Department of Mathematics
(incl. Math. Statistics)

Stockholm University

Syllabus

for course at advanced level

Algebraic Topology
Algebraisk topologi

7.5 Higher Education Credits
7.5 ECTS credits

Course code:	MM8042
Valid from:	Autumn 2019
Date of approval:	2018-11-19
Department	Department of Mathematics (incl. Math. Statistics)
Main field:	Mathematics/Applied Mathematics
Specialisation:	A1F - Second cycle, has second-cycle course/s as entry requirements

Decision

This syllabus was approved by the Board of the Faculty of Science at Stockholm University November 19, 2018.

Prerequisites and special admittance requirements

Admission to the course requires knowledge equivalent to Mathematics III - Abstract Algebra, 7.5 credits (MM5020), and Topology, 7.5 credits (MM8002). English 6 or equivalent.

Course structure

Examination code	Name	Higher Education Credits
HELA	Algebraic Topology	7.5

Course content

The course covers:
- singular homology and cohomology of topological spaces
- exact sequences, chain complexes and homology
- homotopy invariance of singular homology
- the Mayer-Vietoris sequence and excision
- cell complexes and cellular homology
- the cohomology ring
- homology and cohomology of spheres and projective spaces
- applications such as the Brouwer Fixed Point theorem, the Borsuk-Ulam theorem and theorems about vector fields on spheres

Learning outcomes

Having passed this course, the student is expected to be able to
- state and prove basic theorems in algebraic topology
- compute the (co)homology of topological spaces and interpret the results geometrically

Education

Instruction consists of lectures and exercises.

Forms of examination

a. The course is examined as follows: Knowledge assessment takes the form of written assignments as well as

oral presentations of assignments.

b. Grades are assigned according to a seven-point goal-related grading scale:

A = Excellent
B = Very Good
C = Good
D = Satisfactory
E = Sufficient
Fx = Fail (more work required before credit can be awarded)
F = Total fail

c. The grading criteria will be distributed at the beginning of the course.

d. To be awarded a pass, a minimum of grade E is required.

e. Students who fail an ordinary examination are entitled to sit additional examinations as long as the course is offered. There is no restriction on the number of examinations. Examinations also include other obligatory elements of the course. Students who have passed an examination may not resit it in order to achieve a higher grade. Students who have failed on two occasions are entitled to request the appointment of a different examiner for the next examination. Any such request must be made to the departmental board. The course has at least two examinations for each academic year in the years in which instruction is provided. Intervening years include at least one examination.

f. Students awarded the grade Fx are given the opportunity to improve their grade to E. The examiner decides the supplementary assignments to be performed and the pass mark criteria. The supplementary assignments will take place before the next examination session.

Interim

Students may request that the examination be conducted in accordance with this course plan even after it has ceased to be valid. However, this may not take place more than three times over a two year period after course instruction has ended. Requests must be made to the departmental board. The provision also applies in the case of revisions to the course plan.

Limitations

This course can not be included in a degree alongside the course Homological Algebra and Algebraic Topology 7.5 ECTS (MM8020).

Misc

This course is offered as part of the Master's Programme in Mathematics and as a separate course.

Required reading

Course literature is decided by the departmental board and described thereafter in an appendix to the course plan.