GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2023-2024

Green Chemistry of Renewable Resources (I002679)

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

Credits 4.0 **Study time 120 h**

Course offerings and teaching methods in academic year 2023-2024

A (semester 1)	English	Gent	group work
			lecture

Lecturers in academic year 2023-2024

Mangelinckx, Sven	LA24	lecturer-in-charge
Heugebaert, Thomas	LA24	co-lecturer

Offered in the following programmes in 2023-2024	crdts	offering
International Master of Science in Sustainable and Innovative Natural Resource Management	4	A
Master of Science in Bioscience Engineering: Chemistry and Bioprocess Technology	4	A
Master of Science in Bioscience Engineering: Environmental Technology	4	A
Master of Science in Chemical Engineering	4	A
Master of Science in Chemical Engineering	4	A
Exchange Programme in Bioscience Engineering: Chemistry and Bioprocess Technology (master's level)	4	A
Exchange Programme in Bioscience Engineering: Environmental Technology (master's level)	4	A
Exchange Programme in Bioscience Engineering: Food Science and Nutrition (master's level)	4	A

Teaching languages

English

Keywords

Renewable resources, green chemistry, green processes, non-food applications

Position of the course

Green chemistry of renewable resources contains the study of the processing and/or the chemical modification of agricultural raw materials and natural products as part of a sustainable biobased economy. The course is focused on the green chemistry principles applied on renewable resources for applications with a high added value or as renewable energy source. The applications are described according to the chemical classes of natural products. The coverage of the renewable resources takes into account the availability, the environmental impact and the ecological conditions. Different aspects are discussed in view of the European Agricultural Policy.

Contents

The themes discussed in this course will be built around three levels, (i) the different renewable resources, (ii) their processing and chemical modification from a green chemistry perspective and (iii) the resulting biobased products and their applications.

1) Introduction on sustainability, the circular and biobased economy
2) The principles of green chemistry, engineering and biorefinery
3) Renewable resources
4) Conversion and applications of mono-, di- and polysaccharides
5) Conversion and applications of wood and lignin
6) Conversion and applications of proteins

7) Conversion and applications of fibers
8) Conversion and applications of lipids

Initial competences

Green chemistry of renewable resources builds on certain learning outcomes of course units ' Organic Chemistry - structure' and 'Organic Chemistry - reactivity'; or the learning outcomes have been achieved differently.

Final competences

1 Having insight in the origin and processing of renewable resources
2 Having insight in the green chemical principles of industrial modification processes of renewable resources
3 Having insight in the importance and applications of chemically modified renewable resources
4 Have insight and knowledge about the connectivity and the multidisciplinary character of the taught subjects
5 Being able to collect, analyze, critically interpret and report information about industrial modification processes of renewable resources for non-food applications

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

Extra information on the teaching methods

Theory: oral lectures, seminars
Exercises: group work

Learning materials and price

Course material and slides in English are available which can be bought at the VLK course services (costs see: https://cursusdienst.boerekot.be/courseservice/productlist/) or are made available electronically on Ufora.

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
S. Vaz Jr. Biomass and Green Chemistry: Building a Renewable Pathway, Springer, Cham (2018) (Online ISBN 978-3-319-66736-2)
A. Behr, T. Seidensticker, Chemistry of Renewables, An Introduction. Springer (2020), ISBN 978-3-662-61430-3 (eBook)

Course content-related study coaching

Close contacts via contact hours or via electronic appointment with the professor or the assistents. Interactive support through the Ufora website.

Assessment moments

end-of-term and continuous assessment

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

Written assessment with open-ended questions

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

Written assessment with open-ended questions

Examination methods in case of permanent assessment

Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Extra information on the examination methods

Theory: period aligned evaluation via written examination
Exercises: group work report according to the guidelines like mentioned on Ufora to be submitted before the week of catch-up activities

Calculation of the examination mark

Theory: period aligned evaluation (75% of final mark)
Exercises: non-period aligned evaluation (25% of final mark)
Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examinator.