COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**ΓΚ1202**	**SEMESTER**	3rd
COURSE TITLE	GEOLOGY FOR ENGINEERS		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
	4	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialized general knowledge, skills development*	General background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	eclass.uth.gr/courses/CULT_U_135/

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

1. Presentation of the basic principles and methods of Geology oriented to the field of Civil Engineering projects. Description of the scientific subject of Geology with emphasis on the issues that affect the location, design, construction and maintenance of technical projects.

2. Analysis of the main characteristics of the interior and surface of the Earth and the processes that contributed to their formation.

3. Reading and interpretation of topographic and geological maps.

4. Design of topographic and geological sections with the aim of studying stratigraphic and tectonic data below the Earth's surface.

Students:

5. Cultivate their judgment as engineers when studying the geological environment and evaluate its impact on technical projects,

6. Develop responsibility and professional ethics that relate to the responsibility of drafting correct geotechnical studies and to understanding the importance of the work of the Civil Engineer in society and the natural environment.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking Working in an interdisciplinary environment*
Production of new research ideas	*……*
	Others…
	…….

Search, analysis and synthesis of data and information, using the necessary technologies. Processing of geological data required for the design and management of geotechnical projects. Working in an interdisciplinary environment. Cultivating critical thinking skills when selecting data and evaluating the results of problems. Developing geological awareness and a good understanding of space. Respect for the natural environment.

(3) **SYLLABUS**

1. Introduction to Geology. Engineering Geology and Civil Engineering. The Earth planet. Shape, size, structure and outer zones of the Earth. Intrinsic and extrinsic processes. Density, pressure, and temperature in the interior of the Earth. Isostasy and gravity field changes. The magnetic field of the Earth. Theory of tectonic plates. Tectonic structure in Greece.

2. Minerals: General characteristics, structure, chemical composition and typical groups. Rocks: General characteristics and types. The rocks as the primary source for the history of the Earth. The transformation cycle of the rocks. Igneous rocks. The volcano of Santorini. Sedimentary rocks. Oil deposits. Metamorphic rocks.

3. The measurement of geological time. Relative chronology. Principles of stratigraphy, fossils and unconformities. Absolute chronology. The biosphere from a geological perspective.

4. Weathering: Mechanical and chemical. Soils and soil formation procedures. Composition, structure, classification and rate of soil formation. Gravitational movements. Landslides: Classification and countermeasures.

5. Surface waters. River flow. Erosion, transport and deposition. Evolution of the relief of the Earth. Floods. Alluvial deposits.

6. Groundwater: Distribution and movement. Types of aquifers, springs and aquifers with respect to rivers. Water wells. Dangers of overexploitation and pollution of groundwater. The geological work of groundwater. Glaciers and Winds.

7. Tectonic structures, stress, strain. Orientation of the geologic strata. Joints. Faults: Types, time and space formation. Folds.

8. Earthquakes. Seismic waves. Measurements on earthquakes. Richter's scale. Mechanism of earthquakes. Disasters and intensity of an earthquake. Mercalli's scale. Earthquake prediction and addressing catastrophic events.

9. Maps (definitions, types, scale). Coordinates of the Earth. Cartographic projections. Topographic maps. Illustration embossed surface with contour lines. Construction of a surveying section.

10. Geologic maps. Geological sections. Horizontal strata. Geological section in map with horizontal layers.

11. Inclined layers. Details of inclined layers: Strike line, strike, dip, dip direction. Thickness of layers. Geological section in map with inclined strata.

12. The "three points" problem. Unconformities and faults in the geological maps. Geological section in map with unconformity and fault.

13. Folds. Geological section in map with folded strata.

14. Exercises in geological sections (horizontal and inclined strata, angular unconformities, inclined and vertical faults, folded strata. Calculation of the inclination, vertical and actual stratum thickness).

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY ***Face-to-face, Distance learning, etc.***	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	During the lectures, the lecturer uses a laptop and a projector. The lecturer communicates with the students and makes educational material available via eclass and email. In addition, the Department's website is used for course announcements. The students solve the relevant exercises during the lectures with the help of the lecturer. Bibliographic research by the students is done online via the university library website.
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non- directed study according to the principles of the ECTS*	

Activity	*Semester workload*
Lectures - Theory	28
Exercises in the hall	28
Home study	56
Exam preparation	25
Examination	3
Course total	140

STUDENT PERFORMANCE EVALUATION ***Description of the evaluation procedure*** *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open- ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	The language of the evaluation procedure is Greek. The final evaluation for grading takes place at the end of the semester and is written and consists of theory and exercises. The evaluation method and the grading criteria of the exam are made known to students in the 1st lesson and are announced in eclass.

(5) **ATTACHED BIBLIOGRAPHY**

-Suggested bibliography:

In Greek:

1) Δούτσος, Θ., (2000), "Γεωλογία: Αρχές και Εφαρμογές", Εκδόσεις Leader Books, Αθήνα.
2) Κλαψόπουλος, Γ., (2011), "Σημειώσεις Τεχνικής Γεωλογίας", Πανεπιστημιακές Εκδόσεις Θεσσαλίας, Βόλος.
3) Παπανικολάου Δ.Ι., και Σίδερης Χρ. Ι., (2013), "Γεωλογία: Η επιστήμη της Γης", Εκδόσεις Πατάκη, Αθήνα.
4) Ροντογιάννη - Τσιαμπάου Θ., (2018), "Γεωλογία. Θεμελιώδεις έννοιες για μηχανικούς", Εκδόσεις Τζιόλα, Θεσσαλονίκη.
5) Δεπούντης Ν., Κουκουβέλας Ι., Παπουλης Δ.,(2020), "Γεωλογία για Πολιτικούς Μηχανικούς", Εκδόσεις Δίσιγμα ΙΚΕ, Θεσσαλονίκη.

In English:

1) Bell, F.G., (2007), "Engineering Geology", Elsevier Butterworth-Heinemann, Oxford.
2) Blyth, F.G.H., and De Freitas, M.H., (1984), "A Geology for Engineers", Elsevier Science & Technology, Oxford.
3) Goodman, R. E., (1993), "Engineering Geology", John Wiley and Sons Ltd.
4) Lisle, R.J., (2004), "Geological Structures and Maps", Elsevier Butterworth-Heinemann, Oxford.
5) Lutgens, F.K., Tarbuck, E.J., and Tasa, D., (2012), "Essentials of Geology", Prentice Hall.

- Related academic journals:

1) Bulletin of the Hellenic Geological Society (in Greek), ISSN: 0438-9557
2) Engineering Geology, ISSN: 0013-7952
3) Environmental Earth Sciences, ISSN: 1866-6280
4) Geomorphology, ISSN: 0169-555X
5) International Journal of Earth Sciences, ISSN: 1437-3254
6) Journal of Structural Geology, ISSN: 0191-8141