ED2200 Energy and Fusion Research 6.0 credits

Energi och fusionsforskning

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

Course syllabus for ED2200 valid from Spring 2019

Grading scale

P, F

Education cycle

Second cycle

Main field of study

Electrical Engineering,Engineering Physics,Physics

Specific prerequisites

Students from all programs, but prerequisites listed in the course information are strongly recommended.

Language of instruction

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

Intended learning outcomes

The main objective of this course is to present and discuss fusion energy in the perspective of future national and global energy scenarios, as well as to provide basic knowledge in fusion physics.

The student should be able to

- give an overview of the national and global energy production within a sustainable perspective
- discuss the need for fusion energy for future production of electricity
- describe the principles for for magnetic confinement, both at particle- and at macroscopic level
- give an account of the most important plasma models
- solve simpler problems within the fusion plasma physics fields of equilibrium, stability and transport
- describe the basic plasma parameters and correspon-ding diagnostic techniques for fusion plasmas
- explain the function of different plasma heating techniques
- describe the components of a fusion reactor, and their functions
- give an account of alternative confinement schemes and the planned route to a reactor

Course contents

The course provides an introduction to the international energy problems and to fusion research. In particular, the following topics are treated:

The energy demand. Different energy sources. Environment and energy. Possible future energy scenarios. The potential of fusion energy.

Brief history of fusion research. The research at KTH and internationally.

The Lawson criterion. The fusion plasma and its quality parameters.

Theoretical plasma models.

Equilibrium. Stability. Transport.

The tokamak today and as a reactor.

Alternative fusion. Inertial confinement.

The components of a reactor.

Safety and environmental problems.

Demonstration of the experimental device Extrap T2R at the Alfvén Lab, KTH.

Course literature

Jan Scheffel and Per Brunsell: Fusion physics –

an introduction to the physics behind fusion energy, Stockholm 2016.

Examination

- PRO1 - Project, 1.5 credits, grading scale: P, F
- ÖVN1 - Assignments, 4.5 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.

Other requirements for final grade

Continual examination, consisting of home assignments (4.5 credits) and group work in class (1.5 credits). There is no final exam.

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.