MJ1112 Applied Thermodynamics 9.0 credits

Tillämpad termodynamik

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

Establishment

Course syllabus for MJ1112 valid from Autumn 2019

Grading scale

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

Education cycle

First cycle

Main field of study

Mechanical Engineering, Technology

Specific prerequisites

SF1624, SF1625, SF1626, SG1102, SK1110 or the equivalent courses.

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. 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.

The subject area of the Course is defined under the heading ”Course content”.

Course contents

The course is divided into 10 main fields of study:

1. Energy forms, fundamental thermodynamic concepts. The zeroth main clause. Applications of the first law of thermodynamics on closed and open systems, the energy equation State quantities (temperature, pressure, specific volume, internal energy, enthalpy).

2. The properties of ideal gases and ideal gas mixtures.

3. Idealised changes of state, such as e g isothermal, isobaric, isochoric, isentropic and polytropic processes. Processes in compressors and turbines. The Carnot cycle, other the second and third main clauses, the concepts entropy and exergy.

4. Circuit processes with gaseous media such as e g the Otto, Diesel, Joule/Brayton, Ericsson, and Stirling cycles.

5. The properties of real media, their representation in state diagrams.

6. Simple steam power processes.

7. The compressor-driven evaporation cooling process, heat pumps, the concepts of sub-cooling and overheating.

8. Basic relationship for incompressible and compressible flow in ducts and nozzles for reversible cases and for incompressible flow with losses.

9. Fundamental concepts, general laws and calculation methods for heat transfer and for heat exchangers.

10. The properties of moist air, its state diagrams and applications.

Examination

- ÖVN1 - Assignments, 1.5 credits, grading scale: P, F
- KON4 - Test, 0.0 credits, grading scale: P, F

- KON3 - Test, 0.0 credits, grading scale: P, F
- KON2 - Test, 0.0 credits, grading scale: P, F
- KON1 - Test, 0.0 credits, grading scale: P, F
- TEN1 - Written exam, 7.5 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

Approved examination (TEN1; 7.5 credits) as well as passed practical assignments (ÖVN1, 1.5 credits).

Four optional quizzes are organised during the course, whose result may be included at examination. A Pass grade on at least three of four quizzes (KON1, KON2, KON3 and KON4) within one (1) year give a Pass grade on the 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.