

## Resource Recovery and Recycling Technologies (I002767)

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.

<b>Course size</b>	<i>(nominal values; actual values may depend on programme)</i>		
<b>Credits</b> 5.0	<b>Study time</b> 150 h	<b>Contact hrs</b>	50.0 h

### Course offerings in academic year 2022-2023

A (year)	English	Gent
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### Lecturers in academic year 2022-2023

Hennebel, Tom	LA25	lecturer-in-charge
De Gusseme, Bart	LA25	co-lecturer
Du Laing, Gijs	LA24	co-lecturer
Folens, Karel	LA25	co-lecturer
Frisch, Gero	FREIBE01	co-lecturer

Offered in the following programmes in 2022-2023	crdts	offering
<a href="#">International Master of Science in Sustainable and Innovative Natural Resource Management</a>	5	A
<a href="#">Exchange Programme in Bioscience Engineering: Environmental Technology (master's level)</a>	5	A

### Teaching languages

English

### Keywords

resource, recovery, recycling technology, waste

### Position of the course

This course is structured around the "metallurgical toolbox". This toolbox contains a range of novel and more established technologies that may be integrated into process chains to be set up for recovery of (mineral) resources from solid and liquid wastes and secondary resources.

### Contents

The toolbox is constructed based on four typical, subsequent steps in metallurgical flowsheets. In each of the steps, different metallurgical tools will be discussed:

1. Pretreatment
2. Metal extraction: hydrometallurgy, bioleaching, solvo-metallurgy and pyrometallurgy
3. Metal recovery: electrowinning, biosorption/bioprecipitation, physicochemical separations
4. Residue valorization

For each tool, the relevant thermodynamic modelling will be discussed.

### Initial competences

The requested initial competences for entering the SINREM MSc programme

### Final competences

- 1 capable to comprehend the engineering principles of the (unit) processes covered in the course
- 2 can evaluate a technical description of a waste treatment system/installation
- 3 able to specify the requirements which a waste treatment installation needs to fulfil
- 4 has insights in the potential use of the different processes when designing technologies for recovery of resources from waste
- 5 By going through the (online) learning materials offered within the different elements of the toolbox, students will be able to gain basic/general knowledge on the mechanisms behind

the different technologies, their working principles, their potential applications, boundary conditions for their use, their (dis)advantages, economic aspects, environmental impact, etc. The learning materials should allow students that have at least a bachelor degree in a broad range of scientific disciplines (e.g., chemists, bioscience engineers, civil engineers, geologists,...) to become familiar with the technologies involved.

**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, microteaching, online discussion group, project, research project

**Learning materials and price****References****Course content-related study coaching****Evaluation methods**

end-of-term evaluation and continuous assessment

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

Written examination

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

Written examination

**Examination methods in case of permanent evaluation**

Oral examination, report

**Possibilities of retake in case of permanent evaluation**

examination during the second examination period is not possible

**Calculation of the examination mark**

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