GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Resource Recovery Technology (I002607)

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

Credits 6.0 **Study time 180 h**

Course offerings in academic year 2024-2025

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

Lecturers in academic year 2024-2025

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 2024-2025	crdts	offering
International Master of Science in Sustainable and Innovative Natural Resource Management	6	A
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 Bioscience Engineering: Environmental Technology	6	A
Master of Science in Environmental Science and Technology	5	B
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 A comprises the whole course content and targets
- Offering session B covers only biotechnological processes. The topics on the course content indicated with an asterisk are therefore excluded from this offering session.

Theory

CH1: Anaerobic digestion
CH2: The carboxylate platform and biopolymers
CH3: Composting
CH4: Sulfur Recovery
CH5: Nutrient recovery*
CH6: Biometallurgy + Bioleaching
CH7: Water reuse
CH8: Source Separation
CH9: Microalgae

Practical activities

1. Peer teaching and report relating to case study
2. Company visits

Initial competences

Chemistry, mathematics and physics: level of bachelor of science; basics on water treatment; basics on biotechnological processes

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

Group work, Excursion, Lecture, Independent work, Peer teaching

Extra information on the teaching methods

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

Study material

Type: Syllabus

Name: Resource Recovery Technology syllabus
Indicative price: Free or paid by faculty
Optional: no
Language : English
Number of Pages : 345
Available on Ufora : Yes
Online Available : No
Available in the Library : No
Available through Student Association : No

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.

Assessment moments

end-of-term and continuous assessment

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

Oral assessment, Written assessment

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

Oral assessment, Written assessment

Examination methods in case of permanent assessment

Presentation, Peer and/or self assessment, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Calculation of the examination mark

Scoring for session A and B is the same. The score is made up for 12/20 on the periodic evaluation and 8/20 on the permanent evaluation.
IMPORTANT:

1 No oral exam for offering session B
2 For calculation of the final grade the student must obtain a minimum score of 8/20 on each part of both the periodic and permanent evaluation since essential competences are evaluated in both periodic and permanent evaluation. Only then, credits from the periodic and permanent evaluation will be incorporated for calculation of the final credit.

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