MJ2494 Polygeneration 9.0 credits

Polygenerering

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

Establishment

Course syllabus for MJ2494 valid from Autumn 2012

Grading scale

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

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

MJ1112 Applied Thermodynamics (or equivalent).

MJ2405 Sustainable Power Generation (or equivalent)

MJ2490 Environomical pathways (or equivalent)

MJ2491 Environomical Pathways, Advanced Course (or equivalent)

Language of instruction

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

Intended learning outcomes

After completing the course, students should be able to:

* In detail describe the technical concept of cogeneration of multiple energy services with flexible fuel input, specifically with regards to

--> Efficiency as compared to stand-alone production

--> Economical as well as environmental performance.

* Describe and carry out engineering design of smart buffers (batteries, thermal energy storage, pure water reservoirs, etc)

* Describe and carry out engineering design of functional control strategies for integrated polygeneration systems.

* Carry out advanced thermoeconomic optimizations for design of technically robust, and environmentally and economically sound polygeneration of energy services, as applied to practial need in various situations (e.g. industrial processes, the built environment and transportation)

Course contents

In the Polygeneration course, cogeneration of multiple energy services (heat, power, cold, pure water...) using flexible fuel input to allow for a sustainable energy mix will be in focus. The following sub-topics will be covered:

- Cogeneration;

- Control strategies;

- The integration of smart buffers: batteries, thermal energy storage, pure water reservoirs, etc; and

- Thermoeconomic optimization of polygeneration systems.

Thus, the course aims at integrating those engineering skills previously aquired as applied to energy efficient energy conversion pathways -- Polygeneration.

Disposition

The course will be given in periods 1 and 2

Planned hours:

- Lectures -- 40 h (20 occasions)

- Class exercise --20 h (10 occasions)

- Exam -- 5h (after study period 1)

- Project presentation, PRO1 -- 8h (scheduled last week of period 2)

Course literature

CompEdu www.compedu.net

Scientific articles available through KTH library

Lecture Handout

Examination

- INL1 - Assignment, 2.0 credits, grading scale: P, F
- PRO1 - Project, 2.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Exam, 5.0 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.

If the course is discontinued, students may request to be examined during the following two academic years.

TEN1 -- Written Exam 5hp, Grading A-F

INL1 -- Assignment 2 hp, Grading P/F

PRO1 -- Project, 2hp, Grading A-F

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.