



# MJ1405 Introduction to Energy Conversion in Energy Technology 5.0 credits

Introduktion till Energiomvandling inom Energiteknik

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

## Establishment

The official course syllabus is valid from the fall semester 2024 in accordance with the decision by the Head of the ITM School: M-2023-2164. Date of decision: 2023-10-13

## Grading scale

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

## Education cycle

First cycle

## Main field of study

Mechanical Engineering

## Specific prerequisites

Degree of Bachelor (BSc) or the equivalent.

## 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. Correctly describe power system components and explain their functions.
2. Carry out calculations on AC and DC circuits.
3. Give an account of the energy transformation process to electric power.
4. Calculate power system quantities based on the unit system.
5. Summarise operation principles of a power system in terms of control of voltage, active and reactive power.

## Course contents

The course will give the students a basic background in electrical engineering, electric machines, force converters and power systems to prepare them for future courses in the field of electrical engineering and power generation. It will balance the knowledge between students with electric and non-electronic engineering backgrounds and to give an applied view of conventional electrotechnical concepts that are usually taught in a purely theoretical way.

The course starts with an introduction to the electric power system, where the main parts in the power system and its essential components are introduced. The basic operation of the power system will also be described. The second part of the course consists of basic electrotechnical concepts. The basic concepts in electrical engineering will be explained to give the students basis to carry out basic calculations with AC circuits. Three-phase AC systems (basic for an understanding of the power system and power generation) will be introduced. The third part consists of description of synchronous generators, where the aim is to gain an understanding of the basic basic principles of synchronous generators. The fourth part consists of force converters, where the aim is to gain an understanding of the basic operation principles of force converters that are used in renewable production. The fifth part consists of the foundations for control of power systems, where the aim is to gain an understanding of the basic operation principles of synchronous generators and the basic control of the power system.

## Examination

- KONA - Partial exam, 2.0 credits, grading scale: A, B, C, D, E, FX, F
- KONB - Partial exam, 2.0 credits, grading scale: A, B, C, D, E, FX, F
- INLA - Hand-in assignment, 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.