Faculty of Science

NUMN25, Advanced Course in Numerical Algorithms with Python/SciPy, 7.5 credits

Avancerad kurs i numeriska algoritmer med Python/SciPy, 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 with specialization in Numerical Analysis	AXX, Second cycle, in-depth level of the course cannot be classified
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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:

- have obtained an understanding of the basic principles of computational algorithms.
- have advanced his or her knowledge of a number of important computational problems and ways to tackle them.

Skills and abilities:

- have acquired numerical programming skill at the highest level.
- have learnt how to code, test, and assess results of, complex numerical algorithms with the use of well-established software libraries.
- be able to carry out a programming project in a group including identification of, and division in, partial problems and personal responsibility for the solution of a partial problem.
- be able to account for a computational project both in an oral presentation and in a written report.

Course content

Description of the subject-related contents of the course:

- Introduction to Python assuming knowledge of other programming languages/tools. Object-oriented programming style for scientific computing. Scipy/Numpy data structures.
- Examples of complex numerical algorithms from different fields within numerical analysis.
- Coupling to numerical libraries in C and Fortran (Netlib).
- Automatic tests in scientific computing. Graphical representation of numerical results (animation). The use of Python to control system processes.
- The contents may be supplemented with contributions from invited guest lecturers with special expertise.

Course design

The teaching consists of lectures and supervision of programming projects. A larger programming project is carried out in groups.

Assessment

Examination takes place through individual, weekly programming projects. A larger programming project in groups, with written report, should be presented before other course participants at a seminar. Review of the report of another group. Compulsory attendance at all presentations.

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

Grades

Marking scale: Fail, Pass.
To pass the entire course, the student must have passed on all programming projects (including passed written report and oral presentation for the group project), have produced an approved review of the report of another group and have attended all presentations.

Entry requirements

For admission to the course, knowledge equivalent to NUMA22 Tools in Computational Mathematics, 7.5 credits, and 7.5 credits more in numerical analysis (e.g. NUMA11, NUMA12, NUMN12 or NUMN15) is required.

Subcourses in NUMN25, Advanced Course in Numerical Algorithms with Python/SciPy

Applies from H12

1201 Advanced Course in Numerical Algorithms with Python/SciPy, 7,5 hp
Grading scale: Fail, Pass