Course Handbook Environmental Technologies Bachelor

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Deputy Head of Studies	N.N.
Chairman of Examination	Prof. Dr.-Ing. Alpaslan Yörük
Deputy Chairman of Examination	Prof. Dr.-Ing. Christian Lang

Environmental Technologies Bachelor - mandatory courses (overview)

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Automation Technology in Process Engineering	UI-T-AUV	P241-0232, P241-0233	5	3V+1LU	5	Prof. Dr. Benedikt Faupel
Bachelor Thesis	UI-BT	T251-0009	7	-	12	Studienleitung
Building Materials and Resources	UI-I-BST	P251-0065	6	4VU	5	Prof. Dr.-Ing. Stefan Jung
Business English for Environmental Engineers	UI-BEE	P251-0013	1	2S	2	Prof. Dr. Christine Sick
Concepts of Thermal Energy Systems	UI-T-KTE	P251-0068	7	2V	3	Prof. Dr. Frank Ulrich Rückert
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.
	UI-TM1		1	4VU	5	

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Engineering Mechanics I		P110-0181, P251-0044				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 Management	UI-I-UM	P251-0066	7	2VU	3	Studienleitung
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
Geographic Information Systems	UI-GIS	P251-0021	6	3V+1U	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	4VU+1LU	6	Prof. Dr.-Ing. Alpaslan Yörük

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Mathematics I	UI-MAT1	P110-0179, P251-0025	1	4VU	5	Prof. Dr.-Ing. Christian Lang
Mathematics II	UI-MAT2	P110-0187, P251-0026	2	4VU	5	Prof. Dr.-Ing. Christian Lang
Practical Training Phase	UI-PRA	S251-0038, S251-0040	4	1V	22	Studienleitung
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 Fundamentals of Waste Management and Recycling	UI-I-GAK	P251-0057	5	4VU	5	Studienleitung
Wastewater Treatment I	UI-I-AR1	P110-0183	6	4VU	5	Prof. Dr.-Ing. Joachim Dettmar
Wastewater Treatment II	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

(29 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

Automation Technology in Process Engineering

Module name (EN): Automation Technology in Process Engineering
Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025
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. [*updated 04.01.2025*]
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 UI-T-AUV (P241-0232, P241-0233) Environmental Technologies, Bachelor, SO 01.10.2025 , 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. Benedikt Faupel

Lecturer: Prof. Dr. Benedikt Faupel

[*updated 28.10.2024*]

Learning outcomes:
After successfully completing this module, students will be able to:
- operate programmable logic controllers.
- apply system-theoretical methods to solve practice-oriented control and regulation tasks in the field of process engineering.
- select controllers and their settings in a practice-oriented manner.
- assess the particular problems involved in selecting and adjusting control loops.
- describe modern tools for problem solving, as well as modeling and simulating automation tasks.

[*updated 04.01.2025*]

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 04.01.2025*]

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 04.01.2025*]

Bachelor Thesis

Module name (EN): Bachelor Thesis

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

Module code: UI-BT

Hours per semester week / Teaching method:
-

ECTS credits:
12

Semester: 7

Mandatory course: yes

Language of instruction:
German

Assessment:
Written composition

[*updated 04.01.2025*]

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
UI-BT (T251-0009) Environmental Technologies, Bachelor, SO 01.10.2025 , 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 28.10.2024*]

Learning outcomes:
After successfully completing this module, students will:
be able to independently work on a technical problem using scientific methods and within a given time frame
in the case of a practice-related thesis, be able to develop a practical solution to a problem
be able to independently research and evaluate specialist literature on a selected topic
be able to write and present a written paper according to given guidelines and in compliance with scientific standards.

[*updated 04.01.2025*]

Module content:
The topic of the bachelor´s thesis is based on a range of course content and specializations and can be in the form of a practical project (e.g. in collaboration with a company or other institution) or a theoretical paper.
Students can begin writing their Bachelor´s thesis in the seventh semester, at the earliest. The time required to complete it is, as a rule, nine weeks.
If a Bachelor thesis is supervised by a lecturer or a professor from another department, a professor from the Environmental Engineering Department must be appointed second supervisor.
The bachelor thesis can also be written in an institution outside the University of Applied Sciences if the required supervision is guaranteed by the professor responsible.

[*updated 04.01.2025*]

Teaching methods/Media:
Independent scientific work

[*updated 04.01.2025*]

Recommended or required reading:
Independent research

[*updated 04.01.2025*]

Building Materials and Resources

Module name (EN): Building Materials and Resources

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

Module code: UI-I-BST

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 29.04.2024*]

Applicability / Curricular relevance:

UI-I-BST (P251-0065) Environmental Technologies, Bachelor, ASPO 01.10.2021 , semester 6, mandatory

course
UI-I-BST (P251-0065) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 6, mandatory course
UI-I-BST (P251-0065) Environmental Technologies, Bachelor, SO 01.10.2025 , 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. Stefan Jung

Lecturer: Prof. Dr.-Ing. Stefan Jung

[*updated 28.10.2024*]

Learning outcomes:
After successfully completing this module, students will be able to:
- describe the main building and construction materials and their most important chemical and environmentally relevant properties,
- explain the main pollutants associated with these materials that are harmful to humans and the environment,
- independently categorize and describe these and other building materials,
- distinguish and classify raw materials, resources and reserves,
- weigh up resource efficiency and recycling against each other using economic criteria and taking urban mining into account,

[*updated 29.04.2024*]

Module content:
Introduction to the topics of building materials and resources:
- Mineral building materials
- Metals and corrosion protection
- Wood / wood building materials and wood preservatives
- Plastics, fiber-bonded building materials
- Insulation materials, sealants

Raw materials industry
Efficient use of resources
Recycling and reuse
Perspectives on resource procurement and utilization

[*updated 29.04.2024*]

Teaching methods/Media:
None

[*updated 29.04.2024*]

Recommended or required reading:
Lecture notes (passed out at the beginning of the semester), Internet research
Scholz/Hiese: Baustoffkenntnis; Werner-Verlag
Bundesministerium für Wohnen, Stadtentwicklung und Bauwesen: Baufachliche Richtlinien: Schadstoffe in der Bausubstanz
Bossemeyer, Dolata, Schubert, Zwiener: Schadstoffe im Baubestand
Gesamtverband Schadstoffsanierung: Schadstoffe in Innenräumen und an Gebäuden
Umweltbundesamt: Urban Mining, Ressourcenschonung im Anthropozän
Richtlinien DGUV, TRGS, GefStoffV

[*updated 29.04.2024*]

Business English for Environmental Engineers

Module name (EN): Business English for Environmental Engineers

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

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
UI-BEE (P251-0013) Environmental Technologies, Bachelor, SO 01.10.2025 , 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-TRW Technical Reading and Writing for Environmental Engineers

[*updated 06.11.2024*]

Module coordinator:
Prof. Dr. Christine Sick

Lecturer: Prof. Dr. Christine Sick

[*updated 28.10.2024*]

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.

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*]

Concepts of Thermal Energy Systems

Module name (EN): Concepts of Thermal Energy Systems

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

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
UI-T-KTE (P251-0068) Environmental Technologies, Bachelor, SO 01.10.2025 , 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. Frank Ulrich Rückert

Lecturer: Prof. Dr. Frank Ulrich Rückert

[*updated 28.10.2024*]

Learning outcomes:

[*updated 29.04.2024*]

Module content:

[*updated 29.04.2024*]

Recommended or required reading:

[*updated 29.04.2024*]

Electrical Engineering für Mechanical Engineering und Process Engineering

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

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

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
MAB_24_A_2.07.ELT Mechanical and Process Engineering, Bachelor, SO 01.10.2024 , 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
UI-ELT (P241-0241, P241-0242, P251-0017, P251-0018) Environmental Technologies, Bachelor, SO 01.10.2025 , 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-25
UI-T-EN Energy Efficiency and Sustainability

[*updated 19.11.2024*]

Module coordinator:
Prof. Dr. Marc Deissenroth-Uhrig

Lecturer: Prof. Dr. Marc Deissenroth-Uhrig

[*updated 28.10.2024*]

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, SO 01.10.2025

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
UI-T-EN (P212-0024) Environmental Technologies, Bachelor, SO 01.10.2025 , 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

[*updated 19.11.2024*]

Recommended as prerequisite for:

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

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

[*updated 28.10.2024*]

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, SO 01.10.2025

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:

BBA140 (P110-0181) Civil and structural engineering, Bachelor, SO 01.10.2024 , 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
UI-TM1 (P110-0181, P251-0044) Environmental Technologies, Bachelor, SO 01.10.2025 , 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 06.11.2024*]

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

Lecturer: Prof. Dr.-Ing. Christian Lang

[*updated 28.10.2024*]

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, SO 01.10.2025

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
BBA250 (P110-0196) Civil and structural engineering, Bachelor, SO 01.10.2024 , 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
UI-TM2 (P110-0081, P251-0045) Environmental Technologies, Bachelor, SO 01.10.2025 , 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 06.11.2024*]

Recommended as prerequisite for:

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

Lecturer: Prof. Dr.-Ing. Christian Lang

[*updated 28.10.2024*]

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, SO 01.10.2025

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
UI-T-BUV (P241-0415, P241-0416) Environmental Technologies, Bachelor, SO 01.10.2025 , 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 28.10.2024*]

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 Management

Module name (EN): Environmental Management

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

Module code: UI-I-UM

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 - 90 minutes

[*updated 04.01.2025*]

Applicability / Curricular relevance:

UI-I-UM (P251-0066) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 7, mandatory course
UI-I-UM (P251-0066) Environmental Technologies, Bachelor, SO 01.10.2025 , semester 7, 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: Studienleitung

[*updated 28.10.2024*]

Learning outcomes:
After successfully completing this module, students will be able to explain the issues of corporate environmental protection / environmental management and regional material flow management based on the example of municipalities and regions.
They will be able to explain the interfaces and interrelations between relevant environmental areas at both the corporate and regional level, such as immission control, water/waste management, soil protection and the energy industry.
Students will be able to apply the practical implementation of environmental management systems as an essential prerequisite for sustainable and resilient corporate development and as a means of maximizing local value creation. They will be able to integrate key aspects into green supply structures and sustainable economics.
Students will be able to present the requirements for implementing environmental management systems in relation to different applications and to evaluate them in the context of current developments.

[*updated 04.01.2025*]

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

The aspects of sustainability will be derived from examples given in the context of the relevant goals (SDGs) related to the development of companies and regions (What impacts companies/regions?; What effects do companies/regions have?)

Effects of global/national and regional processes (ecological, economic, social)

Examples and effects of a sustainable economy in the context of corporate processes and business areas (aspects of the EU Green Deal) with regard to a reduction in environmental impact

Description of operational and regional responsibilities as well as potential liability issues in connection with relevant legislation

Technical fields of operational environmental protection (waste management, immission control, water protection, soil protection, ...)

Explanation of the functions, elements and processes for implementing environmental management systems (standardization systems ISO 14001/EMAS; incl. certification processes) with regard to organizational and operational structure and the associated management structures

Interfaces to other management processes at company and regional level (e.g. quality/energy management, occupational safety, CSRD,..)

Stakeholders, networks and social effects (including acceptance)

[*updated 04.01.2025*]

Teaching methods/Media:
Excursions in cooperation with Saarland business associations

[*updated 04.01.2025*]

Recommended or required reading:

Holger Rogall, Katharina Gapp-Schmeling: Nachhaltige Ökonomie Band 1: Grundlagen des nachhaltigen Wirtschaftens, 3., 2021

Gabi Förtsch, Heinz Meinholz: Handbuch Betriebliches Umweltmanagement, 2018

Ludwig Glatzer, Thomas Loew: Umweltmanagementsysteme und Klimarisiken, Umweltbundesamt, 2022

[*updated 04.01.2025*]

Environmental Process Technology and Circular Economies

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

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

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:
Written exam 180 min.

[*updated 04.01.2025*]

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
UI-T-UVK (P241-0413, P241-0414) Environmental Technologies, Bachelor, SO 01.10.2025 , 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 28.10.2024*]

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 04.01.2025*]

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 04.01.2025*]

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, SO 01.10.2025

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:
Project - 10 DIN A4 pages

[*updated 04.01.2025*]

Applicability / Curricular relevance:

UI-UP1 (P251-0056) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 1, mandatory course
UI-UP1 (P251-0056) Environmental Technologies, Bachelor, SO 01.10.2025 , 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: Studienleitung

[*updated 28.10.2024*]

Learning outcomes:
After successfully completing this module, students will be able to independently work on a simple project with an environmental connection according to the specifications of an engineering task and draw up an informative documentation of the results with explanatory illustrations.

[*updated 04.01.2025*]

Module content:
Environmental reference: relation to environmental media, environmental technology, environmental legislation
For example: taking water and wastewater samples, analyzing water and wastewater ingredients, recording energy generation with PV modules under different conditions.

[*updated 04.01.2025*]

Teaching methods/Media:
None

[*updated 04.01.2025*]

Recommended or required reading:
Depends on the respective tasks

[*updated 04.01.2025*]

Environmental Project II

Module name (EN): Environmental Project II

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

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:
Project - 10 DIN A4 pages

[*updated 04.01.2025*]

Applicability / Curricular relevance:

UI-UP2 (P251-0059) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 2, mandatory course
UI-UP2 (P251-0059) Environmental Technologies, Bachelor, SO 01.10.2025 , 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: Studienleitung

[*updated 28.10.2024*]

Learning outcomes:
After successfully completing this module, students will be able to independently work on a simple project with an environmental connection according to the specifications of an engineering task and draw up an informative documentation of the results with explanatory illustrations.

[*updated 04.01.2025*]

Module content:
Environmental reference: relation to environmental media, environmental technology, environmental legislation
For example: taking water and wastewater samples, analyzing water and wastewater ingredients, recording energy generation with PV modules under different conditions.

[*updated 04.01.2025*]

Teaching methods/Media:
None

[*updated 04.01.2025*]

Recommended or required reading:
Depends on the respective tasks

[*updated 04.01.2025*]

Environmental Project III

Module name (EN): Environmental Project III

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

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:
Project work 80% and presentation 20%

[*updated 04.01.2025*]

Applicability / Curricular relevance:

UI-UP3 Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 4, mandatory course
UI-UP3 Environmental Technologies, Bachelor, SO 01.10.2025 , 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: Studienleitung [*updated 28.10.2024*]
Learning outcomes: After successfully completing this module, students will be able to work on a practical project with an environmental focus, taking into account the relevant legal requirements and the specifications of the current technical regulations. Given guidance, they will be able to develop and discuss organizational, conceptual and technical solutions and document the results in an appropriate report, including diagrams if necessary. [*updated 04.01.2025*]
Module content: Environmental reference: relation to environmental media, environmental technology, environmental legislation Topics: Groundwater, wastewater technology, energy generation, water modeling, measurement technology [*updated 04.01.2025*]
Teaching methods/Media: None [*updated 04.01.2025*]
Recommended or required reading: Depends on the respective tasks [*updated 04.01.2025*]

Fundamentals of Chemistry (with Lab Course)

Module name (EN): Fundamentals of Chemistry (with Lab Course)
Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025
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
UI-GCL (P241-0255, P241-0256, P251-0023, P251-0054) Environmental Technologies, Bachelor, SO 01.10.2025 , 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:

Module coordinator:
Prof. Dr. Timo Gehring

Lecturer: Prof. Dr. Timo Gehring

[*updated 28.10.2024*]

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*]

Geographic Information Systems

Module name (EN): Geographic Information Systems

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

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
UI-GIS (P251-0021) Environmental Technologies, Bachelor, SO 01.10.2025 , 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 28.10.2024*]

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 II

Module name (EN): Hydraulic Engineering II

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

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:

BBA610 (P110-0184) Civil and structural engineering, Bachelor, SO 01.10.2024 , 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
UI-I-WB2 (P110-0184) Environmental Technologies, Bachelor, SO 01.10.2025 , 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):
None.

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

[*updated 07.11.2024*]

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

Lecturer: Prof. Dr.-Ing. Alpaslan Yörük

[*updated 28.10.2024*]

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, SO 01.10.2025

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:

BBA710 (P110-0186) Civil and structural engineering, Bachelor, SO 01.10.2024 , 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
UI-I-WB3 (P110-0186) Environmental Technologies, Bachelor, SO 01.10.2025 , 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-WB2 Hydraulic Engineering II

[*updated 07.11.2024*]

Recommended as prerequisite for:

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

Lecturer: Prof. Dr.-Ing. Alpaslan Yörük

[*updated 28.10.2024*]

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, SO 01.10.2025

Module code: UI-HYD

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

BBA260 (P110-0042) Civil and structural engineering, Bachelor, SO 01.10.2024 , 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
UI-HYD (P110-0042, P251-0024) Environmental Technologies, Bachelor, SO 01.10.2025 , 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-WB1-25
UI-SWW-25

[*updated 28.11.2024*]

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

Lecturer: Prof. Dr.-Ing. Alpaslan Yörük

[*updated 28.10.2024*]

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*]

Mathematics I

Module name (EN): Mathematics I

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

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
BBA100 (P110-0179) Civil and structural engineering, Bachelor, SO 01.10.2024 , semester 1, mandatory course
UI-MAT1 (P110-0179, P251-0025) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 1, mandatory course
UI-MAT1 (P110-0179, P251-0025) Environmental Technologies, Bachelor, SO 01.10.2025 , 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
UI-TWF-25

[*updated 06.05.2025*]

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

Lecturer:
Dr. Anna-Katharina Mahro

[*updated 06.05.2025*]

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, SO 01.10.2025

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:

BBA200 (P110-0187) Civil and structural engineering, Bachelor, SO 01.10.2024 , semester 2, mandatory course
UI-MAT2 (P110-0187, P251-0026) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 2, mandatory course
UI-MAT2 (P110-0187, P251-0026) Environmental Technologies, Bachelor, SO 01.10.2025 , 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 06.11.2024*]

Recommended as prerequisite for:

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

Lecturer:
Dr. Anna-Katharina Mahro

[*updated 06.11.2024*]

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*]

Practical Training Phase

Module name (EN): Practical Training Phase

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

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:

[*updated 04.01.2025*]

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
UI-PRA (S251-0038, S251-0040) Environmental Technologies, Bachelor, SO 01.10.2025 , 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 28.10.2024*]

Learning outcomes:
Students will become familiar with the diverse career opportunities for environmental engineers in engineering firms, regulatory agencies, municipal administrations, transportation companies, energy supply companies, insurance companies, manufacturing and technology firms, and research institutions.
They will be able to apply the skills and talents they have acquired so far in specific professional situations by constructively working on engineering or research-oriented tasks.
They will be able to deal with internal company matters in terms of organization as well as administrative and technical processes. Furthermore, they will be able to integrate themselves into the social structures of work situations.
Students will be able to write up the knowledge they have acquired in an internship report based on a deeper examination and reflection on the work they have done during the internship. During their final presentation, students will show that they can communicate a technical subject to an audience based on a key topic of the internship.

[*updated 04.01.2025*]

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*]

Technical Facility Management

Module name (EN): Technical Facility Management

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

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
UI-I-TGM (P251-0064) Environmental Technologies, Bachelor, SO 01.10.2025 , 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: Studienleitung

[*updated 28.10.2024*]

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, SO 01.10.2025

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
UI-TRW (P251-0043) Environmental Technologies, Bachelor, SO 01.10.2025 , 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 06.11.2024*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Christine Sick

Lecturer: Prof. Dr. Christine Sick

[*updated 28.10.2024*]

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 Fundamentals of Waste Management and Recycling

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

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

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
UI-I-GAK (P251-0057) Environmental Technologies, Bachelor, SO 01.10.2025 , 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:
UI-I-ALS-25

[*updated 06.05.2025*]

Module coordinator: Studienleitung
Lecturer: Prof. Dr.-Ing. Susanne Hartard [*updated 07.11.2024*]
Learning outcomes: [*updated 30.10.2023*]
Module content: [*updated 30.10.2023*]
Recommended or required reading: [*updated 30.10.2023*]

Wastewater Treatment I

Module name (EN): Wastewater Treatment I
Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025
Module code: UI-I-AR1
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 29.04.2024*]

Applicability / Curricular relevance:

BBA600 (P110-0183) Civil and structural engineering, Bachelor, SO 01.10.2024 , semester 6, mandatory course,
UI-I-AR1 (P110-0183) Environmental Technologies, Bachelor, ASPO 01.10.2023 , semester 6, mandatory course
UI-I-AR1 (P110-0183) Environmental Technologies, Bachelor, SO 01.10.2025 , 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:
UI-I-AR2 Wastewater Treatment II

[*updated 28.11.2024*]

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

Lecturer: Prof. Dr.-Ing. Joachim Dettmar

[*updated 28.10.2024*]

Learning outcomes:

[*updated 29.04.2024*]

Module content:

[*updated 29.04.2024*]

Recommended or required reading:

[*updated 29.04.2024*]

Wastewater Treatment II

Module name (EN): Wastewater Treatment II

Degree programme: Environmental Technologies, Bachelor, SO 01.10.2025

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:

BBA700 (P110-0185) Civil and structural engineering, Bachelor, SO 01.10.2024 , semester 7, mandatory course,
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
UI-I-AR2 (P110-0185) Environmental Technologies, Bachelor, SO 01.10.2025 , 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 Wastewater Treatment I

[*updated 28.11.2024*]

Recommended as prerequisite for:

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

Lecturer: Prof. Dr.-Ing. Joachim Dettmar

[*updated 28.10.2024*]

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, SO 01.10.2025

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
UI-T-WPV (P212-0083) Environmental Technologies, Bachelor, SO 01.10.2025 , 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 28.10.2024*]

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*]

Environmental Technologies Bachelor - optional courses