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| **Name of the course**  *Statistical methods in biology – all-academic profile* | | | **ECTS code** |
| **Name of the leading institution**  *Institute of Biology* | | | |
| **Study description**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **faculty** | **Level** | **type of study** | **specialty** | **specialisation** | | *Biology* | *II* | *stationary* | *palaeobiology* | **-** |   \*the name follows the accepted catalogue of faculties and specializations | | | |
| **Name/-s of a teacher/-s**  *Dr hab.. S. Mitrus, prof. UO* | | | |
| **Type of course, way of realization and amount of hours** | | | **ECTS credit points: 2**  Contact hours  - lecture participation: 15 h  - laboratory participation: 30 h  - consultations: 1 h  All: 46 h = 2 cp ECTS  Individual student work  - preparation to the laboratory: 20 x 1h = 20 h  - preparation to the final credit: 20 x 1h = 20 h  All: 40 h = 2cp ECTS  Lec (2 cp ECTS) + Lab (2 cp ECTS) |
| **A.** **type of course**   * *lecture (L)* * *laboratory (Lab) [computer laboratories]* | | |
| **B.** **way of realization**   * *laboratory and lecture room* | | |
| **C.** **amount of hours**  15L + 30Lab | | |
| **Module**   * *basic module - obligatory* | | **Language**  *English* | |
| **Didactic methods**   * *lectures with multimedia presentation* * *laboratory:*  *practical training with computers using statistical software, discussion, work in small groups* | | **Conditions to get credits for:** | |
| **A. Way of final evaluation:**   * *lectures: a grad* * *laboratory: a grade* | |
| **B. Form of testing:**   * *lecture: written exam (exam consisting of a mixture of single-choice, multiple choice, and open questions; theoretical questions, interpretation of results of statistical analyses, short problems to solve, etc.); "open book exam" – participants can use own notes and books during the exam* * *laboratory:*  *practical test: practical test, using computer: analyses data set using computer software, interpretation of results; "open book exam" – participants can use own notes and books during the test* | |
| **C. Basic criteria**   * *L: obtaining at least 40% of the total score available for the exam* * *Lab: participation and active performance during the computer laboratories, accepted protocols from individual work, obtaining at least 50% of the total score available for the final test* | |
| **Necessary knowledge from listed below subjects and the preliminary conditions**  ***A.*** *Formal conditions: none*  ***B.*** *Preliminary conditions: knowledge of mathematical statistic at basic level; ability to use computer with Windows OS and basic software (Microsoft Office or equivalent)* | | | |
| **Goal:**  *The aim of the course is to enable students to use statistical methods and statistical software to conduct their own statistical analyses (typical for biological sciences).* | | | |
| **Content:**  ***A.*** *Lecture:*  *Aim of statistical analyses in biological sciences. Statistical population and a sample. A mean; measuring variability. Confidence limits for a mean. Hypothesis testing using binomial and normal distribution. Basic parametrical and non-parametric tests. Analysis of regression and correlation. Analysis of variance. Presentation of statistical results.*  ***B.*** *Laboratory:*  *Performing statistical analysis using software; the results interpretation. Measures of central tendency, dispersion and variability; t Student tests; normality test; basic non-parametric tests; analysing frequencies (the chi-square goodness of fit test); Kruskal–Wallis test and a posteriori test; Pearson correlation, Spearman correlation; simple linear regression; introduction to analysis of variance. Graphical presentation of results.* | | | |
| **Literature**  **A. obligatory literature:**  *A.1. used during lectures and laboratory sessions*  *Manual of statistical software package.*  *Instructions for computer laboratories (will be available on the e-learning platform, for participants).*  *A.2. lectures for self-study*  *any book on statistical methods in biology, e.g. Fowler J., Cohen L., Jarvis P. 1997. Practical statistics for field biology. Chichester–New York, John Wiley & Sons.*  *Manual of statistical software package*  *Instructions for computer laboratories (will be available on the e-learning platform, for participants).*  **B. additional literature**  *Ferguson G.A., Takane Y. 1999. Analiza statystyczna w psychologii i pedagogice. Warszawa, Wydawnictwo Naukowe PWN.*  *Fowler J., Cohen L., Jarvis P. 1997. Practical statistics for field biology. Chichester–New York, John Wiley & Sons.*  *Łomnicki A. 2014. Wprowadzenie do statystki dla przyrodników. Warszawa, Wydawnictwo Naukowe PWN.*  *Meissner W. 2014. Przewodnik do ćwiczeń z przedmiotu Metody statystyczne w biologii. Gdańsk, Wydawnictwo Uniwersytetu Gdańskiego.*  *Quinn G.P., Keough M.J. 2002. Experimental design and data analysis for biologists. Cambridge University Press.*  *Sokal R.R., Rohlf F.J. 1995. Biometry. New York, Freeman and Company.*  *Zar J.H. 1999. Biostatistical analysis. New Jersey, Prentice-Hall Inc.* | | | |
| **Effects of education** | **Knowledge**  K\_W14\_ / \_P7S\_WG uses advanced statistical tools adequate to the problems of the specialty of biological sciences studied  K\_W17\_ /\_P7S\_WG recognizes the wealth of modern approaches and experimental techniques in biological sciences and plans to use them to solve set tasks  K\_W18\_/\_P7S\_WG presents advanced methods and techniques for conducting field research in the natural environment and the possibilities of their use in the protection of the natural environment | | |
| **Skills**  K\_U04\_ /\_P7S\_UO plans and performs research tasks or expertise in the field of the studied biological specialty under the supervision of a tutor  K\_U05\_ / \_P7S\_UW uses statistical methods and IT techniques and tools to describe biological phenomena and analyze specialized statistical data  K\_U06\_ /\_P7S\_UW uses the acquired specialist knowledge to interpret the collected empirical data and present conclusions | | |
| **Social competencies**  K\_K01\_ / \_P7S\_UW aware of the complexity of biological phenomena and processes  K\_K02\_ /\_P7S\_UK consistently applies and disseminates the principle of strict, based on empirical data, interpretation of biological phenomena and processes in research work and practical activities  K\_K03\_ /\_P7S\_UW responsible for the equipment and own work and respects the work of others | | |
| **Contact**  *E-mail or phone:*  *S. Mitrus, e-mail: smitrus@uni.opole.pl, room 211, Kominka Str. 6, www.uni.opole.pl/~smitrus* | | | |