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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**

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| **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 hAll: 46 h = 2 cp ECTSIndividual student work- preparation to the laboratory: 20 x 1h = 20 h- preparation to the final credit: 20 x 1h = 20 hAll: 40 h = 2cp ECTSLec (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*
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| **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*
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|  **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 studiedK\_W17\_ /\_P7S\_WG recognizes the wealth of modern approaches and experimental techniques in biological sciences and plans to use them to solve set tasksK\_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 tutorK\_U05\_ / \_P7S\_UW uses statistical methods and IT techniques and tools to describe biological phenomena and analyze specialized statistical dataK\_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 processesK\_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 activitiesK\_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* |