MJ2521 Integrated Energy Systems for Buildings 6.0 credits

Integrerade energisystem för byggnader

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

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-2020-2026).

Grading scale

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

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

Knowledge in thermodynamics and heat transfer equivalent to contents of the courses MJ1112 "Applied Thermodynamics" (9 higher education credits) and MJ1401 "Heat Transfer" (6 higher education credits),
And knowledge equivalent to at least 6 credits in the subject of energy systems for buildings, for example the course 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 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 students should be able to:

1. perform operations on functions Discuss the progress in integrated energy systems for residential and commercial buildings.

2. Use the calculation tools to carry out performance calculations for integrated systems.

3. Design integrated energy systems for residential or commercial buildings.

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

4. Analyse performance of integrated energy system solutions and compare them with conventional independent solutions.

5. Describe some of the latest technologies in selected application fields.Justify their implementation and compare them with traditional technology.

6. Evaluate and propose improvements of existing system solutions for relevant applications.

Course contents

The course covers design and performance - evaluation aspects by means of modellings tools and data from real installations. The course will also discuss, how the economy of an integrated energy system can be evaluated and which business models that can facilitate the implementation of such systems. Systems monitoring and control are important parts in the integrated energy systems to reach highest efficiency and economic advantages; therefore, they are also included.

The different integrated energy systems that are discussed in this course are always compared with independent typical solutions where advantages, disadvantages, limitations and challenges are presented.

Integrated energy systems including the following systems and components will be discussed:

- Heat pump systems: air and geothermal heat pumps for heating and cooling
- Commercial cooling systems
- Solar energy systems; thermal and photovoltaic (PV)
- Energy storage; thermal and electric

Examination

- INL2 - Assignment, 2.0 credits, grading scale: P, F
- INL3 - Assignments, 2.0 credits, grading scale: P, F
- TEN1 - Oral examination, 0 credits, grading scale: A, B, C, D, E, FX, F
- INL1 - Assignments, 2.0 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.