



FED3310 Plasma Waves, Advanced Course 6.0 credits

Plasmavågor, avancerad kurs

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 FED3310 valid from Autumn 2011

Grading scale

Education cycle

Third cycle

Specific prerequisites

ED2210, Electromagnetic Processes in Dispersive Media or a similar course and FED3250 or FED3240

Language of instruction

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

Intended learning outcomes

When completing the course, the student should be able to

- Describe the main modifications of the response due to hot plasmas
- Characterize the most common waves in a hot plasma
- Describe how to calculate the change in the distribution function due to wave-particle interaction, using quasi-linear theory
- Describe RF-heating and current drive
- Characterize the drift waves
- Describe three-wave interactions
- Describe how the ponderomotive force affects the plasma

Course contents

Hot dielectric tensor; waves in hot plasmas, instabilities in velocity space (stimulated emission). Quasilinear diffusion in velocity space due to collisions and wave absorption; radio frequency heating and current drive. Linear mode conversion, the Budden equation.

Drift waves. Non-linear effects; ponderomotive force and three-wave interactions.

Disposition

Seminars or discussion meetings.

Course literature

Lecture notes. References in lecture note required for understanding the notes.

T.H. Stix, Waves in Plasmas, American Institute of Physics, New York, 1992 Chapters 10, 11 13 14, 16, 17

e.g. in D.G. Swanson, Plasma Waves, second edition, Institute of Physics Publishing Ltd 2003 London

Examination

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

Written and Final Oral examination

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.