

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)	English	excursion	5.0 h
		seminar: coached	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

Master of Science in Engineering Physics	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, quantumphysics, 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