

## COURSE SYLLABUS AND COURSE REQUIREMENTS

## ACADEMIC YEAR 2023/2024 SEMESTER FALL

<i>Course title</i>	<i>Underground Structures</i>
<i>Course Code</i>	MSB384ANEP
<i>Hours/Week: le/pr/lab</i>	2 lectures, 1 practice /week
<i>Credits</i>	3
<i>Degree Programme</i>	B.Sc in Civil Engineering
<i>Study Mode (TVSZ-ben training schedule)</i>	
<i>Requirements</i>	None
<i>Teaching Period</i>	7th
<i>Prerequisites</i>	None
<i>Department(s)</i>	Civil Engineering
<i>Course Director</i>	
<i>Teaching Staff</i>	Ali Mohamed Mohamed Salem
<i>Hours/Week: le/pr/lab</i>	2 lectures, 1 practice /week

## COURSE DESCRIPTION

*Neptun: Instruction/Subjects/Subject Details/Basic data/Subject description*

This course is designed to teach students geotechnical issues related to tunnelling and underground construction, particularly in urban areas. The fundamentals of tunnel design and the most common methodologies for tunnel construction are presented with the aid of documented case histories. Teaching students different methods of soil improvement, Site Dewatering, and supported deep excavation.

## SYLLABUS

*Neptun: Instruction/Subjects/Subject Details/Syllabus*

**1. GOALS AND OBJECTIVES**

*Neptun: Instruction/Subjects/Subject Details/Syllabus/Goal of Instruction*

This course is aimed to provide basic and advanced knowledge of underground space and underground construction technologies, including planning, construction methods, safety, and environmental considerations. Students will gain from this course:

- Knowledge of soil exploration and bearing capacity of soil,
- Understanding and Practical knowledge of underground construction.
- Knowledge of Ground improvement and supported deep excavation

Methodology:

- Lectures: will give the basis of underground space and underground construction technologies.
- Practical class and lab practice: Students will be assigned tasks to complete
- Exams: Accumulated knowledge is tested in two exams: a midterm and a final exam. Both feature multiple-choice, true-false or short essay questions

**2. COURSE CONTENT**

*Neptun: Instruction/Subjects/Subject Details/Syllabus/Subject content*

**TOPICS**

LECTURE	TOPICS
	1. Introduction in Tunnelling and Underground Construction Technology
	2. Planning of Underground Construction Technology
	3. Geotechnical Investigation for Tunnel Construction
	4. Tunnel Construction Techniques, Shape and size of tunnels
	5. Stresses around Tunnels, Surface settlement calculation
	6. Principles of Tunnel Lining Design
	7. Ventilation and lighting of tunnels
	8. Monitoring and control in Tunnel Construction
	9. Dewatering systems

## PRACTICE

10. Ground Movements, soil reinforcement and Supported deep foundation
1. Tunnelling and Underground Construction Technology
2. Planning of Underground Construction Technology
3. Geotechnical Investigation for Tunnel Construction
4. Tunnel Construction Techniques, Shape and size of tunnels
5. Stresses around Tunnels, Surface settlement calculation
6. Principles of Tunnel Lining Design
7. Ventilation and lighting of tunnels
8. Monitoring and control in Tunnel Construction
9. Dewatering systems
10. Ground Movements, soil reinforcement and Supported deep foundation

## DETAILED SYLLABUS AND COURSE SCHEDULE

ACADEMIC HOLIDAYS INCLUDED

### LECTURE

week	Topic	Compulsory reading; page number (from ... to ...)	Required tasks (assignments, tests, etc.)	Completion date, due date
1.	Course description. Orientation.	...	...	...
2.	Introduction in Tunnelling and Underground Construction Technology	Lecture notes and slides	----	
3.	Planning of Underground Construction Technology	Lecture notes and slides	Assignment_1	20-09-2023
4.	Geotechnical Investigation for Tunnel Construction	Lecture notes and slides	Assignment_2	27-10-2023
5.	Tunnel Construction Techniques, Shape and size of tunnels	Lecture notes and slides	Assignment_3	04-10-2023
6.	Stresses around Tunnels	Lecture notes and slides	Assignment_4	11-10-2023
7.	Surface settlement calculation	Lecture notes and slides	Assignment_5	18-10-2023
8.	<b>Mid-Term Exam</b>			25-10-2023
9.	Principles of Tunnel Lining Design	Lecture notes and slides	Assignment_6	-----
10.	Ventilation and lighting of tunnels	Lecture notes and slides	Assignment_7	08-11-2023
11.	Monitoring and control in Tunnel Construction	Lecture notes and slides	Assignment_8	15-11-2023
12.	Dewatering systems	Lecture notes and slides	Assignment_9	22-11-2023
13.	Ground Movements, soil reinforcement and Supported deep foundation	Lecture notes and slides	----	-----
14.	Final Exam,			

### PRACTICE, LABORATORY PRACTICE

week	Topic	Compulsory reading; page number (from ... to ...)	Required tasks (assignments, tests, etc.)	Completion date, due date
1.	Course description. Orientation.	...	...	...
2.	Introduction in Tunnelling and Underground Construction Technology	Lecture notes and slides	----	
3.	Planning of Underground Construction Technology	Lecture notes and slides	Assignment_1	20-09-2023
4.	Geotechnical Investigation for Tunnel Construction	Lecture notes and slides	Assignment_2	27-10-2023

5.	Tunnel Construction Techniques, Shape and size of tunnels	Lecture notes and slides	Assignment_3	04-10-2023
6.	Stresses around Tunnels	Lecture notes and slides	Assignment_4	11-10-2023
7.	Surface settlement calculation	Lecture notes and slides	Assignment_5	18-10-2023
8.	<b>Mid-Term Exam</b>			25-10-2023
9.	Principles of Tunnel Lining Design	Lecture notes and slides	Assignment_6	-----
10.	Ventilation and lighting of tunnels	Lecture notes and slides	Assignment_7	08-11-2023
11.	Monitoring and control in Tunnel Construction	Lecture notes and slides	Assignment_8	15-11-2023
12.	Dewatering systems	Lecture notes and slides	Assignment_9	22-11-2023
13.	Ground Movements, soil reinforcement and Supported deep foundation		-----	-----
14.	Final Exam,			

### 3. ASSESSMENT AND EVALUATION

(Neptun: Instruction/Subjects/Subject Details/Syllabus/Examination and Evaluation System)

#### ATTENDANCE

In accordance with the Code of Studies and Examinations of the University of Pécs, Article 45 (2) and Annex 9. (Article 3) a student may be refused a grade or qualification in the given full-time course if the number of class absences exceeds 30% of the contact hours stipulated in the course description.

**Method for monitoring attendance** (e.g.: attendance sheet / online test/ register, etc.)

attendance sheet

#### ASSESSMENT

Cells of the appropriate type of requirement is to be filled out (course-units resulting in mid-term grade or examination). Cells of the other type can be deleted.

---

**Course resulting in mid-term grade (PTE TVSz 40§(3))**

**Mid-term assessments, performance evaluation and their ratio in the final grade**

Type	Assessment	Ratio in the final grade
Attendance	10 points	10%
Assignments and project	20 points	20%
Midterm Exam	30 points	30%
Final Exam	40 points	40%

**Opportunity and procedure for re-takes** (PTE TVSz 47§(4))

all tests and assessment tasks can be repeated/improved at least once every semester, and the tests and home assignments can be repeated/improved at least once in the first two weeks of the examination period.

#### **Grade calculation as a percentage**

based on the aggregate performance according to the following table

Course grade	Performance in %
excellent (5)	85 % ...
good (4)	70 % ... 85 %
satisfactory (3)	55 % ... 70 %
pass (2)	40 % ... 55 %
fail (1)	below 40 %

The lower limit given at each grade belongs to that grade.

---

### **Course-unit with final examination**

#### **Mid-term assessments, performance evaluation and their weighting as a pre-requisite for taking the final exam**

Type	Assessment	Weighting as a proportion of the pre-requisite for taking the exam
1. Attendance	10 points	10%
2. Assignments	20 points	20%
3. Midterm Exam	30 points	30%
4. Final Exam	40 points	40%

#### **Requirements for the end-of-semester signature**

The end-of-semester signature is successful if the result is minimum **40** %.

#### **Re-takes for the end-of-semester signature (PTE TVSz 50§(2))**

All tests and assessment tasks can be repeated/improved at least once every semester, and the tests and home assignments can be repeated/improved at least once in the first two weeks of the examination period.

**Type of examination (written, oral):** written

The exam is successful if the result is minimum **40** %.

#### **Calculation of the grade (TVSz 47§ (3))**

The mid-term performance accounts for **30** %, the performance at the exam accounts for **40** % in the calculation of the final grade.

#### **Calculation of the final grade based on aggregate performance in percentage.**

Course grade	Performance in %
excellent (5)	85 % ...
good (4)	70 % ... 85 %
satisfactory (3)	55 % ... 70 %
pass (2)	40 % ... 55 %
fail (1)	below 40 %

The lower limit given at each grade belongs to that grade.

## **4. SPECIFIED LITERATURE**

*In order of relevance. (In Neptun ES: Instruction/Subject/Subject details/Syllabus/Literature)*

### **COMPULSORY READING AND AVAILABILITY**

- [1.] Primary compulsory reading and its availability
- [2.] Compulsory literature and its availability

### **RECOMMENDED LITERATURE AND AVAILABILITY**

- D.Kolymbas, Tunnelling and Tunnel Mechanics, Springer
- D. Chapman et al., Introduction to Tunnel Construction, Spon Press
- Lecture notes and slides