

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, Energy use in transport

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

Extra information on the teaching methods

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

Study material

Type: Syllabus

Name: Course notes for Sustainable Energy and Rational Use of Energy

Indicative price: € 7

Optional: no

Language : English

Number of Pages : 200

Available on Ufora : Yes

Online Available : No

Available in the Library : No

Available through Student Association : Yes

References

Nicholas Jenkins, Janaka Ekanayake, *Renewable Energy Engineering*. Cambridge University Press (2017). <https://dx.doi.org/10.1017/9781139236256>

MacKay, D. J. C. (2009). *Sustainable energy - without the hot air*. Cambridge: UIT. ISBN: 978 19 068 6001 1. Free download via <https://withouthotair.com>

Course content-related study coaching

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

Assessment moments

end-of-term assessment

Examination methods in case of periodic assessment during the first examination period

Written assessment open-book

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

Written assessment open-book

Examination methods in case of permanent assessment**Possibilities of retake in case of permanent assessment**

not applicable

Extra information on the examination methods

During examination period: written open-book exam

Calculation of the examination mark