

ECTS

ΕΥΡΩΠΑΪΚΟ ΣΥΣΤΗΜΑ ΜΕΤΑΦΟΡΑΣ ΑΚΑΔΗΜΑΪΚΩΝ ΜΟΝΑΔΩΝ
ΣΤΗΝ ΕΥΡΩΠΑΪΚΗ ΕΝΩΣΗ

(B) Course information in english

General course information:

Course title:	Geology for engineers	Course code:	ΓΚ1202
Credits:	5	Work load (hours):	140
Course level:	Undergraduate <input checked="" type="checkbox"/>	Graduate	<input type="checkbox"/>
Course type:	Mandatory <input checked="" type="checkbox"/>	Selective	<input type="checkbox"/>
Course category:	Basic <input checked="" type="checkbox"/>	Orientation	<input type="checkbox"/>
Semester:	3th	Hours per week:	4
Course objectives (capabilities pursued and learning results):			
Introduction to geology with emphasis on topics affecting the location, design, construction, and maintenance of civil works. Analysis of the main features of the interior and the surface of the Earth and the processes that contributed to their development. Reading and interpretation of topographic and geologic maps. Exercises and practice in geological sections.			
Prerequisites:			

Instructor's data:

Name:	Georgios Efraimidis
Level:	Assistant Professor
Office:	102A Civil Engineering Faculty University of Thessaly Pedion Areos, 383 34 Volos, Greece
Tel. – email:	+30-24210-74155, gefraim@uth.gr
Other tutors:	

Specific course information:

Week No.	Course contents	Hours	
		Course attendance	Preparation
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.	4	2
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.	4	2

3	The measurement of geological time. Relative chronology. Principles of stratigraphy, fossils and unconformities. Absolute chronology. The biosphere from a geological perspective.	4	2
4	Weathering: Mechanical and chemical. Soils and soil formation procedures. Composition, structure, classification and rate of soil formation. Gravitational movements. Landslides: Classification and countermeasures.	4	2
5	Surface waters. River flow. Erosion, transport and deposition. Evolution of the relief of the Earth. Floods. Alluvial deposits.	4	3
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.	4	3
7	Tectonic structures, stress, strain. Orientation of the geologic strata. Joints. Faults: Types, time and space formation. Folds.	4	4
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.	4	4
9	Maps (definitions, types, scale). Coordinates of the Earth. Cartographic projections. Topographic maps. Illustration embossed surface with contour lines. Construction of a surveying section.	4	4
10	Geologic maps. Geological sections. Horizontal strata. Geological section in map with horizontal layers.	4	6
11	Inclined layers. Details of inclined layers: Strike line, strike, dip, dip direction. Thickness of layers. Geological section in map with inclined strata.	4	6
12	The "three points" problem. Unconformities and faults in the geological maps. Geological section in map with unconformity and fault.	4	6
13	Folds. Geological section in map with folded strata.	4	6
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	6

Additional hours for:			
Class project	Examinations	Preparation for examinations	Educational visit
	3	25	

Suggested literature:**In Greek:**

- 1) Doutsos, Th., (2000), "Geology: Principles and Applications", Leader Books, Athens (in Greek).
- 2) Klapsopoulos, G., (2011), "Engineering Geology Notes ", University Press of Thessaly, Volos (in Greek).
- 3) Papanikolaou D.I., and Sideris Chr. I., (2013), "Geology: The science of the Earth", Patakis Publishers, Athens (in Greek).
- 4) Rontoyianni – Tsiambaou Th., (2018), "Geology. Fundamental concepts for Engineers", Tziola Publications, Thessaloniki, (in Greek).

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 scientific 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

Teaching method (select and describe if necessary - weight):		
Teaching	<input checked="" type="checkbox"/> Oral presentations with examples	50 %
Seminars	<input type="checkbox"/>%
Demonstrations	<input type="checkbox"/>%
Laboratory	<input type="checkbox"/>%
Exercises	<input checked="" type="checkbox"/> Topographical and geological maps: Reading, understanding and interpretation. Topographical and geological sections.	50 %
Visits at facilities	<input type="checkbox"/>%
Other (describe):	<input type="checkbox"/>%
Total		100%

Evaluation method (select)- weight:				
	<i>written</i>	<i>%</i>	<i>Oral</i>	<i>%</i>
Homework	<input type="checkbox"/>		<input type="checkbox"/>	
Class project	<input type="checkbox"/>		<input type="checkbox"/>	
Interim examination	<input type="checkbox"/>		<input type="checkbox"/>	
Final examinations	<input checked="" type="checkbox"/>	100	<input type="checkbox"/>	
Other (<i>describe</i>):	<input type="checkbox"/>		<input type="checkbox"/>	