Course syllabus

Beräkningsprogrammering
Scientific Computing

FMNF15, 6 credits, G2 (First Cycle)

Valid for: 2017/18
Decided by: PLED F/Pi
Date of Decision: 2017-04-06

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: arithmetric 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.


*Credits:* 4.5. *Grading scale:* UG. *Assessment:* Written examination.

**Admission**

*Admission requirements:*

- FMAB20 Linear Algebra

*Required 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:* FMN065, FMN140

**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.