



Course syllabus

Faculty of Technology

Department of Physics and Electrical Engineering

2FY812 Datorfysik I, 7,5 högskolepoäng

2FY812 Computational Physics I, 7.5 credits

Main field of study

Physics

Subject Group

Physics

Level of classification

First Level

Progression

G2F

Date of Ratification

Approved 2010-11-26

Revised 2014-06-16 by Faculty of Technology. Objectives, content and examination are revised.

The course syllabus is valid from autumn semester 2014

Prerequisites

Physics 45 credits, and Mathematics 45 credits or equivalent.

Objectives

- Knowledge of computer simulation and methods for different physical and technical applications.
- Ability to independently identify, formulate and solve physics problems by performing numerical simulations. @@Understanding and ability to write algorithms and simple computer programs to perform simulations.
- Knowledge and ability to use simple standard programs for computations and simulations.
- Understanding the impact of information technology on society.

Content

Basic skills in using standard mathematics programs such as Mathematica and/or Matlab.

Numerical integration of differential equations. Applications on mechanical systems

including chaotic and many-body problems.

Finite difference method: Poisson equation, diffusion equation. Applications on electrostatic problems, diffusion and heat conduction.

Monte Carlo methods, random numbers and statistical distributions. Applications on thermodynamic systems and the Ising model.

Curve fitting and regression analysis including error estimation and Hypothesis Testing.

Type of Instruction

Lectures, laboratory exercises and/or project work.

Examination

The course is assessed with the grades Fail (U), Pass (G) or Pass with Distinction (VG).

On request, students may have their credits translated to ECTS-marks. Such a request must be sent to the examiner before the grading process starts.

Assessment of student performance is made through written and oral presentation of mandatory assignments.

Students who do not pass the regular examination are given the opportunity to do a resit examination shortly after the regular examination.

Course Evaluation

A course evaluation will be carried out at the end of the course in accordance with the guidelines of the University. The result of the course evaluation will be filed at the department.

Required Reading and Additional Study Material

Required Reading

Harvey Gould, Jan Tobochnik, and Wolfgang Christian: *An Introduction to Computer Simulation Methods: Applications to Physical Systems*”