MJ2426 Applied Heat and Power Technology 6.0 credits

Tillämpad kraft- och värmeteknologi

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 2021-10-15, the Dean of the ITM School has decided to establish this official course syllabus to apply from spring term 2023 (registration number M-2021-2041).

Grading scale

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

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

MJ2405 "Sustainable power generation", 9 cr.
MJ2411 "Renewable Energy Technology", 6 cr.

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. Evaluate the operational characteristics of the most common systems for thermal power generation to identify practical limitations of operational performance
2. Identify and quantify the way to improve the total energy efficiency by means of system integration concepts
3. Design adapted energy systems for realistic applications and evaluate its technical-economical feasibility, environmental impact and the sustainability of the proposed concepts.

Course contents

The objective of the course is to provide an engineering assessment for realization of theoretical aspects and the practical limits of heat and power generation systems including solar and wind power, evaluation of operational performances, and analysis of modern concepts for achieving energy efficiency improvements and the sustainability of operations.

Course includes six main topics;

- Theoretical concepts, practical requirements/limitations and operational performances of commonly used thermal power plant designs such as; steam turbine power, gas turbine power and gas engine-based power plant applications.
- Fundamental concepts of the designs and practical limitations of both electrical and thermal power distribution networks.
- Analysis of the power cycles to estimate quality and quantity of waste heat recovery potential from thermal power generation systems and provide engineering solutions to utilize waste energy in appropriate combined power generation applications.
- Renewables fueled thermal power generation systems; biomass boilers, MSW incineration and gasification systems (waste to energy), large scale concentrated solar power and power generation from large scale wind power are presented (as case studies) and evaluate system concepts and performances.
- Evaluation of concepts and operational performances of more advanced designs thermal power systems, such Combined Power Generation (CPG), Combined Heat and Power (CHP) and Combined Heat, Power and Cooling (CHPC) through case studies.
- Sustainability and mitigation of environmental impacts causing by thermal power plants

Examination

- TEN1 - Written exam, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- ÖVN1 - Exercises, 1.5 credits, grading scale: P, F
- ÖVN2 - Exercises, 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.

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.