

## Environmental Constructions (I001522)

**Course size** (nominal values; actual values may depend on programme)

**Credits** 5.0      **Study time** 135 h      **Contact hrs** 60.0 h

**Course offerings and teaching methods in academic year 2017-2018**

A (semester 1)	guided self-study	10.0 h
	group work	7.5 h
	excursion	3.75 h
	seminar: practical PC room classes	6.25 h
	lecture	23.75 h
	seminar: coached exercises	8.75 h

**Lecturers in academic year 2017-2018**

Volcke, Eveline      LA05      lecturer-in-charge

**Offered in the following programmes in 2017-2018**

	crdts	offering
<a href="#">Bachelor of Science in Environmental Technology</a>	5	A
<a href="#">Master of Science in Chemical Engineering</a>	5	A
<a href="#">Master of Science in Chemical Engineering</a>	5	A
<a href="#">Master of Science in Bioscience Engineering: Environmental Technology</a>	5	A
<a href="#">International Master of Science in Sustainable and Innovative Natural Resource Management</a>	5	A
<a href="#">Exchange Programme in Bioscience Engineering: Environmental Technology (master's level)</a>	5	A

**Teaching languages**

English

**Keywords**

environmental technology, design, process control, equipment

**Position of the course**

The aim of this course is to gain insight in the **design and control of environmental installations**, for the treatment of waste streams (solid waste, wastewater, off-gas, etc.) and/or in view of bio-energy production. Particular attention is paid to the **practical implementation** of these installations, involving process engineering aspects, equipment needs, energy requirements and process control.

This course enables the students **to implement** the physical-chemical or biological unit processes known from other courses **in practice**, and **to integrate** them in **the context of larger installations**.

**Contents**

1. Introduction to design – process diagrams
2. Wastewater treatment
  - Design for COD and N removal
  - Instrumentation and process control
3. Air treatment  
Installations for the removal of NH<sub>3</sub>, NO<sub>x</sub>, dust ...
4. Solid waste treatment

Design and automation of thermal and biological treatment units

5. Energy

Production of mechanical energy, heat and electricity

6. Design of an environmental installation

Coached exercises, PC room classes and group work concerning the design of (part of) an installation for the treatment of wastewater, solid waste or off-gas or for energy conversion.

### **Initial competences**

Environmental Construction builds on certain learning outcomes of course units 'Physics 4: Physical Transport Phenomena', 'Process Technology', 'Process Control' ; or the learning outcomes have been achieved differently.

### **Final competences**

- 1 Being capable of interpreting process diagrams, in particular P&IDs
- 2 To design unit processes and installations of limited scale in the field of environmental engineering
- 3 To have knowledge on the practical implementation of unit processes in the field of environmental engineering and on their integration in a larger whole

### **Conditions for credit contract**

Access to this course unit via a credit contract is determined after successful competences assessment

### **Conditions for exam contract**

This course unit cannot be taken via an exam contract

### **Teaching methods**

Guided self-study, excursion, group work, lecture, seminar: coached exercises, seminar: practical PC room classes

### **Extra information on the teaching methods**

Theory: Lecture ; Plenary exercises

Exercises: Coached exercises ; Practical PC room classes ; Group work

### **Learning materials and price**

Available in electronic form through Minerva

### **References**

- Henze M., van Loosdrecht M.C.M., Ekama G. and Brdjanovic D. (Eds.) (2008). *Biological wastewater treatment. Principles, modelling and design*. IWA publishing, London, U.K, 512 p.
- Qasim S.R. (1999) Wastewater treatment plants. Planning, design and operation. 2nd edition, CRC press.
- Olsson G., Nielsen M. K., Yuan Z., Lynggaard-Jensen A. and Steyer J.-P. (2005). *Instrumentation, Control and Automation in Wastewater Systems. IWA Scientific and Technical Report no. 15*. IWA Publishing, London, U.K, 246 p.
- Tchobanogous G., Theisen H. en Vigil S.A. (1993). *Integrated solid waste management. Engineering principles and management issues*. McGraw-Hill, Inc., 976 p.

### **Course content-related study coaching**

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### **Evaluation methods**

end-of-term evaluation and continuous assessment

### **Examination methods in case of periodic evaluation during the first examination period**

Written examination, open book examination, oral examination

### **Examination methods in case of periodic evaluation during the second examination period**

Written examination, open book examination, oral examination

### **Examination methods in case of permanent evaluation**

Participation, assignment, report

### **Possibilities of retake in case of permanent evaluation**

examination during the second examination period is possible

### **Extra information on the examination methods**

Non-period aligned evaluation (45% of final mark): through group works

Period-aligned evaluation (55% of final mark): oral examination - part of which may be prepared in writing

**Calculation of the examination mark**

Combination of non-period aligned evaluation and period aligned evaluation.  
Students who eschew periodic and/or permanent evaluations for this course unit may be failed by the examiner.