The Hebrew University of Jerusalem

Syllabus

PRINCIPLES AND APPLICATIONS IN STAT ANALYSIS - 52221

Last update 07-10-2015

<u>*HU Credits:*</u> *5*

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

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

<u>*Academic year:*</u> *0*

<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:
 Ms.
Mr. Dan Bendel
Ms. Elisheva Schwarz
Prof Micha Mandel

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 statisticsγ
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:
* 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 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.*

The R software will be used.