

SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	Babeş-Bolyai University of Cluj-Napoca
1.2 Faculty	Environmental Science and Engineering
1.3 Department	Environmental Analysis and Assessment
1.4 Field of study	Environmental Engineering
1.5 Study cycle	Bachelor
1.6 Study programme / Qualification	Environmental Engineering

2. Information regarding the discipline

2.1 Name of the discipline	Soil Science						
2.2 Course coordinator	Assoc. Prof., PhD Ramona Bălc						
2.3 Seminar coordinator	Assoc. Prof., PhD Ramona Bălc						
2.4. Year of study	II	2.5 Semester	IV	2.6. Type of evaluation	E	2.7 Type of discipline	Mandatory

3. Total estimated time (hours/semester of didactic activities)

3.1 Hours per week	4	Of which: 3.2 course	2	3.3 seminar/laboratory	2
3.4 Total hours in the curriculum	56	Of which: 3.5 course	28	3.6 seminar/laboratory	28
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					22
Additional documentation (in libraries, on electronic platforms, field documentation)					22
Preparation for seminars/labs, homework, papers, portfolios and essays					15
Tutorship					9
Evaluations					2
Other activities:					0
3.7 Total individual study hours	70				
3.8 Total hours per semester	126				
3.9 Number of ECTS credits	5				

4. Prerequisites (if necessary)

4.1. curriculum	Geology, Biology, Physics, Chemistry
4.2. competencies	- Use of laboratory equipment and utensils - Calculation of the studied parameters - Interpretation of the obtained results

5. Conditions (if necessary)

5.1. for the course	Video logistic support
5.2. for the seminar /lab activities	Participation to at least 80 % of the laboratory work is a condition for sustaining the exam

6. Specific competencies acquired

Professional competencies	• Learning and understanding how the soil system is evolving and functioning • Learning and understanding how all the soil components are integrated • Making logical connections between accumulated knowledge, acquiring specific concepts and formulating conclusions
Transversal competencies	• Developing skills in using various terms regarding factors and processes leading to the soil formation in order to understand the complex function of soil • Using classical terms in new contexts • Applying theoretical concepts in solving practical tasks

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	The main goal of this course is going to explain very clear the concepts of pedology and offer theoretical and practical knowledge regarding the soil as a dynamic bio-physical-chemical system. In addition, the students will fully understand which are the more important functions of the soil and why it is important to protect this resource against erosion, salinization, pollution, etc.
7.2 Specific objective of the discipline	Recognizing the main soil horizons and understand that each horizon is formed by a specific process. Determination of physical parameters of the soil and their interpretation. Applying the information in geotechnical field, for any type of constructions, roads and railways, tailing dumps or landslides rehabilitation, etc.

8. Content

8.1 Course	Teaching methods	Remarks
1. Introduction in Soil Science	Ppt presentation-discussions, interactive activities, working groups, learning to experimentation, e-learning	On-site
2. Factors of soil formation	Ppt presentation-discussions, interactive activities, working groups, learning to experimentation, e-learning	On-site
3. Formation and composition of the mineral part of the soil	Ppt presentation-discussions, interactive activities, working groups, learning to experimentation, e-learning	On-site
4. Formation and composition of the organic part of the soil	Ppt presentation-discussions, interactive	On-site

	activities, working groups, learning to experimentation, e-learning	
5. Formation and composition of the soil profile	Ppt presentation-discussions, interactive activities, working groups, learning to experimentation, e-learning	On-site
6. Soil water	Ppt presentation-discussions, interactive activities, working groups, learning to experimentation, e-learning	On-site
7. Soil air	Ppt presentation-discussions, interactive activities, working groups, learning to experimentation, e-learning	On-site
8. Soil temperature	Ppt presentation-discussions, interactive activities, working groups, learning to experimentation, e-learning	On-site
9. Chemical properties of soil	Ppt presentation-discussions, interactive activities, working groups, learning to experimentation, e-learning	On-site
10. Soil classification (part I)	Ppt presentation-discussions, interactive activities, working groups, learning to experimentation, e-learning	On-site
11. Soil classification (part II)	Ppt presentation-discussions, interactive activities, working groups, learning to experimentation, e-learning	On-site
12. Mapping and grading the agricultural soils (Part I)	Ppt presentation-discussions, interactive activities, working groups, learning to experimentation, e-learning	On-site
13. Mapping and grading the agricultural soils (Part II)	Ppt presentation-discussions, interactive activities, working	On-site

	groups, learning to experimentation, e-learning	
14. Soil degradation – prevention methods	Ppt presentation-discussions, interactive activities, working groups, learning to experimentation, e-learning	On-site
References: 1. Barbu, N. (1987), <i>Geografia solurilor României</i>, Centrul de multiplicare al Universității Al. I. Cuza, Iași. 2. Blaga, Gh., Filipov, F., Rusu, I., Udrescu, S., Vasile, D. (2005), <i>Pedologie</i>, Ed. AcademicPres, Cluj-Napoca. 3. Blaga, Gh., Filipov, F., Paulette, L., Rusu, I., Udrescu, S., Vasile, D., (2008). <i>Pedologie</i>, Ed. Mega, Cluj-Napoca 4. Blume, H-P., Brümer, G.W., Fleige, H., Horn, R., Kandeler, E., Kögel-Knabner, I., Kretzschmar, R., Stahr, K., Wilke, B-M., (2016). <i>Scheffer/Schachtschabel Soil Science</i>. Springer-Verlag, Berlin Heidelberg. 5. Bucur, N., Lixandru, Gh. (1997), <i>Principii fundamentale de știința solului; formarea, evoluția, fizica și chimia solului</i>, Edit. Dosoftei, Iași. 6. Drăgan, I., Rusu, I. (1990), <i>Solurile României</i>, Litografia Universității de Științe Agricole, Timișoara. 7. Filipov, F., Lupașcu, Gh. (2003), <i>Pedologie. Alcătuirea, geneza și clasificarea solurilor</i>, Ed. Terra Nostra, Iași 8. Florea, N., Muntean, I. (2003), <i>Sistemul Român de Taxonomie a Solurilor</i>, Edit. Estfalia, București. 9. Ianoș, Gh. (1998), <i>Pedogeografie</i>, Edit. Mirton, Timișoara. 10. Ianoș, Gh. (2004), <i>Geografia solurilor cu noțiuni speciale de pedologie</i>, Edit. Mirton, Timișoara. 11. Ioniță, I. (2000), <i>Geomorfologie aplicată. Procese de degradare a regiunilor deluroase</i>, Ed. Universității „Al. I. Cuza”, Iași. 12. Lupașcu, Gh., Rusu, C., Secu, C., (2001). <i>Pedologie – caiet de lucrări practice pentru studenții secțiilor de geografie, știința mediului și ecologie, partea I</i>. Ed. Univ. “Al. I. Cuza”, Iași 13. Mac, I., (2003), <i>Știința Mediului</i>, Ed. Europontic, Cluj-Napoca. 14. Miclăuș, V. (1991), <i>Pedologie ameliorativă. Protecția mediului</i>, Ed. Dacia, Cluj-Napoca. 15. Moțoc, M., Munteanu, S., Băloiu, V., Stănescu, P., Mihaiu, Gh, (1975), <i>Eroziunea solului și metodele de combatere</i>, Ed. Ceres, București. 16. Muntean, O.L., (2005), <i>Evaluarea impactului antropic asupra mediului</i>, Ed. Casa Cărții de Știință, Cluj-Napoca. 17. Oanea, N., Rogobete, Gh. (1977). <i>Pedologie generală și ameliorativă</i>. Ed. Didactică și Pedagogică, București. 18. Udrescu, T. (1997), <i>Solurile lumii</i>, Edit. Ceres, București.		
8.2 Seminar / laboratory	Teaching methods	Remarks
1. Soil profile – generalities. Soil sampling methods	speech	On-site
2. Identification of the soil horizons	Ppt presentation, movies, drawing	On-site
3. Determination of soil consistency, soil structure and soil color	Practical work	On-site
4. Determination of bacterial activity – Winogradsky columns	Construction of the columns	On-site
5. Determination of soil moisture	Practical work	On-site

6. Determination of soil bulk-density	Practical work	On-site
7. Determination of Atteberg limits (Part I)	Practical work	On-site
8. Determination of Atteberg limits (Part II)	Practical work	On-site
9. Determination of soil free swell	Practical work	On-site
10. Determination of soil grain-size – sedimentation method	Practical work	On-site
11. Determination of soil grain-size – sieving method	Practical work	On-site
12. Determination of soil humus content	Practical work	On-site
13. Determination of soil CaCO ₃ content	Practical work	On-site
14 Interpretation of the obtained results	Correlation and interpretation of the results and	On-site

References:

1. Barhoumi, B., Beldean-Galea, M.S., Al-Rawabdeh, A.M., Roba, C., Martonos, I.M., Bălc, R., Kahlaoui, M., Toiul, S., Tedetti, M., Driss, M.R., Baci, C., (2019). Occurrence, distribution and ecological risk of trace metals and organic pollutants in surface sediments from a Southeastern European river (Someșu Mic River, Romania). *Science of the Total Environment*, **660**: 660-676
2. Bălc, R., Roba, C., Roșian, G., Costin, D., Horvath, C., Zglobiu, O.R., Chirtoș, D., (2020). Changes in the physico-chemical properties of topsoil in a landslide affected area (western part of the Transylvanian Basin, Romania). *Geological Quarterly*, **64**: 931-941
3. Bălc, R., Tămaș, T., Popiță, G., Vasile, G., Bratu, M.C., Gligor, D.M., Moldovan, C., (2018). Assessment of chemical elements in soil, grapes and wine from two representative vineyards in Romania. *Carpathian Journal of Earth and Environmental Sciences*, **13**: 435-446
4. Doroșan, D., Bălc, R., Kalmár, J., (2019). Neotectonically controlled quaternary sedimentation in the Lăpuș basin (Maramureș county, Romania), demonstrated by sedimentological and geochemical analyses. *Geo-Eco-Marina*, **25**: 203-218
5. Flint, L.E., Flint, A.L., (2002). Porosity. In: *Methods of Soil Analysis: Part 4 Physical Methods*, 5.4. (Eds. Dane, H.D, Topp, G.C), Soil Science Society of America, SSSA Book Series.
6. Krawczyk, D., Flieger-Szymańska, M., Wanatowski, D., (2019). Liquid limit of selected postglacial soils from west-central Poland. *Geological Quarterly*, **63**: 711-720.
7. Paulette, L., Blaga, Gh., (2002). *Pedologie – lucrări practice*. Ed. Poliam, Cluj-Napoca
8. Schwyter, A.R., Vaughan, K.L., (2020). *Introduction of Soil Science. Laboratory Manual*, University of Wyoming Libraries, Mountain Scholar, UW Open Education Resources (OER).
9. STAS 1913/1-82 – Determinarea umidității
10. STAS 1913/3-76 – Determinarea densității pământurilor
11. STAS 1913/4-86 – Determinarea limitelor de plasticitate
12. STAS 1913/5-85 – Determinarea granulozității pământurilor
13. STAS 1913/2-88 – Capacitatea determinării de adsorbție a pământurilor
14. STAS 7107/1-76 – Determinarea materiilor organice

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

The students will obtain knowledge and information useful for future jobs, especially in geotechnical field, the construction of roads and highways and, last but not least, the restoration of the environment.

10. Evaluation

10. Evaluation			
Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	Knowledge of the informational content	Writing exam	70%
	The ability to use the information in a new context		
10.5 Seminar/lab activities	Learning analytical methods	Practical exam	30%
	Learning to use understand and follow a protocol/standard		
10.6 Minimum performance standards			
• Knowing 50% of the information from the theoretical part • Knowing 60% of the information from the practical part			

Date

Signature of course coordinator

Signature of seminar coordinator

05.12.2024

Dr. Ramona Bălc

Dr. Ramona Bălc



Date of approval

Signature of the head of department