MJ2530 Thermal Conversion and Industrial Energy Systems Analysis 5.0 credits

Termisk omvandling och industriell energisystemanalys

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

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

Establishment

The official course syllabus is valid from the fall semester 2024 in accordance with the decision by the Head of the ITM School: M-2023-2119. Date of decision: 2023-10-13

Grading scale

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

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

Degree of Bachelor (BSc) or the equivalent.

Only for admitted students in SELECT (TMESM) Master's programme.

Language of instruction

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

Intended learning outcomes

After passing the course, the student should be able to:

1. Identify components, draw detailed schematic outlines for typical power cycles and technology solutions in modern combined power and heating station technology and carry out calculations on such energy systems;
2. Apply energy and exergy analyses of energy systems where the primary energy sources up to energy services are included in the system;
3. Critically process composite analyses of thermodynamic flows, exergy flows, environmental impact and monetary costs;
4. Critically process exergy analyses, thermoeconomic analyses and pinch analyses on heat exchanger networks.

Course contents

The course Thermal energy conversion and industrial systems analysis deal with the subject areas of applied thermodynamics, energy technology and energy system analysis with exergy, finance and environmental perspective, in particular the theoretical basic principles and the practical design aspects for the different technologies for power and heat production, both regarding conventional thermal power and renewable energy and their interplay. Technical and sustainable solutions are discussed from a system perspective.

The specific technological point of view is above all on the following fields:

- Thermal power cycles and thermal power stations (steam, gas, combined-cycle power plants);
- Direct energy conversion, niche technology and fuel cells in interplay with conventional power stations;
- System aspects, regulation, efficiency and innovation solutions.

Examination

- TEN1 - Written examination, 2.5 credits, grading scale: A, B, C, D, E, FX, F
- TENB - Unsupervised exam and oral exam, 2.5 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.

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.