The Hebrew University of Jerusalem

Syllabus

PRINCIPLES AND APPLICATIONS IN STAT ANALYSIS - 52221

Last update 13-08-2014

<u>HU Credits:</u> 5

<u>Degree/Cycle:</u> *1st degree (Bachelor)*

<u>Responsible Department:</u> *Statistics*

<u>Academic year:</u> *2*

<u>Semester:</u> *1st Semester*

<u>Teaching Languages:</u> *Hebrew*

<u>Campus:</u> *Mt. Scopus*

<u>Course/Module Coordinator:</u> *Micha Mandel*

<u>Coordinator Email:</u> msmic@huji.ac.il

<u>Coordinator Office Hours:</u> *Tuesday 14-15*

Teaching Staff:
  Prof Moshe Haviv
Prof Micha Mandel
 Oron Zaeiri
 Amit Korngut
 Shira Shalev

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_γ
7. To calculate and to interpret simple linear regression.

Attendance requirements(%):
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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:
  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.
Descriptive statistics: density estimation, quantiles, empirical distribution function, scatter plot.
Linear regression.

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 0 %
 Presentation 0 %
 Participation in Tutorials 0 %
 Project work 0 %
 Assignments 0 %
 Reports 0 %
 Research project 0 %
 Quizzes 0 %
 Other 100 %

Additional information:
  Assignments should be done individually. Submitting at least 9 assignments is compulsory. Three points will be deducted from the final score of each assignment below this number which will not be submitted. Assignments
should be handed prior to the lecture or during its intermission.