

DISCIPLINE SHEET

Name of the discipline: Molecular Biology **Owner of the course activities: Dr. Oana Moldovan, senior researcher I**
 The year of studies:

Number of hours per week/Check/Credits		
Course	Form of examination	Credits
2 hours	Exam	15

A. OBJECTIVES OF THE COURSE (The objectives are formulated in terms of professional skills)

General objective of the discipline	Acquisition of general, theoretical, and practical knowledge on subterranean biology
Specific objectives:	Acquiring some domain-specific notions on the equilibrium of subterranean systems Learning field and laboratory study methods Learning methods of data analysis Learning to write a scientific paper with the obtained data

B. TERMS (where applicable)

For conducting the course	
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C. SPECIFIC ACQUIRED COMPETENCED (Regards the competencies provided by the program of which discipline is a part)

Professional skills	<ul style="list-style-type: none"> • Increased ability to solve various problems • Ability to write scientific papers and experimental reports • The ability to critically interpret research results • Ability to quickly and correctly understand and evaluate new information • Ability to identify alternative solutions and ability to demonstrate/support the relevance of these alternatives
Transversal skills	Ability to work independently and in a team Abilities to write academic reports and scientific papers Development of professional values and ethics Personal and professional continuous training

D. CONTENT OF THE COURSEȚINUTUL DISCIPLINEI

a) Course

Chapter	Content	No. hours
1. The diversity of the subterranean domain	Faunal groups, trophic relationships between different groups, collection and conservation methods	6
2. Modern methods of subterranean	eDNA, metagenomics	6

diversity analysis		
3. Diversity of subterranean habitats, niches, and micro-niches	Methods for the characterization of physico-chemical and microclimatic characteristics, field measurements, laboratory analyses	6
4. Subterranean deposits microbiology	Microbial diversity, principles of survival in oligotrophic environments, chemoautotrophy in caves	6
5. Conservation and protection of subterranean fauna	Holistic approach, conservation methods and tools for underground domain protection	6
Total hours		30

E. EVALUATION (The methods, forms of evaluation and their weighting in establishing the final grade are specified. The minimum performance standards, related to competencies defined in point A. Objectives of the discipline, are indicated)

Type of activity	Evaluation criterias	Methods of evaluation	Weight of the final grade
Course	-Accuracy and quality of presentation of the exam subjects -Acquiring the course knowledge	Check by oral exam	100%
The results of the subject evaluation are expressed by the following qualifications: "Very good"; "Good"; "Satisfactorily"; "Unsatisfactory". The grades "Very good", "Good" and "Satisfactory" allow the doctoral student to obtain the credits.			

F. METHODOLOGICAL REFERENCES

Lecture and dialogue. Use of modern teaching aids.

G. CORROBORATION OF THE COURSE CONTENT WITH THE EXPECTATIONS OF THE REPRESENTATIVES OF THE EPISTEMIC COMMUNITY, PROFESSIONAL ASSOCIATIONS AND REPRESENTATIVE EMPLOYERS FROM THE FIELD RELATED TO THE PROGRAM

- The discipline ensures a wide fund of fundamental and practical knowledge regarding modern and sustainable methods of work in the field and laboratory
- The discipline offers basic elements that help the doctoral student in environmental specialties and environmental protection

H. BIBLIOGRAPHY

Barton, HA, Northup, DE. 2007. Geomicrobiology in cave environments: present and future perspectives. Journal of Cave and Karst Studies 69 (1), 163-178

Culver, D C., Pipan, T. 2009. The Biology of Caves and Other Subterranean Habitats. Oxford University Press.

Lavoie, KH, Northup, DE, Barton, HA. 2010. Microbe–mineral interactions geomicrobiology. Geomicrobiology, 1-45

Mammola S, Meierhofer MB, Borges PAV, Colado R, Culver DC, Deharveng L, Delić T, Di Lorenzo T, Dražina T, Ferreira RL, Fiasca B, Fišer C, Galassi DMP, Garzoli L, Gerovasileiou V, Griebler C, Halse S, Howarth FG, Isaia M, Johnson JS, Komerički A, Martínez A, Milano F, Moldovan OT, Nanni V, Nicolosi G, Niemiller ML, Pallarés S, Pavlek M, Piano E, Pipan T, Sanchez-Fernandez D, Santangeli A, Schmidt SI, Wynne JJ, Zagamajster M, Zakšek V, Cardoso P. 2022. Towards evidence-based conservation of subterranean ecosystems. *Biol Rev Camb Philos Soc.* 97(4):1476-1510.

Mammola, S., Amorim, I.R., Bichuette, M.E., Borges, P.A.V., Cheeptham, N., Cooper, S.J.B., Culver, D.C., Deharveng, L., Eme, D., Ferreira, R.L., Fišer, C., Fišer, Ž., Fong, D.W., Griebler, C., Jeffery, W.R., Jugovic, J., Kowalko, J.E., Lilley, T.M., Malard, F., Manenti, R., Martínez, A., Meierhofer, M.B., Niemiller, M.L., Northup, D.E., Pellegrini, T.G., Pipan, T., Protas, M., Reboleira, A.S.P.S., Venarsky, M.P., Wynne, J.J., Zagamajster, M. and Cardoso, P. 2020. Fundamental research questions in subterranean biology. *Biol Rev*, 95: 1855-1872.

Moldovan O.T., Kovac L., Halse S. 2018. *Cave Ecology*. Springer International Publishing. 532 pp, ISBN 978-3-319-98852-8, 2018.3

Course teacher

Doctoral School Director

Dr. Oana Moldovan