

## 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 2019-2020

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

### Lecturers in academic year 2019-2020

Volcke, Eveline LA24 lecturer-in-charge

### Offered in the following programmes in 2019-2020

Programme	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, safety aspects, 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  
Excursions

### 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, peer assessment, 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 (40% of final mark): through group works  
Period-aligned evaluation (60% 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.