

MSG300, MARKOV THEORY, 7.5 credit points

Level: undergraduate

1. Authorization

The course plan has been authorized by the vice-dean of the Department of Mathematical Sciences on November 9, 2006, to be valid from July 1, 2007.

Educational field: Mathematical Sciences

2. Educational context

The course is part of the Bachelor Program in Mathematical Sciences. It is also open for students outside the program who meet the course prerequisites.

3. Prerequisites

The student must have passed a first course comprising a substantial part of basic probability theory, such as MSG100 at Göteborg University, and also introductory courses in mathematical analysis and linear algebra.

4. Goals and learning outcomes

After finishing the course, the student should

- have a solid knowledge of the basic concepts, ideas and results of Markov chains in discrete and continuous time,
- be able to carry out the calculations for concrete problems of such processes,
- have an appreciation of how such processes come to use for modeling in several areas of science and management, and
- have learned the skills needed for Markov modeling in at least one particular area.

5. Course description

Markov chains and processes is a major area of probability theory, with an abundance of applications in science and technology, ranging from genetics to Internet communication.

Key words and phrases are: transition probabilities and intensities, absorptions and ruins, the Chapman-Kolmogorov equation, the Kolmogorov backward and forward equations, stationarity and ergodicity, coupling, random walk, the Poisson process, birth- and death processes, queuing systems.

There are usually one or two guest lectures in the course.

6. Literature

See separate list.

7. Assessment

The assessment is mainly based on a written final examination.

There may also be compulsory home assignments.

8. Grades

The grade levels are Fail (U), Pass (G), and High Pass (VG). A wish for an ECTS grade should be reported to the examiner at the beginning of the course.

9. Course evaluation

In the middle and at the end of the course the teacher arranges an oral feedback discussion with the students.

There may also be a questionnaire for the students to answer. The results of the questionnaire will be processed by the lecturer together with another faculty member.

10. Additional information