האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

R-Programming for the Analysis of Ecological and - 73555

Last update 09-02-2014

HU Credits: *2*

Degree/Cycle: *2nd degree (Master)*

Responsible Department: *nvironment and Natural Resources in Agriculture*

Academic year: *1*

Semester: *2nd Semester*

Teaching Languages: *hebrew and englis*

Campus:

Course/Module Coordinator: *Prof Moshe Coll*

Coordinator Email: *moshe.coll@mail.huji.ac.il*

Coordinator Office Hours: *by appointment*

Teaching Staff:
Prof Moshe Coll

Course/Module description:
Use of R programming for the statistical analysis of ecological, environmental and behavioural data; data management, descriptive statistics, graphical representation, distributions, hypothesis testing - comparing means, relationships between two variables (correlation, regression, contingency table, Chi-square), non-parametric statistics, generalized linear models, survival analysis, logistic and log-linear regressions, more.

Course/Module aims:
The aim of the course will provide knowledge and tools using in R language for statistical analysis of ecological data, environmental and behavioral;

Learning outcomes - On successful completion of this module, students should be able to:
Use an R to:
- *organize data*
- *Identify trends in data*
- *display data graphically*
- *apply statistical tests to examine hypotheses*

Attendance requirements(%):
100

Teaching arrangement and method of instruction: lectures and exercises

Course/Module Content:
1. Learning how to use R programmes: How to download and how to install it; discovering the user interface; basic syntax; importing data; help and documentation; graphics; functions, packages, etc.
2. Introduction to statistics: Aim, goal, terminology.
3. Using R for descriptive statistics: Graphical representation, distributions, parameters to describe a sample (average, variance, etc.).
4. Using R to test one or two averages: Assumptions and limits, comparing an average to a theoretical value, comparing two average values coming from two independent or non-independent samples.

5. Using R to compare more than two averages: Introduction to one-way analysis of variance (ANOVA), homoscedasticity, looking for significant differences.
6. Using R to test for relationship between two variables: Two quantitative variables: Correlation, regression line; Two qualitative variables: Contingency table and Chi-2; Comparing percentages.
7. Using R for non-parametric tests: Some tests to compare averages: Wilcoxon-Mann-Whitney, Kruskal-Wallis; Paired samples: Wilcoxon signed-rank test, Spearman rank correlation.
8. Using R for general linear models: Generalized linear models and survival analysis; logistic and log-linear regressions; Kaplan-Meier and log-rank tests.

Required Reading:
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Additional Reading Material:
http://koti.mbnet.fi/tuimala/toiminimi/material/Ecological_data_analysis_September_2011/Handouts_4up_September_2011.pdf
http://www.r-project.org/
http://www.statsoft.com/textbook/
http://www.statmethods.net/
Brian Dennis. The R Student Companion. Chapman & Hall/CRC Press, Boca Raton, FL, 2012. ISBN 978-1-4398-7540-7. [bib | Discount Info |http://www.crcpress.com/product/isbn/9781439875407]
Pierre-Andre Cornillon. R for Statistics. Chapman & Hall/CRC Press, Boca Raton, FL, 2012. ISBN 978-1-4398-8145-3. [bib | Discount Info |http://www.crcpress.com/product/isbn/9781439881453]
Paul Teetor. 25 Recipes for Getting Started with R. O'Reilly, 2011. ISBN 978-1-4493-0322-8. [bib | http://oreilly.com/catalog/9781449303228]
Paul Murrell. R Graphics, Second Edition. Chapman & Hall/CRC the R series. Chapman & Hall/CRC Press, Boca Raton, FL, 2011. ISBN 978-1-4398-3176-2. [bib | Discount Info | http://www.crcpress.com/product/isbn/9781439831762]
Hrishi Mittal. R Graphs Cookbook. Packt Publishing, 2011. ISBN 1849513066. [bib | https://www.packtpub.com/r-graph-cookbook/book]
Benjamin M. Bolker. Ecological Models and Data in R. Princeton University Press, 2008. ISBN 978-0-691-12522-0. [bib | Publisher Info |http://www.zoology.ufl.edu/bolker/emdbook/]
Claus Thorn Ekstrom. The R Primer. Chapman & Hall/CRC Press, Boca Raton, FL, 2011. ISBN 978-1-4398-6206-3. [bib | Discount Info |http://www.crcpress.com/product/isbn/9781439862063]
John M. Quick. The Statistical Analysis with R Beginners Guide. Packt Publishing, 2010. ISBN 1849512086. [bib |https://www.packtpub.com/statistical-analysis-with-r-beginners-guide/book]
Carlo Gaetan and Xavier Guyon. Spatial Statistics and Modeling. Springer Series in

Statistics. Springer, 2010. ISBN 978-0-387-92256-0. [bib | Discount Info | Publisher Info]
Hrishikesh D. Vinod, editor. Advances in Social Science Research Using R. Lecture Notes in Statistics. Springer, 2010. ISBN 978-1-4419-1763-8. [bib |Discount Info | Publisher Info]
Victor Bloomfield. Computer Simulation and Data Analysis in Molecular Biology and Biophysics: An Introduction Using R. Springer, 2009. ISBN 978-1-4419-0084-5. [bib | http://www.springer.com/physics/biophysics+\%26+biological+physics/book/978-1-4419-0084-5]
Richard M. Heiberger and Erich Neuwirth. R Through Excel. Use R. Springer, 2009. ISBN 978-1-4419-0051-7. [bib | Discount Info | Publisher Info]

Additional:
Yihui Xie. Dynamic Documents with R and knitr. Chapman & Hall/CRC, 2013. ISBN 978-1482203530. [bib | Publisher Info |https://github.com/yihui/knitr-book/]
Robert J Knell. Introductory R: A Beginner's Guide to Data Visualisation and Analysis using R. March 2013. ISBN 978-0-9575971-0-5. [bib |http://www.introductoryr.co.uk]
Joseph Hilbe. Methods of Statistical Model Estimation. Chapman & Hall/CRC Press, Boca Raton, FL, 2013. ISBN 978-1-4398-5802-8. [bib | Discount Info | http://www.crcpress.com/product/isbn/9781439858028]
Din Chen. Applied Meta-Analysis with R. Chapman & Hall/CRC Biostatistics series. Chapman & Hall/CRC Press, Boca Raton, FL, 2013. ISBN 978-1-4665-0599-5. [bib | Discount Info | http://www.crcpress.com/product/isbn/9781466505995]
Sarah Stowell. Instant R: An Introduction to R for Statistical Analysis. Jotunheim Publishing, 2012. ISBN 978-0-957-46490-2. [bib |http://www.instantr.com/book]
Michael Lawrence. Programming Graphical User Interfaces in R. Chapman & Hall/CRC the R series. Chapman & Hall/CRC Press, Boca Raton, FL, 2012. ISBN 978-1-4398-5682-6. [bib | Discount Info | http://www.crcpress.com/product/isbn/9781439856826]
Dimitris Rizopoulos. Joint Models for Longitudinal and Time-to-Event Data, with Applications in R. Chapman & Hall/CRC, Boca Raton, 2012. ISBN 978-1-4398-7286-4. [bib | Publisher Info | http://jmr.R-Forge.R-project.org/]
Laura Chihara and Tim Hesterberg. Mathematical Statistics with Resampling and R. Wiley, 1st edition, 2011. ISBN 978-1-1180-2985-5. [bib |Publisher Info | https://sites.google.com/site/chiharahesterberg/home]
John Fox and Sanford Weisberg. An R Companion to Applied Regression. Sage Publications, Thousand Oaks, CA, USA, second edition, 2011. ISBN 978-1-4129-7514-8. [bib | http://socserv.socsci.mcmaster.ca/jfox/Books/Companion/index.html]
Bruno Falissard. Analysis of Questionnaire Data with R. Chapman & Hall/CRC Press, Boca Raton, FL, 2011. ISBN 978-1-4398-1766-7. [bib |Discount Info | http://www.crcpress.com/product/isbn/9781439817667]
Chris Hay Jahans. R Companion to Linear Models. Chapman & Hall/CRC Press, Boca Raton, FL, 2011. ISBN 978-1-4398-7365-6. [bib | Discount Info | http://www.crcpress.com/product/isbn/9781439873656]

Damon M. Berridge. Multivariate Generalized Linear Mixed Models Using R. Chapman & Hall/CRC Press, Boca Raton, FL, 2011. ISBN 978-1-4398-1326-3. [bib | Discount Info | http://www.crcpress.com/product/isbn/9781439813263]
Robert A. Muenchen. R for SAS and SPSS Users. Springer Series in Statistics and Computing. Springer, 2009. ISBN 978-0-387-09417-5. [bib | Discount Info | Publisher Info]
Paul S. P. Cowpertwait and Andrew Metcalfe. Introductory Time Series with R. Springer Series in Statistics. Springer, 2009. ISBN 978-0-387-88697-8. [bib | Discount Info | Publisher Info]

Course/Module evaluation:

End of year written/oral examination 100 %
Presentation 0 %
Participation in Tutorials 0 %
Project work 0 %
Assignments 0 %
Reports 0 %
Research project 0 %
Quizzes 0 %
Other 0 %

Additional information:

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