

Technology for the Circular Economy (F000896)

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

Credits 5.0 Study time 150 h Contact hrs 60.0 h

Course offerings and teaching methods in academic year 2018-2019

A (semester 2)	English	guided self-study	10.0 h
		seminar: coached	10.0 h
		exercises	
		excursion	5.0 h
		group work	5.0 h
		lecture	30.0 h

Lecturers in academic year 2018-2019

Van de Wiele, Tom	LA25	lecturer-in-charge
De Gusseme, Bart	LA25	co-lecturer
Ganigué, Ramon	LA25	co-lecturer
Hennebel, Tom	LA25	co-lecturer

Offered in the following programmes in 2018-2019

	crdts	offering
Master of Science in Business Engineering (main subject Data Analytics)	5	A
Master of Science in Business Engineering (main subject Finance)	5	A
Master of Science in Business Engineering (main subject Operations Management)	5	A
Exchange programme in Economics and Business Administration	5	A

Teaching languages

English

Keywords

Technology for a circular economy, drinking water production, water reuse, purification of water, soil and air, energy recovery, nutrient recovery, recovery of rare-earth-elements and urban mining

Position of the course

The 21st century economy has to embrace the aspect of sustainability. The transition of a linear to a circular economy already originates from the end of the 20th century. It requires novel technologies, novel ideas to cope with resources, products and wastestreams and, importantly, energy. A new mindset is required for both the producer as consumer, where the application of renewable energy and renewable resource are maximized if costs from environmental damage, climate change and other disadvantages from a linear economy are taken into account. Striving for novel sustainable technologies also accelerates economic growth and job creation. The objective of the course is to gain insight in the application of technology to make this transition to a circular economy. From the perspective that "waste does not exist" a paradigm shift is applied in which contaminated water, air, soil or solid waste as such are regarded as resources of water, carbon, nutrients and energy. This course will prepare the student for an employment in industrial sectors that are active in this domain.

Contents

1. Wastewater: parameters, autopurification by surface waters, activated sludge process and reactortechnology
2. New technologies of activated sludge: membrane bioreactors, aerobic granulation

3. Drinking water: production from groundwater, surface water
4. Resource recovery: anaerobic digestion and water reuse
5. Air contamination: parameters, technology, combustion technology and energy recovery
6. Solid waste: composting, anaerobic composting and material and energy recovery
7. Soil contamination: regulatory aspects, remediation techniques
8. Urban mining, biometallurgy
9. Life cycle analysis

Initial competences

Basic chemistry

Final competences

- 1 The student acquires the insight in the basis principles of environmental technology and the capability to manage the interface "economy - sustainable production".
- 2 The student can perform calculations with wastestream sizes from different orders of magnitude to assess what are processing costs and what are possible benefits from resource and energy recovery.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

Access to this course unit via an exam contract is unrestricted

Teaching methods

Guided self-study, excursion, group work, lecture, seminar: coached exercises

Extra information on the teaching methods

Theory: lectures
Exercises: calculations and excursions

Learning materials and price

Lecture notes and presentations are made available through Minerva

References

Course content-related study coaching

Guidance from lecturers and/or doctor assistant

Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination, open book examination, assignment

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

Written examination, open book examination, assignment

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

Theory: closed book
Exercises: Open book
Case study: non period-bound evaluation. Individual company visit and term paper
At least 10/20 must be obtained for the exam prior to taking the score from the term paper into account for calculation of the final exam score.

Calculation of the examination mark

End of term evaluation: 80%
Term paper: 20%