

Syllabus

for course at advanced level

Homological algebra and algebraic topology
Homologisk algebra och algebraisk topologi

**7.5 Higher Education
Credits**
7.5 ECTS credits

Course code:	MM8020
Valid from:	Spring 2011
Date of approval:	2010-11-15
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 on 15 November 2011

Prerequisites and special admittance requirements

Admission to the course requires knowledge equivalent to 90 credits in mathematics, where Algebra III, 7.5 credits, or equivalent, is included. English B/English 6 or equivalent.

Course structure

Examination code	Name	Higher Education Credits
HELA	Homological algebra and algebraic topology	7.5

Course content

Homological algebra: homomorphisms, kernels, cokernels, exact sequences and complexes, Snake lemma, functorial properties of Hom and the tensor product, Tor and Ext, Universal Coefficient Theorem.

Topology: Euclidian and projective spaces, singular homology, fundamental group. Applications on for example Brouwer fix point theorem and non-vanishing vector fields on spheres.

Learning outcomes

After the course, students are expected to be able to:

- * account for and prove basic theorems in homological algebra and algebraic topology
- * account for how homological algebra is used to study algebraic topology, and vice versa
- * construct homologies for complexes and interpret the answers 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 and/or oral examination
 - * written and/or oral presentations of group work and exercises
 - * active participation in seminars

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, the minimum grade E is required.

e. Students who fail an ordinary examination are entitled to sit at least four additional examinations as long as the course is offered. 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.

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.

Misc

The course is a component of the Master's Programmes in Mathematics and in Applied Mathematics, but it can also be taken as a separate course.

Required reading

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