

**Subject Area: Advanced Methods in Biotechnology and Biodiversity**

**Subject: Advanced statistical methods in natural sciences**

**Level: PhD**

**Year: I-IV**

**Semester: 1-2**

**Speciality: N/A**

**Status: Facultative**

**ECTS: 3**

**Department(s): Ecology**

**Cooperating Department:**

Form of teaching (Number of hours: Form of assessment: Exam or Credit

Lectures:	Conversatoria	Practicals	Total
-	-	<b>30</b>	<b>30</b>

**Staff:**

SUBJECT COORDINATOR: Associate Professor Piotr Skubała PhD

LECTURERS: Associate Professor Piotr Skubała PhD; Anna Orczewska PhD; Izabella Franiel PhD

**Contents:**

**PRACTICALS:**

The aim of the module is to broaden the students' knowledge on advanced methods in statistics applied in natural sciences. Students learn different methods of multivariate analysis, especially ordination, classification (cluster analysis) and discriminant analysis. Indirect gradient analyses, e.g. Polar ordination (PO), Principal Coordinates Analysis (PCoA), Nonmetric Multidimensional Scaling (NMDS), Principal Components Analysis (PCA), Correspondence Analysis (CA), Detrended Correspondence Analysis (DCA) and direct gradient analyses, e.g. Canonical Correspondence Analysis (CCA), Detrended Canonical Correspondence Analysis (DCCA), Redundancy Analysis (RDA) are discussed and practiced on many examples. As regards cluster analysis, hierarchical agglomerative methods is mainly practiced. Practicals are taught using the following statistical programs: CANOCO, Statistica, Multivariate Variate Statistical Package (MVSP) and PAST (PAleontological Statistics).

**Methods and forms of teaching:** short computer presentations of a selected theoretical problem, exercises using various computer programs,

**Requirements:**

General basic knowledge in statistics and biology

**Literature:**

Lepš J., Šmilauer P. 2003. Multivariate Analysis of Ecological Data Using CANOCO. Cambridge University Press.

Multi-Variate Statistical Package. 2007. Version 3.1. Users' Manual. Kovach Computing Services.

PAST. PAleontological Statistics. Version 3.0. Reference manual. Øyvind Hammer, Natural History Museum, University of Oslo, 1999-2013.

Stanisz A. 2007. Przystępny kurs statystyki z zastosowaniem STATISTICA PL na przykładach z medycyny - TOM 3. Analizy wielowymiarowe. StatSoft, Kraków.

**Remarks (if necessary):**