

Syllabus

for course at advanced level

Numerical Methods for Physicists II
Numeriska metoder för fysiker II

**7.5 Higher Education
Credits**
7.5 ECTS credits

Course code:	BE7001
Valid from:	Spring 2015
Date of approval:	2006-09-27
Changed:	2014-08-22
Department	Department of Mathematics (incl. Math. Statistics)
Main field:	Scientific Computing
Specialisation:	A1N - Second cycle, has only first-cycle course/s as entry requirements

Decision

This syllabus has been approved by the Board of the Faculty of Science at Stockholm University, September 27, 2006, revised October 15, 2007, and August 22, 2014.

Prerequisites and special admittance requirements

For course admission knowledge equivalent to Numerical Methods for Physicists I, FL, 7.5 HECs (BE3002) is required.

Course structure

Examination code	Name	Higher Education Credits
LABB	Practical Exercises	4.5
THEO	Theory	3

Course content

a. The course covers

- Numerical algebra: Linear/non linear systems of equations. Direct and iterative methods. Perturbation theory and condition. Eigenvalue problems and singular value decomposition. Linear/non linear model fitting. Numerical optimization.
- Ordinary differential equations: initial value and boundary value problems. Difference methods and methods of approach. Stability and accuracy. Stiff and non-stiff problems.
- Partial differential equations: classification, boundary conditions. Finite differences and finite element methods. Stability and accuracy.
- Practical exercises give training in managing applied problems from different areas of physics.

b. The course includes the following elements:

- Practical Exercises, 4.5 HECs
- Theory, 3 HECs

Learning outcomes

It is expected that the student after taking the course will be able to:

- use, analyse and implement advanced computer oriented numerical methods

- solve technical-mathematical problems from different applications of physics
- use mathematical-numerical software for computer simulation of physical courses of events
- evaluate and present, both orally and in written reports, results of numerical computations and computer simulations

The course gives necessary qualifications for continued studies in scientific computing.

Education

The education consists of lectures, exercises, and practical exercises.

Participation in practical exercises is compulsory. The examiner may rule that a student is not obliged to participate in certain compulsory education, if there are special grounds for this, after consultation with the relevant teacher.

Forms of examination

a. Examination for the course is in the following manner: measurement of knowledge of Theory takes place through written examination, and the Practical exercises through written and oral presentation.

b. Grading is carried out according to a 7-point scale related to learning objectives:

A = Excellent
 B = Very Good
 C = Good
 D = Satisfactory
 E = Sufficient
 Fx = Fail
 F = Fail

c. Grading criteria for the course will be distributed at the start of the course.

d. A minimum grade of E is required to pass the course, together with participation in all compulsory education.

e. Students who receive a failing grade on a regular examination are allowed to retake the examination as long as the course is still provided. The number of examination opportunities is not limited. Other mandatory course elements are equated with examinations. A student who has received a passing grade on an examination may not retake the examination to attain a higher grade. A student who has failed the same examination twice is entitled to have another examiner appointed at the next examination. Such requests should be made to the department board.

The course has at least two examinations for each academic year in the years in which instruction is provided. Intervening years include at least one examination.

f. Students awarded the grade Fx are given the opportunity to improve their grade to E. The examiner decides the supplementary assignments to be performed and the pass mark criteria. The supplementary assignments will take place before the next examination session.

Interim

Students may request that the examination is carried out in accordance with this syllabus even after it has ceased to apply. This right is limited, however, to a maximum of three occasions during a two-year-period after the end of giving the course. A request for such examination must be sent to the departmental board. The provision also applies in the case of revisions to the course plan.

Limitations

The course may not be included in a degree together with the course Applied Numerical Methods, Intermediate Course (BT2040), or the course Applied Numerical Methods, FL (BE3007), or the equivalents.

Misc

The course is a component of the Master's Programme in Computational Physics, and it can also be taken as an individual course.

Required reading

Course literature is decided by the departmental board and is described in an appendix to the syllabus.