

Renewable Resource Technology (O000147)

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

Credits	3.0	Study time	90 h	Contact hrs	30.0 h
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Course offerings and teaching methods in academic year 2019-2020

A (semester 2)	English	lecture	20.0 h
		seminar: coached	10.0 h
		exercises	

Lecturers in academic year 2019-2020

Rabaey, Korneel	LA25	lecturer-in-charge
Mangelinckx, Sven	LA24	co-lecturer

Offered in the following programmes in 2019-2020

Bachelor of Science in Environmental Technology	crdts	offering
	3	A

Teaching languages

English

Keywords

Non-food applications, renewable resources, green chemistry, chemical modification, bioenergy, biosolids, critical metals.

Position of the course

Renewable Resource Technology is about of the use/reuse and/or the chemical modification of side-streams and raw materials from urban, industrial and agricultural activity. The emphasis of the course is on applications with added value as well as on applications enabling loop closure. The coverage of the renewable resources takes into account the availability, the environmental impact and the ecological conditions.

Contents

1. The interest in renewable resources and principles of green chemistry
2. Use of carbohydrates in non-food applications
3. Use of proteins in industrial applications
4. Natural fibers
5. Use of lipids in industrial applications
6. Recovering organics for agriculture with composting
7. Anaerobic digestion: principles and technology
8. Metal removal and recovery from solid and aqueous waste
9. Emerging topics in microbial reuse

Initial competences

*A basic knowledge of organic chemistry and general microbiology is required, as well as basic knowledge on wastewater and waste treatment.
Renewable Resource Technology builds on certain learning outcomes of course units 'Organic Chemistry 1: Structure and Reactivity' (O000082) and 'Organic Chemistry 2: Advanced Reactivity' (O000092); or the learning outcomes have been achieved differently.*

Final competences

- 1 *Having insight in the chemical principles of industrial modification processes of renewable resources*
- 2 *Having insight in the importance of chemically modified renewable resources*
- 3 *Having insight in the origin and processing of renewable resources*
- 4 *Have insight and knowledge about the connectivity and the multidisciplinary character of the taught subjects*
- 5 *Understanding the potential of harnessing microorganisms for the recovery of*

resources

6 *Understanding the building blocks needed for circular resource management from a technology perspective*

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

Lecture, seminar: coached exercises

Extra information on the teaching methods

Theory: oral lectures, seminars

Exercises: guided sessions

Learning materials and price

A syllabus (in English) is available which can be bought or downloaded from the course website. The slides in English are made available electronically.

References

C. V. Stevens, R. Verhé : Renewable Bioresources, Scope and Modification for Non-Food Applications, Wiley, London (2004) (ISBN : 0-470-85447-2)

Chapter 15 Fats and Oils in H. A. Wittcoff, B. G. Reuben, J. S. Plotkin: Industrial Organic Chemicals, Third Edition, Wiley, ISBN 9780470537435, 2013

Chapter 16 Carbohydrates in H. A. Wittcoff, B. G. Reuben, J. S. Plotkin: Industrial Organic Chemicals, Third Edition, Wiley, ISBN 9780470537435, 2013

Tchobanoglous, G., Burton, F. and Stensel, H.D. (2002) Wastewater engineering: treatment and reuse, Metcalf & Eddy.

Course content-related study coaching

Close contacts via contact hours or via electronic appointment with the lecturers.

Evaluation methods

end-of-term evaluation

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

Written examination with open questions, written examination

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

Written examination with open questions, written examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Calculation of the examination mark

Part on Renewable Resource Technology: chemical modification: period aligned evaluation (50% of final mark)

Part on biological processes 50% of mark, of which 2/3 theory and 1/3 exercises

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