Faculty of Science

MATM35, Mathematics: Number Theory, 7.5 credits

Matematik: Talteori, 7,5 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2019-12-06 and was last revised on 2020-07-07. The revised syllabus applies from 2020-07-07, autumn semester 2020.

General Information

The course is an elective course for second-cycle studies for a Master of Science degree in mathematics.

Language of instruction: English

Main field of studies	*Depth of study relative to the degree requirements*
Mathematics	A1N, Second cycle, has only first-cycle course/s as entry requirements

Learning outcomes

The course aims to provide a introduction to classic number theory of importance for further studies in number theory as well as in other areas such as encryption systems. The purpose is further to develop the students' ability to solve problems.

Knowledge and understanding

After completing the course the student should be able to:

- give a detailed account of the concepts and methods within number theory included in the course,
- Identify the most important theorems in the course and present their proofs,
- explain the theory behind the methods introduced in the course.

Competence and skills

After completing the course, the student should be able to:

- integrate knowledge from the different parts of the course in connection with problem solving,
- identify problems that can be solved by methods that are part of the course and use an appropriate solution method,
- plan and carry out assignments relevant for the course using appropriate methods within a given time frame,
- explain the solution to a mathematical problem within the framework of the course in speech and in writing, logically coherent and with adequate terminology.

Judgement and approach

After completing the course, the student should be able:

- argue about the importance of number theory as a tool in other areas such as encryption systems and discuss its limitations,
- make assessments with regard to relevant social and ethical aspects related to encryption.

Course content

The course treats multiplicative number theoretic functions, Möbius inversion formula, properties of Euler's totient function, primitive roots and indices, quadratic residues, the Legendre symbol and it's properties, the quadratic reciprocity theorem, representations of integers as sums of squares, number theoretic properties of the Fibonacci sequence, continued fractions, Diophantine approximation.

Course design

The teaching consists of lectures and seminars. A compulsory assignment is included in the course.

Assessment

The examination consists of a written examination followed by an oral examination at the end of the course and a written assignment during the course. The oral examination may only be taken by those students who pass on the written examination.

Students who fail the regular examination are offered a re-examination shortly thereafter.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.
To pass the course it is required to pass the written examination, the oral examination and the written assignment. In addition, to obtain the grade Pass with distinction it is required that the total number of points obtained in the written and the oral examination is at least 75% of the total maximal number of points. The maximal number of points that can be obtained in the written and the oral examination are weighted three to one.

Entry requirements

For admission to the course, English 6 is required as well as at least 90 credits, with at least 60 credits in mathematics, including the course MATA23 Foundations of algebra, 7.5 credits and MATB25 Discrete mathematics, 7.5 credits, or corresponding.

Further information

The course may not be included in degree together with MATM15 Number theory, 7.5 credits.

Subcourses in MATM35, Mathematics: Number Theory

Applies from H20

2001 Assignment, 0,0 hp
Grading scale: Fail, Pass
2002 Written examination, 5,0 hp
Grading scale: Fail, Pass
2003 Oral examination, 2,5 hp
Grading scale: Fail, Pass