

Green Chemistry and Technology (O000142)

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 2019-2020

A (semester 1)	English	seminar: coached	12.0 h
		exercises	
		self-reliant study	12.0 h
		activities	
		lecture	24.0 h
		group work	12.0 h

Lecturers in academic year 2019-2020

Verpoort, Francis	KR01	lecturer-in-charge
Heynderickx, Philippe	KR01	co-lecturer

Offered in the following programmes in 2019-2020

Bachelor of Science in Environmental Technology	crdts	offering
	5	A

Teaching languages

English

Keywords

Prevention, atom economy, design of safer chemicals, catalysis, pollution prevention, biogas upgrading and cleaning, CO₂ capture/removal, waste management

Position of the course

Green chemistry in very simple terms is just a different way of thinking about how chemistry and the corresponding chemical engineering can be done. Over the years different principles have been proposed that can be used when thinking about the design, development and implementation of chemical products and processes. These principles enable scientists and engineers to protect and benefit the economy, people and the planet by finding creative and innovative ways to reduce waste, conserve energy, and discover replacements for hazardous substances.

It is important to note that the scope of these of green chemistry and corresponding engineering principles go beyond concerns over hazards from chemical toxicity and include energy conservation, waste reduction and designing for end of life or the final disposition of the product.

The course is well suited to attribute to the development of scientific skills such as analytical reasoning, ability to critical reflection and problem solving capability as future bachelor in life sciences and bioscience engineering.

Contents

- 1 : Principles of Green Chemistry
- 2 : Pollution Prevention
- 3 : Atom Economy
- 4 : Designing safer chemicals and energy efficiency
- 5 : Materials as catalysts and adsorbents
- 6 : Catalysis
- 7 : Biogas upgrading
- 8 : Biogas cleaning
- 9 : CO₂ conversion
- 10 : Waste management

Initial competences

Competences acquired in Inorganic Chemistry 1 and 2, Organic Chemistry 1.

Final competences

- 1 *The student has acquired understanding of green chemistry and processes.*
- 2 *As a future Bachelor in Environmental Technology, the student will have the necessary insight into the principles governing the Green Chemistry and engineering.*
- 3 *The student will have acquired insight on how to design chemical products and processes that reduce or even eliminate the use or generation of hazardous substances.*
- 4 *The student has started to master a scientific engineering attitude and has a framework for designing or improving materials, products, processes, and systems taking the 12 principles of Green Chemistry into account*

Conditions for credit contract

Access to this course unit via a credit contract is unrestricted: the student takes into consideration the conditions mentioned in 'Starting Competences'

Conditions for exam contract

Access to this course unit via an exam contract is unrestricted

Teaching methods

Group work, lecture, self-reliant study activities, seminar: coached exercises

Learning materials and price

Course notes (theory and exercises in text and slide format) and slides are available on Minerva platform

References

Syllabus 'Green Chemistry and Technology' by Prof. Verpoort & Prof. Heynderickx and the references within.

Course content-related study coaching

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, oral examination

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

Written examination with open questions, oral examination

Examination methods in case of permanent evaluation

Participation, assignment

Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

Extra information on the examination methods

During the first and second examination period, the periodic evaluation accounts for 70% (14/20) for the final score. The non-periodic evaluation takes up 30% (6/20). This non-periodic evaluation consists of 5% presence and attitude (participation) during lectures, lectures for plenary exercises and seminars for coached exercises on one hand, and for 25% on a presentation to be made during Group work. This presentation is the elaboration of (a) case study(ies) where the principles of Green Chemistry are applied and will be defended in week 12 of the semester.

To qualify for passing, both the score of for the presentation needs to be higher than 2.5/5 and the total score (= summation of the score for periodic evaluation, maximal 14 pts, presentation, maximal 5 pts, and the participation, maximal 1 pt) needs to be at least 10/20.

During the second examination period, the non-periodic evaluation (maximal 6 pts, see upper paragraph) cannot be retaken.

If different courses collide in the teaching schedule for non-model trajectory students, the course from the year in which the student is enrolled has priority and no special (re) arrangements are made regarding the other course(s) for this student.

Calculation of the examination mark

5% participation (presence and attitude)

25% presentation (assignment)

70% oral exam with written preparation (open questions and exercises)