02441 Applied Statistics and Statistical Software

Outline and evaluation of the course

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Outline

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Course presentation

02441 Applied Statistics and Statistical Software

`https://kurser.dtu.dk/course/02441`

a) MSc. 5 Point ECTS. Offered as a single course. Programme-specific course:

- (MSc), Bioinformatics
- (MSc), Environmental Engineering
- (MSc), Transport and Logistics
- Elective courses, IT and Economics

b) Academic prerequisites. An introductory course in Statistics:

- 02402 Statistics (Polytechnical Foundation),
- 02403 Introduction to Mathematical Statistics,
- 02323 Introduction to Statistics.

You are expected to already know the material of an introductory course in Statistics.

Course organization

Week I

- Ten lectures on applied statistics using R. Two per day in Week I.
- Hands-on exercises after each lecture. I will be available for any help (TA)
- Brief presentation of solutions to the exercises by one group of students.
- Solutions to the exercises will be uploaded at *DTUlearn* once they have been presented and discussed (PDFs or Rs).

Week II. Assignment 1.

- Assignment 1. Statistical analysis of one project work. Available on Friday the 8th by the end of the day.
- Work and report in groups of three students. I will be available in the classroom for supervision.
- Report to be uploaded to *DTU learn* on Wednesday the 13th Feedback at DTUlearn will be given by Thursday the 14th in the afternoon.

Course organization

Week III. Exam assignment.

- Statistical analysis of two projects using:
  - Logistic regression and
  - Multiple linear (regularized) regression.

  Datasets and description of each project will be available on Wednesday the 13th at noon.
- Group supervision at the classroom.
- Exam assignment to be uploaded to *DTU learn* on Wednesday the 20th latest at 16:00. It will be graded and no feed back is expected.
- Prepare the presentation for the exam.

Course evaluation

The **course grade** will be based on:

1. The **assignment 1**. Graded as **Pass/Non-pass**. If Non-pass, it should be resubmitted in order to present the oral exam.
2. The **exam-assignment**. Graded following the 7-scale: -3, 0, 2, 4, 7, 10, 12.
3. The **group presentation** of exam-assignment, on Friday the 22th of January. Each group will present the exam assignment using up to 5 slides in about 15 minutes.
4. The **individual oral examination**. Following the presentation of the exam assignment, each student will take an oral exam lasting 10-30 minutes.

The individual oral examination is not unlikely to modify the grade obtained in the exam assignment.

Course exam

The exam will be on Friday, the 22nd, lasting about one hour per group. It will consist of two parts:

- A group presentation of **one of the two projects of the exam assignment**. The project to be presented will be **randomly chosen at the beginning of the exam**. So, both projects should be prepared for presentation.
- Following the group presentation, each student will have an individual oral exam based on the chosen project.
- The grade is composed of the exam-assignment's grade and the individual oral exam's performance. An internal censor will participate in the exam.
- The grade will be given to each student at the end of the oral exam, and the grades will be **uploaded to the system on the same day**. In case of any clarification of the final grade, please notify the lecturer on the same day.

Some References

1. Ten lectures on Applied Statistics. Available at *dtulearn*.

2. *"Statistics: An Introduction Using R"*, Second edition, M.J. Crawley, John Wiley and Sons Ltd, (2015). Main reference for the course.

3. Madsen, H, ans Thyregod, P. (2011). Introduction to General and Generalized Linear Models. CRC Press. Ch 3.

4. *"An Introduction to Statistical Learning with Applications in R/Python"*. Second edition. James J, Witten, D, Hastie, T, and Tibshirani, R. Available at `https://www.statlearning.com` . Mainly for regularized regression analysis (lasso).

5. *Introduction to Statistics at DTU.* Brockhoff PB, Møller JK, Andersen EW, Bacher P, Christiansen, LE. For *02402 Statistics* is a good reference for main statistical concepts.

6. Jones, P., Harden, S. and Crawley, M.J. (2023). The R book, 3th ed. Wiley. An extended and updated version of reference [2].
   `https://findit.dtu.dk/en/catalog/643dedb4354e276889ad093b`

7 An Introduction to R `https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf`

Course material for the course and for R

1. Course material available at DTU Learn
2. R software and documentation available at

   `http://www.cran.r-project.org`

   - Base R
   - A large number of libraries or packages are available. E.g. `library{stats}`, `library{MASS}`, `library{car}`, `library{glmnet}`.
   - Lots of documentation available on its webpage. An appendix in the reference book [2] and Ch. 1 and 3 in the reference [6].
   - E. g. An Introduction to R, Notes on R: A Programming Environment for Data Analysis and Graphics Version 4.6.0 (2026-04-24)

     `https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf`
3. Interface for R

   - You can work directly on the R console.
   - RStudio from `http://www.rstudio.com`. Recommended.