FSF3731 Obstacle Problems in Mathematical Physics and Industry 7.5 credits

Hinderproblem i matematisk fysik och industri

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 FSF3731 valid from Autumn 2009

Grading scale

Education cycle

Third cycle

Specific prerequisites

A Master degree including at least 30 university credits (hp) in in Mathematics. Standard courses in Analysis on advanced level.

Language of instruction

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

Intended learning outcomes

The goal of the course is to learn how to solve certain problems related to free boundaries that appear in various applied sciences.

This will also give insight in how mathematics---and in particular partial differential equations---can be used to formulate problems in physics, mechanics, finance, biology, and industry,

After completing the course students should understand and be able to apply the theory of variational calculus and partial differential equations to study specific problems chosen from applications.

Course contents

The material will be chosen from the following topics:

The obstacle problem:

Specific topics to be treated in this course are chosen from various applications in physics, biology, industry, finance, and others.

Mathematical tools:

- Basic functional analysis,
- Function spaces,
- Green's formula and boundary value problems,
- Second order elliptic partiella, differentialekvationer,
- The projection theorem,
- Existence results,
- Stability,
- Comparison and maximum principles.

Disposition

Lectures and seminars.

Course literature

Lecture Notes by the examiner and other articles

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.

The examination consists homework assignments and oral presentation of a project.

Other requirements for final grade

Approved assignments and presentations.

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.