MJ2434 Advanced Refrigeration and Heat Pump Technology 6.0 credits

Påbyggnadskurs i kyl- och värmepumpteknik

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

Establishment

Course syllabus for MJ2434 valid from Autumn 2019

Grading scale

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

Education cycle

Second cycle

Main field of study

Specific prerequisites

MJ2407 Sustainable Energy Utilisation, MJ2423 Applied Refrigeration and Heat Pump Technology, or the equivalent

Language of instruction

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

Intended learning outcomes

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

1. Discuss the most important progress in refrigeration and heat pump technology.

2. Use the most important computational tools for refrigeration and heat pump technology.

3. Carry out calculations of performance for heat and cooling system.

4. Design heat pumping systems and choose appropriate capacity for the main components of the systems.

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

5. Analyse performance for heat pumping systems and compare performance between different system solutions.

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

7. 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 aim of the course is to introduce the students to selected subjects from the research front in the field of refrigeration and heat pump technology. An additional aim is to broaden the students' knowledge in this field from previous courses.

The course includes the following subjects communicated via lectures, assignments and study visits.

- Applications.

o Cooling in shops

o Geothermal heat pumps

o Ice rinks and their energy systems

o Heat recovery

- Working fluids

o New synthetic low-GWP (Global Warming Potential) refrigerants

o Propane and ammonia in small heat pumps

o Carbon dioxide

- Alternative cycles

o Heat driven cold

o Acoustic, magnetic and other

- Modelling tools

o CoolPack and PackCalc

o Refprop in Excel

o IMST-ART

o Earth Energy Designer-EED

Course literature

Kursen kommer att baseras på 1) Artiklar från tekniska och vetenskapliga tidskrifter, 2) Material utdelat i samband med gästföreläsningar, 3) Material sammanställt av läraren.

Examination

- INL1 - Home Assignment 1, 1.0 credits, grading scale: P, F
- INL2 - Home Assignment 2, 1.0 credits, grading scale: P, F
- TEN1 - Written exam, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- INL3 - Home Assignment 3, 1.0 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.

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.