Linnæus University

Jnr: UGA 2013/1254-3.1.2

Course syllabus

Faculty of Technology
Department of Mathematical Education

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 2012-03-30
Revised 2013-06-14 by Faculty of Technology. Objectives, content and literature lists are revised.
The course syllabus is valid from autumn semester 2013

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 Education for lower secondary and upper secondary school III
. 7.5 credits
After the course students should be able to:

- demonstrate knowledge of the relationship between skills, mathematics content

and working arrangements in lower secondary and upper secondary school mathematics teaching and apply this knowledge to meet and develop students' mathematical abilities
- demonstrate advanced knowledge to interpret goals and grading criteria in lower secondary and upper secondary school mathematics and their implications for teaching and assessment of student performance
- demonstrate the ability to plan, implement and evaluate mathematics teaching
- demonstrate knowledge of the role of language in mathematics, for conceptualization, communication and classroom norms
- analyze student solutions, teaching materials and tests, especially the national tests
- apply formative and summative assessment, grading, documenting students' skills for different purposes.

Module 2.Probability Theory and Statistics
. 7.5 credits
After the course students should be able to:

- Understand and describe the basic concepts in probability theory in particular the notions constituting Kolmogorov's axioms and the notion of independence
- Distinguish between independent and uncorrelated random variables
- Apply stochastic calculus
- Understand the different notions of convergence in probability theory in particular their relations
- Reproduce and apply the Laws of large numbers
- Understand the proof of the Central limit theorem and be able to apply the theorem
- Evaluate stochastic problems regarding a suitable distribution
- Understand and describe the basic concepts in statistics which are point estimatates and statistical inference
- Interpret, communicate and discuss in probabilistic settings in particular solve assessment problems in small groups and present them to an auditorium.

Content

Module 1.Mathematics Education for lower secondary and upper secondary school III
. 7.5 credits

The course starts with an in-depth review of the policy documents, especially goals and grading criteria for lower secondary and upper secondary school mathematics, as a starting point for understanding the organization-specific conditions and practice.
Advancement on working methods and working arrangements, including digital tools, is given to helping students mathematical concepts development by adapting the language, content and working arrangements in education to meet and challenge their abilities.
Mathematics teaching as a phenomenon addressed from different classroom perspectives (eg. pupil, teacher, communication, democracy, motivation, gender) and deepened through the study of scientific articles.
In-depth studies of their own mathematics and especially math includes analysis of student solutions, teaching materials analysis, analysis of national tests and construction of own samples.
Grading and assessment discussed in the in-depth understanding of the relationship between skills and mathematics content and in relation to current objectives and grading criteria.
Formative and summative assessment embodied in teaching as well as in the development plans, assessment and as a basis for the documentation of the student's knowledge.
An in-depth review of the policy documents in mathematics, focusing on the objectives,

content and grading criteria.
Advancement of mathematical abilities/skills and deeper understanding of the relationship between abilities, different contents and working arrangements in lower secondary and upper secondary school mathematics
Grading and assessment
Analysis of student solutions.
Teaching materials analysis.
Analysis of test, including national tests, construction of test.
Grading and documentation of students' knowledge.

Module 2. Probability Theory and Statistics. 7.5 credits
Module content
Sample space, event, and probability distribution, the notion of independence, conditional probability, discrete and continuous distributions, distributions functions, one and higher dimensional random variables, moments, moment generating and characteristic functions, conditional expectation, joint and marginal distributions, basic notions of convergence in probability theory, the Law of large numbers, the Central limit theorem.

Point estimates and statistical inference.

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 or through a written examination.

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 Education for lower secondary and upper secondary school III

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

PRIM-gruppen, Bedömning av kunskap- för lärande och undervisning i matematik, ISBN:978-91-7656-670-1. 104 pages.

Skolverket. Kursplan och betygskriterier för ämnet matematik. Stockholm: Skolverket.

www.skolverket.se

Skolverket. (2011) Gymnasieskola 2011. Stockholm: Skolverket. ISBN: 978-91-38325-80-3. (www.skolverket.se/publikationer?id=2597)

Skolverket. (2011) Kunskapsbedömning i skolan - praxis, begrepp, problem och möjligheter. Stockholm: Skolverket. ISBN: 978-91-86529-54-3. (www.skolverket.se/publikationer?id=2660)

Björklund Boistrup, L. (2010). Assessment Discourses in Mathematics Classrooms

Nyström, P. (2004). Rätt mätt på prov. Om validering av bedömningar i skolan

Emanuelsson, G m fl (red), Matematik –ett kommunikationsämne. Nämnaren Tema, NCM. Göteborgs universitet, 1996. Pages 150 (selected pages).

Material provided by the department, app. 200 pages.

Module 2. Probability Theory and Statistics

Bertsekas, Dimitri P. Tsitsiklis, John N., Introduction to Probability, Athena Scientific, Belmont, Massechusetts, latest edition. 544 pages