LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Beräkningsprogrammering
Scientific Computing

FMNF15, 6 credits, G2 (First Cycle)

Valid for: 2023/24
Faculty: Faculty of Engineering, LTH
Decided by: PLED F/Pi
Date of Decision: 2023-04-18

General Information

Main field: Technology.
Compulsory for: V2
Language of instruction: The course will be given in Swedish

Aim

The course provides a basic understanding of how to apply computational tools to write programs to simulate and visualize various problems in civil engineering. The student should experience technical computations as a useful tool. The course should stimulate further studies.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- be able to answer questions about the MATLAB syntax and the online help function.
- be able to describe the Matlab output corresponding to a sequence of (possible incorrect) commands.

Competences and skills
For a passing grade the student must

- be able to write computational programmes needed in later courses in the civil engineering programme.
- be able to visualize, interpret and evaluate numerical results.
- be able to report solutions and numerical results in written and graphical form.

Judgement and approach
For a passing grade the student must

write a well structured report in suitable terminology on the numerical solution of a computational project within civil engineering

Contents

Files, editing. MATLAB's basic functions: aritmetic operations, vectors, matrices, simple graphics functions. Syntax: [for], [if-then-else], [while]. Built-in functions, user-written functions, and m-files. Linear systems of equations. Non-linear equations. Least squares fitting of measurement data. Numerical integration. Interpretation and critical assessment of results. Applications and project work.

Examination details

Grading scale: UG - (U,G) - (Fail, Pass)
Assessment: Written exam and a computational project.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Parts
Code: 0117. **Name:** Project.
Credits: 1,5. **Grading scale:** UG. **Assessment:** Computational project. **Contents:** See above.
Code: 0217. **Name:** Scientific Calculation.
Credits: 4,5. **Grading scale:** UG. **Assessment:** Written examination.

Admission

Admission requirements:

- FMA420 Linear Algebra or FMA421 Linear Algebra with Scientific Computation or FMA656 Mathematics, Linear Algebra or FMAA20 Linear Algebra with Introduction to Computer Tools or FMAA21 Linear Algebra with Numerical Applications or FMAA55 Mathematics, Linear Algebra or FMAB20 Linear Algebra

Assumed prior knowledge: FMAA05 Calculus in One Variable and FMAB30 Calculus in Several Variables.
The number of participants is limited to: No
The course overlaps following course/s: FMN140, FMN065, FMNF05

Reading list

- Exercise material is provided by the department.

Contact and other information

Course coordinator: Anders Holst, Studierektor@math.lth.se
Teacher: Johan Helsing, helsing@maths.lth.se
Course coordinator: Studerandeexpeditionen, expedition@math.lth.se
Course homepage: https://canvas.education.lu.se/courses/20390
Further information: The applications are taken from structural design, building physics,

hydrology and hydraulics. The students will work on a larger project, which is developed in cooperation with the teacher in Structural mechanics.