



NDAB16012U Modelling and Analysis of Data (MAD)

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Volume 2021/2022

Education

BSc Programme in Computer Science

BSc Programme in Physics

Content

The purpose of the course is to provide a basic and broad introduction to the representation, analysis, and processing of sampled data. The course will introduce the student to statistical analysis, mathematical modelling, machine learning and visualisation for experimental data. Examples will be taken from real-world problems, such as analysis of internet traffic, language technology, digital sound and image processing, etc.

Learning Outcome

After the course, the student should have the following knowledge, skills, and competences.

Knowledge of

- Descriptive statistical methods
- Likelihood functions and maximum likelihood estimation
- Least-squares methods, linear regression
- Simple models for classification
- Presentation and validation of machine learning results
- Multivariate statistics
- Presentation of analysis results, including visualisation by simple plotting
- Introduction to programming tools for data analysis
- The student will also become familiar with the analytical derivation of algorithms for data analysis

Skills to

- Apply the least-squares method for linear modelling and estimation.
- Analyse sampled data by appropriate mathematical modelling methods.
- Describe certain useful multivariate methods and their use
- Visualise low- and high-dimensional data with simple plots and images.
- Implement simple data analysis and modelling methods.
- Perform the analysis of experimental data using the methods learnt during the course and evaluate the results.

Competences in

- Building and using simple statistical models, assessing their relevance for solving concrete scientific problems, and quantifying uncertainty about the drawn conclusions.
- Performing basic data analysis tasks which include modelling, visualisation, and interpretation of the results.
- Assessing the limitations of the used methods.
- Applying calculus tools, such as partial derivatives, gradients, and integrals.

Literature

See Absalon when the course is set up.

Recommended Academic Qualifications

Basic knowledge of programming as obtained on PoP or similar. Skills in computational thinking as obtained on PoP, DMA, LinAlgDat, and MASD or similar. Mathematical knowledge equivalent to those obtained in the courses DMA, LinAlgDat, and MASD or similar.

Teaching and learning methods

Lectures, excercises and mandatory assignments.

Remarks

The courses NDAB15001U Modelling and Analysis of Data (MAD) and NDAK16003U Introduction to Data Science (IDS) have a very substantial overlap both in topics and level, and it is therefore not recommended that students pass both of these courses.

Workload

Category	Hours
Lectures	36
Class Instruction	28
Preparation	42
Exercises	77
Exam	23
Total	206

Feedback form

Written

Collective

Continuous feedback during the course of the semester

There will be written feedback for the weekly assignments (comments via Absalon).

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Exam

Credit

7,5 ECTS

Type of assessment

Written assignment, 7 days

Exam registration requirements

4-6 mandatory individual assignments written during the course, which may include programming tasks. All but one of these must be passed in order to be qualified for the exam.

Aid

All aids allowed

Marking scale

7-point grading scale

Censorship form

No external censorship

Multiple internal examiners.

Re-exam

The re-exam is a 20 minutes oral examination without preparation in the course curriculum. No aids allowed. If the student is not qualified for the exam, qualification can be achieved by submitting and approval of equivalent written assignments or course assignments that has not previously been approved. The assignments must be submitted two weeks prior to the re-exam.

Criteria for exam assesment

See Learning Outcome.

Course information

Language

English

Course code

NDAB16012U

Credit

7,5 ECTS

Level

Bachelor

Duration

1 block

Placement

Block 2

Schedule

A

Course capacity

No limit.

[Course is also available as continuing and professional education](#)**Study board**

Study Board of Mathematics and Computer Science

Contracting department

Department of Computer Science

Contracting faculty

Faculty of Science

Course Coordinators

Bulat Ibragimov (bulat@di.ku.dk)

Saved on the 15-06-2021

Timetable[21E-B2-2;Hold 01;;Modelling and Analysis of Data](#)[◀ BACK](#)

If you have questions about the course please contact your local Student service.

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