

SYLLABUS

Summer semester 2019/2020

Course	System biology
Host Institution	Institute of Human Genetics Polish Academy of Sciences Strzeszyńska Street, 32
Language	English
The expected effects of teaching in terms of: knowledge, skills and social qualifications	Ph. D. student is supposed to gain knowledge in statistical methods used in biology. In particular, the following specific topics will be elaborated: <ol style="list-style-type: none">1. R language – basics of programming and visualization.2. Main descriptive statistics.3. Basics of statistical tests and estimation.4. Main assumptions in parametric tests.5. Tests to compare two or more means.6. Measuring and testing dependency7. Analysis of correlation and regression.8. Basics of Bioconductor.
Type of course	Facultative
Semester/year	Summer semester 2019/2020
First name/family name of the person responsible for the course	Prof. UAM dr hab. Tomasz Górecki
First name/family name of the person responsible for the exam	Prof. UAM dr hab. Tomasz Górecki
Format	Lecture will be held in English with usage of audio-visual equipment.
Basic and additional requirements	Skills in English
Number of ECTSs	2
ECTSs summary	1 ECTS corresponds to 25-30 hours of personal studies focused on broadening knowledge based on suggested bibliography (<i>vide</i> bibliography list below).
Method of teaching	Lectures will be held using power point presentation and a multimedia projector
Method of evaluation	Oral exam

Prerequisite for passing	Positive score at the exam
Topics	<ol style="list-style-type: none"> 1. Introduction to R language (dplyr library) 2. Simple data plots: scatterplot, boxplot and (ggplot2 library) 3. Descriptive statistics: mean, median, mode, variance, standard deviation, standard error 4. Statistical tests – introduction 5. Goodness of fit tests: exact test, test chi2 and test G 6. Comparison of two populations: – t test for independent and dependent samples. Wilcoxon test 7. Assumptions in statistical tests: normality, homoscedasticity of variance – Box-Cox method 8. Comparison of multiple samples – one-way and multiway analysis of variance (ANOVA). Kruskal-Wallis test and Friedman test. Post-hoc comparison 9. Independence tests. Mosaic plot, balloon plot and association plot 10. Pearson and Spearman coefficient of correlation. Application of scatterplot and sunflower plot to correlation analysis 11. Simple regression. Multiple regression 12. Bioconductor
Additional material	Presentation of each lecture in PDF format and R scripts.
Bibliography	<ol style="list-style-type: none"> 1. Biecek, P. (2016). Odkrywać! Ujawniać! Objaśniać!, Wydawnictwo UW. 2. Biecek, P. (2017). Przewodnik po pakiecie R, GiS. 3. Crawley, M.J. (2012), The R Book, Wiley. 4. Gągolewski, M. (2014). Programowanie w języku R, PWN. 5. Górecki, T. (2011). Podstawy statystyki z przykładami w R, BTC. 6. James, G., Witten, D., Hastie, T., Tibshirani, R. (2017). An Introduction to Statistical Learning with Applications in R. Springer. 7. Koronacki, J., Mielniczuk, J. (2009). Statystyka dla studentów kierunków technicznych i przyrodniczych, WNT. 8. Zieliński, R. (1990). Siedem wykładów wprowadzających do statystyki matematycznej, PWN.