



COURSE SYLLABUS

Computer Simulation in Physics and Engineering, 6 credits

Datorsimulering i fysik och teknik, 6 högskolepoäng

Course Code:	TDSK16	Education Cycle:	First-cycle level
Confirmed by:	Dean Feb 9, 2015	Disciplinary domain:	Technology (95%) and social sciences (5%)
Valid From:	Jan 1, 2016	Subject group:	TF1
Version:	1	Specialised in:	GIF
Reg number:	JTH 2015/1519-313		

Intended Learning Outcomes (ILO)

On the completion of the course, the student should

Knowledge and understanding

- show a basic knowledge of the selected areas of thermodynamics, electrodynamics, mechanical vibrations and spectra of periodic signals, including their engineering applications
- show a basic knowledge of mathematical modeling as process and computer simulation as a part of it
- show basic understanding of concepts of model verification and validation in engineering

Skills and abilities

- show independent ability to perform written calculations with mathematical models of different physical phenomena
- show a basic ability to select relevant simulation methods, and build computational models with the help of simulation tools, as well as classify mathematical models of classical physics
- show a basic ability to apply simulation tools, such as e.g. Matlab/Simulink, CFD tool Flotherm, CEM tool Wire-MoM, both for evaluating the performance of a physical system and for solving physics-related engineering problems
- show independent ability to create simple programs in Matlab, and apply them for post-processing and visualization of simulation/calculation results

Judgement and approach

- show independent ability to evaluate of physical system performance and to perform comparison of system variants, with the help of simulation tools

Contents

The course treats models of classical physics and engineering applications, introducing simulation software as a tool for engineering problem solving and evaluation of physical system performance. The simulation tools shall demonstrate and help understanding various physical phenomena via learning a typical simulation work flow, and interpreting the simulation results.

The course includes the following topics:

- Computer simulation methodology in physics and engineering.
- Thermodynamics, incl. fundamentals of heat transfer and applications.

- Spectra of periodic signals, and applications.
- Elements of electrodynamics, and applications.
- Overview of mechanical vibrations, and applications.

Type of instruction

Lectures, exercise sessions, exercise assignments, tutorials and computer simulation labs, incl. experimental support. Laboratory sessions provide hands-on experience in the simulation tools used by research and development staff and design engineers in industries. Some laboratory sessions include experimental validation and theoretical verification of computational models.

The teaching is conducted in English.

Prerequisites

General entry requirements with Physics B or Physics 2 from gymnasium or completed course Basic Physics 2, 6 credits, and Single Variable Calculus, 6 credits (or the equivalent).

Examination and grades

The course is graded 5,4,3 or Fail.

For grade 3 it is required to get passed both the written home assignments and the computer labs.

For a grade higher than 3, it is required to pass a written examination related to the theory contained in the course compendium.

Registration of examination:

Name of the Test	Value	Grading
Assignments and laboratory work	6 credits	5/4/3/U

Course literature

Literature

Course compendium which is to be distributed.

The literature list for the course will be provided one month before the course starts