Faculty Board of Science

MSA100  Computer Intensive Statistical Methods

7.5 higher education credits

Second Cycle

This syllabus is the binding document.

1. Confirmation

The syllabus was confirmed by the Department of Mathematical Sciences on November 01, 2007 to be valid from the same date. Field of education: Science. Responsible department: Mathematical Sciences.

2. Position in the educational system

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

3. Entrance qualifications

The prerequisite for the course MSA100  Computer Intensive Statistical Methods is the equivalent of the course TMS150 Stochastic Data Processing and Simulation.

4. Course content

The course is built around statistical models and computational tools in cases where computer-assisted computations are essential. In particular, we focus on stochastic simulation as a computational tool. Bayesian inference is a central concept, and we will study Markov chain Monte Carlo simulation methods from both applied and theoretical viewpoints. Jackknife and bootstrap methods will be studied, as well as decision theory. Permutation methods for hypothesis testing and multiple hypothesis testing issues are also covered in this course.

A special effort will be made to help the student to see the connections and interplay between statistical modeling and applied problem solving, as well as computational and theoretical aspects of the models.

5. Learning outcomes

Through this course students should

- learn a range of modern computer intensive methods within statistical analysis,
- understand the interplay among the modeling, theoretical, computational, and applied aspects in a wide variety of example problem,
- be able to make independent and informed decisions about statistical modeling and computational choices,
- acquire skills of presenting the results of statistical analysis in a structured and pedagogical way.
6. Required reading
List of required reading will be given in the lecture notes.

7. Assessment
In order to pass, each student must make an oral presentation during the course discussing statistical analysis of a problem that requires computer assisted computations. The grade will be based on a written examination at the end of the course.

A student who has failed a test twice has the right to change examiner, unless weighty arguments can be invoked. For this, the student must send a written request to the board of the department.

8. Grading scale
The grades are Fail (U), Pass (G), and High Pass (VG).

Students who are contractually entitled to ECTS grades should inform the examiner about this no later than one week after the start of the course.

Students without such entitlement will not be awarded ECTS grades. Grades will be converted into ECTS terminology according to a standard model approved by the University President.

9. Course evaluation
Oral and/or written course evaluation will be performed. The results of the evaluation will be communicated to the students and will serve as a guide for the development of the course.

10. Additional information
The language of instruction is English unless all involved are Swedish speakers.