

## Photovoltaic Energy Conversion and Sustainable Energy (E039040)

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

**Credits** 6.0      **Study time** 180 h      **Contact hrs** 60.0 h

**Course offerings and teaching methods in academic year 2016-2017**

A (semester 2)	excursion	5.0 h
	seminar: coached exercises	30.0 h
	lecture	25.0 h

**Lecturers in academic year 2016-2017**

Strubbe, Filip	TW06	lecturer-in-charge
Khelifi, Samira	TW06	co-lecturer

**Offered in the following programmes in 2016-2017**

<a href="#">Master of Science in Engineering Physics</a>	crdts	offering
	6	A

**Teaching languages**

English

**Keywords**

photovoltaics, solar energy, sustainable energy

**Position of the course**

To get familiar to solar energy and its conversion to electrical work, by means of the photovoltaic effect.

Other sustainable energies : thermal solar energy conversion, wind energy.

Ecologic advantages of sustainable energy.

Positioning of the sustainable energies within a broader thermodynamic context.

**Contents**

- Availability of solar energy
- Thermal conversion
- Principles of photovoltaic conversion
- Realistic efficiency
- Classical silicon solar cells (mono and polycrystalline)
- Amorphous solar cells
- GaAs solar cells
- Heterojunction solar cells
- Ecology and economy
- Wind energy

**Initial competences**

basics of thermodynamics, quantum physics, solid-state physics, semi-conductor physics, diode theory

**Final competences**

- 1 INSIGHTS: Understanding the basic principles of photovoltaic energy conversion. Understanding the limitations of realistic solar panels.
- 2 INSIGHTS: The ecological benefits of sustainable energy. Understanding the efficiency and limitations of photovoltaic and thermal energy conversion. Understanding the availability of wind energy.
- 3 PROFICIENCIES: Calculations of the available solar energy.
- 4 PROFICIENCIES: Calculations of the conversion and the conversion efficiency of solar energy. Calculations of wind 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, seminar: coached exercises

**Learning materials and price**

course notes

**References****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, oral examination

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

Written examination, oral examination

**Examination methods in case of permanent evaluation**

Report

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

examination during the second examination period is possible

**Extra information on the examination methods**

period-bound evaluation: written closed-book exam; oral closed-book exam  
Non-period-bound evaluation: evaluation of reports; evaluation of oral presentation;  
frequency: 1 computer practicum 10%, 1 group work (written report and oral presentation) 20%.

**Calculation of the examination mark**

period-bound evaluation: 70%

non-period bound evaluation: 10%+20%

For the non-period-bound evaluation: scores from the first examination period are transferred to the second examination period