Linnæus University

Dnr: 2014/1632-3.1.2

Course syllabus

Faculty of Technology

Department of Mathematics

2MD51U Matematik och matematikdidaktik, för undervisning i åk 1-3, 1-30 - ingår i lärarlyftet, 30 högskolepoäng

2MD51U Mathematics and Mathematics Education, teaching in year 1-3 (1-30), 30 credits

Main field of study
Mathematics

Subject Group
Mathematics

Level of classification
First Level

Progression
G1N

Date of Ratification
Approved 2013-03-04
Revised 2014-06-16 by Faculty of Technology. Literature lists are revised.
The course syllabus is valid from autumn semester 2014

Objectives

Common expected learning outcomes

After completing the course students will be able to:

- discuss and explain the role of the steering documents in mathematics education and through a so-called educational planning show how to work with it in mathematics education
- plan, implement, analyze and evaluate different forms of learning activities for primary school (pre-school up to year 3) linked to the framework of mathematical skills
- reflect on theories of learning to see the link between skills, mathematics content and methods in mathematics education in pre-school up to year 3 and apply this knowledge practically to meet and develop students' abilities and learning
- know and be able to describe stage relevant research from mathematics education which can be related to mathematics instruction in pre-school up to year 3.

Otherwise, the objectives for each module are listed below.

Module 1; 7.5 hp
After completing this module the students will be able to:

- based on the core content of the LGR11 for F-3 demonstrate advanced knowledge of and correctly use primary school mathematics with a focus on arithmetic (natural numbers, integers, rational numbers), numbers and spatial perception, number use, and concepts of mathematics
- apply knowledge of arithmetic (natural numbers, integers, rational numbers), numbers and spatial perception, number use, and concepts in mathematics in didactic activities with a focus on pre-school up to year 3
- explain how preschoolers develop their number and spatial awareness and be able to build on this knowledge in pre-school up to year 3
- explain how mathematics in pre-school up to year 3 is the underlying mathematics of 4-9 with respect to the modules elements
- to account for various factors on students' desire and ability to learn mathematics
- explain and apply different forms of representation and working methods in mathematics presented in this module
- explain overall character of the development of mathematics and the history of ideas for this modules math element.

Module 2; 7.5 credits
After completing this module the students will be able to:

- based on the core content of the LGR11 for F-3 demonstrate a thorough knowledge of and be able to use primary school mathematics with a focus on geometry, algebra, statistics, probability, regression and change
- apply knowledge of primary school mathematics with a focus on geometry, algebra, statistics, probability, regression and change in didactic activities with a focus on pre-school up to year 3
- describe how preschool mathematics is dealt with in relation to the modules elements and be able to build on this knowledge in pre-school up to year 3
- explain how mathematics in the pre-school up to year 3 is the underlying mathematics of 4-9 with respect to this modules element
- explain and apply different forms of representation and working methods in mathematics from this modules element
- explain overall character of the development of mathematics and the history of ideas for this modules math element.

Module 3, 7.5 hp
After completion of this module, students should be able to:

- analyze math tasks for purpose, content, knowledge, solution strategies, and critical aspects of student learning
- interpret goals and grading criteria for mathematics in primary school (pre-school up to year 6), with an emphasis on pre-school up to year 3 and their impact on teaching and assessment of student performance
- analyze teaching and pupils' solutions of mathematical tasks and construct assignments and exams based goals for learning
- identify, document and assess students' knowledge and be able to analyze students' knowledge developing in mathematics.

Module 4, 7.5 hp

After completion of this module, students should be able to:

- describe how different students' math skills for concepts, representation, problem solving, communication and reasoning can be expressed in combination with different mathematics content, with an emphasis on mathematics content in pre-school up to year 3
- demonstrate knowledge and application of simple exercises to show how mathematical abilities may develop in students through a variety of content and working methods
- demonstrate an ability to use a variety of learning environments and working methods, including ICT, to support and challenge all pupils' learning in mathematics.

Content

Module 1

The module addresses the student's own math skills in arithmetic, with a focus on number perception and number usage and concepts and building of concepts in mathematics combined with didactic perspective relevant to activities in preschool and grades 1-3. The mathematical content discussed in relation to the abilities that form the basis of the primary school curriculum in mathematics. These abilities linked to mathematics content and the whole is highlighted by focusing on different approaches and strategies to support numbers and concept development. The module also deals with factors affecting mathematics teaching in school and giving the joy and opportunity to learn mathematics. Mathematics subject characteristics and historical development are highlighted in a comprehensive, school-oriented perspective with a focus on mathematical constructs and ideas. Mathematics education as a research field is illustrated by studies of research articles relevant to primary school mathematics.

Module 2

The module addresses the student's own math skills in geometry, algebra, probability and statistics, regression and change. This knowledge deepens and is used in combination with didactic perspectives relevant to preschool and year 1-3. The mathematical content discussed in relation to the abilities that form the basis of the compulsory school curriculum in mathematics. These abilities are linked to mathematics content and the it is highlighted by focusing on different approaches to support conceptual development and to highlight different problem-solving strategies with particular focus on the role of language and the variety of forms of representation. The module also addresses factors influencing mathematics teaching in school and giving the desire and opportunity to learn mathematics. Mathematics subject characteristics and historical development are highlighted in a comprehensive, school-oriented perspective with a focus on mathematical constructs and ideas. Mathematics education as a research field is illustrated by studies of research articles relevant to primary school mathematics.

Module 3

The course begins with an in-depth review of the policy documents, especially goals and grading criteria for primary school mathematics with emphasis on pre-school up to year 3, as a starting point for understanding the primary school-specific conditions and practice. Their own mathematics knowledge is further developed by both solving and constructing their own task from a given mathematical content. Based on their own mathematics and mathematics for pre-school up to year 3 the module consists of studies

and analysis of students' solutions to mathematical tasks, teaching materials analysis, and analysis of mathematical tasks for the purpose, content, mathematical knowledge and developable solution strategies. Analysis of data and students solutions includes identification and assessment as a basis for the documentation of the student's knowledge and to support the student's continued knowledge development. Identification, assessment and grading of students' knowledge of mathematics discussed in the in-depth understanding of the relationship between skills and mathematics content and in relation to the current objectives.

Module 4
The course aims to deepen students' ability to customize the content and approach in order to meet, challenge and develop all students' mathematical abilities, which includes a special educational perspective (individual, group, organization) are highlighted. Mathematics teaching as a phenomenon is addressed from different classroom perspectives (eg, student, teacher, communication, democracy, motivation, gender, ethnicity) and deepened through the study of scientific articles.

Type of Instruction
The course is conducted through lectures, seminars, methodology sessions and practical sessions. Field study days may be included. The teaching always requires mandatory attendance.

Distance teaching is possible. When given as a distance course special forms of distribution are used appropriate for the method of teaching.

To attend this course you need a field study class or group of pupils.

Examination
The course is assessed with the grades Fail (U), Pass (G) or Pass with Distinction (VG).

The course is assessed partial through active participation in seminars, method meeting and presentations, partial through written and oral presentations of individual and group assignments, and partial through written examination/home exam. Some of examinations are practical elements (field studies) that the student implements and presents. To receive a passing grade (G) the objectives has to be achieved. To receive Pass with Distinction (VG) on the course the student has to get the grade Pass with Distinction (VG) on 3 of 4 modules. Students who do not pass the regular examination will be offered a second examination within six weeks during the regular semester periods. On request, students may have their credits translated to ECTS-marks. Such a request must be sent to the examiner before the grading process starts

Course Evaluation
A course evaluation will be carried out and compiled after the course is completed. The compilation will be presented to the current board as well as to the students and filed by the coordinating department.

Required Reading and Additional Study Material
Required Reading
Module 1

Häggblom, Lisen. *Med matematiska förmågor som kompass*. Lund: Studentlitteratur

Malmer, Gudrun . *Bra matematik för alla: nödvändig för elever med inlärningssvårigheter* (latest edition). Lund: Studentlitteratur

Skolverket. *Läroplan för grundskolan, förskoleklassen och fritidshemmet 2011* www.skolverket.se/publikationer?id=2575

Compendium and scientific articles, app 200 p

Myndigheten för Skolutveckling. Mer än matematik- om språkliga dimensioner i matematikuppgifter. (46 p). www.skolverket.se/publikationer?id=1891

Skolverket. Rapport 2009:5: *Undervisningen i matematik- utbildningens kvalitet och ändamålsenlighet* (28 p) www.skolinspektionen.se/Documents/Kvalitetsgranskning/Matte/granskningsrapport-matematik.pdf

Sollervall, Håkan. Tal: och de fyra räknesätten (latest edition). Lund: Studentlitteratur

Module 2

Bråting, Kajsa, Sollervall, Håkan & Stadler, Erika. Geometri för lärare(latest edition). Lund: Studentlitteratur

Malmer, Gudrun. Bra matematik för alla: nödvändig för elever med inlärningssvårigheter (latest edition). Lund: Studentlitteratur

Skolverket. Läroplan för grundskolan, förskoleklassen och fritidshemmet 2011 www.skolverket.se/publikationer?id=2575

In addition compendiums and scientific articles approximate 100 pages.

Module 3

McIntosh, Alistair. Förstå och använda tal: en handbook (latest edition). Göteborg: Nationellt centrum för matematikundervisning (NMC), Göteborgs universitet

Analysschema i matematik för åren före skolår 6 / Lärarhögskolan i Stockholm. PRIM-gruppen. (latest edition). Stockholm: Skolverket www.skolverket.se/publikationer?id=2219

Pettersson, Astrid. Bedömning av kunskap: för lärande och undervisning i matematik (latest edition). Stockholm: Institutionen för matematikämnets och naturvetenskapsämnenas didaktik, Stockholms universitet

Hodgen, Jeremy; William, Dylan. Mathematics inside the black box : bedömning för lärande i matematikklassrummet (latest edition). Stockholms universitets förlag.

Malmer, Gudrun. Bra matematik för alla: nödvändig för elever med inlärningssvårigheter (latest edition). Lund: Studentlitteratur

Skolverket. Läroplan för grundskolan, förskoleklassen och fritidshemmet 2011 www.skolverket.se/publikationer?id=2575

In addition compendiums and scientific articles approximate 100 pages.

Module 4

Myndigheten för Skolutveckling. Mer än matematik- om språkliga dimensioner i matematikuppgifter. (46 p). www.skolverket.se/publikationer?id=1891

McIntosh, Alistair. Förstå och använda tal: en handbook (latest edition). Göteborg: Nationellt centrum för matematikundervisning (NMC), Göteborgs universitet

Sterner, Görel & Lundberg, Ingvar. Läs- och skrivsvårigheter och lärande i matematik (latest edition). Göteborg: Nationellt centrum för matematikutbildning, Göteborgs univ. www.ncm.gu.se/node/468

Jess, Kristine, Skott, Jeppe & Hansen, Hans Christian. Matematik för lärare. My, Elever med särskilda behov (latest edition). Malmö: Gleerups

Pettersson, Eva & Wistedt, Inger. Barns matematiska förmågor - och hur de utvecklass. (latest edition). Lund: Studentlitteratur

Boaler, Jo. Elefanten i klassrummet: - att hjälpa elever till ett lustfyllt lärande i matematik latest edition). Liber

Malmer, Gudrun. Bra matematik för alla: nödvändig för elever med inlärningssvårigheter (latest edition). Lund: Studentlitteratur

Skolverket. Läroplan för grundskolan, förskoleklassen och fritidshemmet 2011 www.skolverket.se/publikationer?id=2575

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