SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Civil Engineering
1.3	Department	Structures
1.4	Field of study	Civil Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Civil, Industrial and Agricultural Buildings /Engineer (English language)
1.7	Form of education	Full time
1.8	Subject code	30.00

2. Data about the subject

2.1 Subject name		Geotechnics					
2.2 Course responsible/lecturer		Conf.dr.ing. Nicoleta – Maria ILIEȘ, nicoleta.ilies@dst.utcluj.ro					
2.3 Teachers in charge of laboratory		S.L.dr.ing. Olimpiu Cristian MUREȘAN, olimpiu.muresan@dst.utcluj.ro S.L.dr.ing. Iulia Consuela PRODAN, iulia.prodan@dst.utcluj.ro					
2.4 Year of study	II	2.5 Semester	2	2.6 Assessment	E	2.7 Subject category	DD DI

3. Estimated total time

3.1 Number of hours per week	4	3.2 of which, course:	2	3.3 applications	2
3.4 Total hours in the curriculum	104	3.5 of which, course:	28	3.6 applications	28
Individual study					hours
Manual, lecture material and notes, bibliography					32
Supplementary study in the library, online and in the field					8
Preparation for seminars/laboratory works, homework, reports, portfolios, essays					4
Tutoring					1
Exams and tests					3
Other activities					

3.7 Total hours of individual study	48
3.8 Total hours per semester	104
3.9 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1 Curriculum	
4.2 Competence	

5. Requirements (where appropriate)

5.1. For the course	Cluj-Napoca, Str. G. Barițiu Nr. 25, Amphitheatre
5.2. For the applications	Cluj-Napoca, Str. G. Barițiu Nr. 25, Geotechnics Laboratory

6. Specific competences

Professional competences	– Recognizing and using geotechnical terms in civil engineering field
	  – Identifying and classifying soils;
	  – Using soil parameters, determined in laboratory and in situ;
	  – Calculating soil stresses in soil massif;
	  – Calculating soil settlement;
	  – Calculating earth pressure;
	– After the study of the discipline, students are able to use the apparatus for the geotechnical tests: hygrometer, thermometer, oven, Proctor apparatus, direct shear test apparatus, Oedometer, triaxial test apparatus etc.
	– Technological and economical design for geotechnical works,
	– Organizing and conducting geotechnical works, for civil, industrial and agricultural buildings
	– Following quality and durable development requirements specific to geotechnical works

Cross competences	– Responsible execution of professional tasks , in restricted autonomy conditions and qualified assistance: applying efficient and responsible work strategies, punctuality, reliability and responsibility, based on principles, norms and professional ethics, – Acquaintance with roles and activities specific to team work and distributing tasks for subordinate levels, – Awareness of lifelong learning; efficient use of resources and learning techniques for personal and professional development

7. Discipline objectives (as results from the *key competences gained*)

7.1 General objective	Development of competences regarding the soil behaviour as support for a constructions, as load and as construction material.
7.2 Specific objectives	Assimilation of theoretical and practical knowledge regarding geotechnical parameters determination, soil settlement calculation, earth force calculation etc.

8. Contents

8.1. Lecture (syllabus)	Teaching methods	Notes
1. Introduction in geotechnics. Short history Soil composition and classification: Soil as three phase system. Solid phase. Soil structure and texture. Soil grading curve.	Lecture, discussions, case studies etc.	Video-projector
2. Physical and mechanical soil properties. Liquid phase (water in soil). The effect of surface phenomenon's on the behaviour of clayey soils. Capillary water. Free water.		
3. Water mechanical action on soils. The prevention of hydrodynamic water effect. Iced water.		
4. Soil compressibility: General information. Elastic compressibility. The principle of effective pressures and compaction law. One dimension compression. Unconfined compression.		
5. The influence of stress history. The influence of cycling loading. The anisotropy influence. The linear deformation modulus determination by on site tests.		
6. Soil shearing resistance. Soil shearing resistance. Soil shearing resistance determination.		
7. Soil shearing resistance tests. Factors influencing soil shearing resistance. Soil shearing resistance determination by on site tests.		
8. E. Stresses in the soil massif. General information. Vertical stress generated by soil self-weight. Stresses due to a vertical point load on the surface of elastic semi space. Stresses due to a linear load on the surface		

of semi space. Distributed pressures on a continuous strip having B width. Distributed pressures on a closed surface. Vertical stresses distribution in layered soils.		
9. The anisotropy influence. The influence of the limited thickness of the deformable soil layer. Contact pressures distribution on the foundation bottom.		
10. Foundation soil settlement. Deformations. Methods to calculate settlements. Semi theoretic computation methods. Consolidation settlement computation. Constructions deformations types. The effect of foundation displacements and deformations (settlements) on the construction.		
11. Soil lateral pressure. General information. Lateral pressure at rest lateral pressure. Lateral soil pressure calculation: Definition of limit equilibrium state; Active lateral pressure; Passive lateral pressure.		
12. Methods based on wedge theory: Active lateral pressure –Coulomb's theory. Active pressures distribution on retaining structures. Active pressure calculation for layered soils. External loads influence. Passive lateral pressure –Coulomb's theory.		
13. Considerations on computation methods for soil lateral pressure. The effect of retaining structure displacement on soil lateral pressure.		
14. Soil lateral pressure on retaining structures. Retaining walls. Soil lateral pressure on simple timbered retaining structures. Soil lateral pressure on diaphragm walls. Soil lateral pressure on anchored diaphragm walls		
References 1. Farcas, A.Popa, Geotehnica. Teorie si exemple de calcul, Ed. UTPress, 2014, 2. A. Popa, V. Farcaş, Geotehnică, UT Press, 2004 3. F. Mureşanu, Geotehnică, UT Press, 2001 4. A. Stanciu, I. Lungu, Fundaţii, vol I, , Ed. Tehnică, 2006 5. V. Pop, A. Popa, Geotehnică şi fundaţii, Lito IPCN, 1983, 6. V. Farcas, N. Ilies etc., Geotehnica. Îndrumător de laborator, Ed. UTPress, 2014 7. A. Popa, Geotehnică, Exemple de calcul, 1994 8. V. Pop, A. Popa, Geotehnică. Îndrumător de laborator, Lito IPCN, 1983, 9. A.Popa, col., Proiectarea fundaţiilor, LitoIPCN, 1985. 10. A.Popa, col., Fundaţii în condiţii speciale de fundare. Lito IPCN 1992, 11. SR EN 1997-1: 2006 Eurocod 7: Proiectarea geotehnică. Partea 1: Reguli Generale. 12. Geologie, Indrumător pentru lucrările de laborator, A. Suciu, 2002 13. Handy R.L., Spangler M.G. – Geotechnical Engineering 14. Braja M.D. – Principles of Foundation Engineering 15. Lio Cheng – Soils and Foundations 16. Bowels J.E. – Foundation Analysis and Design 17. Teng W. C. – Foundation Design		
8.2. Applications/Laboratory	Teaching methods	Notes
1. Geotechnical indexes determination	Lecture and numerical applications, Laboratory tests	Computer, design tables,
2. Soil water content. Soil Consistency.		
3. Grading curve determination. Applications		
4. Proctor test		
5. Soil permeability		
6. Soil compressibility		
7. Soil shear resistance (I)		
8. Soil shear resistance (II)		
9. Swelling clays characteristics.		
10. Applications		

11. Stress distribution in soil		
12. Settlement computation		
13. Soil lateral pressure		
14. In situ geotechnical indexes determination. Geotechnical rapport. Finalizing laboratory works.		

References

1. SR EN 1997-2: 2007 Eurocode 7: Geotechnical deign. Partea 2: Soli testing and investigation.
2. V. Farcas, N. Ilies etc., Geotehnica. Îndrumător de laborator, Ed. UTPress, 2014
3. A. Popa, Geotehnică, Exemple de calcul, 1994
4. V. Pop, A. Popa, Geotehnică. Îndrumător de laborator, Lito IPCN, 1983,
5. A.Popa, col., Proiectarea fundaţiilor, LitoIPCN, 1985.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Acquired competences are necessary for the civil engineers who activate both in design and execution companies.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	One numerical application and 3-4 theoretical questions	Written test – duration: 2-2.5 hours	70% (50% theoretical questions + 20% numerical application)
10.5 Applications	3 written test with 3-4 questions from the laboratory tests completed during the semester	Written test – duration: 15-20min/ test	30%

10.6 Minimum standard of performance

- Course: numerical application (min grade 5) and a correct answer for all the theoretical questions (for each theoretical question the student will receive a grade, the minimum grade for each question is 5)
  - *If the numerical application grade is <5, the student is not eligible for the theoretical examination*
- Application: If the tests grade is <5, the student is not eligible for the final examination. Attendance to the final Geotechnics exam is conditioned by attending all the laboratory classes and having a grade >5 to all the laboratory tests

Date of filling in:		**Title Surname Name**	**Signature**
01.10.2019	Lecturer	Conf.dr.ing. Nicoleta Maria ILIEȘ	
	Applications	S.L.dr.ing. Olimpiu Cristian MUREȘAN S.L.dr.ing. Iulia Consuela PRODAN	

Date of approval in the Structures Department council _____	Head of Department of Structures, Conf.dr.ing. Attila PUSKAS
Date of approval in the Faculty Council _____	Dean, Conf.dr.ing. Nicolae CHIRA