ChE-304  
**Energy systems engineering**  
Luterbacher Jeremy, Smit Berend

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<tr>
<th>Cursus</th>
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<td>Génie chimique</td>
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**Language**  
English  

**Credits**  
3  

**Session**  
Summer  

**Semester**  
Spring  

**Exam**  
During the semester  

**Workload**  
90h  

**Weeks**  
14  

**Hours**  
3 weekly  

**Lecture**  
2 weekly  

**Exercises**  
1 weekly  

**Number of positions**  

### 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 pertaining to the global energy supply
• Analyze the thermodynamics of a sustainable energy system
• Perform a simple systems analysis of a renewable energy system
• Analyze the economics of a sustainable 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.