Department of Mathematics
(incl. Math. Statistics)

Stockholm University

Syllabus

for course at first level

Applied Numerical Methods
Tillämpade numeriska metoder

7.5 Higher Education Credits
7.5 ECTS credits

Course code:	BE3009
Valid from:	Autumn 2014
Date of approval:	2013-10-07
Department	Department of Mathematics (incl. Math. Statistics)
Main field:	Scientific Computing
Specialisation:	G1F - First cycle, has less than 60 credits in first-cycle course/s as entry requirements

Decision

This syllabus has been approved by the Board of the Faculty of Science at Stockholm University, 7 October 2013.

Prerequisites and special admittance requirements

For course admission knowledge equivalent to Numerical Methods, FL, 7,5 HECs (BE3003) is required

Course structure

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

Course content

a. The course covers:
• numerical treatment of ordinary and partial differential equations;
• numerical solution of large linear systems of algebraic equations;
• solution of differential equations with discretization by difference methods and finite element methods;
• solution of linear systems of equations by direct and iterative methods;
• orientation about mathematical modeling and about software for scientific computing.

b. The course includes the following elements:
• Theory, 3 HECs
• Practical Exercises, 4.5 HECs

Learning outcomes

It is expected that the student after taking the course will be able to:
• for a given mathematical model, identify the problem type and suggest a suitable algorithm for the numerical solution;
• implement an algorithm in a programming language suitable for numerical solution of a mathematical model;
• identify suitable software for numerical solution of problems from scientific and engineering applications; utilise computer tools for simulation and visualization of mathematical models in science and engineering;
• recognize and construct simple model problems for the analysis of stability and accuracy of a numerical

model;
• among several possble numerical methods choose a method that is is efficient.

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

Participation in practical exercises is compulsory. An 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.

The instruction is in English.

Forms of examination
a. Examination for the course is in the following manner: measurement of knowledge of the element Theory takes place through written and oral examination.

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 pass of the element Practical Exercises, and participation in all other 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, unless there are special reasons to the contrary. Such requests should be made to the department board.
The course includes at least two examination opportunities (if necessary: for each course unit) per year when the course is given. At least one examination opportunity will be offered during a year when the course is not given.

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.

Limitations
The course may not be included in a degree together with the course Applied Numerical Methods, Intermediate Course (BT2040), Applied Numerical Methods, FL (BE3007), Applied Numerical Methods, FL (BE3008), Numerical Methods for Physicists II, SL (BE7001), or the equivalents.

Misc
The course is offered as a separate course.

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