



The Hebrew University of Jerusalem

Syllabus

PRINCIPLES AND APPLICATIONS IN STAT ANALYSIS - 52221

Last update 19-10-2019

HU Credits: 5

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Statistics

Academic year: 2020

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: Mt. Scopus

Course/Module Coordinator: Offer Kella

Coordinator Email: offer.kella@gmail.com

Coordinator Office Hours: By appointment (Sun., Tue., Wed., after 14:00)
or by appointment.

Teaching Staff:

Mr. Tzvi Alon
Mr.
Ms. Shir Moshe
Prof Offer Kella

Course/Module description:

The course defines the foundation principle for data analysis and in particular deals with point and interval estimation, testing statistical hypotheses, descriptive statistics and simple regression.

Course/Module aims:

Learning the foundation of Frequentist statistical inference, in particular, point and interval estimation, and hypothesis testing.

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

1. To calculate point estimators based on the method of moments and on maximum likelihood.
2. To deal with some properties of the estimators (biasedness, variance, mean square error), to compare between estimators, to select optimal estimators and to (weight) average between estimators.
3. To construct confidence intervals for the mean, variance, difference (or sum) of means and some other parameters. To compute the confidence level.
4. To conduct tests for simple and composite hypotheses. To compute and interpret the p-value.
5. To compute the required sample size for point and interval estimators and for hypothesis testing.
6. To understand and to apply graphical methods of descriptive statistics
7. To calculate and to interpret simple linear regression.

Attendance requirements(%):

0

Teaching arrangement and method of instruction: Frontal lecturers will deal with the theoretical parts. The tutorials will look again on theory with an emphasis on examples. The weekly assignments are designed in order to apply the studied material and to make sure of its understanding.

Course/Module Content:

Descriptive statistics, quantiles, histogram, scatter plot. Linear regression.

Population and samples, estimation, consistent estimators, unbiased estimators, mean square error.

Estimation methods: the method of moments, maximum likelihood estimators.

Confidence intervals: ideas and principles. Examples: mean, difference in means, proportion, difference in proportions, variance.

Testing hypothesis: ideas and principles. Examples: as above for confidence intervals. Goodness of fit. A-parametric inference.

Required Reading:

None

Additional Reading Material:

4. Freund, *Mathematical Statistics*, Prentice Hall

5. Bertsekas and Tsitsiklis, *Introduction to Probability*, Athena Scientific.

6. Ross, *A first Course in Probability*, Prentice Hall.

7. Meyer, *Introductory Probability and Statistical Applications*, Addison Wesley.

8. Mood, Graybill and Boes, *Introduction to the Theory of Statistics*, McGraw Hill.

9. Hogg and Graig, *Introduction to Mathematical Statistics*, Macmillan.

Course/Module evaluation:

End of year written/oral examination 80 %

Presentation 0 %

Participation in Tutorials 0 %

Project work 0 %

Assignments 0 %

Reports 0 %

Research project 0 %

Quizzes 20 %

Other 0 %

Additional information:

Weekly assignments will be given in Moodle.

There will be two one hour midterm exams that will be constructed from the weekly assignments.

Half of the final exams will be constructed from the weekly assignments and the other half will be new.