

Resource Recovery from Wastewater (1002771)

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	<i>(nominal values; actual values may depend on programme)</i>		
Credits 3.0	Study time 90 h	Contact hrs	30.0 h

Course offerings and teaching methods in academic year 2022-2023

A (year)	English	Gent	online seminar: coached exercises	7.5 h
			online lecture	10.0 h
			self-reliant study activities	2.5 h
			online discussion group	5.0 h
			guided self-study	5.0 h

Lecturers in academic year 2022-2023

Du Laing, Gijs	LA24	lecturer-in-charge
Ganigué, Ramon	LA25	co-lecturer
Rabaey, Korneel	LA25	co-lecturer
Vanoppen, Marjolein	LA24	co-lecturer

Offered in the following programmes in 2022-2023

	crdts	offering
International Master of Science in Sustainable and Innovative Natural Resource Management	3	A
Exchange Programme in Bioscience Engineering: Environmental Technology (master's level)	3	A

Teaching languages

English

Keywords

Resource recovery, recycling, wastewater, water

Position of the course

In this web-based course participants are made familiar with processes used for recovery of valuable resources from liquid waste streams, as well as technologies and unit operations involved in these. The participants learn what type of components can be recovered from wastewater streams originating from various industrial activities. They learn to describe the fundamental principles and commonly applied technologies to recover resources from various wastewater streams, including the advantages, disadvantages and typical application area of each technology. They learn to set a design basis for the different recovery technologies, conduct preliminary reactor sizing and calculate performance predictions. Moreover, opportunities, challenges and research needs for resource recovery from wastewater are identified in terms of environmental and economic benefits.

Contents

- Introduction to resource recovery from wastewater
- Nutrients (N and P) recovery from wastewater
- Recovery of organics from wastewater
- Recovery of metals from wastewater
- Water reuse
- Energy recovery from wastewater
- Case studies

Initial competences

Advanced knowledge of chemistry (min. 15 ECTS at academic level), basic knowledge of microbiology and microbial technology, mathematics and physics (min. 15 ECTS at academic level)

Final competences

- 1 Have systematic and applied insights in techniques for qualitative and quantitative exploration and physicochemical characterisation of resources present in the environment, and in different physical and (bio)chemical processing technologies and industrial processes to extract resources from liquid waste materials, generated throughout the value chain, and transform them into valuable products
- 2 Be able to select, apply and develop innovative technologies for optimising material flows in the value chain, with a particular focus on resource recovery from waste, taking the industrial process context into consideration.
- 3 Understand the importance of resource recovery from wastewater within the industry value chains of the 21st century in general and the global low carbon economy in particular;
- 4 Describe some of the key components that can be recovered from wastewater streams originating from various industrial activities;
- 5 Describe the fundamental principles and commonly applied technologies to recover resources from various wastewater streams, including the advantages, disadvantages and typical application area of each technology;
- 6 Set a design basis for the different recovery technologies, conduct preliminary reactor sizing and calculate performance predictions;
- 7 Identify opportunities, challenges and research needs for resource recovery from wastewater in terms of environmental and economic benefits.

Conditions for credit contract

This course unit cannot be taken via a credit contract

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Guided self-study, online discussion group, self-reliant study activities, online lecture, online seminar: coached exercises

Extra information on the teaching methods

Web-based course with additional assignment.

Learning materials and price

All course materials, including videolectures, slides and background reading materials, are distributed electronically by means of the e-learning platform.

References

Course content-related study coaching

The lecturers are available through the e-learning platform for questioning, feedback and guidance.

Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination with open questions, written examination with multiple choice questions, written examination

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

Written examination with open questions, written examination with multiple choice questions, written examination

Examination methods in case of permanent evaluation

Written examination with open questions, written examination with multiple choice questions, participation, assignment

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

Calculation of the examination mark