Faculty of Biology and Biotechnology

Course title: INTRODUCTION TO STATISTICS FOR BIOLOGISTS

ECTS credit allocation (and other scores): 2
Semester: summer

Level of study: ISCED-6 - first-cycle programmes (EQF-6)

Branch of science: Natural sciences

Language: English

Number of hours per semester: 30 h.

Course coordinator/ Department and e-mail: Jacek J. Nowakowski; Department of Botany and Evolutionary Ecology; jacek.nowakowski@uwm.edu.pl

Type of classes: classes (computer laboratory) and lectures

Substantive content

CLASSES: (Computer laboratory). Principles of organization database in Statistica or SPSS program and data operations – calculating, coding, transformation. Descriptive statistics - estimation of statistics from a sample, presentation of measurement data. Parametric and non-parametric tests: tests for comparison a sample distribution to a theoretical normal distribution; calculation of confidence intervals; tests for comparison two means; tests for analysis relationships between metric variables and between nominal variables.

LECTURES: Statistics as a research tool. Descriptive and inductive statistics. Planning and organizing research – experimental design, replication, randomization, methods of sample selection, sample size. Measurements in biological sciences – variables, measurement scales. Presentation of statistical data. The inevitability of uncertainty and estimation of uncertainty. Parametric and nonparametric inference. Types of theoretical distributions. Biological hypothesis – statistical hypothesis. Null hypothesis and alternative hypothesis. Principles of hypothesis verification. Type I and II errors. Principles of using descriptive statistics – statistics and parameters. Assumptions of test functions – comparison of dependent and related samples, analysis of the dependencies of quantitative and qualitative variables.

LEARNING PURPOSE: Introduction students to the methods of statistical analysis of data in biological research. Learning the statistical analysis of data and the use of the Statistica or SPSS program in statistical analysis.

On completion of the study programme the graduate will gain:

KNOWLEDGE: student knows and understands the role of biostatistics as a tool for biological research, defines the types of variables and knows the basic principles of hypotheses testing.

SKILLS: the student analyzes data using appropriately selected methods of statistical analysis and can use Statistica or SPSS software.

SOCIAL COMPETENCIES: Respect the principles of formal inference in scientific research.

Basic literature: 1.) *TIBCO Software Inc. (2020). Data Science Textbook.* https://docs.tibco.com/data-science/textbook.

Supplementary literature: 1.) Sokal R.R., Rolf F.J., Biometry, W H. Freeman and Co., NewYork, 1995.

The allocated number of ECTS points consists of:

Contact hours with an academic teacher: 32 h.

Student's independent work: 18 h.