Course syllabus

Beräkningsprogrammering
Scientific Computing

FMN140, 6 credits, G2 (First Cycle)

Valid for: 2016/17
Decided by: Education Board B
Date of Decision: 2016-03-29

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 an 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: arithmetic 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  
**Assessment:** Written exam and a computational project.

**Parts**

Code: 0110. **Name:** Scientific Calculation.  
Credits: 4.5. **Grading scale:** UG. **Assessment:** Written examination.  
Code: 0210. **Name:** Project.  
Credits: 1.5. **Grading scale:** UG. **Assessment:** Computational project. **Contents:** See above.

**Admission**

**Admission requirements:**

- FMA420 Linear Algebra

**Required prior knowledge:** FMAA05 Calculus in One Variable and FMA430 Calculus in Several Variables.

**The number of participants is limited to:** No  
**The course overlaps following course/s:** FMN065

**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 administrator:** Patricia Felix Poma de Kos, patricia.felix_poma_de_kos@math.lth.se  
**Course homepage:** http://www.maths.lth.se/na/courses/FMN140  
**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.