MAT1	P110-0179, P251-0025	1	4VU	5	Prof. Dr.-Ing. Christian Lang
Mathematics II	UI-MAT2	P110-0051, P251-0026	2	4VU	5	Prof. Dr.-Ing. Christian Lang
Mobility, Urban and Traffic Planning	UI-MSV	P251-0031	5	4VU	5	Prof. Dr.-Ing. Thorsten Cypra
Network Technologies	UI-T-NWT	P251-0032	7	2V	3	Prof. Dr. Steffen Knapp
Physical Process Engineering with Practical Case Studies	UI-T-PVT	P241-0273, P241-0274	6	4V	5	Prof. Dr. Matthias Faust

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Physics 1	UI-PH1	P211-0117, P251-0033	1	4V+1U	5	Prof. Dr.-Ing. Barbara Hippauf
Physics 2	UI-PH2	P211-0118, P251-0034	2	4V+1U	5	Prof. Dr.-Ing. Barbara Hippauf
Planning and Operating Decentralized Energy Systems	UI-T-PBE		5	3V+1U	5	Prof. Dr. Marc Deissenroth-Uhrig
Renewable Energies	UI-ERN	P212-0003, P212-0004, P251-0019, P251-0020	3	3V+1P	5	Prof. Dr. Marc Deissenroth-Uhrig
Technical Facility Management	UI-I-TGM	P251-0064	6	4VU	5	Studienleitung
Technical Reading and Writing for Environmental Engineers	UI-TRW	P251-0043	2	2S	2	Prof. Dr. Christine Sick
The Circular Economy and the Bioeconomy	UI-I-ZBÖ	P251-0063	6	4VU	5	Prof. Dr.-Ing. Joachim Dettmar
The Fundamentals of Waste Management and Recycling	UI-I-GAK	P251-0057	5	4VU	5	Prof. Dr.-Ing. Susanne Hartard
Urban Water Resource Management	UI-I-SWW	P110-0067	5	6VU	6	Prof. Dr.-Ing. Joachim Dettmar
Wastewater Treatment	UI-I-AR2	P110-0185	7	2VU	3	Prof. Dr.-Ing. Joachim Dettmar
Wind Energy und Photovoltaic Systems	UI-T-WPV	P212-0083	6	4V	5	Prof. Dr. Marc Deissenroth-Uhrig
Work Experience Phase	UI-PRA	S251-0038, S251-0040	4	1V	22	Studienleitung

(45 modules)

Environmental Technologies Bachelor - optional courses (overview)

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator

(0 modules)

Environmental Technologies Bachelor - mandatory courses

Applied Metrology

Module name (EN): Applied Metrology
Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023
Module code: UI-AMT
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: Exam [*updated 16.11.2023*]
Applicability / Curricular relevance: UI-AMT (P241-0097, P241-0227) Environmental Technologies, 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):
UI-ELT Electrical Engineering für Mechanical Engineering und Process Engineering

[*updated 28.03.2024*]

Recommended as prerequisite for:

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

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

[*updated 28.03.2024*]

Learning outcomes:

[*updated 16.11.2023*]

Module content:

[*updated 16.11.2023*]

Recommended or required reading:

[*updated 16.11.2023*]

Applying for an Engineering Job and Professional Presentations

Module name (EN): Applying for an Engineering Job and Professional Presentations

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-AEJ

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

ECTS credits:
2

Semester: 3

Mandatory course: yes

Language of instruction:
English/German

Assessment:
Term paper

[*updated 01.07.2021*]

Applicability / Curricular relevance:

UI-AEJ (P251-0006) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 3, mandatory course
UI-AEJ (P251-0006) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 3, mandatory course

Suitable for exchange students (learning agreement)

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):
UI-BEE Business English for Environmental Engineers
UI-TRW Technical Reading and Writing for Environmental Engineers

[*updated 26.03.2024*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Christine Sick

Lecturer:
Dipl.-Übers. Eva Langenbahn

[*updated 19.02.2024*]

Learning outcomes:
The modules “Business English for Environmental Engineers”, “Technical Reading and Writing for Environmental Engineers ”, as well as “Applying for an Engineering Job and Professional Presentations” 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.

About the “Applying for an Engineering Job and Professional Presentations” module:
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 the verbal expressions they have mastered in them. In doing so, they will continue to develop their understanding of the functional use of language.
With regard to job application processes, students will be given the opportunity to prepare their application documents in English, apply and practice interview strategies and develop their intercultural awareness.

[*updated 01.07.2021*]

Module content:
Presentations
- Strategic knowledge
- Structure of an English presentation
- Structures for linguistic implementation
- Describing tools, numbers, cause and effect correlations, and trends

Applying for a job
- Job advertisement
- Application documents (resume and cover letter)
- Job interview

In addition, we will work on:
Vocabulary
Repeating relevant grammatical structures
Intercultural competence
Raising awareness for functional language use

[*updated 01.07.2021*]

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 01.07.2021*]

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 01.07.2021*]

Automation Technology in Process Engineering

Module name (EN): Automation Technology in Process Engineering
Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023
Module code: UI-T-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): None.
Recommended as prerequisite for:
Module coordinator: Prof. Dr.-Ing. Michael Sauer, M.Sc.
Lecturer: Prof. Dr.-Ing. Michael Sauer, M.Sc. [*updated 04.08.2023*]

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

Module name (EN): Bachelor Thesis

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-BT

Hours per semester week / Teaching method:
-

ECTS credits:
12

Semester: 7

Mandatory course: yes
Language of instruction: German
Assessment: Project work [*updated 16.11.2023*]
Applicability / Curricular relevance: UI-BT (T251-0009) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 7, mandatory course UI-BT (T251-0009) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 7, mandatory course
Workload: The total student study time for this course is 360 hours.
Recommended prerequisites (modules): None.
Recommended as prerequisite for:
Module coordinator: Studienleitung
Lecturer: Studienleitung [*updated 04.08.2023*]
Learning outcomes: [*updated 16.11.2023*]
Module content: [*updated 16.11.2023*]
Recommended or required reading: [*updated 16.11.2023*]

Biology

Module name (EN): Biology
Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023
Module code: UI-BIO
Hours per semester week / Teaching method: 3V+1U (4 hours per week)
ECTS credits: 5
Semester: 1
Mandatory course: yes
Language of instruction: German
Assessment: [*still undocumented*]
Applicability / Curricular relevance: UI-BIO (P251-0011) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 1, mandatory course UI-BIO (P251-0011) 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: UI-BTE Biotechnology UI-UG1 Fundamentals of Environmental Science I [*updated 13.03.2024*]
Module coordinator: Prof. Dr. Timo Gehring

Lecturer:
Prof. Dr. Uwe Waller

[*updated 22.02.2024*]

Learning outcomes:

[*still undocumented*]

Module content:

[*still undocumented*]

Recommended or required reading:

Biologie für Ingenieure, 2012
von Hans-Dieter Görtz (Autor), Franz Brümmer (Autor), Martin Siemann-Herzberg (Mitwirkende),
Springer-Verlag

[*updated 30.07.2021*]

Biotechnology

Module name (EN): Biotechnology

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-BTE

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

ECTS credits:
3

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 180 min.

[*updated 28.02.2024*]

Applicability / Curricular relevance:

UI-BTE (P251-0012) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 3, mandatory course
UI-BTE (P251-0012) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 3, mandatory 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):
UI-BIO Biology
UI-GCL Fundamentals of Chemistry (with Lab Course)

[*updated 22.02.2024*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Timo Gehring

Lecturer: Prof. Dr. Timo Gehring

[*updated 04.08.2023*]

Learning outcomes:
After successfully completing this module, students will be able to:
- name recent applications of biotechnology and describe their relevance.
- describe the chemical structure of amino acids and explain the different levels of protein structure, including primary structure, secondary structure, tertiary structure and quaternary structure.
- name examples of proteins in nature and in the human body and describe their functions.
- acknowledge carbohydrates and polysaccharides as the basic building blocks of life and understand their functions in nature and in the human body, e.g. blood groups.
- explain how glycogen develops and breaks down.
- distinguish between saturated and unsaturated fatty acids and explain the importance of omega-3 fatty acids. They will also be able to describe the structure and function of lipids, fats and double lipid layers in biological systems.
- They will be able to: describe the structure of nucleic acids and nucleotides and explain the processes of DNA replication, transcription and translation.
- explain the dogma of molecular genetics and describe biotechnological tools and techniques such as restriction enzymes, vectors, plasmids, cloning, PCR, genetic fingerprinting, lac operon and CRISPR-CAS9.
- describe the process of photosynthesis and explain the use of photobioreactors for the biotechnological cultivation of algae.
- describe the process of biotechnological production of insulin in the form of two modern industrial processes

[*updated 28.02.2024*]

Module content:
Relevance of biotechnology using current examples.
Amino acids and proteins as the basic building blocks of life: chemical structure of amino acids, chirality, primary structure, secondary structure, tertiary structure, quaternary structure, disulfide bridges. Examples

and functions of proteins in nature and in the human body. GFP and insulin
Carbohydrates and polysaccharides as the basic building blocks of life: Examples and functions of carbohydrates in nature and in the human body Blood groups and glycogen
Fats and lipids as the basic building blocks of life: saturated and unsaturated fatty acids Omega-3 fatty acids Micelles and double lipid layer formation Examples and functions of lipids and fats in nature and in the human body
Nucleic acids and nucleotides as the basic building blocks of life: structure of nucleotides, structure of RNA and DNA
DNA replication, dogma of molecular genetics, transcription and translation. Restriction enzymes, vectors and plasmids with cloning, PCR, genetic fingerprinting, lac operon, CRISPR-CAS9
Photosynthesis and photobioreactors Biotechnological cultivation of algae
Biotechnological production of insulin

[*updated 28.02.2024*]

Teaching methods/Media:
Blackboard, independent work with script and texts, PowerPoint presentations, films, interactive tests in Moodle, warm-ups, group work

[*updated 28.02.2024*]

Recommended or required reading:
German:
Biotechnologie für Einsteiger, Renneberg, ISBN 978-3-662-56283-3
Lehrbuch der Molekularen Zellbiologie, von Jochen Graw (Herausgeber), Bruce Alberts et al., ISBN: 978-3527347797
Taschenatlas der Biotechnologie und Gentechnik, Schmid, Rolf D., ISBN: 978-3-527-33514-5
Bioprozesstechnik, Horst Chmiel, Springer, ISBN: 978-3-8274-2477-8

English:
Brock Biology of Microorganisms, Daniel H. Buckley, ISBN: 978-1-292-40479-0
Biochemical Pathways Poster

French:
Biochimie et biologie moléculaire Taschenbuch, Christian Moussard, ISBN-13:978-2807322158

Molekülbaukasten

[*updated 28.02.2024*]

Business English for Environmental Engineers

Module name (EN): Business English for Environmental Engineers

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-BEE

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 01.07.2021*]

Applicability / Curricular relevance:

UI-BEE (P251-0013) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 1, mandatory course
UI-BEE (P251-0013) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 1, mandatory course

Suitable for exchange students (learning agreement)

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:
UI-AEJ Applying for an Engineering Job and Professional Presentations
UI-TRW Technical Reading and Writing for Environmental Engineers

[*updated 26.03.2024*]

Module coordinator:
Prof. Dr. Christine Sick

Lecturer: Prof. Dr. Christine Sick

[*updated 04.08.2023*]

Learning outcomes:
The modules “Business English for Environmental Engineers”, “Technical Reading and Writing for Environmental Engineers ”, as well as “Applying for an Engineering Job and Professional Presentations” 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 Environmental Engineers module is to provide future environmental engineers 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 01.07.2021*]

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 01.07.2021*]

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 01.07.2021*]

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 (learning offer to help students learn English at the htw saar Alt-Saarbrücken campus)

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 01.07.2021*]

CAD for Environmental Projects

Module name (EN): CAD for Environmental Projects

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-CAD

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

ECTS credits:
5

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Project

[*updated 22.09.2021*]

Applicability / Curricular relevance:

UI-CAD (P251-0014) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 3, mandatory course
UI-CAD (P251-0014) Environmental Technologies, 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:
Studienleitung

Lecturer: Studienleitung

[*updated 04.08.2023*]

Learning outcomes:
After successfully completing this part of the course, students will be able to:
create standardized technical drawings,
conceptualize structures and technical equipment (machinery),
develop structured plans incl. elevations and sections with the help of a CAD system,
apply the CAD techniques they have learned to projects related to the environment.

[*updated 22.09.2021*]

Module content:
Basic geometric structures
Axonometry and perspective
Introduction to technical drawing
Basics of operating the program, display control
Drawing aids (coordinates, ortho and polar modes, etc.)
CAD-specific drawing techniques
Object-oriented 3D design of components taking into account CAD techniques
Forming the structure of buildings with height nodes, labeling and dimensioning
Drawing organization: Floor plans, views, sections, border lines, title block, 3D model
Applying CAD techniques to environmental issues or projects.

[*updated 22.09.2021*]

Recommended or required reading:
Dubbel (2020). Taschenbuch für den Maschinenbau, Springer-Verlag.
Schneider (2020). Bautabellen für Ingenieure mit Berechnungshinweisen und Beispielen. 24., überarbeitete Auflage, Herausgeber Andrey Albert. REGUVIS Fachmedien.
Brix, M; Petzold, E; Riedemann, C (1994). Kartographische Bearbeitung von Altlasten auf dem PC, Herausgeber Wilfried J. Bartz, Expert-Verlag.
Labisch, S; Weber, C. (2014). Technisches Zeichnen. Verlag Springer Vieweg, 4., überarbeitete und erweiterte Auflage.

[*updated 22.09.2021*]

Concepts of Thermal Energy Systems

Module name (EN): Concepts of Thermal Energy Systems

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-T-KTE

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

ECTS credits:
3

Semester: 7

Mandatory course: yes

Language of instruction:
German

Assessment:
Term paper

[*updated 28.02.2024*]

Applicability / Curricular relevance:

UI-T-KTE (P251-0068) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 7, mandatory course, technical
UI-T-KTE (P251-0068) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 7, mandatory course, technical

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):
UI-PH1 Physics 1

[*updated 20.03.2024*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Frank Ulrich Rückert

Lecturer:
Benjamin Allweyer

[*updated 20.03.2024*]

Learning outcomes:
After successfully completing this module, students will be able to:
- analyze and evaluate transport and utilization concepts of thermal energy systems from a constructive, energetic and economic point of view
- plan and carry out analytical and model investigations
- evaluate the basic principles for the design and construction of important systems for electricity and heat generation (including gas turbines, boilers (hot water), heat pumps and chillers)

[*updated 28.02.2024*]

Module content:
- Extraction/production, processing and transportation of solids including biomass, liquids and gases
- Fuel state

- Standard and default state
  - Ideal and real behavior
  - Liquid, solid and gaseous fuels
- Fluid energy machines for energy conversion
  - Pumps and compressors
  - Propeller and fan
  - Turbines
  - Combustion engines
- Calculation and determination of pressure losses, components and pipe network design
- Pipe network calculations and system analysis
  - Determining peak delivery times
  - Fundamentals of fluid mechanics
  - Calculating pressure loss
  - Pipe networks
- Emissions, immissions and heat recovery
- Measurement and billing

[*updated 28.02.2024*]

Teaching methods/Media:

Lecture notes, lecture guide, exercises, collection of formulas
Simulation calculations with Simcenter Amesim in the computer pool

[*updated 28.02.2024*]

Recommended or required reading:
- Zahoransky, Richard: Energietechnik, Springer Vieweg, (akt. Aufl.)
- Rückert, Sauer: Die Erstellung eines digitalen Zwillings - Eine Einführung in Simcenter Amesim; Springer Essentials, Buch (Taschenbuch)

[*updated 28.02.2024*]

Data Structures and Databases

Module name (EN): Data Structures and Databases

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-DDB

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

ECTS credits:
5

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Project work

[*updated 09.11.2022*]

Applicability / Curricular relevance:

UI-DDB (P251-0015) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 3, mandatory course
UI-DDB (P251-0015) Environmental Technologies, 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. Damian Weber

Lecturer:
Dipl.-Physiker Michael Meßner

[*updated 28.03.2024*]

Learning outcomes:
After successfully completing this course, students will: be able to store, process, evaluate, and communicate data securely.

[*updated 09.11.2022*]

Module content:
1. Bits, bytes and basics
2. Data structures
3. File basics
4. Python:
5. File formats
6. Documents
7. Databases
8. NoSQL databases
9. Standards
10. Cloud technology
11. Algorithms on datasets
12. Evaluating data
13. Secure communication
14. Trend topics

[*updated 09.11.2022*]

Recommended or required reading:

[*still undocumented*]

Electrical Engineering für Mechanical Engineering und Process Engineering

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

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-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
UI-ELT (P241-0241, P241-0242, P251-0017, P251-0018) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 2, mandatory course
UI-ELT (P241-0241, P241-0242, 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):
None.

Recommended as prerequisite for:
UI-AMT Applied Metrology
UI-T-EN Energy Efficiency and Sustainability

[*updated 28.03.2024*]

Module coordinator:
Prof. Dr. Marc Deissenroth-Uhrig

Lecturer: Prof. Dr. Marc Deissenroth-Uhrig

[*updated 04.08.2023*]

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: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-T-EN

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

ECTS credits:
5

Semester: 6

Mandatory course: yes

Language of instruction:
German

Assessment:
Oral examination

[*updated 30.10.2023*]

Applicability / Curricular relevance:

UI-T-EN (P212-0024) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 6, 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):
UI-ELT Electrical Engineering für Mechanical Engineering und Process Engineering

UI-ERN Renewable Energies

[*updated 28.03.2024*]

Recommended as prerequisite for:

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

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

[*updated 28.03.2024*]

Learning outcomes:

[*updated 30.10.2023*]

Module content:

[*updated 30.10.2023*]

Recommended or required reading:

[*updated 30.10.2023*]

Engineering Mechanics I

Module name (EN): Engineering Mechanics I

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-TM1

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

ECTS credits:
5

Semester: 1

Mandatory course: yes

Language of instruction:
German

Assessment:
Written examination

[*updated 28.09.2020*]

Applicability / Curricular relevance:

BIBA130-17 (P110-0080) Civil and structural engineering, Bachelor, ASPO 01.10.2017 , semester 1, mandatory course
UI-TM1 (P110-0181, P251-0044) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 1, mandatory course
UI-TM1 (P110-0181, P251-0044) 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:
UI-TM2 Engineering Mechanics II

[*updated 15.03.2024*]

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

Lecturer: Prof. Dr.-Ing. Christian Lang

[*updated 04.08.2023*]

Learning outcomes:
_ After successfully completing this module, students will understand the importance of structural analyses and be familiar with the corresponding basic terminology.
_ They will be able to define load-bearing systems, determine loads and calculate support forces and internal forces for simple systems.

[*updated 28.09.2020*]

Module content:
_ Loads (DIN 1055)
_ Structural systems, load-bearing systems
_ Force-vector components, addition, decomposition, force polygon
_ Equilibrium condition, support forces, internal forces, internal force principle
_ The following structural systems will be discussed: single-span beam, folded beam, articulated beam, three-hinged arch, frame, truss

[*updated 28.09.2020*]

Recommended or required reading:
_ Schneider: Bautabellen; Schneider: Baustatik _ Zahlenbeispiele;
_ Wagner/Erlhof: Praktische Baustatik 1; Kraus/Führer: Grundlagen der Tragwerkslehre

[*updated 28.09.2020*]

Engineering Mechanics II

Module name (EN): Engineering Mechanics II

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-TM2

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

ECTS credits:
4

Semester: 2

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 28.09.2020*]

Applicability / Curricular relevance:

BIBA250-17 (P110-0081) Civil and structural engineering, Bachelor, ASPO 01.10.2017 , semester 2, mandatory course
UI-TM2 (P110-0081, P251-0045) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 2, mandatory course
UI-TM2 (P110-0081, P251-0045) 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 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):
UI-MAT1 Mathematics I
UI-TM1 Engineering Mechanics I

[*updated 15.03.2024*]

Recommended as prerequisite for:

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

Lecturer: Prof. Dr.-Ing. Christian Lang

[*updated 04.08.2023*]

Learning outcomes:
After successfully completing this module, students will:
_ understand the terms stress (normal stress, shear stress) and cross-sectional values.
_ be able to calculate stress for standard cross-sections and loads reliably.
_ understand the concept of the verification of load-bearing capacity and be able to apply it.

[*updated 28.09.2020*]

Module content:
_ Safety concept, partial safety coefficients
_ Stress, strain, E-Modul, Hooke´s law, Euler-Bernoulli beam theory, structural robustness
_ Cross-section properties: Moment of inertia, moment of resistance, static moment
_ Normal stress due to normal force and bending (including double bending)
_ Shear stress due to shear force
_ Principal stresses
_ Stress on building components without tensile strength (gaping joint)

[*updated 28.09.2020*]

Recommended or required reading:
_ Schneider, Bautabellen für Ingenieure, Werner Verlag
_ Schweda: Baustatik/Festigkeitslehre
_ Göttsche, Petersen: Festigkeitslehre _ klipp und klar

[*updated 28.09.2020*]

Environmental and Bioprocess Engineering (with Lab Course)

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

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-T-BUV

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

ECTS credits:
5

Semester: 6

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 (P241-0415, P241-0416) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 6, mandatory course, technical
UI-T-BUV (P241-0415, P241-0416) 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):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Timo Gehring

Lecturer: Prof. Dr. Timo Gehring

[*updated 04.08.2023*]

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: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-T-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:
Exam

[*updated 23.02.2024*]

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 04.08.2023*]

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*]

Environmental Project I

Module name (EN): Environmental Project I

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-UP1

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

ECTS credits:
3

Semester: 1

Mandatory course: yes

Language of instruction:
German

Assessment:
Term paper

[*updated 30.10.2023*]

Applicability / Curricular relevance:

UI-UP1 (P251-0056) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 1, mandatory 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: Studienleitung
Lecturer: Prof. Dr.-Ing. Thorsten Cypra Prof. Dr.-Ing. Joachim Dettmar Prof. Dr. Matthias Faust Prof. Dr. Timo Gehring Prof. Dr.-Ing. Christian Gierend [*updated 13.03.2024*]
Learning outcomes: [*updated 30.10.2023*]
Module content: [*updated 30.10.2023*]
Recommended or required reading: [*updated 30.10.2023*]

Environmental Project II

Module name (EN): Environmental Project II
Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023
Module code: UI-UP2
Hours per semester week / Teaching method: 2PA (2 hours per week)
ECTS credits: 3
Semester: 2
Mandatory course: yes
Language of instruction: German

Assessment:
Term paper

[*updated 30.10.2023*]

Applicability / Curricular relevance:

UI-UP2 (P251-0059) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 2, mandatory 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:
Studienleitung

Lecturer:
Prof. Dr.-Ing. Thorsten Cypra
Prof. Dr.-Ing. Joachim Dettmar
Prof. Dr. Matthias Faust
Prof. Dr. Timo Gehring
Prof. Dr.-Ing. Christian Gierend

[*updated 13.03.2024*]

Learning outcomes:

[*updated 30.10.2023*]

Module content:

[*updated 30.10.2023*]

Recommended or required reading:

[*updated 30.10.2023*]

Environmental Project III

Module name (EN): Environmental Project III
Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023
Module code: UI-UP3
Hours per semester week / Teaching method: 2PA (2 hours per week)
ECTS credits: 8
Semester: 4
Mandatory course: yes
Language of instruction: German
Assessment: Written composition (80%) and presentation (20%) [*updated 30.10.2023*]
Applicability / Curricular relevance: UI-UP3 Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 4, mandatory course
Workload: 30 class hours (= 22.5 clock hours) over a 15-week period. The total student study time is 240 hours (equivalent to 8 ECTS credits). There are therefore 217.5 hours available for class preparation and follow-up work and exam preparation.
Recommended prerequisites (modules): None.
Recommended as prerequisite for:
Module coordinator: Studienleitung
Lecturer: Prof. Dr.-Ing. Thorsten Cypra Prof. Dr.-Ing. Joachim Dettmar Prof. Dr. Matthias Faust Prof. Dr. Timo Gehring Prof. Dr.-Ing. Christian Gierend [*updated 13.03.2024*]

Learning outcomes:

[*updated 30.10.2023*]

Module content:

[*updated 30.10.2023*]

Recommended or required reading:

[*updated 30.10.2023*]

Fundamentals of Chemistry (with Lab Course)

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

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-GCL

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

ECTS credits:
5

Semester: 1

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:
UI-BTE Biotechnology
UI-T-PVT Physical Process Engineering with Practical Case Studies

[*updated 28.03.2024*]

Module coordinator:
Prof. Dr. Timo Gehring

Lecturer:
Dr. Patrick Maurer

[*updated 22.02.2024*]

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 Environmental Science I

Module name (EN): Fundamentals of Environmental Science I

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-UG1

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

ECTS credits:
5

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Project

[*updated 22.09.2021*]

Applicability / Curricular relevance:

UI-UG1 (P251-0050) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 3, mandatory course
UI-UG1 (P251-0050) Environmental Technologies, 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):
UI-BIO Biology

[*updated 13.03.2024*]

Recommended as prerequisite for:
UI-UG2 Fundamentals of Environmental Science II

[*updated 20.03.2024*]

Module coordinator:
Studienleitung

Lecturer:
Prof. Dr. Uwe Waller
Manuel Trapp

[*updated 13.03.2024*]

Learning outcomes:
After successfully completing this module, students will:
understand the basics of climatology, climate dynamics and climate change and be able to explain them,
be familiar with and understand the basics of ecology and its dependence on climate,
be able to analyze and evaluate questions concerning the relationship between climate and ecology.

[*updated 22.09.2021*]

Module content:
Climate
Fundamentals of meteorology
Structure and composition of the atmosphere
Definitions of climate, climate factors; climate system; climate elements
Climate and land use change
Earth risk management
Climate modeling - possibilities and limits

Ecology
Individuals and populations
Biocenosis and biotope
Feeding relationships, energy flow, abiotic and biotic factors.
Terrestrial ecology
Limnology

Life cycle assessments/LCA
Definition of goal and research scope
Life Cycle Inventory
Impact assessment
Evaluation

[*updated 22.09.2021*]

Recommended or required reading:
Schönwiese, C.-D. (2020). Klimatologie, Taschenbuch, UTB-Verlag.
Kappas, M (2009). Klimatologie - Klimaforschung im 21. Jahrhundert - Herausforderung für Natur- und Sozialwissenschaften, Spektrum Akademischer-Verlag.
Begon, M.; Howarth, R.W.; Townsend, C.R. (2017). Ökologie. Springer-Spektrum-Verlag

[*updated 22.09.2021*]

Fundamentals of Environmental Science II

Module name (EN): Fundamentals of Environmental Science II

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-UG2

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

ECTS credits:
5

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:
Term paper

[*updated 30.10.2023*]

Applicability / Curricular relevance:

UI-UG2 (P251-0049) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 5, mandatory course
UI-UG2 (P251-0049) Environmental Technologies, Bachelor, ASPO 01.10.2023 , 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):
UI-UG1 Fundamentals of Environmental Science I

[*updated 20.03.2024*]

Recommended as prerequisite for:

Module coordinator:
Studienleitung

Lecturer:
Dr. Ulrike Schinkel
Verena Dürr

[*updated 20.03.2024*]

Learning outcomes:
After successfully completing this module, students will:
recognize and understand the principles underlying emissions and their environmental impact,
recognize and understand the principles and contexts of public participation in environmentally relevant planning processes,

be able to identify and classify the influence of emissions on environmental media,
be able to organize and implement public participation processes responsibly.

[*updated 22.09.2021*]

Module content:
Environmental assessment/environmental impact study
Structure, procedure and methods of an environmental assessment (screening, scoping, beteiligung)
Presenting and preparing an environmental impact study
Evaluation procedures and methods
Quantitative assessment methods of environmental aspects
Measures for mitigating or solving problems

Society: Participation/public participation procedures/public relations work
Function and benefits of participation
Legal foundation for participation
Participants and affected parties (players or stakeholders) and their role in the planning process
Participation methods and procedures
Mediating and moderating planning processes
Evaluating planning processes

[*updated 30.10.2023*]

Recommended or required reading:
UVP und strategische Umweltprüfung: Rechtliche und fachliche Anleitung für die Umweltverträglichkeitsprüfung (Praxis Umweltrecht, Band 12).
Die Bewertung zur Umweltverträglichkeitsprüfung - ein methodischer Leitfaden: Grundlagen, Konzept, Arbeitsmodelle, Vorgehensweise, Arnim Bechmann und Joachim Hartlik, November 2004.

[*updated 22.09.2021*]

Geographic Information Systems

Module name (EN): Geographic Information Systems

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-GIS

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

ECTS credits:
5

Semester: 6

Mandatory course: yes

Language of instruction:
German

Assessment:
Project

[*updated 22.09.2021*]

Applicability / Curricular relevance:

UI-GIS (P251-0021) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 6, mandatory course
UI-GIS (P251-0021) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 6, 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. Alpaslan Yörük

Lecturer: Prof. Dr.-Ing. Alpaslan Yörük

[*updated 04.08.2023*]

Learning outcomes:
After successfully completing this module, students will:
be able to describe the basic principles, terms, components and structure of geoinformation systems,
be proficient in georeferencing data and maps and can change the reference system,
be able to analyze and present spatial data,
be able to operate a desktop GIS and model environmentally relevant information.

[*updated 22.09.2021*]

Module content:
Basic principles and terms
Components of a GIS (data acquisition, analysis, visualization)
Referencing data and maps, changing the reference system
Implementing and operating a desktop GIS
Modeling spatial information
GIS scripting (Python)

[*updated 22.09.2021*]

Recommended or required reading:
Bartelme, N. (2005): Geoinformatik. Modelle - Strukturen - Funktionen. - 4. Auflage, Berlin Heidelberg.
De Lange, N. (2013): Geoinformatik in Theorie und Praxis. - 3. aktualisierte und erweiterte Auflage, Berlin Heidelberg.
Ehlers, M. & J. Schiewe (2012): Geoinformatik. Geowissen kompakt, WBG, Darmstadt.
Bill, R. (2010): Grundlagen der Geo-Informationssysteme. - 5., völlig neu bearbeitete Auflage, Wichmann Verlag, Berlin, Heidelberg.
Bill, R.; Zehner, M. L. (2000): Lexikon der Geoinformatik. Wichmann Verlag, Berlin, Heidelberg.
QGIS (2020). QGIS Geographic Information System. Open Source Geospatial Foundation Project. http://qgis.org. Zugriff: 30.09.2020

[*updated 22.09.2021*]

Hydraulic Engineering I

Module name (EN): Hydraulic Engineering I

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-I-WB1

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

ECTS credits:
5

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 28.09.2020*]

Applicability / Curricular relevance:

BIBA380 (P110-0087) Civil and structural engineering, Bachelor, ASPO 01.04.2009 , semester 3, mandatory course
BIBA380 (P110-0087) Civil and structural engineering, Bachelor, ASPO 01.10.2011 , semester 3, mandatory course
BIBA380 (P110-0087) Civil and structural engineering, Bachelor, ASPO 01.10.2017 , semester 3, mandatory course
UI-I-WB1 (P110-0180) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 5, mandatory course, civil and structural engineering
UI-I-WB1 (P110-0180) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 5, mandatory course, civil and structural engineering

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):
UI-HYD Hydromechanics

[*updated 15.03.2024*]

Recommended as prerequisite for:
UI-I-WB2 Hydraulic Engineering II
UI-I-WB3 Hydraulic Engineering III

[*updated 15.03.2024*]

Module coordinator:
Prof. Dr.-Ing. Alpaslan Yörük

Lecturer: Prof. Dr.-Ing. Alpaslan Yörük

[*updated 04.08.2023*]

Learning outcomes:
After successfully completing this module, students will be able to recognize and understand the relationships between hydrological processes, water management requirements and hydrology. They will be able to use their knowledge to design simple measures for watercourse regulation, as well as simple structural facilities on bodies of water.

[*updated 28.09.2020*]

Module content:
- Hydrology and water management,
- Hydraulics,
- Water science and water regulation,
- Hydraulic engineering plants

[*updated 28.09.2020*]

Recommended or required reading:
Lange, Lecher: Gewässerregelung-Gewässerpflege
Lattermann: Wasserbau-Praxis, Wasserbau in Beispielen
Maniak: Hydrologie und Wasserwirtschaft
Patt, Jürging, Knaus: Naturnaher Wasserbau
Schröder (Hrsg.): Grundlagen des Wasserbaus
DIN-standards etc.

[*updated 28.09.2020*]

Hydraulic Engineering II

Module name (EN): Hydraulic Engineering II

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-I-WB2

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

ECTS credits:
5

Semester: 6

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 05.02.2020*]

Applicability / Curricular relevance:

BIBA685 (P110-0088) Civil and structural engineering, Bachelor, ASPO 01.04.2009 , semester 6, mandatory course
BIBA685 (P110-0088) Civil and structural engineering, Bachelor, ASPO 01.10.2011 , semester 6, mandatory course
BIBA685 (P110-0088) Civil and structural engineering, Bachelor, ASPO 01.10.2017 , semester 6, mandatory course
UI-I-WB2 (P110-0184) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 6, mandatory course, civil and structural engineering
UI-I-WB2 (P110-0184) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 6, mandatory course, civil and structural 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):
UI-I-WB1 Hydraulic Engineering I

[*updated 15.03.2024*]

Recommended as prerequisite for:
UI-I-WB3 Hydraulic Engineering III

[*updated 15.03.2024*]

Module coordinator:
Prof. Dr.-Ing. Alpaslan Yörük

Lecturer: Prof. Dr.-Ing. Alpaslan Yörük

[*updated 04.08.2023*]

Learning outcomes:
After successfully completing this module, students will be familiar with and understand hydrological and hydraulic processes. They will be able to apply their knowledge and skills, as well as the knowledge gained in applying hydrological and hydraulic calculation and design methods as a basis for hydraulic engineering design.

[*updated 28.09.2020*]

Module content:
- Hydrology and water management
- Hydraulic calculations
- Conveyance of solids
- Flood protection

[*updated 05.02.2020*]

Recommended or required reading:
BWK: Hydraulische Berechnung naturnaher Fließgewässer
DVWK: Hydraulische Berechnung von Fließgewässern
DVWK: Hydraulisch-sedimentologische Berechnungen naturnah gestalteter Gewässer
LfU BW: Hydraulik naturnaher Fließgewässer
Maniak: Hydrologie und Wasserwirtschaft
Schröder (Hrsg.): Grundlagen des Wasserbaus

[*updated 05.02.2020*]

Hydraulic Engineering III

Module name (EN): Hydraulic Engineering III

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-I-WB3

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

ECTS credits:
3

Semester: 7

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 28.09.2020*]

Applicability / Curricular relevance:

BIBA785 (P110-0089) Civil and structural engineering, Bachelor, ASPO 01.04.2009 , semester 7, mandatory course
BIBA785 (P110-0089) Civil and structural engineering, Bachelor, ASPO 01.10.2011 , semester 7, mandatory course
BIBA785 (P110-0089) Civil and structural engineering, Bachelor, ASPO 01.10.2017 , semester 7, mandatory course
UI-I-WB3 (P110-0186) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 7, mandatory course, civil and structural engineering
UI-I-WB3 (P110-0186) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 7, mandatory course, civil and structural engineering

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):
UI-I-WB1 Hydraulic Engineering I
UI-I-WB2 Hydraulic Engineering II

[*updated 15.03.2024*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr.-Ing. Alpaslan Yörük

Lecturer: Prof. Dr.-Ing. Alpaslan Yörük

[*updated 04.08.2023*]

Learning outcomes:
After successfully completing this module, students will have comprehensive knowledge about hydraulic engineering systems. They will be able to appyl the knowledge gained in the dimensioning and design of hydraulic engineering facilities.

[*updated 28.09.2020*]

Module content:
- Water regulation structures,

- Inland waterway construction,
- Regulatory structures and bodies,
- Dams,
- Groundwater hydraulics,
- Hydropower plants

[*updated 28.09.2020*]

Recommended or required reading:
Giesecke, Mosonyi: Wasserkraftanlagen _ Planung, Bau und Betrieb
Muth: Hochwasserrückhaltebecken
Kaczynski: Stauanlagen _ Wasserkraftanlagen
Kuhn: Binnenverkehrswasserbau
Schröder, Römisch: Gewässerregelung _ Binnenverkehrswasserbau
DIN, etc.

[*updated 28.09.2020*]

Hydromechanics

Module name (EN): Hydromechanics

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-HYD

Hours per semester week / Teaching method:
5VU (5 hours per week)

ECTS credits:
6

Semester: 2

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 28.09.2020*]

Applicability / Curricular relevance:

BIBA260-17 (P110-0042) Civil and structural engineering, Bachelor, ASPO 01.10.2017 , semester 2, mandatory course
UI-HYD (P110-0042, P251-0024) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 2, mandatory course
UI-HYD (P110-0042, P251-0024) Environmental Technologies, 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 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:
UI-I-WB1 Hydraulic Engineering I

[*updated 15.03.2024*]

Module coordinator:
Prof. Dr.-Ing. Alpaslan Yörük

Lecturer: Prof. Dr.-Ing. Alpaslan Yörük

[*updated 04.08.2023*]

Learning outcomes:
After successfully completing this module, students will be familiar with and understand the principles of hydrostatics, as well as pipe flow and open-channel flow.
_ They are able to apply their knowledge and understanding, in order to carry out simple calculations and standard measurements in these fields.

[*updated 28.09.2020*]

Module content:
_ Introduction
_ Hydrostatics
_ Hydrodynamics: Basics, pipe flow (pressure discharge), open-channel flow (open channel discharge)

[*updated 28.09.2020*]

Teaching methods/Media:
_ Carrying out and computing experiments

[*updated 28.09.2020*]

Recommended or required reading:
_ Aigner & Bollrich: Handbuch der Hydraulik
_ Freimann: Hydraulik für Bauingenieure
_ Heinemann, Feldhaus: Hydraulik für Bauingenieure
_ Schröder: Technische Hydraulik
_ Zanke: Wasserbau
_ Schneider, Bautabellen für Ingenieure, Werner Verlag

[*updated 28.09.2020*]

Introduction to Thermodynamics, Heat Transfer and Fluid Technology

Module name (EN): Introduction to Thermodynamics, Heat Transfer and Fluid Technology
Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023
Module code: UI-T-TWF
Hours per semester week / Teaching method: 3V+1U (4 hours per week)
ECTS credits: 5
Semester: 6
Mandatory course: yes
Language of instruction: German
Assessment: Exam [*updated 30.10.2023*]
Applicability / Curricular relevance: UI-T-TWF (P251-0016) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 6, mandatory course, technical UI-T-TWF (P251-0016) 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): UI-MAT1 Mathematics I UI-PH1 Physics 1   [*updated 19.02.2024*]
Recommended as prerequisite for:
Module coordinator: Prof. Dr. Frank Ulrich Rückert

Lecturer: Prof. Dr. Frank Ulrich Rückert

[*updated 04.08.2023*]

Learning outcomes:

[*updated 30.10.2023*]

Module content:

[*updated 30.10.2023*]

Recommended or required reading:

[*updated 30.10.2023*]

Mathematics I

Module name (EN): Mathematics I

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-MAT1

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

ECTS credits:
5

Semester: 1

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 05.02.2020*]

Applicability / Curricular relevance:

BIBA151 (P110-0050) Civil and structural engineering, Bachelor, ASPO 01.04.2009 , semester 1, mandatory course

BIBA151 (P110-0050) Civil and structural engineering, Bachelor, ASPO 01.10.2011 , semester 1, mandatory course
BIBA151 (P110-0050) Civil and structural engineering, Bachelor, ASPO 01.10.2017 , semester 1, mandatory course
UI-MAT1 (P110-0179, P251-0025) 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:
UI-MAT2 Mathematics II
UI-T-TWF Introduction to Thermodynamics, Heat Transfer and Fluid Technology
UI-TM2 Engineering Mechanics II

[*updated 15.03.2024*]

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

Lecturer:
Dr. Anna-Katharina Mahro

[*updated 15.03.2024*]

Learning outcomes:
_ After successfully completing this moduel, students will have basic mathematical knowledge (arithmetic and algebra of real numbers) and be able to apply mathematical basics in the field of civil engineering.
_ Professional and methodological competence: Students will be able to solve job-typical tasks and civil engineering problems using higher mathematics (in particular, vector calculus and differential calculus)
_ Exercises and examples from the professional world of civil engineering.

[*updated 28.09.2020*]

Module content:
- Functions
_ Elementary functions,
_ Differential calculus (properties of differentiable functions),
_ Applying differential calculus,
_ Linear algebra (vector calculus).

[*updated 05.02.2020*]

Recommended or required reading:
_ Papula: Mathematik für Ingenieure und Naturwissenschaftler, Bd 1+2, Vieweg; Haake/Hirle/Maas: Mathematik für Bauingenieure, Bd. 1+2, Teubner-Verlag, Stuttgart:
_ Rjasanowa: Mathematik für Bauingenieure, Carl Hanser Verlag;

_ Meyberg, Vachenauer: Höhere Mathematik, Bd. 1+2, Springer
_ Papula: Mathematische Formelsammlung für Ingenieure und Naturwissenschaftler, Vieweg;

[*updated 05.02.2020*]

Mathematics II

Module name (EN): Mathematics II

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-MAT2

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

ECTS credits:
5

Semester: 2

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 05.02.2020*]

Applicability / Curricular relevance:

BIBA270 (P110-0051) Civil and structural engineering, Bachelor, ASPO 01.04.2009 , semester 2, mandatory course
BIBA270 (P110-0051) Civil and structural engineering, Bachelor, ASPO 01.10.2011 , semester 2, mandatory course
BIBA270 (P110-0051) Civil and structural engineering, Bachelor, ASPO 01.10.2017 , semester 2, mandatory course
UI-MAT2 (P110-0051, P251-0026) 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):
UI-MAT1 Mathematics I

[*updated 15.03.2024*]

Recommended as prerequisite for:

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

Lecturer:
Dr. Anna-Katharina Mahro

[*updated 15.03.2024*]

Learning outcomes:
_ After successfully completing this module, students will be able to apply integration rules and use integral calculus to solve specific problems such as areas, centres of gravity, moments of inertia.
_ They will be able to check linear systems of equations for their solvability and determine solutions those systems. They will be able to solve eigenvalue problems and simple differential equations. They will be able to determine the probability distributions of random variables, as well as calculate expected values and standard deviations.

[*updated 28.09.2020*]

Module content:
_ Integration (integration rules and methods)
_ Applying integration methods,
_ Matrices, linear dependence, matrix rank, solving systems of equations, eigenvalue problems,
_ Homogeneous and inhomogeneous ordinary differential equations and linear 1st order differential equations, differential equations of higher order
_ Calculating probability (discrete stochastic processes, probability measure, random variables, expected value, variance and standard deviation)

[*updated 05.02.2020*]

Recommended or required reading:
_ Papula: Mathematik für Ingenieure und Naturwissenschaftler, Bd. 1,2,3, Vieweg Haake/Hirle/Maas: Mathematik für Bauingenieure, Bd. 1+2, Teubner-Verlag, Stuttgart
_ Rjasanowa: Mathematik für Bauingenieure, Carl Hanser Verlag
_ Meyberg, Vachenauer: Höhere Mathematik, Bd. 1, 2, Springer
_ Papula: Mathematische Formelsammlung für Ingenieure und Naturwissenschaftler, Vieweg

[*updated 05.02.2020*]

Mobility, Urban and Traffic Planning

Module name (EN): Mobility, Urban and Traffic Planning

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-MSV

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

ECTS credits:

5

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 22.09.2021*]

Applicability / Curricular relevance:

UI-MSV (P251-0031) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 5, mandatory course
UI-MSV (P251-0031) Environmental Technologies, Bachelor, ASPO 01.10.2023 , 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):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr.-Ing. Thorsten Cypra

Lecturer:
Prof. Dr.-Ing. Thorsten Cypra
Dr. Ulrike Schinkel

[*updated 11.03.2024*]

Learning outcomes:
After successfully completing this module, students will:
be able to explain the principles and interrelationships of urban development and modern mobility,
be familiar with and understand legal principles and related planning processes,
be able to recognize and understand the effects of urban development and mobility on urban ecology and describe them,
be familiar with the fundamentals of traffic planning and traffic engineering,
be able to create, analyze and evaluate urban ecological concepts and mobility concepts.

[*updated 22.09.2021*]

Module content:
Basic knowledge and practical working methods of urban development and urban planning
Basic knowledge of how to integrate traffic planning into urban development processes
Legal foundations, land use, development and specialized planning
Planning processes and public participation procedures
Functions in city, building and construction methods
Traffic and urban planning
Interaction between urban land use planning and transportation
Urban ecology
Fields of activity and tasks of traffic planning
Causes and structural foundations of mobility
Traffic surveys and forecasts (methods, preparation of data, findings)
Basics of traffic engineering
Developing mobility concepts
Designing urban transport networks, traffic safety and transport infrastructure.

[*updated 22.09.2021*]

Recommended or required reading:
Lampugnani, V. M. (2010): Die Stadt im 20. Jahrhundert. Visionen, Entwürfe, Gebautes. Berlin.
Streich, B. (2014): Subversive Stadtplanung. Wiesbaden.
Schmidt, A.; Jansen, H.; Wehmeyer, H.; Garde, J. (2013). Neue Mobilität für die Stadt der Zukunft. Projektbericht der Stiftung Mercator.
Schneider, U. (2017): Urbane Mobilität im Umbruch: Normen, Leitbilder und familiäre Aushandlungsprozesse zu Autos und Elektroautos, Springer-Verlag.

[*updated 22.09.2021*]

Network Technologies

Module name (EN): Network Technologies

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-T-NWT

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

ECTS credits:
3

Semester: 7

Mandatory course: yes

Language of instruction:
German

Assessment:
Exam

[*updated 30.10.2023*]

Applicability / Curricular relevance:

UI-T-NWT (P251-0032) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 7, mandatory course, technical
UI-T-NWT (P251-0032) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 7, mandatory course, technical

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. Steffen Knapp

Lecturer: Prof. Dr. Steffen Knapp

[*updated 04.08.2023*]

Learning outcomes:

[*updated 30.10.2023*]

Module content:

[*updated 30.10.2023*]

Recommended or required reading:

[*updated 30.10.2023*]

Physical Process Engineering with Practical Case Studies

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

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-T-PVT

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

ECTS credits:
5

Semester: 6

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 (P241-0273, P241-0274) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 6, mandatory course, technical
UI-T-PVT (P241-0273, P241-0274) 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):
UI-GCL Fundamentals of Chemistry (with Lab Course)

[*updated 28.03.2024*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Matthias Faust

Lecturer: Prof. Dr. Matthias Faust

[*updated 04.08.2023*]

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*]

Physics 1

Module name (EN): Physics 1

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-PH1

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

ECTS credits:
5

Semester: 1

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam, 120 min.

[*updated 04.03.2024*]

Applicability / Curricular relevance:

E2102 (P211-0117) Electrical Engineering and Information Technology, Bachelor, ASPO 01.10.2018 , semester 1, mandatory course, technical
UI-PH1 (P211-0117, P251-0033) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 1, mandatory course
UI-PH1 (P211-0117, P251-0033) Environmental Technologies, Bachelor, ASPO 01.10.2023 , 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:
UI-T-KTE Concepts of Thermal Energy Systems
UI-T-TWF Introduction to Thermodynamics, Heat Transfer and Fluid Technology

[*updated 20.03.2024*]

Module coordinator:
Prof. Dr.-Ing. Barbara Hippauf

Lecturer:
Prof. Dr.-Ing. Barbara Hippauf

[*updated 28.03.2024*]

Learning outcomes:
After successfully completing this module, students will: be familiar with kinematic quantities and their interrelationships. They will be able to set up equations of motion for different movements, with respect to different reference systems and determine solutions. Students will have learned to break down complex movements into partial movements by applying superposition.
- They will understand force and momentum as physical quantities and use these quantities to determine the cause, state and effect of a movement. They will be familiar with models that describe friction between bodies and of bodies in liquids and gases and be able to apply them.
- Students will be familiar with torque and angular momentum and be able to use these for the dynamics of rotary motion. They will be familiar with the analogies and differences between translation and rotation and be able to reproduce them. They will understand how the principles of the center of mass can be transferred to rigid bodies.
- Students will have mastered the definitions of work, power and energy and know the different units for these quantities. They will be familiar with the concept of conservative force and how it is used in the definition of potential energy.
- Students will be able to explain gravitational force as an elementary interaction and draw conclusions from its properties, such as Kepler´s laws.
- Students will understand the methods of conservation of momentum, conservation of angular momentum and conservation of energy and be able to apply them to examples such as multidimensional impact.
- Students will be familiar with the causes of gravitational pressure and buoyancy in liquids and gases and be able to explain their consequences. They will know what types of flows can be categorized and how they are recorded. They will be able to describe and determine flows without turbulence using equations.
- Students will be familiar with temperature and heat quantity as fundamental variables. They will be able to explain the principles and consequences of the kinetic theory of gases. They will be able to explain the main laws of thermodynamics and know and explain their applications.
- Students will have gained insights into and know where physical laws and methods are applied in everyday life, in technology and especially in the field of sensors.

[*updated 04.03.2024*]

Module content:
Kinematics
Definition of the kinematic variables for linear motion,
linear uniform motion, linear uniformly accelerated motion, free fall,
non-rectilinear motion, especially circular motion, oblique throwing, oscillations
Dynamics of a mass point
Force and momentum, conservation of momentum, especially elastic and inelastic collisions, Newtonian laws,
Friction,
Dynamics in curvilinear motion, especially circular motion, torque and angular momentum, angular momentum,
Work, power, potential and kinetic energy, energy conservation with conservative force,
Gravitational force

Dynamics of rigid bodies
Center of gravity and moment of inertia in rigid bodies, rotation equations,
Physical pendulum, torsion pendulum,
Rotational energy, gyroscope

Mechanics of liquids and gases
Gravitational pressure and buoyancy in liquids,
Archimedes´ law and Boyle Marriott´s law,
Gravitational pressure and buoyancy in gases, especially in the atmosphere,
laminar flow, in particular continuity and Bernoulli´s equation, Hagen Poisuellle´s law
turbulent flow, Reynolds number

Thermodynamics
The concept of temperature, measuring temperature, heat capacity,
Phase transformations, kinetic gas theory, equation of state of the ideal gas, van der Waals equation, changes of state,
Main laws of thermodynamics, entropy, cyclic processes, heat-power machines, heat conduction, radiation laws

[*updated 04.03.2024*]

Teaching methods/Media:
Blackboard, lecture notes, presentation

[*updated 04.03.2024*]

Recommended or required reading:
Hering, Ekbert; Martin, Rolf; Stohrer, Martin: Physik für Ingenieure, Springer Vieweg, (akt. Aufl.)
Hering, Ekbert; Martin, Rolf; Stohrer, Martin: Taschenbuch der Mathematik und Physik, Springer Vieweg
Turtur, Claus Wilhelm: Prüfungstrainer Physik, Springer Spektrum

[*updated 04.03.2024*]

Physics 2

Module name (EN): Physics 2

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-PH2

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

ECTS credits:
5

Semester: 2

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 120 min.

[*updated 04.03.2024*]

Applicability / Curricular relevance:

E2202 (P211-0118) Electrical Engineering and Information Technology, Bachelor, ASPO 01.10.2018 , semester 2, mandatory course, technical
UI-PH2 (P211-0118, P251-0034) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 2, mandatory course
UI-PH2 (P211-0118, P251-0034) Environmental Technologies, 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:

Module coordinator:
Prof. Dr.-Ing. Barbara Hippauf

Lecturer:
Prof. Dr.-Ing. Barbara Hippauf

[*updated 28.03.2024*]

Learning outcomes:
After successfully completing this module, students will: be able to set up differential equations for second-order systems, explain their solutions and carry them out using examples. Analogy systems from mechanics and electrical engineering.
- Students will be able to transfer the methods to coupled systems and higher order systems.
- Students will be familiar with the propagation of various physical quantities via waves. They will be familiar with the wave equation as a solution to differential equations and be able to apply it. They will understand the superposition of waves and their consequences.
- Students will be familiar with the propagation of light as a beam and have a good command of the terms reflection, total internal reflection and refraction. They will be able to describe and calculate images on mirrors, lenses and lens combinations geometrically and mathematically. They will be able to explain the structure and mode of operation of optical devices.
- Students will be familiar with the limits of ray optics. They will be able to use the wave nature of light to explain and apply interference and diffraction phenomena, e.g. when limiting the resolution of optical devices.
- Students will be familiar with the structure of the hydrogen atom in Bohr´s model based on classical physics. Using this, they will be able to explain the shell model and energy levels, as well as spectra. They will know how X-rays are generated and used. They will be able to explain the photoelectric effect with light as a particle.

[*updated 04.03.2024*]

Module content:
Vibrations
Setting up differential equations for different types of vibrations using examples in various mechanical and electronic systems,

Solutions in the undamped and damped spring-mass system,
forced oscillation in the spring-mass system, solution via complex approach, amplitude response and phase response,
Higher-order systems
Two coupled oscillators, setting up differential equations, beat, in-phase and out-of-phase oscillations, coupling of more than two oscillators

Waves
Propagation of waves of different physical quantities, general wave equation,
superposition of waves, standing wave, interference, amplitude modulation, frequency modulation,

Optics
Propagation of light in a medium, laws of reflection and refraction,
Mirrors, lenses in geometric optics, image equation, combination of lenses,
Structure of the eye, magnifying glass, microscope, telescope, analog and digital camera,
Light as waves, phase and group velocity, polarization, Huygens principle, diffraction through slits, interference at double slit and grating, Newton s rings, resolving power of optical instruments
Atomic Physics
Bohr´s postulate, energy levels in the Hydrogen atom, generating X-rays, using X-rays, especially Bragg reflection in X-ray diffraction and scanning electron microscope,
Photoelectric effect, photons, quantum of action
Thermally generated emission of electrons, heat transfer by radiation.

[*updated 04.03.2024*]

Teaching methods/Media:
Blackboard, lecture notes, presentation

[*updated 04.03.2024*]

Recommended or required reading:
Hering, Ekbert; Martin, Rolf; Stohrer, Martin: Physik für Ingenieure, Springer Vieweg, (akt. Aufl.)
Hering, Ekbert; Martin, Rolf; Stohrer, Martin: Taschenbuch der Mathematik und Physik, Springer Vieweg
Turtur, Claus Wilhelm: Prüfungstrainer Physik, Springer Spektrum

[*updated 04.03.2024*]

Planning and Operating Decentralized Energy Systems

Module name (EN): Planning and Operating Decentralized Energy Systems

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-T-PBE

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

ECTS credits:
5

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:
Presentation

[*updated 16.11.2023*]

Applicability / Curricular relevance:

EE1506 (P212-0058, P212-0060) Energy system technology / Renewable energies, Bachelor, ASPO 01.10.2022 , semester 5, mandatory course
UI-T-PBE Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 5, mandatory course
UI-T-PBE Environmental Technologies, Bachelor, ASPO 01.10.2023 , 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):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Marc Deissenroth-Uhrig

Lecturer:
Dipl.-Ing. Danjana Theis

[*updated 19.02.2024*]

Learning outcomes:
After successfully completing this module, students will:
- be able to describe the structure of decentralized energy systems and their integration into buildings or into a local or district heating network
- be able to evaluate the energy process, from decentralized energy conversion, transport and storage to consumption characteristics with regard to economic and ecological aspects
- be able to calculate heating and ventilation heat requirements and the heat load of a building in accordance with EnEV
- be able to plan and calculate systems, plan projects and evaluate the energy and economic efficiency of decentralized energy systems on the basis of physical and technical principles
- be able to independently familiarize themselves with a technology for decentralized energy supply, identify the respective advantages and disadvantages and communicate this knowledge to third parties

[*updated 16.11.2023*]

Module content:
1. Basics of building and energy supply (heat, electricity) and legal framework conditions in Germany and

the EU
2. Heating and ventilation heat requirements according to EnEV
3. Standard heating load and hot water requirements
4. Heat generating systems
5. Radiators and room heating surfaces
6. Hydraulic principles
7. Ventilation systems
8. Complex decentralized energy systems for the provision of electricity and heat (e.g. small CHP systems)
9. Local and district heating systems
10. Valuation parameters and economic efficiency

[*updated 16.11.2023*]

Teaching methods/Media:
Seminar based on scripts, self-organized learning and teh presentation of acquired knowledge, exercises

[*updated 16.11.2023*]

Recommended or required reading:
Albers, Karl-Josef (Hrsg.): Taschenbuch für Heizung und Klimatechnik, DIV, (akt. Aufl.)
Bonin, Jürgen: Handbuch Wärmepumpen, Beuth, (akt. Aufl.)
Buderus (Hrsg.): Handbuch für Heizungstechnik, Beuth, (akt. Aufl.)
Burkhardt, Wolfgang; Kraus, Roland; Ziegler, Franz Josef: Projektierung von Warmwasserheizungen, Oldenbourg, (akt. Aufl.)
Koenigsdorff, Roland: Oberflächennahe Geothermie für Gebäude, Fraunhofer IRB, 2011, ISBN 978-3816782711
Pistohl, Wolfram; Rechenauer, Christian; Scheuerer, Birgit: Handbuch der Gebäudetechnik Band 2, Werner
Rietschel, H.; Fitzner, Klaus: Raumklimatechnik: Band 3: Raumheiztechnik, Springer, 2004, ISBN 978-3540571803

[*updated 16.11.2023*]

Renewable Energies

Module name (EN): Renewable Energies

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-ERN

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:
Exam

[*updated 23.02.2024*]

Applicability / Curricular relevance:

DFBEES-312 (P610-0004) Electrical Engineering - Renewable Energy and System Technology, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course
EE1105 (P211-0212, P212-0003, P212-0004) Energy system technology / Renewable energies, Bachelor, ASPO 01.10.2022 , semester 1, mandatory course
UI-ERN (P212-0003, P212-0004, P251-0019, P251-0020) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 3, mandatory course
UI-ERN (P212-0003, P212-0004, P251-0019, P251-0020) Environmental Technologies, 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:
UI-T-EN Energy Efficiency and Sustainability

[*updated 28.03.2024*]

Module coordinator:
Prof. Dr. Marc Deissenroth-Uhrig

Lecturer: Prof. Dr. Marc Deissenroth-Uhrig

[*updated 04.08.2023*]

Learning outcomes:
After successfully completing this module, students will:
- identify the different forms of renewable energy, such as solar, wind, hydro and ocean energy, geothermal and biomass.
- distinguish between terms such as primary, secondary, final and useful energy.
- perform simple design calculations.
- illustrate the main conversion steps of energy in renewable energy systems.
- formulate simple mass and energy balances.
- research scientific questions in a team and present them to an audience.
- independently document contributions developed in the team.
- put their own study group together to work as a team on a conference paper about renewable energies .

[*updated 23.02.2024*]

Module content:
After an introduction to mass and energy balances in simple technical systems and the prediction of energy yields (annual frequency distribution), the following topics will be introduced:

- Hydropower (potential and aggregates)
- Ocean energy (potential and aggregates)
- Wind turbines
  (power of the wind, drag rotor, lift rotor, power of a wind power turbine)
- Solar thermal power
  (solar irradiance, solar thermal water heating, solar thermal power plants, ORC plants)
- Geothermal (temperature-dependent utilization options: generating heat and power, near-surface and deep geothermal energy (HDR with ORC plants).
- Photovoltaic systems (cells, modules, power inverter)
- Biomass (growth and classification of biomass, forms of biomass, utilization chains with final energetic use, special biomass (energy crops and algae), utilization systems, grate-fired combustion plants, biodiesel, biogas, bioethanol, combustion chemistry and emissions)

[*updated 14.06.2021*]

Teaching methods/Media:
Course materials and exercises Groups will be divided up into individual teams to conduct an RE conference on self-selected presentations (gamification); Students will create and document posts for social media.
At the end of the module, students will hold presentations and take a written exam.

[*updated 14.06.2021*]

Recommended or required reading:
Kaltschmitt, Martin (Hrsg.): Erneuerbare Energien, Springer, (akt. Aufl.)
Khartchenko, Nikolaj V.: Thermische Solaranlagen, Springer, (akt. Aufl.)
Quaschning, Volker: Regenerative Energiesysteme, Hanser, (akt. Aufl.)
Zahoransky, Richard: Energietechnik, Springer Vieweg, (akt. Aufl.)

[*updated 14.06.2021*]

Technical Facility Management

Module name (EN): Technical Facility Management

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-I-TGM

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

ECTS credits:
5

Semester: 6

Mandatory course: yes

Language of instruction:
German

Assessment:
Exam

[*updated 30.10.2023*]

Applicability / Curricular relevance:

UI-I-TGM (P251-0064) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 6, 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:
Studienleitung

Lecturer:
Dr.-Ing. Katharina Boudier

[*updated 20.03.2024*]

Learning outcomes:

[*updated 30.10.2023*]

Module content:

[*updated 30.10.2023*]

Recommended or required reading:

[*updated 30.10.2023*]

Technical Reading and Writing for Environmental Engineers

Module name (EN): Technical Reading and Writing for Environmental Engineers

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-TRW

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 01.07.2021*]

Applicability / Curricular relevance:

UI-TRW (P251-0043) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 2, mandatory course
UI-TRW (P251-0043) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 2, mandatory course

Suitable for exchange students (learning agreement)

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):
UI-BEE Business English for Environmental Engineers

[*updated 26.03.2024*]

Recommended as prerequisite for:
UI-AEJ Applying for an Engineering Job and Professional Presentations

[*updated 26.03.2024*]

Module coordinator:
Prof. Dr. Christine Sick

Lecturer: Prof. Dr. Christine Sick

[*updated 04.08.2023*]

Learning outcomes:
Learning outcomes:

The modules “Business English for Environmental Engineers”, “Technical Reading and Writing for Environmental Engineers ”, as well as “Applying for an Engineering Job and Professional Presentations” 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.

About the “Technical Reading and Writing for Environmental Engineers” module:
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 have extended their repertoire of linguistic structures and will be able to apply these structures to the written elaboration of technical questions and documents.

[*updated 01.07.2021*]

Module content:
- Global and detailed comprehension of environmental engineering texts
- Techniques for taking notes
- Summarizing texts
- Describing functions, systems and processes, etc.
- Cause-effect relationships

In addition, we will work on:
- Vocabulary
- Repeating relevant grammatical structures

[*updated 01.07.2021*]

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 01.07.2021*]

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 (learning offer to help students learn English at the htw saar Alt-Saarbrücken campus, 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 01.07.2021*]

The Circular Economy and the Bioeconomy

Module name (EN): The Circular Economy and the Bioeconomy

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-I-ZBÖ

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

ECTS credits:
5

Semester: 6

Mandatory course: yes

Language of instruction:
German

Assessment:
Exam

[*updated 28.02.2024*]

Applicability / Curricular relevance:

UI-I-ZBÖ (P251-0063) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 6, 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. Joachim Dettmar

Lecturer:
Bernhard Wern
Dr. Janis Winzer

[*updated 20.03.2024*]

Learning outcomes:
After successfully completing this module, students will be able to: define different areas of the bioeconomy sector and present selected products of the bioeconomy in comparison to the fossil economy.
On the basis of the history of the bioeconomy, they will be able to derive economic strategies for upcoming structural changes in the economy. They will be able to outline the possibilities and limits of the defossilization of the economy through bioeconomy. Students will be able to explain the interrelationships of the bio-based economy. They will be proficient in ecological product design and methods of evaluation. They will be able to develop material flow analyses for companies, taking competitor analyses into account. They will be able to illustrate the circular economy as a means of improving the supply of raw materials based on the cascading use of wood. Students will be able to assess business risks using a holistic risk assessment.

[*updated 28.02.2024*]

Module content:
This module provides in-depth knowledge from the following areas:

Definition of the bioeconomy and bioeconomic strategies at EU and German level
Principles and instruments of product-related environmental protection
From sustainable environmental protection to integrated bio-based product policy and design
Circular strategies in the product life cycle
Policy framework for the bioeconomy at the EU and German level
Potential analyses to evaluate regional material flows as a prerequisite for the bioeconomy: Material flow balances / mass balances / economic feasibility studies
Competing uses in the bioeconomy - food, feed and fiber or energy?
From primary raw material to product to residual material to recyclable material - processing methods for selected raw materials
The footprint of the bioeconomy - bioeconomic sustainability assessment
From sustainability assessment to risk assessment of bioeconomic processes in companies
Product assessments from the instruments of the Ecodesign Directive

[*updated 28.02.2024*]

Teaching methods/Media:
Excursions to regional bioeconomy companies

[*updated 28.02.2024*]

Recommended or required reading:
Die Bundesregierung: Nationale Bioökonomiestrategie
CESR (Hrsg.): Pilotbericht zum Monitoring der deutschen Bioökonomie
Kirchner, M. (2021): Bioeconomy present status and future needs of industrial value. chains. https://doi.org/10.1016/j.nbt.2020.09.005
Patermann, C.; Aguilar, A. (2021): A bioeconomy for the next decade. https://doi.org/10.1016/j.bioeco.2021.100005
https://www.gras-system.org/bioeconomy-monitoring-de/
Lewandowski, I (2018): Bioeconomy Shaping the Transition to a Sustainable, Biobased Economy
Petruch, Markus et al. (2022): Der Stoff aus dem die Zukunft ist
Stevels, Ab (2007): Adventures in EcoDesign of Electronic Products
Winzer, Janis (2015): Leistungsfähigkeit produktpolitischer Instrumente

[*updated 28.02.2024*]

The Fundamentals of Waste Management and Recycling

Module name (EN): The Fundamentals of Waste Management and Recycling

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-I-GAK

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

ECTS credits:
5

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:
Exam

[*updated 30.10.2023*]

Applicability / Curricular relevance:

UI-I-GAK (P251-0057) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 5, mandatory course, civil and structural 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.-Ing. Susanne Hartard

Lecturer: Prof. Dr.-Ing. Susanne Hartard

[*updated 26.09.2023*]

Learning outcomes:

[*updated 30.10.2023*]

Module content:

[*updated 30.10.2023*]

Recommended or required reading:

[*updated 30.10.2023*]

Urban Water Resource Management

Module name (EN): Urban Water Resource Management

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-I-SWW

Hours per semester week / Teaching method:
6VU (6 hours per week)

ECTS credits:
6

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 28.09.2020*]

Applicability / Curricular relevance:

BIBA311 (P110-0067) Civil and structural engineering, Bachelor, ASPO 01.10.2011 , semester 3, mandatory course
BIBA311 (P110-0067) Civil and structural engineering, Bachelor, ASPO 01.10.2017 , semester 3, mandatory course
UI-I-SWW (P110-0067) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 5, mandatory course, civil and structural engineering
UI-I-SWW (P110-0067) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 5, mandatory course, civil and structural engineering

Workload:
90 class hours (= 67.5 clock hours) over a 15-week period.
The total student study time is 180 hours (equivalent to 6 ECTS credits).
There are therefore 112.5 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. Joachim Dettmar

Lecturer: Prof. Dr.-Ing. Joachim Dettmar

[*updated 04.08.2023*]

Learning outcomes:
After successfully completing this module, students will recognize and understand the principles of urban water management, in particular the interaction of hydraulic and material parameters. They will be able to apply this knowledge using both simple and complex procedures to solve practice-relevant problems of wastewater discharge, central rainwater treatment in separate and combined sewer systems, as well as rainwater management.
Students will recognize and understand the importance of ensuring the quality of drinking water. They will be able forecast drinking water demand, check the suitability of the various resources on the basis of these forecasts, and then carry out calculations to meet demand by pumping groundwater from wells. They will also be able to implement these calculations in planning. Students will also know how to carry out groundwater recharge measures in the event of water shortages.

[*updated 28.09.2020*]

Module content:
Principles of wastewater disposal
- The composition of wastewater
- Wastewater flows and their patterns over the course of a day
- Land drainage (definitions, symbols, cross-sections)
- Pipe materials (stoneware, concrete, masonry, plastic, steel)
- Drainage systems
- Rain statistics, rain models
- Methods for calculating sewer systems
- Central rainwater treatment and retention in separate and combined sewer systems

Principles of water supply
Based on a comprehensive overview of the water resources available in Germany and their qualitative assessment, the principles of securing and retaining these resources will be presented.
The procedures for extracting groundwater will be discussed in greater depth.
- Significance of and requirements for drinking water

- European Water Charta
- WHG (Water Management Act); Water Framework Directive, Drinking Water Ordinance, DIN 2000
- Components of water supply: Extraction, retention, peak values, water loss
- Water balance equation
- Principles of groundwater flow: Darcy´s law, determining the kf-value
- Calculating wells according to Sichardt and considering groundwater recharge

- Methods for recharging groundwater

[*updated 28.09.2020*]

Recommended or required reading:
ATV-Handbuch, Bau und Betrieb der Kanalisation, Berlin
DWA-ragelwerk (Arbeits- und Merkblätter): A102, A105, A110, A111, A112, A117, A118, A121, A125, A128, A138, A166, M153, M176, M178, M182
Imhoff: Taschenbuch der Stadtentwässerung, München, Wien
Siedlungswasserbau Teil2: Kanalisation, Düsseldorf
BMI: Künstl. Grundwasseranreicherung, Damrath/ Cord-Landwehr: Wasserversorgung
DVGW: Fortbildungskurse Wasserversorgungstechnik für Ingenieure und Naturwissenschaftler Lehr- und Handbuch der Wasserversorgung
Grombach/ Haberer/ Merkl/ Trueb: handbuch der Wasserversorgungstechnik
Handtke: Vergleichende Bewertung von Anlagen zur Grundwasseranreicherung

[*updated 28.09.2020*]

Wastewater Treatment

Module name (EN): Wastewater Treatment

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-I-AR2

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

ECTS credits:
3

Semester: 7

Mandatory course: yes

Language of instruction:
German

Assessment:
Exam

[*updated 16.11.2023*]

Applicability / Curricular relevance:

UI-I-AR2 (P110-0185) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 7, mandatory course, civil and structural engineering
UI-I-AR2 (P110-0185) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 7, mandatory course, civil and structural engineering

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):
UI-I-AR1

[*updated 13.03.2024*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr.-Ing. Joachim Dettmar

Lecturer:
Prof. Dr.-Ing. Joachim Dettmar

[*updated 13.03.2024*]

Learning outcomes:

[*updated 16.11.2023*]

Module content:

[*updated 16.11.2023*]

Recommended or required reading:

[*updated 16.11.2023*]

Wind Energy und Photovoltaic Systems

Module name (EN): Wind Energy und Photovoltaic Systems

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-T-WPV

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

ECTS credits:
5

Semester: 6

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam, duration: 90 minutes

[*updated 26.01.2023*]

Applicability / Curricular relevance:

EE1606 (P212-0083) Energy system technology / Renewable energies, Bachelor, ASPO 01.10.2022 , semester 6, mandatory course
UI-T-WPV (P212-0083) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 6, 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. Marc Deissenroth-Uhrig

Lecturer: Prof. Dr. Marc Deissenroth-Uhrig

[*updated 26.09.2023*]

Learning outcomes:
After successfully completing this course, students will:
- be able to explain the formation of wind, taking into account local characteristics
- have mastered simple analytical methods and procedures for dimensioning wind turbines
- have mastered the blade element method for the design of rotor blades based on experiments
- be able to explain the use and procedure of flow simulation in rotor design
- be able to explain the structural design of current drivetrains and developing trends
- be able to explain current tower concepts
- be able to explain the most important loads and structural stresses for pre-dimensioning
- be able to name and explain the main electrical concepts used in the wind industry
- be familiar with the control and regulation of wind turbines with regard to operational management
- have mastered simple methods for the economic evaluation of wind turbines and possible locations
- be able to name and explain the most important special features for the planning, construction and operation of offshore plants

- be able to describe the structure and function of a solar cell
- be able to explain the factors that influence efficiency with the help of semiconductor physics

- be able to assess the degree of efficiency improvement in new cell developments
- be able to analyze the electrical performance data of a PV system, identify the factors influencing its performance losses and propose solutions for improvement
- be able to use simple analytical methods and procedures to design PV systems according to various system concepts and calculate the expected energy yield.

[*updated 26.01.2023*]

Module content:
Wind energy
- Wind formation and distribution
- Physical principles of wind energy conversion (Impulse Theory according to Betz)
- Design structure of wind turbines
- Rotor aerodynamics (blade element method, CFD)
- Mechanical drivetrain (structure, components)
- Tower and foundation
- Loads and structural stresses
- Electrical system of a wind turbine
- Control, regulation and operation management
- Planning, construction and operation
- Costs of wind turbines and economic efficiency
- Offshore wind power

Photovoltaics
- The annual and daily cycle of solar irradiance
- Introduction to the semiconductor physics of solar cells,
- Design and mode of operation of solar cells, parameters that influence efficiency
- Types of solar cells and development trends
- Solar curves of modules and generators with
- Influences of temperature, mismatching and partial shading on the system efficiency
- Wiring concepts

[*updated 26.01.2023*]

Teaching methods/Media:
Seminar-style teaching with integrated tutorials

[*updated 26.01.2023*]

Recommended or required reading:
Gasch, Robert (Hrsg.): Windkraftanlagen, Springer Vieweg, (akt. Aufl.)
Kaltschmitt, Martin (Hrsg.): Erneuerbare Energien, Springer, (akt. Aufl.)
Mertens, Konrad: Photovoltaik, Hanser, (akt. Aufl.)
Quaschning, Volker: Regenerative Energiesysteme, Hanser, (akt. Aufl.)
Wagemann, Hans-Günther; Eschrich, Heinz: Photovoltaik, Vieweg + Teubner, 2010, 2. Aufl.

[*updated 26.01.2023*]

Work Experience Phase

Module name (EN): Work Experience Phase

Degree programme: Environmental Technologies, Bachelor, ASPO 01.10.2023

Module code: UI-PRA

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

ECTS credits:
22

Semester: 4

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, S251-0040) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 4, mandatory course
UI-PRA (S251-0038, S251-0040) 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 660 hours (equivalent to 22 ECTS credits).
There are therefore 648.75 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Studienleitung

Lecturer: Studienleitung

[*updated 04.08.2023*]

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*]

Environmental Technologies Bachelor - optional courses