



# MJ1112 Applied Thermodynamics 9.0 credits

## Tillämpad termodynamik

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

Course syllabus for MJ1112 valid from Autumn 2013

## Grading scale

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

## Education cycle

First cycle

## Main field of study

Mechanical Engineering, Technology

## Specific prerequisites

SF1625 Calculus i One Variable and SF1626 Calculus in Several Variables or 5B1102 Calculus , SG1130/5C1101 Mechanics, basic course, and SK1112 Physics 1 or 5A1225 Electromagnetism and waves, or equivalent courses.

## Language of instruction

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

## Intended learning outcomes

After the course, the student should be able to:

- formulate, model, and solve problems involving systems and devices having various forms of energy exchange and energy conversion.
- model systems, and to be able to identify sub-systems and components in engineering systems.
- discuss thermodynamics in a logical and general way.

More detailed aims will be presented at the start of the course.

## Course contents

The lecture series includes:

- different forms of energy, fundamental concepts and theorems of thermodynamics
- the properties of gases and gaseous mixtures, with an introduction to combustion and stoichiometry
- thermodynamic properties, together with concepts of work, heat, exergy and anergy
- applications of the first law of thermodynamics about closed and open systems and the energy equation
- different expressions of the second law, with applications in various reversible cycles for energy conversion
- state diagrams for real media and equations of state
- technical processes in compressors and turbines, as well as important cycles such as those in combustion engines, gas turbines, steam power plants, refrigeration plants and heat pumps
- fundamental relations for the flow of liquids and gases in ducts and nozzles, both for reversible cases and for flow with losses
- basic concepts and general laws for heat transfer and for heat exchangers
- properties of moist air and its psychrometric charts, with applications.

The course contains a number of minor home exercises to be submitted individually in writing.

## Course literature

- Tillämpad termodynamik, Ekroth, Granryd, Studentlitteratur, 2006, ISBN 91-44-03980-8.
- Arbetsmaterial till Tillämpad termodynamik, Havtun, 2014, Första utgåvan, ISBN 978-91-633-7728-0.

- Applied Thermodynamics – Collection of Formulas, Havtun, 2013, First edition, ISBN 978-91-633-7727-3.

## Examination

- KON1 - Test, - credits, grading scale: P, F
- KON2 - Test, - credits, grading scale: P, F
- KON3 - Test, - credits, grading scale: P, F
- KON4 - Test, - credits, grading scale: P, F
- TEN1 - Written exam, 7.5 credits, grading scale: A, B, C, D, E, FX, F
- ÖVN1 - Assignments, 1.5 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.

## Other requirements for final grade

One written examination (TEN1; 7,5 cr), comprising questions and calculations. To receive credit for the course, also the student must complete the exercises (ÖVN1; 1,5 cr). Four small tests are organised and the result can be transferred to the examination. Pass on three out of four small tests during the same academic year equals pass 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.