MJ2517 Heat pumping technologies 6.0 credits

Värmepumpsteknik

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

On 15/10/2021, the Dean of the ITM School has decided to establish this official course syllabus to apply from autumn term 2023 (registration number M-2020-2022).

Grading scale

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

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

Documented knowledge in thermodynamics and Heat transfer, equivalent contents in the courses MJ1112 Applied Thermodynamics (9 higher education credits) and MJ1401 Heat Transfer (6 higher education credits).

At least 6 credits in the subject of energy systems for buildings, e.g. MJ2509 "Energy in the built environment" (9 higher education credits) and MJ2519 "Energy Supply Systems for Buildings" (6 higher education credits).

Documented knowledge in English, for example upper secondary course Eng B/6. Or English 6 in an internationally recognised English language test, for example an IELTS Academic/IELTS UKVI total points of 6.5 and no section below 5.5.

Special admission requirements are also fulfilled through Swedish or foreign education, practical experience or due to other circumstances is in a position to benefit from the education. Regulation 2018:1503, section 5b.

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:

To pass the course, the student should be able to:

1. perform operations on functions Discuss the latest progress in the area of cooling and heat pump technology.

2. Carry out performance calculations for heating and cooling systems, with the latest modellings tools in the subject area.

To receive higher grades the student should also be able to:

3. Discuss the most important practical aspects at the design of an energy efficient and reliable heat pump systems.

4. Explain the principles of the most important alternative cooling processes.Identify their potential, limitations and main application fields.

5. Describe some of the latest technologies and the latest introduced refrigerants for selected applications.Justify the introduction of these and compare them with traditional technologies and refrigerants.

Course contents

The following subjects are treated in the course:

Selected applications:

- Cooling and heating in grocery stores
- o Ice rinks and their energy systems
- High temperature heat pumps

Working fluids

- New synthetic low GWP (Global Warming Potential) refrigerants
- o Propane and ammonia in small heat pumps
- Carbon dioxide

Practical aspects

- Control of heat pump systems
- Oil treatment
- Thermal storage

Alternative cycles

- Heat driven cold
- Acoustic, magnetic and other

Applications of modellings tools in the subject area e.g.

- CoolPack and PackCalc
- Refprop and Coolprop in Excel
- IMST-ART

Examination

- INL1 - Assignment, 3.0 credits, grading scale: P, F
- INL2 - Assignment, 1.5 credits, grading scale: P, F
- INL3 - Assignment, 1.5 credits, grading scale: P, F
- TEN1 - Oral examination, - 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.