

## Sustainable Energy and Rational Use of Energy (E039060)

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.

<b>Course size</b>	<i>(nominal values; actual values may depend on programme)</i>		
<b>Credits</b> 4.0	<b>Study time</b> 120 h	<b>Contact hrs</b>	45.0 h

### Course offerings and teaching methods in academic year 2021-2022

A (semester 2)	English	Gent	lecture: plenary exercises	15.0 h
			lecture	25.0 h
			excursion	5.0 h

### Lecturers in academic year 2021-2022

Beeckman, Jeroen	TW06	lecturer-in-charge
------------------	------	--------------------

### Offered in the following programmes in 2021-2022

	crdts	offering
Bachelor of Science in Bioscience Engineering (main subject Environmental Technology)	4	A
Master of Science in Teaching in Science and Technology (main subject Chemistry)	4	A
Master of Science in Chemistry (main subject (Bio)Organic and Polymer Chemistry)	4	A
Master of Science in Chemistry (main subject Analytical and Environmental Chemistry)	4	A
Master of Science in Engineering: Architecture (main subject Architectural Design and Construction Techniques)	4	A
Master of Science in Electrical Engineering (main subject Communication and Information Technology )	4	A
Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation)	4	A
Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)	4	A
Master of Science in Electrical Engineering (main subject Electronic Circuits and Systems)	4	A
Master of Science in Electromechanical Engineering (main subject Maritime Engineering)	4	A
Master of Science in Chemistry (main subject Materials and Nano Chemistry)	4	A
Master of Science in Electromechanical Engineering (main subject Mechanical Construction)	4	A
Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)	4	A
Master of Science in Engineering: Architecture (main subject Urban Design and Architecture)	4	A
Master of Science in Chemistry	4	A
Master of Science in Civil Engineering	4	A
Master of Science in Chemical Engineering	4	A
Master of Science in Civil Engineering	4	A
Master of Science in Computer Science Engineering	4	A
Master of Science in Computer Science Engineering	4	A
Master of Science in Fire Safety Engineering	4	A
Master of Science in Sustainable Materials Engineering	4	A
Master of Science in Engineering Physics	4	A
Master of Science in Chemical Engineering	4	A
Master of Science in Engineering Physics	4	A
Master of Science in Bioscience Engineering: Chemistry and Bioprocess Technology	4	A
International Master of Science in Sustainable and Innovative Natural Resource Management	4	A
Exchange Programme Architecture	4	A

## Teaching languages

English

## Keywords

Sustainable energy, renewable energy, rational energy use

## Position of the course

The aim of this course is to gain insight in production and use of energy. Beside the technical aspects, also environmental and economical aspects are treated. The production of electrical and thermal energy with fossil and nuclear fuels, as well as with renewable energy (wind, solar energy, biomass, hydro), is dealt with. The total energy principle is also highlighted. In a second part methods to prevent use of energy are highlighted.

## Contents

- Energy production: Fossil fuels, Nuclear fuels, Wind energy, Solar energy, Biomass, Hydro energy, Total energy principle, Fuel cells
- Rational use of energy: Energy flow, Use of energy in buildings, Use of energy in production processes, Remote heating, Energy storage

## Initial competences

Chemistry and Physics (Bachelor of Engineering)

## Final competences

- 1 To demonstrate the importance of sustainable energy with respect to the amount of fossil energy available, environmental effects and the climate change.
- 2 To describe which forms of (non-)sustainable energy are available and to estimate in which quantity they are available.
- 3 To describe the scientific principles behind the conversion of sustainable energy sources (solar irradiation, wind, ...) into useful energy (electricity, mechanical power, ...).
- 4 To predict and to calculate the energy production of sustainable energy installations (photovoltaic, wind, hydro, ...).
- 5 To explain the need and the problems of energy storage with respect to sustainable energy production.
- 6 To list a number of ways to reduce energy use through the rational use of energy.
- 7 To predict and calculate the reduction in energy use by switching to a more rational use of energy.

## 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

Excursion, lecture, lecture: plenary exercises

## Extra information on the teaching methods

Classroom lectures; Seminars; Plant visits; Presentations by external speakers

## Learning materials and price

syllabus

## References

- Ouwehand, J., Papa, T., De Geus, J., Gilijamse, W., & De Wit, J. (2014). *Duurzame energietechniek*. 3de geheel geactualiseerde dr. Den Haag: BIM Media. ISBN: 978 90 395 2789 4
- MacKay, D. J. C. (2009). *Sustainable energy - without the hot air*. Cambridge: UIT. ISBN: 978 19 068 6001 1

## Course content-related study coaching

Student coaching and assistance: the lecturer and his/her assistants are available during or in between lectures.

## Evaluation methods

end-of-term evaluation

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

Written examination, open book examination

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

Written examination, open book examination

**Examination methods in case of permanent evaluation**

**Possibilities of retake in case of permanent evaluation**

not applicable

**Extra information on the examination methods**

During examination period: written open-book exam

**Calculation of the examination mark**