Faculty of Science

NUMN05, Simulation Tools, 7.5 credits

Simuleringsverktyg, 7,5 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2013-01-09 to be valid from 2013-01-09, spring semester 2013.

General Information

The course is an elective course for second-cycle studies for a Degree of Master of Science (120 credits) in mathematics with a specialisation in numerical analysis.

Language of instruction: English

Main field of studies	*Depth of study relative to the degree requirements*
Mathematics	A1F, Second cycle, has second-cycle course/s as entry requirements
Mathematics with specialization in Numerical Analysis	A1F, Second cycle, has second-cycle course/s as entry requirements

Learning outcomes

The aim of the course is that students on completion of the course should have acquired the following knowledge and skills:

Knowledge and understanding:

- know which types of problems that can be solved by means of the programs that are discussed during the course.
- know which numerical methods that are used.

Skills and abilities:

- be able to make his or her own evaluations of the results obtained for some examples/problems.
- independently be able to apply and critically evaluate numerical methods that are used in industrial program packages.

Judgement and approach:

- have acquired the ability to see structural similarities between different engineering problems.
- be able to write a report that in a well-structured manner and with adequate terminology accounts for mathematical methods that are used in industry-related simulation tools.

Course content

Theoretical part: Numerical treatment of ordinary differential equations with discontinuities and/or algebraic constraints. Different modelling techniques, variational integrators and other numerical methods suitable for modelling ordinary differential equations with discontinuities and/or algebraic constraints. Introduction to a modelling language.

Practical part: Numerical experiments with computational tools in commercial, industrially relevant, software such as MSC Adam's and ABACUS. Similar experiments with self-produced code in MATLAB or Python.

Course design

The teaching consists of lectures and supervision of advanced assignments.

Assessment

Examination takes place in the form of a written report that is prepared gradually with weekly submissions.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass.
In order to pass the course the student must have produced an approved report and have made an approved presentation of his or her results at a seminar.

Entry requirements

For admission to the course, knowledge equivalent to NUMN12 Numerical methods for differential equations, 7.5 credits, is required.

Subcourses in NUMN05, Simulation Tools

Applies from H13

1301 Simulation Tools, 7,5 hp
Grading scale: Fail, Pass