

## Environmental Biotechnology (I002927)

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

**Credits** 7.5

**Study time** 200 h

**Course offerings in academic year 2023-2024**

A (semester 2)

English

Gent

**Lecturers in academic year 2023-2024**

Bakke, Ingrid

TRONDH01 lecturer-in-charge

**Offered in the following programmes in 2023-2024**

[International Master of Science in Health Management in Aquaculture](#)

**crdts**

7.5

**offering**

A

**Teaching languages**

English

**Keywords**

*Microbial metabolism, microbial ecology, basic processes in waste-water treatment, bioremediation.*

**Position of the course**

The course is an introduction to environmental biotechnology and focuses on the utilization of microbial processes in waste and water treatment, and bioremediation. Topics included are microbial energy metabolism, microbial growth kinetics and elementary chemostat theory, relevant microbiological processes, microbial ecology, approaches for studying microbial communities, and basic principles in bioremediation and biological water and waste treatment.

**Contents**

The course includes lectures, laboratory project, calculatory exercises, and one all-day excursion. Compulsory

- attendance on exercises and laboratory project will take place on scheduled exercise sessions. The laboratory
- project takes place over a 5-6 weeks period, and requires more attendance, but at flexible times

**Initial competences**

Competence for admission to EM AquaH study program and first semester courses at UGent.

**Final competences**

- 1 By the end of the course, the student should be able to:  
Classify microbes according to energy source and carbon source and evaluate energy outcome of the energy metabolism according to electron acceptor and electron donor usage
- 2 Apply Monods kinetics and basic chemostat theory to determine microbial growth rates, biomass yield, and substrate concentration and removal rate
- 3 Carry out an experiment with nitrification in a continuous lab-scale bioreactor for ammonia removal
- 4 Describe suitable methods for characterizing the activity, function, diversity, and composition of microbial communities

- 5 Define basic concepts in microbial ecology, such as carrying capacity, succession, r- and K-selection, ecological niches
- 6 Outline the principles of methods for quantification of organic carbon in wastewater and calculate the theoretical oxygen demand (ThOD) for simple organic compounds
- 7 Explain the microbial processes and growth requirements underlying the activated sludge process, nitrification, denitrification, enhanced phosphorus removal, and anaerobic digestion
- 8 Evaluate alternative process schemes for combined biological nutrient removal (BNR)
- 9 Describe the most commonly applied disinfection methods, and the steps typically involved in drinking water treatment process train
- 10 Evaluate the potential for biodegradation of organic pollutants, taking microbial and physical/chemical environments, as well as the chemical structure of the compound itself, into consideration

#### **Conditions for credit contract**

This course unit cannot be taken via a credit contract

#### **Conditions for exam contract**

This course unit cannot be taken via an exam contract

#### **Teaching methods**

Lecture, Practical

#### **Learning materials and price**

*Course material is specified at the beginning of the course.*

#### **References**

Publications and books/chapters made available

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

*PhD students acts as practical course advisers, support from a permanently employed engineer, guiding upon request, student advice on agreement*

#### **Assessment moments**

continuous assessment

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

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

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

Oral assessment, Written assessment, Assignment

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

examination during the second examination period is possible

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

*The exam may be oral or written, announced in advance.*

#### **Calculation of the examination mark**

The course will have an assessment with standard NTNU grades A-F

*Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.*