SI1335 Introductory Simulation Physics 6.0 credits

Inledande simuleringsfysik

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

Establishment

Course syllabus for SI1335 valid from Spring 2015

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Recommended prerequisites:
Elementary programming in Python or MATLAB, basic courses in mathematics, mechanics and physics.

Language of instruction

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

Intended learning outcomes

- Program and simulating simple physical models.
- Graphically illustrate results from simulations.
- Analyze and discuss the plausibility of the results by going to various limiting cases.
- Compare with experiments and discuss possible reasons for discrepancies.
- Apply the methods to new problems.

Course contents

This course introduces computer simulation as a general and elegant way of solving problems in physics, which can be used also where traditional methods fail. The course aims to give skills to use the computer as a powerful tool for simulation - computer experiments - to study physical systems. The course covers both the modeling and computing in an integrated way. How should physical models be formulated to be both realistic and possible to simulate efficiently? How should the simulation be performed to identify properties of the system system and generate results that can be compared with experiments?
The course includes introductory lectures that introduces various concepts, skills and models. Most of the course consists of a number of student projects. The projects include modeling and programming of problems from different areas of physics and classical mechanics, electromagnetism, thermodynamics, statistical mechanics and quantum mechanics.
This course provides a flexible set of modeling and simulation skills that can be used to study many other problems.

Course literature

An Introduction to Computer Simulation Methods: Applications to Physical Systems (3rd Edition)
Harvey Gould, Jan Tobochnik, Wolfgang ChristianAddison Wesley; 3 edition, 2006

Examination

- PRO2 - Project, 2.0 credits, grading scale: P, F
- TEN2 - Exam, 2.0 credits, grading scale: A, B, C, D, E, FX, F
- PRO3 - Project, 2.0 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.

If the course is discontinued, students may request to be examined during the following two academic years.

TEN2 - Written examination, 2 hp, grades A-F

PRO2 - Written and oral presentation of computer simulation data, 2 credits, grades: P-F

PRO3 - Written and oral presentation of computer simulation data, 2 credits, grades: A-F

Other requirements for final grade

Written examination (TEN2, 2 hp). Presentation of project (PRO2, 2 hp and PRO3, 2hp).

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.