Linnæus University

# Course syllabus

Board of Education Science
School of Computer Science, Physics and Mathematics

## 2MAÄ02 Matematik III - inriktning mot arbete i gymnasieskolan, 15 högskolepoäng

## Mathematics III - for upper secondary school teachers, 15 credits

**Main field of study**
Mathematics

**Subject Group**
Mathematics

**Level of classification**
First Level

**Progression**
G2F

**Date of Ratification**
Approved by the Board of the School of Computer Science, Physics and Mathematics 2012-03-30

The course syllabus is valid from autumn semester 2012

**Prerequisites**
1MAÄ02 Mathematics I – for upper secondary school teachers, 1-30 credits and 1MAÄ04 Mathematics II – for upper secondary school teachers, 31-60 credits, or equivalent

## Objectives

Common expected learning outcomes

After the course students should be able to:

- problematise the teacher's assignments in relation to research on the subject and subject education
- based on current research, evaluate didactic positions in relation to the education activities program prepares students for.

Otherwise the expected learning outcomes are valid for each module.

**Module 1. Mathematics in School. 7.5 credits**
After the course students should be able to:

- demonstrate knowledge of the relationship between abilities, mathematics content and work forms in high school mathematics teaching and apply this knowledge to

meet and develop pupils' mathematical abilities
- demonstrate advanced knowledge to interpret the objectives and grading criteria in high school mathematics and their implications for teaching and assessment of pupil performance
- demonstrate ability to plan, implement and evaluate teaching of mathematics
- analyze pupil solutions, teaching materials and tests, especially national tests
- use formative and summative assessment, rate grading, documenting pupils' knowledge and formulate development plans.

**Module 2. Mathematical modeling I. 7.5 credits**
After the course students should be able to:

- interpret and understand the meaning of a mathematical text
- formulate their own mathematical texts
- communicate and argue with mathematical forms of representation
- use computer programs which are common in the mathematical world
- apply problem solving strategies
- describe how to derive simple difference- and differential equations for concrete models
- using different modeling methods.

## Content

**Module 1. Mathematics in School. 7.5 credits**

The module begins with deepening for policy documents, especially the objectives and grading criteria for high school mathematics, as a starting point for understanding the high school-specific conditions and practice.
Deepening in operating forms and working methods, including digital tools, theme and applications, is given to helping pupils' mathematical development by adapting content and working forms in education, in order to respond and challenge their abilities.
Mathematics Teaching as a phenomenon is considered from different classroom perspective (e.g. pupil, teacher, communication, democracy, motivation, gender) and extended by studies of scientific articles.
In-depth studies of their own mathematics and especially mathematical tasks include analysis of pupil solutions, textbook analysis, analysis of national tests and construction of own tests.
Rating and assessment treated according to a deeper understanding of the relationship between abilities and mathematics content and in relation to the current objectives and grading criteria.
Formative and summative assessment are concretized in teaching and in connection with development plans, grading and as a basis for documentation of pupil’s knowledge.

Module content

- Deepening of the policy documents in mathematics, focusing on the objectives, content and grading criteria
- Deepening of the mathematical abilities / skills and deeper understanding of the relationship between abilities, different contents and working forms in high school mathematics
- Grading and assessment
- Analysis of pupil solutions
- Textbooks analysis
- Analysis of test, including national tests, construction of test
- Grading and documentation of pupils’ knowledge

**Module 2. Mathematical modeling I. 7.5 credits**
Module content

- something about the difference and differential equations, problem solving and modeling methodology
- dimensional analysis
- guide of computer support in mathematics and typesetting of mathematical text with the software Mathematica and LaTeX
- work with a major modeling problems
- oral and written presentations of mathematics

## Type of Instruction
The course consists of lectures, group discussions and mandatory seminar exercises.

## Examination
The course is assessed with the grades Fail (U), Pass (G) or Pass with Distinction (VG).
The course is examined through active participation in seminars, methodology session and through written and oral presentations of individual and group assignments, and through a written examination/ take home assignments.

Moment with mandatory attendance occurs.

## Course Evaluation
After completing the course, is a course evaluation compiled and written feedback to the students. The statement recognized for the current institutional bodies and for the relevant Programme Board, and filed by the course coordinator department.

## Required Reading and Additional Study Material
**Required Reading**
**Module 1. Mathematics in School**

Hansen, Hans Christian, Skott, Jeppe & Jess, Kristine. (2009). Matematik för lärare. Ypsilon band 1 och band 2, Gleerups förlag. ISBN13:9789140668134 och ISBN13:9789140667861
Kilborn, Wiggo & Löving, Madeleine. Baskunskaper i matematik. Lund, Studentlitteratur.ISBN13: 9789144022178
National Research Council (2001). Adding it up: Helping Children learn mathematics. In Jeremy Kilpatrick, Jane Swafford, & Bradford Findell (Eds.). Mathematics Learning Study Committee, Center for Education, Division of Behavioral and Social Sciences and Education. Washington, DC: National Academy Press. (app. 100 pages), ISBN13: 9780309069953
PRIMgruppen, Bedömning av kunskap för lärande och undervisning i matematik, ISBN: 9789176566701. 104 pages.
Skolverket. Kursplan och betygskriterier för ämnet matematik. Stockholm: Skolverket. www.skolverket.se
Material provided by the department, about 200 pages.

**Module 2. Mathematical modeling I**
DFM, Distributed material, Linnéuniversitetet, current year. App. 100 pages.