

# Course Specifications

From the academic year 2015-2016 up to and including the

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

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

Credits 4.0 Study time 120 h Contact hrs 45.0 h

Course offerings and teaching methods in academic year 2016-2017

A (semester 2)	Dutch	excursion	5.0 h
		lecture	25.0 h
		lecture: plenary	15.0 h

Lecturers in academic year 2016-2017

Beeckman, Jeroen	TW06	lecturer-in-charge
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Offered in the following programmes in 2016-2017

	crdts	offering
Bridging Programme Master of Science in Fire Safety Engineering	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 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 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 Photonics 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
Master of Science in Bioscience Engineering: Environmental Technology	4	A

Teaching languages

Dutch

## 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 fossile 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 fossile 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