



## Course syllabus

Faculty of Technology

Department of Physics and Electrical Engineering

2FY512 Datorfysik I, 7,5 högskolepoäng

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 2014-10-03

Revised 2016-11-09 by Faculty of Technology. Prerequisites are revised.

The course syllabus is valid from autumn semester 2017

### **Prerequisites**

Physics 30 credits, and Mathematics 30 credits including a course in Analysis of several variables 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 A, B, C, D, E, Fx or F.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

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.

### Other

Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

### 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*”