Applied Mathematics in Science and Technology

Programme course

6 credits

Tillämpad matematik i teknik och naturvetenskap

TNA005

Valid from: 2017 Spring semester

Determined by
Board of Studies for Electrical Engineering, Physics and Mathematics

Date determined
2017-01-25

Main field of study
Mathematics, Applied Mathematics

Course level
First cycle

Advancement level
G1X

Course offered for
- Electronics Design Engineering, M Sc in Engineering
- Communications, Transport and Infrastructure, M Sc in Engineering
- Media Technology and Engineering, M Sc in Engineering

Specific information
The course include a part of the syllabus block "oral and written communication in english"

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Foundation course in mathematics, Linear algebra, Programming. Calculus in one variable can be studied in parallel with this course, or is otherwise prerequisite.

Intended learning outcomes

The course is intended to bridge between basic mathematic courses and courses within science and technology. Students will aim to improve their ability in using mathematical results and computational software, as MATLAB, to study, analyse, and to some degree, solve realistic problems from applications. After the course, the student should be able to:

- write and use mathematical models for some problems in information technology and physics applications;
- reflect over the benefits and restrictions of a mathematical model;
- use MATLAB as a natural tool for solving computational problems, including: work with matrices and systems of linear equations, formulating and solving least squares problems, solving ordinary differential equations, performing numerical integration;
- choose a suitable method to study mathematical problems arising in different contexts of science and technology;
- structure and present mathematical ideas in both written and oral form;
- write a short technical report in both Swedish and English;
- give relevant and constructive feedback on technical reports, both in written and in oral form.

Course content

Introduction to Matlab and basic programming. Mathematical modelling. Numerical computations: linear algebra, transformations, systems of equations, least squares problems, matrix computations, matrix factorisations, quadrature and ordinary differential equations. Treatment of problems in computer graphics, information technology, and physics applications. Writing of technical reports in Swedish and English; opposition and oral presentations. Review of English grammar and sentence composition.

Teaching and working methods

The teaching consists of lectures, computer exercises, student presentations with feedback, and guidance occasions. A number of mini projects constitute the core of the course. They shall be conducted using MATLAB, and be presented both in writing and orally. These projects are carried out in groups of two to three students, except the last one which is conducted individually. To the group projects, there are also written and oral oppositions.
The course runs over the entire spring semester.

Examination

UPG8	Written report (in English)	1 credits	U, G
UPG6	Individual mini project. Oral and written presentation	2 credits	U, G
UPG7	Mini group project; Oral and written presentation and opposition	1 credits	U, G
UPG5	Mini group project. Oral and written presentation	1 credits	U, G
UPG9	Individual computer examination	1 credits	U, G

Additional occasion for examination is only given in august.
Only the grades Pass/Fail are given on the course.

Grades
Two-grade scale, U, G

Other information
Supplementary courses: All courses with a mathematical content.

Department
Institutionen för teknik och naturvetenskap

Director of Studies or equivalent
George Baravdish

Examiner
Berkant Savas

Course website and other links
http://www2.itn.liu.se/utbildning/kurs/

Education components
Preliminary scheduled hours: 37 h
Recommended self-study hours: 123 h

Course literature

Jönsson, Per, ”MATLAB-beräkningar inom teknik och naturvetenskap, tredje utgåvan”, Studentlitteratur, Lund, 2010. Forsling, Göran och Neymark, Mats, ”Matematisk Analys en variabel”, Liber, Stockholm, godtycklig utgåva. Baravdish, George, ”Linjär algebra TNA002” (kompendium utgivet av institutionen, godtycklig utgåva). Kompletterande materiel tillgängligt från kurshemsidan.

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.