Reg No: MAGL13/20172

Board of Teacher Education
Mathematics

Syllabus

Mathematics and Mathematics Teaching III

Course Code:	MAGL13
Course Title:	Mathematics and Mathematics Teaching III *Matematik III med didaktisk inriktning*
Credits:	30
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has at least 60 credits in first-cycle course/s as entry requirements (G2F)

Major Field of Study:
MAA (Mathematics)

Course Approval
The syllabus was approved by the Board of Teacher Education 2017-03-02, and is valid from the Autumn semester 2017 at Karlstad University.

Prerequisites
Attended courses MAGL11 och MAGL12 with at least 40 ECTS cr completed, or equivalent

Learning Outcomes
The aim of the course is that students further develop the relevant knowledge in mathematics and mathematics education required for teaching and for creating varied

instruction that supports pupils' mathematical understanding, creativity and confidence.

The course comprises the following four modules:

Module 1: Mathematics Education, 5 ECTS cr
Upon completion of the module, students should be able to:
1. plan mathematics teaching on the basis of curricula and inspiration from other countries and choose and argue for methods and approaches that can stimulate pupils' language development, creativity and joy of discovery,
2. give an account of how gender, age and cultural background can affect attitudes to learning mathematics and be able to relate to this in the planning of teaching,
3. give an account of different ways of individualising teaching by considering pupils' different learning and development potentials in the planning of teaching,
4. give an account of the distinguishing features of formative classroom practice and consider this in the planning of teaching, and
5. assess and comment on pupils' solutions in terms of learning outcomes and assessment guidelines.

Module 2a Practical Placement 1, 7.5 ECTS cr
Upon completion of the module, students should be able to:
1. act in accordance with the core values specified in the Swedish education act and national curricula
2. explain the meaning of the legislation pertaining to teacher confidentiality and obligation to notify irregularities,
3. reflect on how the equality and equity perspectives can be integrated in pedagogical activities,
4. communicate professionally with students and staff, one-on-one and in groups, using a language in speech and writing that is functional and adequate to the situation,
5. under some supervision, plan, lead and conduct teaching to a certain degree based on school curricula and knowledge of subject and subject-specific pedagogy,
6. describe special education and students welfare efforts on the basis of local examples
7. describe and reflect on their own teaching and how it is based on curricula and knowledge of subject and subject-specific pedagogy,
8. give an account of their own professional development and identify their needs of further development.

Module 2b, Practical Placement 2, 7.5 ECTS cr
Upon completion of the module, students should be able to:
1. act in accordance with the core values specified in the education act and curricula
2. give an account of legislation concerning school obligations to prevent and take measures against bullying and abuse and analyse local school policy on discrimination,
3. integrate, under some supervision, a norm critical perspective in the pedagogical

activities with a focus on equality and equity,
4. communicate professionally with students and staff, one-on one and in groups, using a language in speech and writing that is functional and adequate to the situation,
5. under some supervision, plan, lead and conduct teaching sequences on the basis of national curricula and subject knowledge and subject-specific pedagogy,
6. plan and conduct teaching with consideration of students' different circumstances and under supervision reflect on special education needs,
7. analyse their own teaching and present arguments for showing how its is related to curricula and knowledge of subject and subject pedagogy,
8. under supervision assess students' knowledge progress and social situation at school and discuss how this can be communicated with students, guardians and staff,
9. with some guidance, use digital tools in pedagogical activities, and
10. discuss their own professional development and identify their need of further development.

Module 3: Mathematical elationships and change in several variables 7.5 ECTS
Upon completion of the module, students should be able to:
1. formulate and explain definitions and theorems in mutivariable calculus, apply them in calculations and problem solving and prove a given selection of theorems treated in the module
2. show understanding by combining new concepts, theorems and experience from examples, identify analogies
and make generalizations, and
3. illustrate and solve problems in the field, using digital tools.

Module 4 Discrete Mathematics and Algebraic Structures, 10 ECTS cr
Upon completion of the module, students should be able to:
1. communicate some important concepts and methods in discrete mathematics and apply these in solving problems,
2. analyse the structures of different sets and operations treated in school mathematics, and systematize these structures into more general algebraic structures,
3.give an account of basic concepts and methods used in theories on groups, rings and fields,
4. combine concepts, theorems and experiences of examples, identify analogues and make generalisations, and prove a given selection of theorems treated in the module, and
5. use basic programming to solve problems related to the module.

Content
Module 1 Mathematics Education, 5 ECTS cr
Current curricula in an international and historical perspective. Varied mathematics teaching with examples drawn from different countries. Different types of learning resources. Individualisation, mathematical difficulties and mathematical giftedness. The language of mathematics and the importance of language in learning mathematics. Different perspectives on learning mathematics such as adult learning,

gender and culture. Different aspects on assessment in mathematics.

Module content is based on research literature and prepares students for the practical placement on the follwing module.

Module 2a. Practical Placement 1, 7.5 ECTS cr
Students have the opportunity to
- meet different groups of staff, for example, teaching teams, student welfare personnel and school management,
- participate in everyday activites, apply central regulations and guidelines and local pedagogical planning with consideration of equality and equal opportunities policies,
- apply subject-specific teaching theories and transform relevant subject knowledge into teaching and reflect on the relation between theory and practice,
- use ICT in their teaching,
- make observations,
- discuss and reflect on the profession and professional development,
- describe special education and student welfare efforts in school,
- acquire knowledge of legislation pertaining to confidentiality and obligation to notify irregularities.

Module 2b. Practical Placement 2, 7.5 ECTS cr
Students engage in the following activites:
-using IT in school
-making classroom observations
-interpreting and implementing national curricula and local pedagogical planning
-applying pedagogical and subject-specific teaching theories and transforming subject knowledge into teaching material with consideration of pupils' different knowledge and interests
-considering the special education perspective
-practising their communicative skills in cooperation with different staff groups and pupils in school
-discussing the profession and their professional development and identify areas to develop in the third practical placement period.

Module 3 Mathematical relationships and change in several variables, 7.5 ECTS cr
Partial derivatives, tangent planes, differentials, directional derivatives, gradients and Taylor polynomials in several variables. Evaluation of double and triple integrals with repeated integration and change of variables. Evaluation of curve integrals and surface integrals. Applications of partial derivatives and multiple integrals.

Module 4 Discrete Mathematics and Algebraic Structures, 10 ECTS cr
Combinatorial mathematics, generating functions, graph theory, recursion, recurrence relations and relations including equivalence relations. Algorithms and basic programming.

Rules for operations on, and properties of, numbers and other mathematical objects are generalised. Important concepts are groups, rings and fields.

Reading List
See separate document.

Examination
Assessment is based on:
Module 1 Mathematics Education, 5 ECTS cr
Group assignment with written and oral report (learning outcomes 1, 4)
Individual assignment with written and oral report (learning outcomes 2, 3)
Individual assignment with oral report (learning outcome 5)

Module 2a Practical Placement, 7.5 ECTS cr
Learning outcomes 1, 4 and 5 are assessed on the basis of completed and documented practical placement.
Learning outcomes 2, 3, 6, 7 and 8 are assessed on the basis of written assignments at the university.

Module 2b
Learning outcomes 1, 3, 4, 5, 6, 8, and 9 are assessed on the basis of completed and documented practical placement.
Learning outcomes 2, 7 and 10 are assessed on the basis of written assignments at the university.

Attendance is required for the introduction to and the school placement component. The occasional day of absence can be completed on agreement with the module convener. Students who fail to attend more than five days will have to retake the whole module.

The number of retake opportunities is limited to two for the practical placement component.

Module 3 Mathematical relationships and change in several variables, 7.5 ECTS cr
Written exam (learning outcomes 1, 2)
Group assignment with written and oral report (learning outcome 3)

Module 4 Discrete Mathematics and Algebraic Structures, 10 ECTS cr
Written exam (learning outcomes 1.4)
Group assignment with written and oral report, and seminar discussions (learning outcomes 1, 5)
Individual assignment with oral presentation via their own recordings (learning outcome 3).

Grades
One of the grade Distinction (VG), Pass (G), or Fail (U) is awarded in the examination of the course.

Quality Assurance
Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate
A course certificate will be provided upon request.

Additional information
The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.

Teacher Education: Secondary school levels