Syllabus

Subject	**Statistical Analysis of Experimental Data**	cod:

Year of study I	PhD	First semester	I	Discipline status (AP-deepening / CC-obtaining competencies / f-optional)	CC

Number of hours per week				Total semester hours/ Total online hours	Total hours of individual activity	Number of credits	Type of evaluation (**P**-en route, **C**-colloquium, **E**-exam, **M**-mixed)	LANGUAGE OF TEACHING
C	S	L	Pr.					
2	-	-	-	24/14	126	6	E	Romanian

Purpose	The course introduces the main statistical methods involved in analyzing experimental data.
Objectives	- To illustrate the main statistical methods used in experimental ecology experimental studies, based on real data - To present the most frequent challenges arising in experimental data analysis, along with the corresponding solutions - To identify alternative methods of analyzing a particular dataset and compare the advantages and disadvantages of each method. - To get the students into practicing the R software.
Competences	*Professional competences:* C1. Advance statistics for theoretical and practical skills development to support strategic decisions in ecology. 2/6 C2. Data collection and data curation; data analysis. 3/6 *Transversal competences:* CT3. Evaluation and diagnostic of continuing education needs in order to ensure an efficient adaptation to the economic and social environment. 1/6

Course content	**Topic 1.** (4 h - online) Descriptive statistics in R. Basic functions, data visualization and interpretation **Topic 2.** (2 h - online) Statistical inference, confidence intervals and hypotheses testing **Topic 3.** (4 h – online) The Chi-square test, the Fisher test, the t-test, one way ANOVA and two - way ANOVA. **Topic 4.** (2 h – online) Nonparametric alternatives tp the t-test and one-way ANOVA. **Topic 5.** (2 h – online) The linear regression model: principles, the least square method, aassumptions and goodness of fit. **Topic 6.** (2 h – face to face) The logistic regression model – estimation, interpretation of results, accuracy **Topic 7.** (2 h – face to face) Hierarchical models with random and mixed effects. **Topic 8.** (2 h – face to face) Hierarchical models selection – the case for quantitative and qualitative outcome variables. **Topic 9.** (2 h – face to face) General aditive models **Topic 10.** (2h – face to face) Applied session – personalized feedback to each student's dataset.
Teaching methods	The teaching process will involve both face-to-face teaching, and online teaching. The teaching materials will be available in Google Classroom, course code zgzei5x. The online teaching will be provided via Google Meet, course link https://meet.google.com/xkx-wraj-zxv. The face-to-face interaction will require whiteboard, computers with R and R Studio available, and video projector. The teaching will alternate theoretical presentation with practical examples and R applications. Interaction between students is encouraged, as well as discussions with the instructor.

Mandatory bibliography (selective)	1. Lecture notes provided by the instructor (PPT presentations, as well as R scripts and markdowns) 2. Quintana-Ascencio, Pedro (2019) Lecture notes, available online at: https://sciences.ucf.edu/biology/d4lab/methods-2/

Assessment		
	Description	The final exam consists of a project presentation. Students are invited to choose a dataset related to their PhD topic (or ask the instructor to provide one, if preferred) and apply the methods taught during the classes. Ideally, the analysis should be conducted in R. However, other software packages are accepted. The ongoing evaluation consists of the assessment of student's participation to in class activities, as explained in the final grade formula.

	Criteria	The ability to conduct a complete statistical analysis on a dataset agreed upon with the instructor. The student is expected to go through each step presented during the classes (numerical descriptive statistics, data visualization, statistical tests such as t-test, chi-square, ANOVA or any other relevant tests, as well as regression models of the type required by the outcome of interest).
	Type of examination	Online examination
	Final grade calculation	The final grade is the sum of the following three scores: • 1 point – default • A maximum of 3 points – in class participation in debates, briefs, and discussions. • A maximum of 6 points – the final exam