

Statistical methods for experimental data		
Institute of Plant Genetics Polish Academy of Sciences	prof. dr hab. Idzi Siatkowski idzi@up.poznan.pl Coordinator	Lecturers: team of scientists from the Department of Mathematical and Statistical Methods, Poznan University of Life Sciences

General information:

Number / form (s) / type (s) of classes	20 teaching hours (lectures and practical courses)
Didactic cycle	Spring-summer 2020
Language	English

Objective of the course:

Understanding the basic statistical methods used in genetics using R.

Topics:

1. Basic calculations
2. Calculations for large datasets
3. Data visualization
4. Parametric and nonparametric testing
5. Multivariate Analysis of variance (MANOVA)
6. Principal Component Analysis
7. Cluster Analysis
8. Nonlinear models
9. Multiple regression
10. Logistic regression
11. Curvilinear regression
12. Experimental designs

After the course PhD student will be able to:

- Perform mathematical calculations in R
- Understand the concept of data types
- Prepare data for calculations
- Load and perform calculations for large data sets
- Make graphical presentation of data
- Conduct parametric and nonparametric statistical tests
- Interpret the results obtained from testing
- Understand the rules for using multivariate analysis of variance
- Perform principal component analysis and clustering
- Perform linear, multiple, logistic and curvilinear regression
- Analyze data from experimental systems

Course content:

1. **Basic calculations in R**
2. **Calculations for large datasets**
 - 2.1. Loading data of various formats

- 2.2. Data analysis
3. **Data visualization**
4. **Parametric and nonparametric testing**
 - 4.1. Introduction
 - 4.2. Two Populations
 - 4.3. Analysis of variance for many populations
 - 4.4. Multiple nonparametric tests
5. **Multivariate statistical analysis**
 - 5.1. Analysis of variance MANOVA
 - 5.2. Principal Component Analysis
 - 5.3. Cluster Analysis
6. **Nonlinear models**
7. **Regressions**
 - 7.1. R formulas describing models
 - 7.2. Linear Regression
 - 7.3. Multiple regression
 - 7.4. Logistic regression
 - 7.5. Curvilinear regression
8. **Experimental designs**
9. **Exam**

Teaching methods / techniques:

- lectures in English, using multimedia techniques
- hands-on at computers

Evaluation of learning outcomes:

- practical exam at computers