Linnæus University

Dr: 2022/2513-3.1.2.2

Course syllabus

Faculty of Technology

Department of Mathematics

2MA501 Bayesianska metoder, 7.5 credits
Bayesian methods

Main field of study
Mathematics

Subject Group
Mathematics

Level of classification
First Level

Progression
G2F

Date of Ratification
Approved 2018-05-07
Revised 2022-06-13 by Faculty of Technology. Literature list is revised.
The course syllabus is valid from spring semester 2023

Prerequisites
At least 60 credits in Mathematics, Computer Science, Physics or Economics including Vector Geometry (1MA403), 7.5 credits and Probability Theory and Statistics (1MA501), 7.5 credits or equivalent.

Objectives
After successfully completing the course, the student is anticipated to be able to account for and apply the following fields in probability and statistics:

- Bayesian probability
- Gaussian processes in linear regression and optimization
- Bayesian classification
- Markov chain Monte Carlo methods
- Graphical models
- Variational inference
- the Expectation-maximization algorithm

Content
The course contains

- Bayesian probability
- Gaussian processes in linear regression and optimization
- Bayesian classification
- Markov chain Monte Carlo methods
- Graphical models
- Variational inference
- the Expectation-maximization algorithm

Type of Instruction
Teaching consists of lectures, presentations, laboratory work, and tutoring.

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 in form of

1. Oral exam, grading scale A-F (3 credits)
2. Computer laboration assignment, grading scale U-G (1 credits)
3. Written report of a project, grading scale A-F (2 credits)
4. Oral presentation of the project, grading scale A-F (1 credits)
5. Opposition of a another student's project, grading scale U-G (0.5 credits)

Course Evaluation
During the course or in close connection to the course, a course evaluation is to be carried out. The result and analysis of the course evaluation are to be communicated to the students who have taken the course and to the students who are to participate in the course the next time it is offered. The course evaluation is carried out anonymously. The compiled report will be filed.

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
Alicia A. Johnson, Miles Q. Ott, Mine Dogucu. Bayes Rules! An introduction to Applied Bayesian modelling, CRC Press, 2021.

Supplementary Reading
Kevin P. Murphy, Machine learning, a probabilistic perspective, MIT Press, latest edition.

Richard McElreath, Statistical Rethinking, A Bayesian course with examples in R and Stan, CRC Press, latest edition.