# Course Specifications

Valid as from the academic year 2024-2025

## Resource Recovery and Recycling Technologies (I002767)

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

**Credits 5.0**          **Study time  150 h**

**Course offerings in academic year 2024-2025**

| A (Year) | English | Gent |
|---|---|---|

**Lecturers in academic year 2024-2025**

| Frisch, Gero | FREIBE01 | staff member |
|---|---|---|
| Hennebel, Tom | LA25 | lecturer-in-charge |
| De Gusseme, Bart | LA25 | co-lecturer |
| Du Laing, Gijs | LA24 | co-lecturer |

| **Offered in the following programmes in 2024-2025** | **crdts** | **offering** |
|---|---|---|
| International Master of Science in Sustainable and Innovative Natural Resource Management | 5 | A |
| Exchange Programme in Bioscience Engineering:  Environmental Technology (master's level) | 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, physicichemical 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**

Group work, Lecture, Independent work, Peer teaching

**Study material**

None

**References**

**Course content-related study coaching**

**Assessment moments**

end-of-term and continuous assessment

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

Written assessment

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

Written assessment

**Examination methods in case of permanent assessment**

Oral assessment, Assignment

**Possibilities of retake in case of permanent assessment**

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.