

**Modulbezeichnung:** Environmental Biotechnology (EBT) 7.5 ECTS  
(Environmental Biotechnology)

Modulverantwortliche/r: Roman Breiter  
Lehrende: Roman Breiter

Startsemester: WS 2017/2018      Dauer: 1 semester      Turnus: jährlich (SS)  
Präsenzzeit: 113 Std.      Eigenstudium: 112 Std.      Sprache: Englisch

**Lehrveranstaltungen:**

Environmental Biotechnology (Lecture) (WS 2017/2018, Vorlesung, Roman Breiter)  
Environmental Biotechnology (Class) (WS 2017/2018, Übung, Roman Breiter)  
Environmental Biotechnology (Practical) (WS 2017/2018, Praktikum, Roman Breiter)

**Empfohlene Voraussetzungen:**

- Basic knowledge of aquatic chemistry
- Basic knowledge of micro biology

**Inhalt:**

- material flows in biotechnological processes of purification of water, soil and air
- substrate degradation and growth (trophy levels, energy production, cell synthesis, sludge age, endogene degradation, mass balances)
- Composition of waste water (chemical composition of particles and solved materials, parameters for waste water cleaning)
- legislative background (water ecology act, waste water articles, direct and indirect feed, limitation values)
- mechanical preparation of waste water (sieves, sand filter, clarifier)
- Procedures in natural and in aerated pond systems (physically and biologically aeration, natural biological processes in water and sediment)
- Land treatment and land application (sewage farm, infiltrations, melioration)
- constructed wetland, free wetland systems FWS, vertical submerged beds VSB (design, purification principles)
- waste water treatment with suspended biomass (tower biology, bio high reactor, activated sludge processes, remaining times)
- waste water treatment with sessil biomass (rotating biological contactor RBC, membrane biological processes, trickling filter)
- nitrogen elimination, nitrification, denitrification, n-species and aeration
- phosphate elimination (chemical processes, enhanced biological phosphate removal processes EBPR, A/O-processes and phostrip process)
- hygienisation (legislative demands, human pathogene organisms and viruses, CT-concept, ozonisation and UV-treatment)
- anaerobe processes of sludge and waste water treatment
- soil and ground water remediation (legal framework, natural attenuation, pump-and-treat processes)

**Lernziele und Kompetenzen:**

The students

- will learn the identification of material flows in environmental protection according to the basic principle of decontamination and purification, where only un toxic products and inert, un toxic remains are allowed as a result - besides the purified environmental media soil, water and air.
- will experience the context between the further development of technological environmental plants and legislative acts.
- will be able to use basics of substrate degradation, biomass growth and the availability of terminal electron acceptors for biological processes in natural and aquatic systems and
- can optimise and intensify these natural processes in an engineering way for waste water treatment and ground water remediation.

- will learn basics of C-, N- and P-elimination and will use them for complex systems with mineral and organic solids as well as for solved substrates in aquatic systems.
- will derive variants of processes with changed limiting conditions (freights, concentrations, composition, aeration).
- will transfer knowledge of processes in biofilm (diffusion, substrate degradation, limitations) to processes with typical natural conditions for waste water treatment (mixing populations, zones of different electron acceptors, macro fauna).
- will experience the basics of anaerobe contaminants in biocenosis and will combine them with the design of anaerobe treatment plants for sludge and waste water.
- will learn current developments of remediation of soil and ground water according to projects proceeded at the institute.

#### Literatur:

Literature is available via StudOn.

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#### Verwendbarkeit des Moduls / Einpassung in den Musterstudienplan:

Das Modul ist im Kontext der folgenden Studienfächer/Vertiefungsrichtungen verwendbar:

[1] **Chemie- und Bioingenieurwesen (Master of Science)**

(Po-Vers. 2008 | TechFak | Chemie- und Bioingenieurwesen (Master of Science) | Vertiefungsmodule | Environmental Biotechnology)

[2] **Chemie- und Bioingenieurwesen (Master of Science)**

(Po-Vers. 2015w | TechFak | Chemie- und Bioingenieurwesen (Master of Science) | Masterprüfung | Vertiefungsmodule | Environmental Biotechnology)

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#### Studien-/Prüfungsleistungen:

Oral exam: Environmental Biotechnology (Prüfungsnummer: 51651)

(englische Bezeichnung: Environmental Biotechnology)

Untertitel: nur Busan

(englischer UntertitelBusan only)

Prüfungsleistung, Klausur, Dauer (in Minuten): 120

Anteil an der Berechnung der Modulnote: 100% Prüfungssprache: Englisch

Erstablingung: WS 2017/2018, 1. Wdh.: SS 2018, 2. Wdh.: WS 2018/2019

1. Prüfer: Roman Breiter

Practical Course: Environmental Biotechnology (Prüfungsnummer: 51652)

(englische Bezeichnung: Environmental Biotechnology - Practical Course)

Untertitel: nur Busan

(englischer UntertitelBusan only)

Studienleistung, Praktikumsleistung

weitere Erläuterungen:

The practical training will be a field trip to appropriate companies in Busan.

Prüfungssprache: Englisch

Erstablingung: WS 2017/2018, 1. Wdh.: WS 2018/2019

1. Prüfer: Roman Breiter

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#### Bemerkungen:

The module "Environmental Biotechnology" at FAU Campus Busan, South Korea (Curriculum: [http://www.fau-busan.ac.kr/en/studies/studies\\_01.html](http://www.fau-busan.ac.kr/en/studies/studies_01.html)) is a core/specialisation module and will only be offered at FAU Busan.