Experimental Design (3MI09NCS05M)

I. GENERAL INFORMATION

Number of hours per semester: 26 (2 practices/week or 4 practices per fortnight)

Credits: 2

Semester: spring

Language: English

Prerequisites: basic mathematics; basic statistics is beneficial

Course type: mandatory/optional

Department: Dpt. of Biometrics and Agricultural Informatics

Course leader: Dr. Ladányi, Márta PhD, associate professor, head of department

Course description: As a continuation of an introductory course, statistical methods are discussed with several applications in biometrics in a practical and interactive way. Seminars are organized in a computer laboratory. Statistical evaluations are conducted by IBM SPSS software.

Requirements: At the end of the semester, the students have to write a report applying at least one of the methods in their own special fields.

Assessment, grading: Grades are given upon a student project report submitted at the end of the semester.

Recommended readings:

Field, A. (2009) Discovering Statistics using SPSS. SAGE Publications Ltd. London, California India, ISBN 978-1-84787-906-6 ISBN 978-1-84787-907-3

Special handouts are available during the course.

II. DETAILED PROGRAM

Discussed chapters:

1. Statistical hypothesis testing; null hypothesis, alternative hypothesis
2. Type I and Type II errors, significance level
3. Nonparametric test: normality tests (Chi-square test; Kolmogorov-Smirnov's test; Shapiro-Wilk's test, d'Agostono's test), PPlot, data transformation for normality;
4. Confidence intervals for the expected values and variance of a normally distributed population
5. Nonparametric test: Chi-square test of independence
6. One-and two-sample parametric tests of variance: Chi-square test, Fisher's test;
7. One-and two-sample parametric tests of expected value: Student's t test, Welch's test; paired t test
8. Bartlett's test; Levene's test;
9. One-way analysis of variance; two-way analysis of variance; interaction, post hoc tests; random block design, mixed models, write-up
10. Correlation
11. Linear regression model
12. Regression diagnostics, write-up;
13. Nonlinear regression models, data transformation.

Learning outcomes: After having completed the course, students will be able to create experimental design, to manage the data and to evaluate their observations correctly, moreover, to report the results in a suitable manner. They can apply their skills in publishing scientific papers as they learn how to present and reason their findings and conclusions professionally.

Attendance policy: Students may be absent for 2 tutorial meetings. Missing more than two tutorial meetings will result in loss of credit for the module. Please note that the two absences are provided for sickness, so save your absences for situations you really need them.

Test(s) during the course: -

Programme: The course is for MSc students.