Faculty of Science

MATM36, Mathematics: Topology, 7.5 credits

Matematik: Topologi, 7,5 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2020-06-08 and was last revised on 2025-05-14 by The Education Board of Faculty of Science. The revised syllabus comes into effect 2025-05-14 and is valid from the spring semester 2026.

General information

The course is an alternative-compulsory course for second-cycle studies leading to a Degree of Master of Science in Mathematics. It can also be included as an elective course for the Degree of Bachelor of Science in Mathematics and may be taken as a stand-alone course.

Language of instruction: English

Main field of study	*Specialisation*
Mathematics	A1N, Second cycle, has only first-cycle course/s as entry requirements

Learning outcomes

The main goal of the course is that the student aquires knowledge about the fundamental principles and techniques of topology, and their applications in different mathematical settings.

Knowledge and understanding

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

- give a detailed account of the fundamental topological concepts 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

- give examples of a variety of topological spaces, and explain their relevance in different areas of mathematics
- recognise the topological structures in a range of mathematical problems.

Competence and skills

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

- critically and systematically integrate knowledge from different areas of mathematics to analyse and solve complex problems using topological methods
- independently and creatively identify, formulate and solve relevant problems within the framework of the course.

Judgement and approach

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

- argue for the important role of topological structures in different areas of research in mathematics and its applications
- identify the own need for further knowledge and take responsibility for further knowledge development.

Course content

The course treats:

- topological spaces and metric spaces with examples, product topologies, continuity of functions
- connectedness, completeness, and compactness, including the Arzela-Ascoli Theorem
- examples of applications and topological structures
- examples of metric and topological spaces relevant in other areas of mathematics, such as normed spaces and Hilbert spaces.

Course design

The teaching consists of lectures and seminars. Assignments are included in the course.

Assessment

The examination consists of a written examination and a corresponding oral examination at the end of the course. The oral examination is only given to those students who have passed the written examination. Completed assignments can give a certain amount of bonus points that can be counted towards the written examination; this will be specified at the start of the course.

Students who fail the regular written and oral examination, respectively, 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.

Grades

Grading scale includes the grades: Fail, Pass, Pass with distinction
To pass the course it is required to pass the written examination and the oral examination. The grade Pass with distinction requires in addition that the total number of points obtained in the written and the oral examination is at least 75% of the maximum total number of points. The maximum numbers of points that can be obtained in the written and the oral examinations are weighted three to one.

Entry requirements

For admission to the course, English 6/B is required as well as at least 90 credits in mathematics including knowledge corresponding to MATB33 Introduction to Higher Analysis, 7.5 credits or MATB34 Linear Analysis, 7.5 credits.

Further information

The course may not be included in a degree together with MATM16 Topology 7.5 credits.

The course is given at the Centre for Mathematical Sciences, Lund University.