

The Hebrew University of Jerusalem

Syllabus

Introduction to Statistics - 52003

Last update 09-08-2022

HU Credits: 4

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Statistics

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: Yuli Slavutsky

Coordinator Email: yuli.slavutsky@mail.huji.ac.il

Coordinator Office Hours: By appointment

Teaching Staff:

Ms. yulia slavutsky,
Mr. Nadav Slotky

Course/Module description:

The field of Statistics deals with methods for making decisions from data, and with mathematically analyzing such methods. In this introductory course we will get to know methods for collecting, summarizing, displaying and making decisions from data.

Assignments:

1. Weekly exercises: the exercises will include theoretical and computational questions. Submission will be allowed by a single student or in small groups (as will be determined in the beginning of the semester). The exercises will be graded in a pass/fail format. Submission of at least 9 exercises will be required to take the final test.
2. Weekly computerized quizzes: the quizzes will be based on the material covered in class and on the weekly exercises. The nine best exercises will form 10% of the final grade.
3. A data collection and analysis project: the project will include formulating a research question, collecting data, and analyzing it (in R or other software). Projects will be submitted in pairs and will form 20% of the final grade. The subject of the project has to be approved by December 7th, and the final works must be submitted by January 18.
4. Final exam: 70% of the final grade.

In addition if feedback sessions will be held, participation in one session will be required to receive a grade.

Course/Module aims:

The course aims to provide an introduction to different statistical aspects, in particular statistical models relevant to applied statistical analysis.

Learning outcomes - On successful completion of this module, students should be able to:

1. Familiarity with the relations between probability and statistics. The role of probabilistic models in statistics.
2. Learning to use point estimation, confidence intervals, statistical tests, correlations and regression models. Learning how to choose a model and carry out inference given data.
3. Learning to propose a method of inference given a verbal description of a problem, and to carry out statistical computations in order to solve the problem.

4. Obtaining basic familiarity with the R statistical programming environment: input and output, data manipulation, simple simulations, descriptive statistics, statistical inference.

Attendance requirements(%):

None

Teaching arrangement and method of instruction: The course consists of lectures, TA sessions, self-work and term-projects.

Weekly exercises and quizzes will be given.

Students will submit in pairs a term-project consisting of collection and analysis of data.

Course/Module Content:

a. Principles in data collection. We will cover survey data (population and sample), experiments (randomization, control), observational studies and their weaknesses, and empirical distributions.

b. Descriptive Statistics:

summary and graphical description of one or two variables: location and spread, robustness, order statistics, histogram, scatter, quantile plots. Methods for plotting trend-lines (linear regression, smooth regressions).

c. Estimation and Confidence intervals. Point estimation, bias, variance, estimation methods (moments, maximum likelihood, simulation based). Confidence intervals definition and estimation.

d. Hypothesis testing and examples: location, spread, goodness-of-fit. Non-parameteric methods.

e. Additional topics: Inference for relation between variables. Multiple comparisons.

Required Reading:

Will be uploaded to moodle.

Additional Reading Material:

1. אלונה רביב ותלמה לויתן, מבוא להסתברות וסטטיסטיקה : הסתברות, עמ'חי.

2. אלונה רביב ותלמה לויתן, מבוא להסתברות וסטטיסטיקה : הסקה סטטיסטית, עמ'חי.

3. Mathematical Statistics and Data Analysis by John A Rice.

4. Statistics by Freedman Pisani and Purves

Course/Module evaluation:

End of year written/oral examination 70 %

Presentation 0 %

Participation in Tutorials 0 %

Project work 0 %

Assignments 0 %

Reports 0 %

Research project 20 %

Quizzes 10 %

Other 0 %

Additional information:

The course assumes basic familiarity with Probability. We will have a quiz in week 2 to test this familiarity. Passing this quiz will be required to take the exam.