



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Energisystemanalys: energi, miljö och naturresurser

Energy Systems Analysis: Energy, Environment and Natural Resources

FMIN25, 7,5 credits, A (Second Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED W

Date of Decision: 2023-02-13

General Information

Elective for: BME4, C4, D4, E4-em, F4, F4-es, I4, W4-es, W4-ms

Language of instruction: The course will be given in Swedish

Aim

The course provides an understanding of the complex interconnections between energy and resource use, and large-scale environmental problems. Different qualitative strategies to attain a sustainable energy system are critically evaluated from different perspectives. The course departs from already acquired knowledge and relates it to the issue of sustainability.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- Be able to describe the scientific mechanisms behind certain important environmental and resource problems/issues, and how they relate to the supply and use of energy.
- Be able to critically evaluate and compare different long-term strategies for a sustainable supply and use of energy.
- Be able to relate important societal changes, for example the type and volume of consumption, to general environmental and resource issues.
- Be able to describe and evaluate different policy instruments, aiming at a sustainable energy system.

Competences and skills

For a passing grade the student must

- Be able to present independent analyses in the scientific field of the course, in writing as well as orally.
- Be able to utilize and evaluate a complex international source material within the field of the course

Contents

As an introduction, energy systems are presented from technical and economical perspectives, and it is described how they relate to large-scale environmental and global security-related problems. The concept of *energy services* is the basis for the understanding of the different parts of the “energy chain”: extraction/supply – conversion – final use. Analytical methods and models of energy systems development are presented.

Different environmental and security-related problems relevant to the use of energy and resources are discussed: climate change; resource conflicts/global security; land use.

Various social/economic issues that are interconnected with the use and supply of energy and resources are discussed, in particular how they relate to consumption.

A large part of the course treats qualitative strategies for attaining sustainable energy systems: more efficient systems for the supply, distribution and final use of energy; more renewable energy; more advanced fossil technologies; more nuclear power.

Institutional/organisational issues, such as policy instruments (legislation, taxes/fees etc.) are discussed in a critical perspective as well as international organisations and treaties/conventions.

During the course, references are made to national and international research in the relevant fields, and to the international political and economic debate.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: A written exam. The final grade of the course follows from the result of the exam, but the quality of the assignments (below) may add points to the exam. Two assignments are required. The first assignment (carried out in small groups, preferably with students from different LTH programmes) is a short literature study that analyses some important issue of the course, and is presented in the form of a short scientific report, which is also defended orally. The second assignment comprises economic and/or technical calculations relevant to sustainable energy systems, that are to be accompanied by an independent critical evaluation. In addition, a book review must be presented in writing, and orally.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Admission

Admission requirements:

- Minimum 120 ECTS credits

The number of participants is limited to: No

The course overlaps following course/s: FMI051, FMI050

Reading list

- Everett B., Peake S., Warren J.: Energy Systems and Sustainability, Power for a Sustainable Future (third edition). Oxford University Press, 2021. Latest edition. Due to quick development in this field the literature may be changed; this will be communicated at least 8 weeks before start of the course.
- Scientific articles, reports and statistics.

Contact and other information

Course administrator: Petra Malmquist, petra.malmquist@miljo.lth.se

Course coordinator: Joakim Haraldsson, joakim.haraldsson@miljo.lth.se

Course homepage: <http://miljo.lth.se>