

ECTS

(B) Course information in english

General course information:

Course title:	GEOENVIRONMENTAL ENGINEERING	Course code:	ΓΕ0500
Credits:	6	Work load (hours):	110
Course level:	Undergraduate <input checked="" type="checkbox"/>	Graduate <input type="checkbox"/>	
Course type:	Mandatory <input type="checkbox"/>	Selective <input checked="" type="checkbox"/>	
Course category:	Basic <input type="checkbox"/>	Orientation <input checked="" type="checkbox"/>	
Semester:	9th	Hours per week:	4
Course objectives (capabilities pursued and learning results):			
The course presents the basic principles and modern technology of Geoenvironmental Engineering in waste disposal, protection from the extension of pollution and decontamination of soils and underground aquifers. Among other things, students are exploring the nature of geo-environmental problems, their impacts and ways of improving the quality of the geoenvironment, as well as enhancing terrain as a means of building civil engineering projects.			
Prerequisites: 1. SOIL ENGINEERING 2. ENVIRONMENTAL ENGINEERING			

Instructor's data:

Name:	VAZOURAS POLYNIKIS
Level:	
Office:	Groundfloor, Department of Civil Engineering
Tel. – email:	2421074149, pvazour@yahoo.gr
Other tutors:	

Specific course information:

Week No.	Course contents	Hours	
		Course attendance	Preparation
1	Purpose and objectives of the course. Program and course content. Protection of geo-environment. Forms and		

	causes of pollution.		
2	Pollution and rehabilitation of geoenvironment in Greece and abroad.		
3	Institutional framework and case law on environmental protection. Environmental impact assessment. Legislative status of environmental protection in Greece today and in the past, in Europe and America.		
4	Soil and hydrogeology data. Minerals - rocks. Categories of soils. Movement of groundwater into soils. Estimation of hydraulic parameters of aquifers. Exploitation of aquifers by pumping.		
5	The role of plants and vegetation in civil engineering works. Hydrological and mechanical mechanisms of protection and stabilization of slopes in the presence of vegetation. The role of vegetation as a measure of protection against erosion.		
6	Territorial erosion. Types of corrosion and factors that cause it. Classification of corrosion. Consequences. Hydraulic corrosion. Surface erosion. Internal corrosion. Principles and measures to protect soil from erosion		
7	Soil pollution. Pollutant characteristics. Sources and acceptable limits of pollution. Polluted and contaminated soils. Related terms. Interaction of soil with soil. The phases of soil and pollutants and the balance between them.		
8	Pollution evolution mechanisms and simulation of pollutant transport. Geotechnical research and control techniques in contaminated sites and disposal sites. Methods and techniques for restoration of contaminated soils.		
9	Categories of solid waste. Municipal waste. Management techniques. Solid waste disposal. Sorting in Source. Collection Centers of recyclable materials - Mechanical Recycling. Thermal processing methods. Biological		

	processing methods. Engineering and Biological Processing Units. Landfill. Institutional framework. Compost making from home disposals.		
10	Aesthetics of technical works. Design and study of technical projects taking into account the factor of aesthetics. Impact. Examples.		
11	Geotechnical research. Purpose. Institutional framework. Methods of geotechnical research. Sample boreholes and excavations. In-field field trials.		
12	Laboratory tests. Classification and soil resistance tests. The triaxial test. Modern methods of determining basic physical and mechanical properties of soils. Permeability tests, chemical identification tests and rheological properties of fluids and viscosity measurement tests Soil filters: role, importance and design.		
13	Improvement and reinforcement of soils. Preload, consolidation, dynamic consolidation, vibratory consolidation, vibratory replacement, reinforcement, reinforcing with injections, thermal action. Recent methods of improvement: passive stabilization, stabilization with bio-materials (bacteria), artificial cementing.		
14	Summary. Key Issues and Basic Principles.		

Additional hours for:			
Class project	Examinations	Preparation for examinations	Educational visit
	3	25	1

Suggested literature (in Greek):
<ol style="list-style-type: none"> 1. Fetter, C.W. 1999. Contaminant Hydrogeology, MacMillan 2. Freeze, R.A. and J.A. Cherry, 1979. Groundwater, Prentice Hall. 3. LaGrega, M., Buckingham P.L. & Evans, J.C., 2001. Hazardous Waste Management, McGraw Hill. 4. Mitchell, J.L., 1993, Fundamentals of Soil Behaviour, Willey. 5. Mohamed, A.M.O. & Paleologos E.K., 2017. Fundamentals of Geoenvironmental Engineering: Understanding Soil, Water, and Pollutant Interaction and Transport, Butterworth-Heinemann ed. 6. Reddi, L. & Inyang, H.I., 2000. Geoenvironmental Engineering: Principles and applications, Marcel Pecker inc.

7. Sarsby, R.W. 2000. Environmental Geotechnics, Thomas Telford Ed.

8. Sharma, H.D. & Reddy, K.R. 2004. Geoenvironmental Engineering: site remediation, waste containment and emerging waste management technologies, Wiley.

9. Quian, X., Koerner R.M. & Gray D.H. 2002. Geotechnical Aspects of Landfill Design and Construction, Prentice Hall.

10. Βράννα, Α.Δ. 2016. «Εργαστηριακή μελέτη της μονοτονικής και ανακυκλικής συμπεριφοράς βελτιωμένων ρευστοποιήσιμων εδαφών». Διδακτορική διατριβή Α.Π.Θ.

11. Καββαδάς, Μ. & Πανταζίδου, Μ. 2013. Στοιχεία Περιβαλλοντικής Γεωτεχνικής, Εκδόσεις ΕΜΠ.

12. Παπασιώτη, Ν. & Πασπαλιάρης, Ι. 2008. Αποκατάσταση ρυπασμένων εδαφών, Έκδοση ΕΜΠ.

Teaching method (select and describe if necessary - weight):		
Teaching	<input checked="" type="checkbox"/>	75%
Seminars	<input type="checkbox"/>%
Demonstrations	<input checked="" type="checkbox"/>%
Laboratory	<input checked="" type="checkbox"/>	15%
Exercises	<input checked="" type="checkbox"/>	5%
Visits at facilities	<input checked="" type="checkbox"/>	5%
Other (describe):	<input type="checkbox"/>%
Total		100%

Evaluation method (select)- weight:				
	<u>written</u>	<u>%</u>	<u>Oral</u>	<u>%</u>
Homework	<input checked="" type="checkbox"/>	30	<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"/>	70	<input type="checkbox"/>	
Other (describe):	<input type="checkbox"/>		<input type="checkbox"/>	
Total		100%		