



Faculty of Technology and Science  
Mathematics

### Syllabus

#### Course Approval

The syllabus was approved by the Faculty Board of Technology and Science on 27 February 2012, and is valid from the Spring semester of 2012 at Karlstad University.

**Course Code:** MAGB64

**Stochastic Methods, 7.5 ECTS Credits**

**(Stokastiska metoder, 7.5 Swedish credit points)**

**Degree Level:** Bachelor

**Progressive Specialisation:** G1F (First cycle, has less than 60 credits in first-cycle course/s as entry requirements)

#### Language of Instruction

Swedish

#### Prerequisites

Mathematics 30 ECTS cr, including single and multivariable calculus courses of which 15 ECTS credits must be completed.

#### Major Field of Study

MAA (Mathematics)

#### Learning Outcomes

The aim of the course is that the student should acquire knowledge in probability theory and fundamental methods of mathematical statistics relevant to applications in technology, natural sciences and economy.

Upon completion of the course, the student should be able to:

- give an account of central concepts, axioms and theorems in probability and statistics theory,
- design stochastic models for simple random situations and experiments,
- apply and combine probability laws to calculate probabilities, expected values, variation and dependency measures in stochastic models,
- derive and analyse estimates and statistical methods based on probability theory results,
- use statistical methods to draw conclusions from given statistical data and assess the degree of uncertainty involved.

#### Content and Form of Instruction

Probability theory: Sample spaces, events and probabilities. Combinatorics. Independent events, conditional probabilities. Discrete and continuous random variables. Common probability distributions, especially the normal, exponential, binomial and Poisson distributions. Functions of random variables. Expected values, variance, covariance and correlation. The law of large numbers and the central limit theorem. Stochastic processes, random walks and Poisson processes.

Statistical methods: The Chi-square and t-distributions. Point estimates, unbiased and consistent estimates.

Estimation with the maximum likelihood and least squares methods. Confidence intervals and test of significance, especially of the normal, binomial and Poisson distributions and in situations where the central limit theorem can be applied. Different forms of misleading statistics. Regression analysis.

#### Reading List

See separate document.

#### Examination

Assessment is based on a written exam. The number of examination opportunities is limited to three per academic year.

#### Grades

One of the grades Fail (U), Pass (G), or Distinction (VG) is awarded in the examination of the course, or a grade on the scale U (Fail), 3 (Pass), 4 (Not without distinction) or 5 (Distinction).

#### Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course assessment is based on student views and experiences as reported in written course evaluations and/or group discussions. Students will be informed of the result of the evaluation and of the measures to be taken.

#### Course Certificate

A course certificate will be provided upon request.

#### Additional Information

Students who enrolled before 1 July 2007 will complete their studies in accordance with the requirements of the earlier admission. Upon completion students may request degree and course certificates to be issued under the current ordinance if they meet its requirements.

The local regulations for studies at the Bachelor's and Master's levels at Karlstad University stipulate the obligations and rights of students and staff.

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