SH2706 Sustainable Energy Transformation Technologies 9.0 credits

Uthållig energiomvandlingsteknik

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

Establishment

The official course syllabus is valid from autumn semester 2026 as decided by the Director of First and Second Cycle Education. Decision date: 2026-07-22

Grading scale

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

Education cycle

Second cycle

Main field of study

Engineering Physics

Specific prerequisites

BSc level with a background that corresponds to completed courses in thermodynamics (9 ECTS), heat transfer (6 ECTS) and fluid mechanics (6 ECTS).

English B / English 6

Intended learning outcomes

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

- Explain principles of operation for various currently known energy transformation technologies.
- Explain principles of design and describe major components of commercially operating energy transformation systems.
- Make balances of energy, entropy and exergy of such systems.
- Analyze major environmental effects of such systems.
- Perform simplified economic analyses of such systems.
- Explain principles of performing life-cycle analyses of such systems.
- Compare the systems with each-other as far as sustainability, reliability, economy and safety are concerned.

Course contents

In the initial stage of the course all the major known energy transformation technologies will be shortly described. The main purpose will be to explain the principles of operation of such technologies, their advantages and disadvantages, required natural resources, availability of such resources, as well as the future potential and main challenges. (3 lectures)

In the second stage, the energy transformation systems that are today employed on a commercial scale will be described in a more detail, including presentations of their designs and their major components. (5 lectures)

The third part of the course will deal with application of conservation and thermodynamic laws to analyze the systems. In particular, energy, entropy and exergy balances will be demonstrated and their consequences will be discussed. (7 lectures, 3 exercises)

The fourth and the last part of the course will be devoted to analyses of various important aspects and parameters of the systems, such as: environmental effects, economy, life-cycle, sustainability, reliability and safety. (7 lectures, 2 exercises)

Examination

- TENA - Exam, 9.0 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.

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.