MJ1012 Basic Thermodynamics 6.0 credits

Grundläggande termodynamik

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

Establishment

The official course syllabus is valid from the autumn semester 2025 in accordance with the decision by the Faculty Board: M-2024-0018. Date of decision: 2024-10-14.

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

MG1202 Engineering mathematics 6 credits and MG1203 Applied mechanics 6 credits.

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 students should be able to:

1. formulate, model and solve problems for technical systems and devices with different types of energy exchange and energy conversion.
2. model systems, and identify subsystems and components in engineering systems.
3. present written solutions to problems in thermodynamics that are stringent and understandable.

Course contents

1. Energy forms, thermodynamic fundamental concept, state units (temperature, pressure, specific volume, internal energy, enthalpy). Applications of the first law of thermodynamics on closed and open systems, the energy equati.on
2. The properties and applications of ideal gases.
3. Idealised changes of state (isothermal, isobaric, isochoric, isentropic and polytropic) with applications. Processes in compressors and turbines. Efficiency.
4. The Carnot cycle, the second law of thermodynamics, entropy.
5. Cycles with gaseous media, such as Otto, Diesel and Joule/Brayton cycles.
6. Basic steam power processes.
7. The compressor-driven evaporation cooling process, heat pumps, the concepts of sub-cooling and superheating.
8. Basic relationships for incompressible flow with losses in ducts and nozzles.
9. Fundamental concepts, general laws and calculation methods for heat transfer and for heat exchangers.

Examination

- TEN1 - Written exam, 6.0 credits, grading scale: A, B, C, D, E, FX, F
- KON2 - Partial exam, 0 credits, grading scale: P, F
- KON1 - Partial exam, 0 credits, grading scale: P, F
- KON3 - Partial exam, 0 credits, grading scale: P, 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.

The course has continuous assessment. During the course, three optional quizzes are offered (KON1, KON2, KON3). A Pass grade on a quiz can be credited for the corresponding exam

question. A Pass grade on a quiz can be credited for the examination during one (1) year counted from the day the quiz took place. Three passed quizzes (KON1, KON2, KON3) during one (1) year can be credited as a passed examination.

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.