Linnæus University

Jnr: 2018/1809-3.1.2.2

Course syllabus

Faculty of Technology
Department of Mathematics

1MA502 Stokastiska processer, 7,5 högskolepoäng
Stochastic processes, 7.5 credits

Main field of study
Mathematics

Subject Group
Mathematics

Level of classification
First Level

Progression
G1F

Date of Ratification
Approved 2014-10-03
Revised 2018-05-29 by Faculty of Technology. Literature list is revised.
The course syllabus is valid from autumn semester 2018

Prerequisites
1MA501 Probability Theory and Statistics, 7,5 credits or the equivalent basic course in mathematical statistics, 7,5 credits.

Objectives

After completing the course, the student should be able to
1. solve problems, perform calculations, and conduct lines of reasoning within the part of mathematics that is covered by the course, and to communicate those solutions, calculations, and reasonings in writing; in particular

- define and describe Markov chains and Markov processes
- calculating the stationary distribution for the studied stochastic processes
- calculate extinction probabilities for branching processes
- formulate and carry out calculations in applied problems in queueing theory and reliability theory under reasonable conditions
- define and describe the basic properties of some elementary series
- calculate covariance functions and spectral densities for AR processes and cosinus processes.

2. with a smaller amount of guidance implement a computer lab in the basic probability theory and statistics, and analyze the results of the lab with a written report within the specified time limits.

Content
The course comprises the following parts:

- Markov chains in discrete time, Markov processes in continuos time, brief introduction to weakly stationary processes, somewhat on the Brownian motion
- Applications in e.g. life-death processes, queeing systems, reliability, filtering
- fundamental concepts are introduced such as transition matrix, intensity matrix, survival function, covariance function, spectral density.

Type of Instruction
Lectures, exercises, and computer labs

Examination
The course is assessed with the grades A, B, C, D, E, Fx or F.
The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

The student's knowledge is assessed through
Written exam
Computer based laboratory assignment

Course Evaluation
A course evaluation will be carried out and compiled after the course is completed. The compilation will be presented to the current board as well as to the students and filed.

Credit Overlap
The course cannot be included in a degree along with the following courses of which the content fully, or partly, corresponds to the content of this course: 1MA202
Stochastic processes, 7.5 credits

Other
Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

Required Reading and Additional Study Material
Required reading
Scott L. Miller, Donald G. Childers, Scott L. Miller, Probability and Random Processes, With Applications to Signal Processing and Communications, Academic Press, latest edition.

Supplementary reading

Frederick S Hillier, Gerald J Liebermann. Introduction to Operations Research, McGaw-Hill, latest edition.