UNIVERSITY OF WARMIA AND MAZURY IN OLSZTYN

Faculty of Biology and Biotechnology

Course title: INTRODUCTION TO STATISTICS FOR BIOLOGISTS

ECTS credit allocation (and other scores): 3

Semester: spring

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

Branch of science: Natural sciences

Language: English

Number of hours per semester: 45

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

Type of classes: classes and lectures

Substantive content

CLASSES: Principles of organization database in Statistica. Data operations – calculating, coding, transformation, standardization. Descriptive statistics. Point and confidence estimators - confidence intervals. Parametric and nonparametric tests. Tests for comparison a sample distribution to a theoretical normal distribution. Testing the significance of differences between two means – tests for dependent and independent samples. Relationships between metric variables – the basics of correlation. The relationships between nominal variables..

LECTURES: Statistics as a research tool in biology. Descriptive and inductive statistics. Planning and organization of research - experimental arrangement, replication, randomization, sampling methods, sample size. Measurements in the biological sciences - variables, measuring scales. Theoretical distributions of data. Biological hypothesis - statistical hypothesis. Principles of hypotheses testing. Type I and type II errors. Rules for the use of descriptive statistics - statistics and parameters. Assumptions of test functions.

Learning purpose: Introduction students to the methods of statistical analysis of data in biology. Learning the statistical analysis of data and the use of the Statistica program in statistical analysis

On completion of the study programme the graduate will gain:

Knowledge: W1 - knows and understands the role of biostatistics as a tool for research in biology; W2 - defines the types of variables; W3 - knows the statistics methods of description of sample distribution; W4 - knows the basic statistical tests and basic principles of hypotheses testing

Skills: U1 - The student calculates and interprets basic statistical estimators of sample distribution; U2 - The students analyzes a data on the basis of point and interval estimation; U3 - The students analyzes and presents data in accordance with the principles of mathematical statistics.

Social Competencies: K1 - respect the principles of formal data analysis in scientific research.

Basic literature:

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

2) Statsoft; Inc., Electronic Statistics Textbook. Tulsa, OK: StatSoft. WEB: http://www.statsoft.com/textbook, 2013.

Supplementary literature:

The allocated number of ECTS points consists of:

Contact hours with an academic teacher: computer lab. – 35 h., lectures -*10 h., consultation – 1 h

Student's independent work: home work (analysis data), preparing to test – 29 h.