MJ2411 Renewable Energy Technology 6.0 credits

Förnybar energi

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for MJ2411 valid from Autumn 2010

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

B.Sc. in Engineering with prerequisite in MJ1112 Thermodynamics 9 ECTS or corresponding knowledge. Minimum 5 ECTS thermodynamics.

Documented proficiency in english B or equivalent.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The purpose of this course is to provide a survey of the most important renewable energy resources, and the technologies for harnessing these within the framework of a broad range of simple to state-of the-art advanced energy systems. After completion of the course, students will be able to:

- Describe the fundamentals and main characteristics of renewable energy sources and their differences compared to fossil fuels.
- Explain the technological basis for harnessing renewable energy sources
- Recognize the effects that current energy systems based on fossil fuels have over the environment and the society
- Describe the main components of different renewable energy systems
- Compare different renewable energy technologies and choose the most appropriate based on local conditions
- Perform simple techno-economical assessments of renewable energy systems
- Perform and compare environmental assessments of renewable energy systems and conventional fossil fuel systems
- Design renewable/hybrid energy systems that meet specific energy demands, are economically feasible and have a minimal impact on the environment
- Suggest the best combination of technological solutions to minimize the emission of greenhouse gases and increase the sustainability of the energy system in specific areas/regions
- Discuss how to utilize local energy resources (renewable and non-renewable) to achieve the sustainable energy system

Course contents

1. Introduction to Renewable Energy Technology
2. Solar Energy
3. Wind Energy
4. Biomass
5. Hydropower
6. Wave Energy
7. Ocean Thermal Energy Conversion
8. Tidal energy
9. Geothermal energy
10. Renewable Hydrogen

Disposition

After completion of the course, students will be able to:

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- Explain the technological basis for harnessing renewable energy sources
- Recognize the effects that current energy systems based on fossil fuels have over the environment and the society
- Describe the main components of different renewable energy systems
- Compare different renewable energy technologies and choose the most appropriate based on local conditions
- Perform simple techno-economical assessments of renewable energy systems
- Perform and compare environmental assessments of renewable energy systems and conventional fossil fuel systems
- Design renewable/hybrid energy systems that meet specific energy demands are economically feasible and have a minimal impact on the environment
- Suggest the best combination of technological solutions to minimize the emission of greenhouse gases and increase the sustainability of the energy system in specific areas/regions
- Discuss how to utilize local energy resources (renewable and non-renewable) to achieve the sustainable energy system

Course literature

Godfrey Boyle, Renewable Energy - Power for a Sustainable Future. Oxford University Press, 2004

Examination

- PRO1 - Project, 1.5 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination, 4.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

INL1 – 1,0 hp

KON1 – 0,5 hp

KON2 – 0,5 hp

TENA – 4,0 hp

Final grade determined as weighted average of KON1, KON2 and TENA.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.