

Syllabus

for course at advanced level

Networks and Epidemics
Nätverk och epidemier

**7.5 Higher Education
Credits**
7.5 ECTS credits

Course code:	MT7040
Valid from:	Autumn 2021
Date of approval:	2021-06-17
Department	Department of Mathematics (incl. Math. Statistics)
Main field:	Mathematical Statistics
Specialisation:	A1N - Second cycle, has only first-cycle course/s as entry requirements

Decision

This course syllabus was approved by the Board of Science at Stockholm University on 2021-06-17.

Prerequisites and special admittance requirements

For admission to the course, knowledge is required equivalent to the courses Probability Theory I, 7.5 credits (MT3001) and Probability Theory II, 7.5 credits (MT5002). Also required is knowledge equivalent to Swedish upper secondary school course English B/English 6.

Course structure

Examination code	Name	Higher Education Credits
HELA	Networks and Epidemics	7.5

Course content

The course covers different types of random graph models that aim to describe complex network structures. The basic theory of branching processes, which is an important tool for many part of the course, is presented at first. The random graph models that are treated in the course include the Erdős-Renyi graph, the configuration model, inhomogeneous graphs and preferential attachment, but other more specific models may also be included. Some basic models for the spread of epidemic diseases are treated, with specific emphasis on models where the spread occurs in an environment with an underlying graph structure.

Learning outcomes

After having completed the course the students are expected to

- be able to account for properties of different types of random graph models for complex networks;
- be able to formulate an appropriate model for a network or an epidemic process and analyze them;
- be able to solve problems related to stochastic graph models and epidemic models.

Education

Teaching consists of lectures, and exercise sessions.

The course is offered in English.

Forms of examination

a. The course is examined as follows: Assessment takes place through written take-home examinations and oral presentation of seminar exercises. The take-home examinations will not be graded in case of late submission. However, the examiner should take special circumstances into account. The examination will be conducted in English. The examiner can decide on adapted or alternative examination formats for students with disabilities.

b. The course has no compulsory instruction.

c. The course's final grade is set according to a seven-point criterion-referenced scale:

A = Excellent

B = Very good

C = Good

D = Satisfactory

E = Adequate

Fx = Failed, some additional work is required

F = Failed, much additional work is required

d. The course's grading criteria are handed out at the start of the course.

e. Students who receive a failing grade on a regular examination are allowed to retake the examination as long as the course is still provided. The number of examination opportunities is not limited. Other mandatory course elements are equated with examinations. A student who has received a passing grade on an examination may not retake the examination to attain a higher grade. A student who has failed the same examination twice is entitled to have another examiner appointed, unless there are special reasons to the contrary. Such requests should be made to the department board. The course typically includes at least three examination opportunities per academic year the course is offered. For the academic years that the course is not offered, at least one examination opportunity is offered.

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

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 the course was discontinued. Requests must be made to the departmental board. The provision also applies in the case of revisions of the course syllabus and revisions of the required reading.

Misc

This course can be taken as part of the Master Programs in Insurance mathematics and Mathematical statistics, but may also be taken as a separate course.

Required reading

The required reading is decided by the department board and published on the Department of Mathematics' website (www.math.su.se) at least 2 months before the start of the course.