



# SF0001 Introductory Course in Mathematics 5.0 credits

Förberedande kurs i matematik

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

## Establishment

Course syllabus for SF0001 valid from Spring 2015

## Grading scale

P, F

## Education cycle

Pre-university level

## Specific prerequisites

General requirements: Completed upper secondary education including documented proficiency in Swedish corresponding to Swedish 3/Swedish B and English corresponding to English 6/English A.

Specific requirements: Knowledge of Mathematics corresponding to Mathematics 3B/C.

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

## Intended learning outcomes

The course, which is a bridge between high school and higher education, consists of four main parts and hand in assignments. The sections go through some of the basic knowledge important to have fully updated for upcoming higher education studies. The course is web based and flexible, i.e. the student studies in a pace that suits him or her best.

After the course the student should be able to;

- Decide which one of two logarithmic expressions is bigger based on a comparison of base/argument
- Simplify algebraic expressions and process these with the rules of squares
- Solve algebraic equations which after simplification or by using logarithms lead to first degree equations
- Solve second degree equations by completing the square and know how to check the solution
- Factorize second degree expressions and know how to solve factorized or almost factorized second degree equations
- Decide on the smallest/largest value a second degree expression can take
- Solve simple root equations by the use of squares and know why the solution has to be proven
- Convert between the formulas  $y=kx+m$  and  $ax+by+c=0$
- Sketch straight lines from the equation
- Solve geometric problems that contain straight lines
- Sketch the graph for second degree functions with the help of completing the square
- Sketch areas that are given by linear differences and decide the area of these
- Formulate and use the Pythagorean theorem
- State the values of  $\cos$ ,  $\sin$  and  $\tan$  for the standard angles  $0^\circ$ ,  $30^\circ$ ,  $45^\circ$ ,  $60^\circ$  and  $90^\circ$  by heart
- Solve trigonometric problems that involve orthogonal triangles
- Convert degrees, radians and circuits and be aware of the terms unit circle, tangent, radius, diameter, periphery, chord and arc
- Decide the values of  $\sin$ ,  $\cos$  and  $\tan$  for arguments that can be reduced to the default angles I one of the squares
- Sketch the graph for  $\cos$ ,  $\sin$  and  $\tan$
- Calculate the area and circumference of circular sectors
- Calculate the distance between two points of a plane
- Sketch circles by completing the square in their equations
- Solve geometrical problems with the help of the law of Area, the law of Sinus and the law of Cosine
- Derive trigonometric relationships from symmetry in the unit circle

- Simplify trigonometric expressions with the help of the trigonometric relationships
- Solve trigonometric base equations
- Solve trigonometric equations that can be transformed back into trigonometric base equations.

## Course contents

### 1. **Numeric calculations**

Different types of calculations, fractions, exponentiation

### 2. **Algebra**

Algebraic expressions, linear expressions, quadratic expressions

### 3. **Roots and logarithms**

Roots, root equations, logarithms, logarithm equations

### 4. **Trigonometry**

Angles and circles, trigonometric functions, trigonometric relationships, trigonometric equations

### 5. **Written account and communication**

How to write about math, individual assignments

## Course literature

The course material will be published on the internet and is freely accessible for course participants.

## Examination

- INL1 - Assignment, 5.0 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

The last day to submit assignments is the day before the start of the fall semester at KTH and the last day to supplement submitted assignments is two weeks after that date.

## Other requirements for final grade

All computer tests and assignments passed.

## Ethical approach

- All members of a group are responsible for the group's work.

- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.