ChE-414

Thermodynamics of energy conversion and storage

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Cursus	Sem.	Type
Chemical Engineering	BA6	Obl.
Energy Science and Technology	MA2, MA4	Opt.
Ing.-chim.	MA2, MA4	Opt.

Language of teaching	English
Credits	3
Session	Summer
Semester	Spring
Exam	Written
Workload	90h
Weeks	14
Hours	**3 weekly**
Courses	2 weekly
Exercises	1 weekly
Number of positions	

Summary

The course is an introduction to the energy conversion. It focusses on the thermodynamics of the engines and systems for the conversion of energy from fossil fuels and renewable resources. The relevant aspects of modern energy conversion are treated and the potentials and limitations are estimated.

Content

• Basic introduction into thermodynamics of energy conversion
• Energy demand and energy economy
• Resources and climat change
• Internal combustion engines (piston engines)
• Turbines
• Nuclear power station
• Renewable energy sources
• Solar thermal energy conversion
• Wind power
• Hydro power
• Photovoltaics
• Geothermal energy
• Tides• Storage of renewable energy

Keywords

Energy conversion
Efficiency
Resources
Renewable energy

Learning Outcomes

By the end of the course, the student must be able to:

- Work out / Determine the potential and limitations of the resources
- Describe the various energy conversion technologies
- Explain the thermodynamics of the energy conversion devices
- Analyze the relevant chemical reactions
- Compare technologies and estimate the potential
- Assess / Evaluate the performance of various energy conversion technologies

Teaching methods

Ex cathedra using Powerpoint slides. Examples will be shown to illustrate theory.

Expected student activities

Taking notes in the course hours. Solve the exercises.

Assessment methods

One final written exam.

Resources

Bibliography

Henning STRUCHRUP, “Thermodynamics and energy conversion”, Springer (PDF CHF 54.- http://www.hanser-elibrary.com/isbn/9783446427327)
David JC McKay, “Sustainable Energy - without the hot air”, http://www.withouthotair.com/cft.pdf

Ressources en bibliothèque

- Sustainable Energy - without the hot air / MacKay
- Thermodynamics and energy conversion / Struchup

Notes/Handbook

Students have access to the slides few days before each lesson.