

## Environmental and Recycling Technology (M. Eng.)

<b>Module – Number</b>	<b>735</b>	<b>Obligatory in specialization Environmental Technology (ET)</b>		
<b>Module name</b>	<b>Environmental Pollutants and Chemistry Aspects</b>			
Module coordinator	Dr. Christian Kaßner/ Dipl.-Ing.(FH) Petra Hauschild			
Title	Environmental Pollutants and Chemistry Aspects			
Title of examination	Environmental Pollutants and Chemistry Aspects			
Semester	2 <sup>nd</sup>			
Course type	Language	Lecture	English	
Credit hours/ ECTS/ Workload	4		5	150
Formal Conditions	Bachelor of Engineering or Bachelor of Science degree			

### 1. Content and objectives

#### Content:

- environmental chemistry / environmental toxicology – overview
  - toxicological assessment
  - transport of pollutants
  - air pollution and atmospheric chemistry
  - water / groundwater, contamination and remediation
  - soil and sediments, contamination and remediation
  - pollutants in buildings and remediation
- pollutants and their effects, including persistent and water pollutant substances, cycle and lifetime of substances ecologic systems
  - inorganic pollutants
  - organic pollutants
- special toxicological effects and analysis
- diversity of environmental chemicals in ground- and surface waters, sediments and soils – especially in industrial regions
- important environmental pollutants in soil, water and air and their effects
- production residues and undesired byproducts in conversion- and degradation products
- properties, effects and detection of environmentally relevant pollutants like ozone, nitrogen and sulfur compounds, organic substances and heavy metals in the environment (air, water and earth)
- toxicological aspects
- detection reactions for selected pollutants

#### Learning objectives:

Students acquire in-depth knowledge in Environmental chemistry. In addition to scientific and engineering knowledges which reflect the toxicological aspects, historical up-to-date engineering processes. In this way students are enabled, to recognize and evaluate application possibilities.

#### Literature:

1. Reh, F.: Environmental Chemistry, Chemistry of Major Environmental Cycles, 2005
2. Paasivirta, Handbook of Environmental Chemistry, 3rd Edition
3. Ortega-Calvo, Parsons: Bioavailability of Organic Chemicals in Soil and Sediment, Springer, 2018
4. Jolliet, Saade-Sbeih et a.: Environmental Life Cycle Assessment, CRC Press 2016
5. ASCE, Water Treatment Plant Design, 5 th Ed.
6. Handbook Environmental Analysis, Patnaik, ISBN 978-1315151946, CRC press
7. Neumaier, Weber: Altlasten: Erkennen, Bewerten, Sanieren, Springer Verlag; ISBN-13: 978-3642648311
8. Paasivirta: New Types of Persistent Halogenated Compounds (The Handbook of Environmental Chemistry), Springer Verlag, ISBN-13: 978-3642085123,
9. Fent: Ökotoxikologie (Umweltchemie-Toxikologie-Ökologie), Thieme-Verlag, ISBN -9783131099945

### 2. Method(s) of instruction

Lecture

**3. Requirements for attendance**

Principles of chemistry and process engineering.

**4. Usability of this module**

This module is obligatory in the specialization Environmental Technology and a compulsory module in the other specialization Recycling Technology.

**5. Requirements for assessment**

The module examination encompasses all contents of the lecture.

Exam: Written exam with a duration of 120 min. Alternative forms of exams are possible.

**6. ECTS Credits**

Modules are assessed by a module examination which is credited by 5 credit points according to the ECTS (European Credit Transfer and Accumulation System).

**7. Frequency of offer**

The module is offered in the first academic year.

**8. Workload**

- course participation	= 50 h
- preparing and following-up of the lecture contents	= 45 h
- exam preparation	= 40h
- preparation for practical training	=15 h
Total workload	<b>150 h = 5 ECTS</b>

**9. Duration of module**

The module is held within one semester.