ChE-304

Energy systems engineering

Cursus	Sem.	Type
Chemical Engineering	BA6	Obl.
Energy Science and Technology	MA2, MA4	Opt.
HES - CGC	E	Obl.

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

Remark

Pas donné en 2020-2021

Summary

This course will provide a toolkit to students to understand and analyze sustainable energy systems. In addition, the main sustainable energy technologies will be introduced and their governing principles explained.

Content

1. Basics of energy analysis

- **Technical aspects of energy: Thermodynamics of energy conversion**
- **Systems modeling**

2. Global energy analysis

- **Energy: issues, definitions and resources**
- **Energy economics**

3. Sustainable energy technologies (the technologies covered will vary year to year depending on guest lecturers)

- **Energy Storage, management and distribution**
- **Fossil energy and carbon sequestration**
- **Geothermal energy**
- **Hydropower**
- **Wind energy**
- **Solar energy**

- **Biomass conversion and bioenergy**

Learning Prerequisites

Required courses

Thermodynamics, General Chemistry

Recommended courses

Introduction to Chemical Engineering I and II

Learning Outcomes

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

- Analyze a renewable energy system
- Describe the working principles of the principle sustainable energy technologies
- Describe the main issues pertainaing to the global energy supply
- Analyze the thermodynamics of a sustainable enrgy system
- Perform a simple systems analysis of a renewable energy system
- Analyze the economics of a sustinable energy system

Teaching methods

Course with examples, case studies and exercises

Assessment methods

Continuous: one in-class exam and a project to be turned in.