

COURSE SYLLABUS AND COURSE REQUIREMENTS

ACADEMIC YEAR 2025/2026 SEMESTER SPRING

Course title	Geotechnics 3. (Foundations)
Course Code	MSB004ANEP
Hours/Week: le/pr/lab	2 lectures, 3 practice /week
Credits	7
Degree Programme	B.Sc in Civil Engineering
Study Mode (TVSZ-ben training schedule)	
Requirements	None
Teaching Period	6th
Prerequisites	None
Department(s)	Civil Engineering
Course Director	
Teaching Staff	Ali Mohamed Mohamed Salem
Hours/Week: le/pr/lab	2 lectures, 3 practice /week

COURSE DESCRIPTION

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

This course is aimed to provide basic and advanced knowledge on the principles and design of the different type of foundation. 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.

Topics covered by the course include: soil site explorations, bearing capacity of soil, shallow foundations, deep foundations , pile caps, 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 on the principles and design of the different types of foundations, underground spaces, and underground construction technologies, including planning, construction methods, safety, and environmental considerations. Topics covered by the course include soil site explorations, bearing capacity of soil, shallow foundations, deep foundations, pile caps, tunnel construction techniques, shape and size of tunnels, principles of tunnel lining design, ventilation and lighting of tunnels, stresses around tunnels, surface settlement calculation, soil improvement, site dewatering, and supported deep excavation.

Students will gain from this course:

- knowledge of soil exploration and bearing capacity of soil,
- Understanding and practical knowledge of foundation design.
- Understanding and practical knowledge of underground construction.
- Knowledge of tunnel construction.
- Knowledge of Ground improvement and supported deep excavation

2. COURSE CONTENT

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

TOPICS

LECTURE	TOPICS
	1. Introduction in Geotechnical Engineering
	2. Bearing capacity of soils
	3. Design of shallow foundation (Strip footing+ Isolated footing)
	4. Design of shallow foundation (Combined Footing)
	5. Design of shallow foundation (Strap beam footing)

PRACTICE

- 6. Introduction to deep foundation (Piles material, size, load transfer, technology)- Design of pile Single pile
 - 7. Design of pile group- pile cap
 - 8. Introduction in Tunnelling and Underground Construction Technology
 - 9. Tunnel Construction Techniques, Shape and size of tunnels
 - 10. Principles of Tunnel Lining Design-Ventilation and lighting of tunnels
 - 11. Stresses around Tunnels-Surface settlement calculation
 - 12. Monitoring and control in Tunnel Construction + Dewatering systems
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- 1. Bearing capacity of soils
 - 2. Design of shallow foundation (Strip footing+ Isolated footing)
 - 3. Design of shallow foundation (Combined Footing)
 - 4. Design of shallow foundation (Strap beam footing + Raft foundation)
 - 5. Design of pile (Single pile)
 - 6. Design of pile group and pile cap
 - 7. Tunnel Construction Techniques, Shape and size of tunnels
 - 8. Principles of Tunnel Lining Design-Ventilation and lighting of tunnels
 - 9. Stresses around Tunnels-Surface settlement calculation

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.	Bearing capacity of soils	Lecture notes and slides	Assignment_1	26-02-2026
3.	Design of shallow foundation(Strap footing+ Isolated footing)	Lecture notes and slides	Assignment_2	05-02-2026
4.	Design of shallow foundation(Combined Footing)	Lecture notes and slides	Assignment_3	12-03-2026
5.	Design of shallow foundation(Strap beam footing)	Lecture notes and slides	Assignment_4	19-03-2026
6.	Introduction to deep foundation (Piles material, size, load transfer, technology)- Design of pile Single pile	Lecture notes and slides	Assignment_5	26-03-2026
7.	Design of pile group- pile cap	Lecture notes and slides	Assignment_6	02-04-2026
8.	Mid-Term Exam			
9.	Spring break			
10.	Introduction in Tunnelling and Underground Construction Technology	Lecture notes and slides		
11.	Tunnel Construction Techniques, Shape and size of tunnels	Lecture notes and slides	Assignment_7	23-04-2026
12.	Principles of Tunnel Lining Design- Ventilation and lighting of tunnels	Lecture notes and slides	Assignment_8	30-04-2026
13.	Stresses around Tunnels-Surface settlement calculation	Lecture notes and slides	Assignment_9	
14.	Monitoring and control in Tunnel Construction + Dewatering systems	Lecture notes and slides	----	07-05-2026
15.	Final Exam,			

PRACTICE, LABORATORY PRACTICE

week	Topic	Compulsory reading; page number (from ... to ...)	Required tasks (assignments, tests, etc.)	Completion date, due date
1.	Introduction in Geotechnical Engineering
2.	Bearing capacity of soils	Lecture notes and slides	Assignment_1	26-02-2026
3.	Design of shallow foundation(Strip footing+ Isolated footing)	Lecture notes and slides	Assignment_2	05-02-2026
4.	Design of shallow foundation(Combined Footing)	Lecture notes and slides	Assignment_3	12-03-2026
5.	Design of shallow foundation(Strap beam footing)	Lecture notes and slides	Assignment_4	19-03-2026
6.	Introduction to deep foundation (Piles material, size, load transfer, technology)- Design of single pile	Lecture notes and slides	Assignment_5	26-03-2026
7.	Design of pile group- pile cap	Lecture notes and slides	Assignment_6	02-04-2026
8.	Mid-Term Exam			
9.	Spring Brek			
10.	Tunnel Construction Techniques, Shape and size of tunnels	Lecture notes and slides	Assignment_7	23-04-2026
11.	Principles of Tunnel Lining Design- Ventilation and lighting of tunnels	Lecture notes and slides	Assignment_8	30-04-2026
12.	Spring break			
13.	Stresses around Tunnels-Surface settlement calculation		Assignment_9	07-05-2026
14.	Monitoring and control in Tunnel Construction + Dewatering systems			
15.	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	20 points	20%
Final Exam	50 points	50%

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	20 points	20%
4. Final Exam	50 points	50%

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 **20** %, the performance at the exam accounts for **50** % 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.] Lectures and notes
- [2.] Compulsory literature and its availability

RECOMMENDED LITERATURE AND AVAILABILITY

1. Joseph E. Bowles, McGraw-Hill 1996 "Foundation Analysis and Design", 5th Ed.by.
2. Braja M. Das Principles of Foundation Engineering, 4th Edition.

3. Farkas, J., Józsa, V., Szendefy J. (2014): Foundation Engineering, elektronikus angol BSc egyetemi jegyzet, BME, Geotechnikai Tanszék p. 97.
4. Holtz, R.D. and Kovacs, W.D. (1981): An Introduction to Geotechnical Engineering, Prentice Hall. [7.] - Lecture notes and slides
5. D.Kolymbas, Tunnelling and Tunnel Mechanics, Springer
6. D. Chapman et al., Introduction to Tunnel Construction, Spon Press