ED1100 Engineering Science 7.5 credits

Ingenjörsvetenskap

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

Establishment

Course syllabus for ED1100 valid from Autumn 2011

Grading scale

P, F

Education cycle

First cycle

Main field of study

Electrical Engineering, Technology

Specific prerequisites

General and specific entry requirements for Master of Science programmes.

Language of instruction

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

Intended learning outcomes

Technology does not exist in Nature - all of technology is designed by man. While the natural sciences focus on laws of Nature, the science of technology is mainly concerned with the methods we humans use to design and manufacture objects and procedures. Engineering Science extends technology to include topics as mathematical modelling, history of technology and the engineer's professional role. These are also the main topics for this course in Engineering Science.

The ambition is that the student, having completed the course, will be able to

- create mathematical models for given scenarios in the steps problem identification, assumptions, solution, interpretation, validation and implementation,
- construct and graphically represent theoretical and empirical models from empirical data,
- make estimates, check formulas and carry out dimensional analysis,
- use the programmes Maple and Excel as tools for problem solving,
- give an account of the evolution of technology as compared to natural science, and discuss their relations,
- constructively reflect over the professional roles of male and female engineers in society,

and show basic skills in

- oral communication and scientific writing in technology and natural science.

Course contents

Progress of technology and science. About understanding and modelling nature. Quantities. Units. Constants of Nature. Methodology for construction of mathematical models. Hypothetical deductive research metodology. Dynamical, iterative systems. Nonlinear systems and chaos. Emperical and theoretical models. Use of derivatives in modelling. Graphical model fitting. Least square and Chebyshev methods. Regression analysis of large data sets. Error sources in modelling. Estimates. Formula checks. Analysis of extreme cases. Proportionality. Dimensional analysis for checking computations and for finding new relations. Simulation modelling. Differential equations as models. The computer tools Maple and Excel. Male and female students of technology - a historical perspective. Perceptions about engineers. The roles of the engineer and the technology user in a gender perspective. Introduction to oral communication and scientific writing.

Disposition

The course is based on learning oriented pedagogics.
Lectures are goal oriented and class sessions are partially carried out as group work.

Course literature

B. Sundin, Den kupade handen, Carlssons, 2006.

F. R. Giordano M. D. Weir and W. P Fox, A first course in mathematical modeling, Thompson 2009

G. Grimvall, Basic facts and skills in physics. 2011, Dept. of Physics, KTH.

Literature on gender aspects for engineers, distributed.

Examination

- ANNC - Assignments, 1.5 credits, grading scale: P, F
- ANNA - Assignments, 4.5 credits, grading scale: P, F
- ANNB - Assignments, 1.5 credits, grading scale: P, 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.

Grades P/F.

Other requirements for final grade

Weekly hand in exercises, participation in seminars and lectures as well as oral presentation.

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.