



Syllabus

for course at first level

Mathematics I
Matematik I

30.0 Higher Education
Credits
30.0 ECTS credits

Course code:	MM2001
Valid from:	Autumn 2008
Date of approval:	2008-09-01
Department	Department of Mathematics (incl. Math. Statistics)
Subject	Mathematics
Specialisation:	G1N - First cycle, has only upper-secondary level entry requirements

Decision

This syllabus has been approved by the Board of the Faculty of Science at Stockholm University on 8 June 2006, revised on 7 June 2007 and on 1 September 2008.

Prerequisites and special admittance requirements

Swedish upper secondary school course Mathematics D, or equivalent.

Course structure

Examination code	Name	Higher Education Credits
M101	Basic computational skills	1.5
M102	Polynomials	1.5
M103	Matrices and systems of linear equations	1.5
M104	Problem solving in algebra	7.5
M105	Elementary functions	1.5
M106	Derivation	1.5
M107	Integration	1.5
M108	Problem solving in mathematical analysis	7.5
M109	Seminar in problem solving	3
M110	Computer-aided problem solving	3
M115	Seminar in Problem Solving in Algebra	1.5
M116	Seminar in Problem Solving in Analysis	1.5
M117	Computer-aided Problem Solving in Algebra	1.5
M118	Computer-aided Problem Solving in Analysis	1.5

Course content

a. The course covers algebra: polynomial division, the factor theorem, factorizations, inequalities, absolute value, arithmetic and geometric sum, partial fraction decomposition, complex numbers, elementary combinatorics, prime number factorization, the binomial theorem, induction, analytic geometry, introduction to sets and logic, linear systems of equations, matrices, determinants, vectors in 2 and 3 dimensions, linear independence, scalar product, vector product, equation of lines and planes, linear applications, mathematical analysis: functions, powers, exponential and logarithmic functions, trigonometry, trigonometric functions, inverse functions, inverse trigonometric functions, limits, continuity, derivative, derivation rules, derivation of elementary functions, maximum and minimum problems, curve sketching, asymptotes, inequalities, integrals, connection between derivative and integral, substitution of variables, partial integration, integrals of certain classes of functions, applications of integrals, differential equations, Taylor's formula, introduction to

analysis of functions of several variables: partial derivatives, maximum and minimum problems over compact domains, double integrals. The contents of the course may be used in modelling in a number of fields as for example physics and economy.

b. The course includes the following elements:

1. Basic Computational Skills 1.5 credits (M101) 2. Polynomials 1.5 credits (M102) 3. Matrices and Systems of Linear Equations 1.5 credits (M103) 4. Problem Solving in Algebra 7.5 credits (M104) 5. Elementary Functions 1.5 credits (M105) 6. Derivation 1.5 credits (M106) 7. Integration 1.5 credits (M107) 8. Problem Solving in Mathematical Analysis 7.5 credits (M108) 9a. Seminar in Problem Solving 3 credits (M109) (in case of full-time studies) 9b. Seminar in Problem Solving in Algebra 1.5 credits (M115) and Seminar in Problem Solving in Analysis 1.5 credits (M116) (in case of half-time studies) 10a. Computer-aided Problem Solving 3 credits (M110) (in case of full-time studies) 10b. Computer-aided Problem Solving in Algebra 1.5 credits (M117) and Computer-aided Problem Solving in Analysis 1.5 credits (M118) (in case of half-time studies)

Learning outcomes

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

- with great facility handle concepts and expressions in elementary algebra and function theory
- define the basic concepts in mathematical analysis and deduce their elementary properties
- use methods in mathematical analysis to solve mathematical and applied problems
- define the basic concepts in linear algebra in two and three dimensions and deduce their most elementary properties
- use methods in linear algebra to solve mathematical and applied problems
- solve simple problems in mathematical analysis in several variables
- use mathematical software to solve problems in mathematical analysis and linear algebra
- account for, in a logical coherent way, both orally and in writing, for the solution of simple problems in algebra and analysis.

Education

The education consists of lectures, group work, seminars, exercises and laboratory work. Participation in group work and laboratory work 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.

Forms of examination

a. Examination for the course is in the following manner: measurement of knowledge takes place through: Measurement of knowledge for elements M104 and M108 takes place through written and/or oral examination and submitted work.

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 elements M101, M102, M103, M105, M106, M107, M109 (or M115 and M116) and M110 (or M117 and M118).

e. Students who fail to achieve a pass grade in an ordinary examination have the right to take at least further four examinations, as long as the course is given. The term “examination” here is used to denote also other compulsory elements of the course. Students who have achieved a pass grade on an examination may not retake this examination in order to attempt to achieve a higher grade. Students who have failed to reach a pass grade on two occasions have the right to request that a different teacher be appointed to set the grade of the course. A request for such appointment must be sent to the departmental board.

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 courses "Mathematics, basic course" (MA1030), "Mathematics, basic course" (MA1120), "Mathematics for the natural sciences" (MA1080), "Mathematics for the social sciences" (MA1110), or the equivalents.

Misc

The course is a component of the Bachelor's programs in mathematics, in mathematics and philosophy, in mathematics and economy, in biomathematics, in computer science, in scientific computing, in 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.