DEEP EXCAVATIONS AND RETAINING STRUCTURES

1	Course Title:	DEEP EXCAVATIONS AND RETAINING STRUCTURES	
2	Course Code:	INS5075	
3	Type of Course:	Optional	
4	Level of Course:	Third Cycle	
5	Year of Study:	1	
6	Semester:	1	
7	ECTS Credits Allocated:	6.00	
8	Theoretical (hour/week):	3.00	
9	Practice (hour/week):	0.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:		
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Doç. Dr. YEŞİM SEMA ÜNSEVER	
15	Course Lecturers:		
16	Contact information of the Course Coordinator:	unsever@uludag.edu.tr 0224 2942946	
17	Website:		
18	Objective of the Course:	Earth retaining systems for deep excavations. Water pressure acting on earth retaining systems and related problems. Lateral earth pressure acting on earth retaining systems. Lateral supporting elements: Ground anchors and struts. Types, components, production and installation, dimensioning, bearing capacity, corrosion protection, testing and pre-stressing of anchors. Lateral and vertical displacements of adjacent ground. Modes of failure of retaining systems. Sloped excavations in soil and rock. Instrumentation and monitoring of deep excavations. Soil nailing: system description and design.	
19	Contribution of the Course to Professional Development:	This course teaches retaining systems for deep excavations and also types of retaining structures.	
20	Learning Outcomes:		
		1	Be able to learn the types of deep excavations and retaining structures
		2	Be able to learn deep excavations and retaining structures applications
		3	Be able to calculate the forces acting on retaining structures
		4	Be able to learn the design criteria
		5	Be able to apply various methods to calculate the stability of the retaining walls and excavations
		6	Be able to design of retaining walls
		7	
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		10	
21	Course Content:		
	Course Content:		
Week	Theoretical	Practice	

1	Introduction	
2	Typical retaining walls; Gravity walls, Cantilever walls, Buttressed walls, Reinforced earth walls	
3	Theory of Lateral earth pressure	
4	Stability problems of retaining structures	
5	Application and design of retaining structures	
6	Types and application of retaining walls at deep excavations	
7	Pore pressure effect on retaining structures	
8	Modern retaining structures; Anchors, Sheet piles, and their stabilities	
9	Modern retaining structures; Anchors, Sheet piles, and their stabilities	
10	Diaphragm walls, applications and stability	
11	Piled walls and their systems	
12	Reinforced earth walls and applications	
13	The analysis of in-situ retaining walls and placement of instrumentations and monitoring the structures	
14	Design examples	

22	Textbooks, References and/or Other Materials:	R.S.Sinha, Underground Structures, Elsevier, 1989; F.Arıoğlu ve A.O.Yılmaz, Çözümlü problemlerle yeraltı

Activites		Number	Duration (hour)	Total Work Load (hour)
Theoretical	**R**	14	3.00	42.00
Practicals/Labs		0	0.00	0.00
Quiz	0	0.00		
Self study and preperation		14	9.00	126.00
Homeworks		1	10.00	10.00
Final Exam	1	60.00		
Projects		0	0.00	0.00
Field Studies		0	0.00	0.00
Contribution of Term (Year) Learning Activities to Success Grade	40.00			
Midterm exams		1	2.00	2.00
Others		0	0.00	0.00
Contribution of Final Exam to Success Grade	60.00			
Final Exams		1	2.00	2.00
Total Work Load				182.00
Total work load/ 30 hr				6.07
Measurement and Evaluation Techniques Used in the Course		Written exams of numerical and theoretical questions and assignments		
ECTS Credit of the Course				6.00

24	**ECTS / WORK LOAD TABLE**

25	**CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS**															
	PQ1	**PQ2**	**PQ3**	**PQ4**	**PQ5**	**PQ6**	**PQ7**	**PQ8**	**PQ9**	**PQ10**	**PQ11**	**PQ12**	**PQ13**	**PQ14**	**PQ15**	**PQ16**
ÖK1	5	4	4	3	0	4	0	0	3	3	0	0	0	0	0	0
ÖK2	5	3	4	0	0	4	0	0	0	0	0	0	0	0	0	0
ÖK3	5	3	4	0	0	4	0	0	0	0	0	0	0	0	0	0
ÖK4	5	5	4	0	0	4	0	0	0	0	4	0	0	0	0	0

ÖK5	5	4	5	3	0	4	0	0	0	3	4	0	0	0	0	0
ÖK6	5	5	4	3	0	5	0	0	0	3	4	0	0	0	0	0

LO: Learning Objectives PQ: Program Qualifications

Contribution Level:	**1 very low**	**2 low**	**3 Medium**	**4 High**	**5 Very High**