Blekinge Institute of Technology
Department of Mathematics and Science

COURSE SYLLABUS

Stokastiska processer

Random Processes

7,5 ECTS credit points (7,5 högskolepoäng)

Course code: MS2502
Educational level: Advanced level
Course level: A1N
Field of education: Natural sciences
Subject group: Mathematical Statistics

Subject area: The course is not part of a main field of study at BTH.
Version: 1
Applies from: 2012-09-18
Approved: 2012-09-18
Replaces course syllabus approved: 2009-11-01

1 Course title and credit points
The course is titled Random Processes/Stokastiska processer and awards 7,5 ECTS credits. One credit point (högskolepoäng) corresponds to one credit point in the European Credit Transfer System (ECTS).

2 Decision and approval
This course is established by Department of Mathematics and Science 2012-09-11. The course syllabus is approved by School of Engineering and applies from 2012-09-18.
Reg.no:ING560-0186-2012
Replaces MS1102 Random processes TEK56-65/2007

3 Objectives
The objective of the course is that the student will get knowledge about stationary random processes and their application in technology.

4 Content
The course is primarily focused on stationary random processes from a probability point of view, analysed both in the time- and the frequency domain. Applications, especially in signal processing and telecommunications, are discussed.
• Repetition of some distributions for one-dimensional random variables
• Multi-dimensional random variables
• Orientation about simulation of random variables
• Chi-square test of hypotheses concerning distribution
• Random processes analysed in the time domain: Continuous and discrete time, stationarity, the autocovariance and autocorrelation functions, continuity, differentiation, integrals of random processes.
• Some special cases: the Poisson process, the normal (Gaussian) process
• Random processes analysed in the frequency domain: the Fourier transfoirm, spectral density., the cross power spectral density
• Linear systems with random input: impuls response, transfer function, the relation between the spectral density for the input and for the output
• Markov chains
• Markov processes
• Basiq queueing theory: M/M/m, M/G/1
• Applications from various technical fields: Signal processing, telecommunications, mechanics

5 Aims and learning outcomes
On completion of the course the student will be able to:
•discuss and apply computation methods for random processes in linear systems.
•know the most important applications of random processes, especially in electrical engineering, mechanics and economy.
•describe how a problem involving random processes can be identified and solved.
•use the usual English vocabulary concerning random processes.

6 Generic skills
The following generic skills are trained in the course:
• Capability to analyse and solve problems

7 Learning and teaching
The teaching consists of lectures and tutorials. It is expected that the student solve the problems at home and the discuss the with the teacher at the tutorials.
The teaching language is Swedish. However, the teaching could be carried out in English.

8 Assessment and grading
Examination of the course

Code	Module	Credit	Grade
1210	Written examination[1]	7.5 ECTS	A-F

[1] Determines the final grade for the course, which will only be issued when all components have been approved.
The course will be graded A Excellent, B Very good, C Good, D Satisfactory, E Sufficient, FX Insufficient, supplementation required, F Fail.If grade Fx are given, the student may after consultation with the course coordinator / examiner get an opportunity to within 6 weeks complement to grade E for the specific course element.

9 Course evaluation
The course coordinator is responsible for systematically gathering feedback from the students in course evaluations and making sure that the results of these feed back into the development of the course.

10 Prerequisites
7,5 credits in MA1106 Linear algebra, MA1102 Calculus 15 credits in one-variable calculus, 4,5 credits in multi-variable calculus, 3 credits in theory of transforms and 7,5 credits in MS1401 Mathematical statistics

11 Field of education and subject area
The course is part of the field of education Natural sciences and is not part of a main field of study at BTH.

12 Restrictions regarding degree
The course cannot form part of a degree with another course, the content of which completely or partly corresponds with the contents of this course.

13 Additional information
The course is included in programmes at Blekinge Institute of Technology and is also available as a separate course.

14 Course literature and other teaching material
Peebles, P.Z. (1993 eller senare). Probability, Random Variables, and Random Signal Pronciples. (Third edition or later) New York: McGraw-Hill. ISBN 0-07-049273-5.
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