האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

Syllabus

STATISTICS HANDS ON - 76996

Last update 05-08-2019

HU Credits: *2*

Responsible Department: *Brain Science: Computation & Information Proc.*

Academic year: *0*

Semester: *2nd Semester*

Teaching Languages: *English*

Campus: *E. Safra*

Course/Module Coordinator: *Israel Nelken*

Coordinator Email: *israel.nelken@mail.huji.ac.il*

Coordinator Office Hours: *Appointments by email*

Teaching Staff:
Prof Israel Nelken
Mr. David Beniaguev
Mr. Nizar Abed

Course/Module description:

A rapid introduction to statistical methods. Meetings will include frontal lectures and guided exercises in class.
The course requires working knowledge of Matlab or R.
The course grade will be determined by participation in the lectures and exercises, as well as the submission of a final project.

Course/Module aims:

The course will provide an introduction to classical statistical methods with emphasis on linear models.

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

Be familiar with the basic terminology of statistical methods
Ability to use statistical software: prepare data for analysis, define a model, and understand the output
Use graphics as a tool for statistical analysis
be able to generalize from the learned methods to statistical methods that have not been covered in the course

Attendance requirements(%):

100

Teaching arrangement and method of instruction: Lectures + personal guided study periods

Course/Module Content:

Basics: measurements, variable types (categorical, ordinal, ...); basic graphical methods (histograms, box plots, scatter plots, ...); measures of location and scale of a distribution; dependence and independence.
The practice of statistical inference, using the t-test: informal development of the formulas; significance and power; using simulations to study the t-test; formal development. Assumptions of the t-test (distribution and independence), their importance. what to do when the assumptions fail.
Introduction of linear models: Linear regression; ANOVA; ANOVA as linear regression; the general linear model; other family members. Maximum likelihood for estimating linear models and generalizations. The problem of over-specification. Linear mixed-effects models as an example of multi-level models.
The danger of classical statistics: multiple comparisons, double-dipping, forking paths, p-hacking and so on. Models with low power and resulting errors. A peek into Bayesian statistics.

Required Reading:
Documentation of all Matlab (or R) functions that we will use in the course

Additional Reading Material:
Any basic statistical book. A very complete description of classical methods can be found in:
Biometry: The Principles and Practices of Statistics in Biological Research 3rd Edition
R. R. Sokal, F. J. Rohlf

Course/Module evaluation:
End of year written/oral examination 0 %
Presentation 0 %
Participation in Tutorials 30 %
Project work 70 %
Assignments 0 %
Reports 0 %
Research project 0 %
Quizzes 0 %
Other 0 %

Additional information: