DETAILED SYLLABUS
Plant and Animal Biocoenology (Community Ecology)

1. Information about the study program

1.1 University	Babeș-Bolyai University
1.2 Faculty	Biology and Geology
1.3 Department	Taxonomy and Ecology
1.4 Field of study	Biology
1.5 Program level (bachelor or master)	Master (2 years) with attendance
1.6 Study program / Qualification	Systemic Ecology and Biodiversity Conservation / Master

2. Information about the subject

2.1 Subject title	Plant and Animal Biocoenology (BME3301)						
2.2 Course activities professor	Dan Gafta						
2.3 Seminar activities professor	Dan Gafta						
2.4 Year of study	2	2.5 Semester	1	2.6 Type of assessment	C	2.7 Subject regime	Compulsory

3. Total estimated time (teaching hours per semester)

3.1 Number of hours per week	4	out of which: 3.2 course	2	3.3 seminar/laboratory	2
3.4 Total number of hours in the curriculum	56	out of which: 3.5 course	28	3.6 seminar/laboratory	28
Time distribution					Hours
Study based on textbook, course support, references and notes					55
Additional documentation in the library, through specialized databases and field activities					20
Preparing seminars/laboratories, essays, portfolios and reports					50
Tutoring					10
Assessment (examinations)					5
Others activities					
3.7 Total hours for individual study	140				
3.8 Total hours per semester	196				
3.9 Number of credits	8				

4. Preconditions (if necessary)

4.1 Curriculum	Principles of Systemic Ecology
4.2 Skills	Tabular calculations and graph production in electronic spreadsheets Report elaboration

5. Conditions (if necessary)

5.1. For course development	Logistic support (computer for each student)
5.2. For seminar / laboratory development	Logistic support (laptop/computer running under Windows 7/8/10 for each student) Software for numerical analysis (R) Real and simulated data sets in electronic format Compulsory attendance of students at minim 80% of the seminars

6. Acquired specific competences

Professional competences	● Ability to prepare a protocol for plant and animal community sampling according to the habitat type, species biological traits and study aims ● Ability to detect the dominant dynamic processes driving the species composition of biocoenoses ● Ability to analyse quantitatively the structure and diversity of ecological communities
Transversal competences	● Developping the capacity of undertaking the ecologic management of biodiversity and natural habitats ● Using the acquired knowledge in new circumstances ● Applying the theoretical knowledge to practical problems

7. Subject objectives (arising from the acquired specific competences)

7.1 Subject's general objective	● Understanding the importance of Biocoenology through the complex relations between the extant species and, between the latter and their abiotic environment
7.2 Specific objectives	● Learning the basic concepts and methodologic approaches used in the analysis of the structure, dynamics and diversity of ecological communities ● Learning about the main intracoenotic connections ● Learning about the complex assembly rules of species in communities ● Learning about the functional approach in the study of biocoenoses ● Understanding the consequences of disturbance on the stability and functioning of the ecological communities

8. Contents

8.1. Courses	Teaching methods	Observations
Current theories about the concept of ecological community (biocoenosis)	Lecture with video presentation support	
Functional approach in studying ecological communities: functional types and ecological strategies	Lecture with video presentation support	
Sampling the terrestrial communities	Lecture with video presentation support	
Interspecific relationships driving the structure and dynamics of ecological communities	Lecture with video presentation support	
Models of species co-existence in communities	Lecture with video presentation support	
Modelling the distribution of species abundance in ecological communities	Lecture with video presentation support	
Organisation of ecological communities	Lecture with video presentation support	
Disturbance and community stability: inertia and resilience	Lecture with video presentation support	
Predictability of ecological successions	Lecture with video presentation support	
Multispecific spatial structure of ecological communities	Lecture with video presentation support	
Ecological determinism and functional role of the species/functional diversity at community level	Lecture with video presentation support	
Estimating the alpha, beta and gamma diversity	Lecture with video presentation support	

Extrapolating the island biogeography theory to the study of the structure of ecological communities	Lecture with video presentation support	
Compositional dissimilarity of ecological communities: species nestedness and turn-over	Lecture with video presentation support	

References:

Begon M., Townsend C.R., 2021. Ecology: from Individuals to Ecosystems. 5th edition. Blackwell, Oxford.
Garnier E., Navas M.L., Grigulis K., 2016. Plant Functional Diversity. Oxford University Press, Oxford.
Magurran A.E., 2013. Measuring Biological Diversity. Wiley-Blackwell, Chichester.
Morin P.J., 2011. Community Ecology. Wiley-Blackwell, Chichester.
Sher A., Molles M., 2021. Ecology: concepts and applications. 9th edition. McGraw-Hill, New York.
van der Maarel E., Franklin J. (eds.), 2013. Vegetation Ecology, 2nd. ed. Wiley-Blackwell, Chichester.

8.2. Seminars	Teaching methods	Observations
Fittinf the empirical distribution of cumulative relative abundance of the species composing an ecological community	Practical application on computer	
Estimation of alpha- and beta-diversity within-communities and respectively, between-communities	Practical application on computer	
Analysis of the specific dissimilarity between two or more groups of communities (ANOSIM)	Practical application on computer	
Estimation of species richness through the procedure of species rarefaction and extrapolation	Practical application on computer	
Estimation of functional diversity at community level	Practical application on computer	
Predicting the species composition of communities along successions through the method of Markov chains	Practical application on computer	
Estimating the width and overlap of ecological niches pertaining to the co-occurring species in communities	Practical application on computer	
Analysis of species patterns between communities: nestedness and turn-over	Practical application on computer	
Special session for repeating the lost seminars		
Working out a project reporting the structural analysis of a set of ecological communities at student's choice	Working independently on data analysis and reporting the results	The report elaboration covers 5 seminars (10 hours)

References:

Gardener M., 2014. Community Ecology - Analytical Methods Using R and Excel. Pelagic Publishing, Exeter.
vegan: Community Ecology Package (https://cran.r-project.org/web/packages/vegan/vegan.pdf)
vegetarian: Jost Diversity Measures for Community Data (https://cran.r-project.org/web/packages/vegetarian/vegetarian.pdf)
coenocliner: Coenocline Simulation (https://cran.r-project.org/web/packages/coenocliner/coenocliner.pdf)
EcoSimR: Null Model Analysis for Ecological Data (https://cran.r-project.org/web/packages/EcoSimR/EcoSimR.pdf)
betapart: Partitioning Beta Diversity into Turnover and Nestedness Components (https://cran.r-project.org/web/packages/betapart/betapart.pdf)
cooccur: Probabilistic Species Co-Occurrence Analysis (https://cran.r-project.org/web/packages/cooccur/cooccur.pdf)
FD: Measuring functional diversity (FD) from multiple traits, and other tools for functional ecology (https://cran.r-project.org/web/packages/FD/FD.pdf)
cluster: Finding Groups in Data (https://cran.r-project.org/web/packages/cluster/cluster.pdf)
fpc: Flexible Procedures for Clustering (https://cran.r-project.org/web/packages/fpc/fpc.pdf)
coin: Conditional Inference Procedures in a Permutation Test Framework (https://cran.r-project.org/web/packages/coin/coin.pdf)
indicspecies: Relationship Between Species and Groups of Sites (https://cran.r-project.org/web/packages/indicspecies/indicspecies.pdf)

9. Corroboration / validation of the subject's content in relation to the expectations coming from representatives of the epistemic community, of the professional associations and of the representative employers in the program's field.

- The course has an updated, similar content to those given in other European and north-American universities and is adapted to the different skill levels of the students
- The course content is focused on practical issues related to the structural analysis of ecological communities, and thus has an applied science feature
- During seminars, the students have the opportunity to propose changes for the course improvement and the conformation of its content to the labour market requirements

10. Assessment (examination)

Type of activity	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Knowledge of the information content Ability to use the acquired knowledge in a new context	Writing exam	75%
10.5 Seminar/laboratory	Ability to perform and interpret the specific structure of ecological communities	Project evaluation	25%
10.6 Minimum performance standards			
• Knowledge of at least 50% of the information that pertains to the given courses • Acquiring the skills (in proportion of at least 60%) practised during seminars • The minimum grade obtained in each of the two examinations (the writing test and the project evaluation) should be at least 5			

Date
27th February 2023

Signature of the course instructor,
Dan Gafta (associate prof.)

Signature of the seminar instructor,
Dan Gafta (associate prof.)

Date of approval by the department
27th February 2023

Head of department's signature
Florin Crisan (lecturer dr.)