



IF1611 Engineering Fundamentals 7.5 credits

Ingenjörsmetodik

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

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

Establishment

Course syllabus for IF1611 valid from Autumn 2008

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Mathematics and physics from senior high in Sweden.

Language of instruction

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

Intended learning outcomes

Mathematics is an essential language in natural science and technology. In this course, the students will practice mathematics by solving actual problems. Emphasis is also placed on physical units and error analysis, which makes this course complementary to traditional mathematics courses that the students will take. In this way, the course also aims at setting the students on the right track in terms of units and significant figures already from Day One at KTH. Basics in thermal physics such as the development of the ideal gas law and van der Waals' gas law are treated with care as an attempt to show the students how scientists deal with real-world problems. After finishing the course, the students should be able to* analyse a given mathematical model with the assistance of dimensional analysis;* build a mathematical model for a descriptive problem with- correct dimensions to each and every physical parameter involved; - proportionality constants determined through the use of least square method;- the solution given in correct units and significant figures;- measurement errors and combined errors analyzed;- an appropriate estimate of a numerical answer.* analyse the behaviour of a function with the assistance of derivatives or differences;* use trigonometric functions, exponential and logarithmic functions as well as derivatives to solve equations or simultaneous equations encountered;* practise with Boyle's, Gay-Lussac's and Charles' laws of gas;* tell the underlying assumptions for the ideal gas law and van der Waal's gas law * use Matlab for graphical solutions and simple calculations as an additional means to solve encountered problems.

Course contents

* Units, proportionality, estimation, dimensional analysis, graphical modeling, mathematical modelling and data fitting;* Mathematics: Polynomials, derivatives (integrals), trigonometric functions, exponential and logarithmic functions, all taught in high school (gymnasiet);* Thermal physics: Boyle's, Gay-Lussac's and Charles' laws of gas, ideal gas law and van der Waal's gas law; * Examples taken from mechanics (speed, acceleration, pendulum movement) and electricity (simple DC circuits) as well as more general society-related issues such as population growth;* Basics of computer usage in the Windows or Linux environment. Matlab for practical engineering problem solving.* Discussions of the professional and scientific identities as an engineer as well as of gender issues.

Disposition

Outline- Lecture: 18X2 h (for both IT and ME programmes)- Tutorial: 13X2 h (3 groups for both IT and ME)- Laboratory: 4X4 h (3 groups for both IT and ME)

Course literature

Introduction to MATLAB 7, Delores M. Etter and David C. Kuncicky with Holly Moore Upplaga: Förlag: Pearson Prentice Hall; Upper Saddle River, NJ 07458 År: 2005 ISBN: **Övrig litteratur** Kompendium 1 "Ingenjörsmetodik", av Shi-Li Zhang Kompendium 2 "Ingenjörsmetodik – Datorlaborationer med kalkylark, Matlab och ordbehandlare", av Carl-Mikael Zetterling

Examination

- LAB1 - Laboratory Work, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination, 4.5 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.

Other requirements for final grade

One written exam (TEN1; 4.5 ECTS credits) And approved lab-report (LAB1; 3 ECTS credits)

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.