GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2020-2021

Resource Recovery Technology (I002607)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

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

Credits 6.0 **Study time 180 h** **Contact hrs** 60.0 h

Course offerings in academic year 2021-2022

A (semester 2)	English	Gent
B (semester 2)		

Lecturers in academic year 2021-2022

Ganigué, Ramon	LA25	lecturer-in-charge
De Gusseme, Bart	LA25	co-lecturer
Hennebel, Tom	LA25	co-lecturer
Meers, Erik	LA24	co-lecturer

Offered in the following programmes in 2021-2022	crdts	offering
Master of Science in Biochemical Engineering Technology	6	A
Master of Science in Bioscience Engineering: Cell and Gene Biotechnology	6	A
Master of Science in Bioscience Engineering: Chemistry and Bioprocess Technology	6	A
Master of Science in Environmental Science and Technology	5	B
Master of Science in Bioscience Engineering: Environmental Technology	6	A
International Master of Science in Sustainable and Innovative Natural Resource Management	6	A
Exchange Programme in Bioscience Engineering: Cell and Gene Biotechnology (master's level)	6	A
Exchange Programme in Bioscience Engineering: Chemistry and Bioprocess Technology (master's level)	6	A
Exchange Programme in Bioscience Engineering: Environmental Technology (master's level)	6	A
Exchange Programme in Bioscience Engineering: Food Science and Nutrition (master's level)	6	A
Exchange Programme in Bioscience Engineering: Land and Forest management (master's level)	6	A

Teaching languages

English

Keywords

Environmental biotechnology, water reuse, nutrient recovery, biogas, bioproduction, membrane technology

Position of the course

This course focuses on the recovery of raw materials, from an engineering point of view and a circular economy mindset. The course covers both existing and innovative technologies for resource recovery.

Contents

Resource recovery involves the recovery of valuable resources (e.g. water, energy, nutrients, metals ...) from current waste streams. This course focuses on some key biotechnological processes for resource recovery, as well as some key physical-chemical techniques for nutrient recovery. The lectures cover the fundamentals of state-of-the-art and emerging technologies for resource recovery and their engineering/implementation. The theoretical course aspects are

combined with a company visit and a case study where students will apply the know-how gained in a real-life example.
The course comprises two offers:
- Offering session 1 comprises the whole course content and targets
- Offering session 2 covers only biotechnological processes. The topics on the course content indicated with an asterisk are therefore excluded from this offering session.

Theory
1. Water recovery
2. Energy recovery
3. Recovery of organic materials
4. Nutrient recovery*
5. Mineral recovery
6. Electrification for reuse

Practical activities
1. Term paper relating to own lecture (case study)
2. Company visits

Initial competences

Chemie, wiskunde en fysica: niveau bachelor; basis waterzuivering; basis biotechnologische processen

Final competences

1 Evaluate the biotechnology of clean water production, aerobic and anaerobic waste treatment, metal recovery and other relevant biological resource recovery technologies.
2 Apply engineering principles to resource recovery processes and cases.
3 Design the important biotechnological unit processes in resource recovery technologies.
4 Judge the various resource recovery processes in terms of performance and order of magnitude of overall opex and capex.

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, group work, lecture, online lecture

Extra information on the teaching methods

Theory is given via lectures. Study coaching is offered during the practical activities.

Learning materials and price

Lecture notes are available via UFORA

References

Course content-related study coaching

For the students which have difficulties with certain topics, there are make-up lectures at their requests. In terms of the home work (in casu the visit to an actual site), the students are invited to prepare this visit properly by contacting an assistant. Moreover, after the visit, they are requested to report to the course responsible and to discuss with them their experiences and potential questions. Finally, they will present their case study and receive feedback.

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

Assignment

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

Extra information on the examination methods

First examination period: period aligned evaluation consisting of:
Part A: closed book and oral exam (theory) + open book exam (exercises)
Part B: written closed book exam (theory) + open book exam (exercises)

Calculation of the examination mark

For offering session A, the score is made up for 15/20 on the periodic evaluation and for 5/20 on the permanent evaluation.
For offering session B, the score is made up for 14/20 on the periodic evaluation and for 6/20 on the permanent evaluation. A minimum score of 8/20 on each part is needed for both session I & session II.
Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.