

# Syllabus

for course at first level

**Mathematics for the Natural Sciences I**  
**Matematik för naturvetenskaper I**

**15.0 Higher Education  
Credits**  
**15.0 ECTS credits**

<b>Course code:</b>	MM2002
<b>Valid from:</b>	Autumn 2020
<b>Date of approval:</b>	2014-10-02
<b>Changed:</b>	2020-01-13
<b>Department</b>	Department of Mathematics (incl. Math. Statistics)
<b>Main field:</b>	Mathematics/Applied Mathematics
<b>Specialisation:</b>	G1N - First cycle, has only upper-secondary level entry requirements

## Decision

This syllabus has been approved by the Board of Faculty of Science at Stockholm University 2014-10-02, and was revised on 2020-01-13.

## Prerequisites and special admittance requirements

Swedish upper secondary school courses Physics B, Chemistry B and Mathematics D, or equivalent.

## Course structure

Examination code	Name	Higher Education Credits
N101	Basic Computational Skills	1.5
N102	Polynomials	1.5
N103	Matrices and Systems of Linear Equations	1.5
N104	Elementary Functions	1.5
N105	Differentiation	1.5
N107	Mathematics for natural sciences I - theory	6
N106	Integration	1.5

## Course content

a. The course covers computation with real and complex numbers, vectors, bases, coordinates, scalar product, vector product, trigonometric functions, exponential and logarithmic functions, inverses and arcus functions, polynomials: division and the factor theorem, rational functions and partial fractions, limits of functions, derivatives: rules of computation and applications, tangent and normal, basic drawing of plots and curves in the plane, derivatives in multiple variables, gradient and directional derivative, max and min problems, linear systems of equations and Gaussian elimination, matrices, matrix inverse, determinants, linear dependence, change of basis, eigenvalues and eigenvectors, primitive functions, area and the fundamental theorem of calculus, applications on volume, arc length, line integrals, first- and second-order differential equations.

b. The course consists of the following parts:

1. Algebra, Basic Computational Skills, 1.5 ECTS credits, N101
2. Algebra, Polynomials, 1.5 ECTS credits, N102
3. Algebra, Matrices and Systems of Linear Equations, 1.5 ECTS credits, N103
4. Mathematical analysis, Elementary Functions, 1.5 ECTS credits, N104
5. Mathematical analysis, Derivation, 1.5 ECTS credits, N105
6. Mathematical analysis, Integration, 1.5 ECTS credits, N106

## 7. Problem Solving, 6 ECTS credits, N107

### Learning outcomes

Upon completion of the course, the student is expected to be able to:

Part 1. Algebra, Basic Computational Skills, 1.5 ECTS credits N101: show basic computational skills

Part 2. Algebra, Polynomials, 1.5 ECTS credits, N102: be able to perform basic calculations on polynomials

Part 3. Algebra, Matrices and Systems of Linear Equations, 1.5 ECTS credits, N103: be able to perform basic matrix calculations

Part 4. Mathematical analysis, Elementary Functions, 1.5 ECTS credits, N104: be able to perform basic calculations of elementary functions

Part 5. Mathematical analysis, Derivation, 1.5 ECTS credits, N105: be able to calculate derivatives for basic functions

6. Mathematical analysis, Integration, 1.5 ECTS credits, N106: be able to calculate primitives for basic functions

7. Problem Solving, 6 ECTS credits, N107

\* use standard methods in mathematical analysis to solve problems in mathematics and in applications.

\* use standard methods in linear algebra to solve problems in mathematics and in applications.

### Education

Instruction is given in the form of lectures, seminars and exercise sessions.

### Forms of examination

a. The course is examined as follows: Assessment of all modules takes place through written exam.

The examiner can decide on adapted or alternative examination formats for students with disabilities.

b. A passing final grade requires participation in seminars.

c. Grading: The course's final grade is set according to a seven-point criterion-referenced scale:

A = Excellent

B = Very good

C = Good

D = Satisfactory

E = Adequate

Fx = Failed, some additional work is required

F = Failed, much additional work is required

Grades of modules 1-6 will be set out according to a three-point grading scale: fail (U), pass (G), pass with credit (VG).

Grades of module 7 will be set according to a seven-point criterion-referenced scale.

A passing final grade requires passing grades on all included parts. The course's final grade is set based on the grading of module 7.

d. The course's grading criteria are handed out at the start of the course.

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. Under normal circumstances, the course includes at least three examination opportunities per module per academic year the course is offered. For the academic years that the course is not offered, at least one examination opportunity is offered.

f. There is no possibility to improve the grade Fx to a pass grade in this course.

### 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 within a two-year-period after the end of the course offering. A request for such examination must be sent to the departmental board. This provision is also valid in the case of revision of the syllabus.

**Limitations**

The course may not be included in a degree together with the courses Mathematics I (MM2001) 30 ECTS credits, Mathematical Methods for Economists (MM3001) 7.5 ECTS credits, Introductory Course in Mathematics (MM1003) 7.5 ECTS credits, or the equivalent.

**Misc**

The course can be taken within Bachelor programs in the natural sciences. It can also be taken as an individual course.

**Required reading**

The required reading is decided by the departmental board and published on the Department of Mathematics' website ([www.math.su.se](http://www.math.su.se)) at least 2 months before the start of the course.