SI1336 Simulation and Modeling 6.0 credits

Simulering och modellering

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 SI1336 valid from Autumn 2019

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Language of instruction

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

Intended learning outcomes

After the course you should be able to:

- Program and simulate simple physical models.
- Graphically visualize the results of the simulations.
- Analyze and discuss the plausibility of the results by going to various borderline.
- Compare with experiments and discuss possible reasons for the discrepancies.
- Apply methods to new problems.

Course contents

The course introduces computer simulation as a general and elegant problem-solving approach in engineering sciences, which can be used where traditional methods do not work. The course aims to provide skills to use the computer as a powerful tool for the simulation - computer experiments - studying physical and general interacting systems. The course covers both modeling and computing as parts of the same whole. How should the model be formulated to be both realistic and possible to simulate efficiently? How should the simulation performed to identify the characteristics of the system and provide results that can be compared with the ruckus?
The course includes introductory lectures introducing various concepts, skills and models. The main part of the course consists of a number of student projects. The projects include modeling and programming problems from different areas of physics and engineering, such as classical mechanics, electromagnetism, statistical mechanics, forest fires and traffic. For each project used all the steps you need for simulations in academia and industry: introduce a problem area, formulating a model, choose one or more simulation methods, write or adapt a program, running simulations and analyzing and presenting the results.
The course provides a flexible set of modeling and simulation skills that can be used to study many other problems.

Specific prerequisites

Finished cours SF1544, Numerical Methods, Basic Course IV.

Course literature

An Introduction to Computer Simulation Methods: Applications to Physical Systems (3rd Edition)

Harvey Gould, Jan Tobochnik, Wolfgang Christian, Addison Wesley; 3 edition, 2006

Examination

- PRO1 - Project exercises, 3.0 credits, grading scale: P, F
- PRO2 - Final Project, 3.0 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.

Other requirements for final grade

To pass the course, both projects must be approved.

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.