

## Resource Recovery Technology (1002607)

**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**

	<b>crdts</b>	<b>offering</b>
<a href="#">International Master of Science in Sustainable and Innovative Natural Resource Management</a>	6	A
<a href="#">Master of Science in Biochemical Engineering Technology</a>	6	A
<a href="#">Master of Science in Bioscience Engineering: Cell and Gene Biotechnology</a>	6	A
<a href="#">Master of Science in Bioscience Engineering: Chemistry and Bioprocess Technology</a>	6	A
<a href="#">Master of Science in Bioscience Engineering: Environmental Technology</a>	6	A
<a href="#">Master of Science in Environmental Science and Technology</a>	5	B
<a href="#">Exchange Programme in Bioscience Engineering: Cell and Gene Biotechnology (master's level)</a>	6	A
<a href="#">Exchange Programme in Bioscience Engineering: Chemistry and Bioprocess Technology (master's level)</a>	6	A
<a href="#">Exchange Programme in Bioscience Engineering: Environmental Technology (master's level)</a>	6	A
<a href="#">Exchange Programme in Bioscience Engineering: Food Science and Nutrition (master's level)</a>	6	A
<a href="#">Exchange Programme in Bioscience Engineering: Land and Forest management (master's level)</a>	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.