GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2023-2024

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	crdts	offering
International Master of Science in Health Management in Aquaculture	7.5	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 undelaying 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.