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: 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 - (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:

- 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.