

I. Subject Specification

1. Basic Data

1.1 Title

Soil-structure interaction

1.2 Code

BMEEOGMMS52

1.3 Type

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	3
Seminar	1

1.5 Evaluation

Midterm grade

1.6 Credits

5

1.7 Coordinator

name	Balázs Móczár PhD
academic rank	Associate professor
email	moczar.balazs@emk.bme.hu

1.8 Department

Department of Engineering Geology and Geotechnics

1.9 Website

<https://oktatas.epito.bme.hu/BMEEOGMMS52>

<https://fiek2.mywire.org/course/view.php?id=2065>

1.10 Language of instruction

hungarian

1.11 Curriculum requirements

Compulsory in the Structural Engineering (MSc) programme

1.12 Prerequisites

1.13 Effective date

1 September 2022

2. Objectives and learning outcomes

2.1 Objectives

The scope of the subject is to teach the students the fundamentals of geotechnics required for structural design, such as familiarity with and use of EC7. These include geotechnical categorization; types and contents of geotechnical documentations; geotechnical and structural design of piles for different loading types, design of soil-supported ground slabs along with the determination of the values of subgrade reaction modulus; design of pile-supported ground slabs and “rigid inclusion” slabs; structural design of excavation support structures, determination of soil reaction moduli along with their effect on deformations and internal forces; design of ground anchors; geotechnical questions of bridge abutments; and the basics of soil dynamics and geotechnical earthquake engineering.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. know the structure and fundamentals of EC7
2. know the geotechnical categories, types and contents of geotechnical documentations
3. know the process of pile design and the determination of spring stiffnesses
4. know the process of designing elastically supported slabs and the determination of spring stiffnesses
5. know the process of designing pile supported slabs and rigid inclusion and the determination of spring stiffnesses
6. know the process of designing excavation support structures
7. know the process of designing earth anchors and their detailing
8. know the geotechnical aspects of bridge abutments
9. know the fundamentals of designing for dynamic effects and earthquakes

B. Skills

1. is able to interpret and apply EC7
2. is able to design pile foundations
3. is able to design elastically supported slabs
4. is able to design pile supported slabs and rigid inclusion foundations
5. is able to design excavation supporting structures
6. is able to carry out the geotechnical modelling of bridge abutments and calculate embankment settlements
7. is able to carry out geotechnical design for dynamic effects and earthquakes

C. Attitudes

1. is cooperative with the teacher and co-students in gaining new knowledge,

2. is continuously expanding his/her knowledge through learning,
3. is open to the application of up-to-date software und state-of-the-art design methods,
4. seeks to learn and routinely employ the design framework for geotechnical problem solving
5. strives for accurate task solving

D. Autonomy and Responsibility

1. individually assesses geotechnical problems and tasks associated with structural engineering, as well as their solution based on given sources
2. is open to reasoned critical remarks
3. applies a systematic way of thinking

2.3 Methods

Lectures, practical classes, verbal and written communication, application of IT devices and techniques, optionally tasks performed independently or in work groups, work organization techniques.

2.4 Course outline

Week	Topics of lectures and/or exercise classes
1.	Introduction and fundamentals of geotechnical design according to Eurocode 7-1. Types and contents of geotechnical documentations.
2.	Geotechnical and structural design of pile foundations.
3.	Design considerations of elastically bedded reinforced concrete slabs. Effect of slab stiffness on ground reactions, and possibilities for the determination of the subgrade reaction modulus.
4.	Design of pile-supported ground slabs.
5.	Design of rigid inclusion foundations systems.
6.	ZH1 (1st midterm test)
7.	Structural design of excavation supports
8.	Anchored excavation support systems. Design of temporary and permanent ground anchors.
9.	Geotechnical considerations of bridge abutments.
10.	ZH2 (2nd midterm test)
11.	In-situ geophysical tests: down-hole and cross-hole tests, seismic CPT, other means for the in-situ determination of wave propagation.
12.	Laboratory determination of dynamic soil parameters. Small-strain stiffness parameters and stiffness degradation curve.
13.	Determination of surface acceleration by site response analysis.
14.	ZH3 (3rd midterm test)

The above programme is tentative and subject to changes due to calendar variations and other reasons specific to the actual semester. Consult the effective detailed course schedule of the course on the subject website.

2.5 Study materials

a) Online materials:

1. Lectures note: ppt files

2.6 Other information

1. Attendance to exercise classes is compulsory. The signature and credits from the subject will be refused to students missing 3 or more exercise classes.
2. Each student is required to submit their original work . Copying and submitting work of others, cheating and plagiarism in any form is unacceptable. Whoever violate the Studies and Exam Regulations of the University will be given a failing grade (1), without the possibility of retake and repeat, and will be reported to the Dean's Office. The definitions of cheating and plagiarism are to be found in the Studies and Exam Regulations.

2.7 Consultation

The instructors are available for consultation during their office hours, as advertised on the department website. Special appointments can be requested via e-mail:

moczar.balazs@emk.bme.hu

This Subject Datasheet is valid for:

2023/2024 semester I

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

The assessment of the learning outcomes specified in clause 0 above and the evaluation of student performance occurs via 3 tests, 3 homework assignments and exercise class activities.

3.2 Assessment methods

Evaluation form	Abbreviation	Assessed learning outcomes
1. midterm test	ZH1	A.1-A.5; B.1-B.4; C.5; D.3
2. midterm test	ZH2	A.6-A.8; B.5-B.6; C.5; D.3
3. midterm test	ZH3	A.9; B.7; C.5; D.3
1. homework	HF1	A.1-A.5; B.1-B.4; C.1-C.5; D.1-D.3
2. homework	HF2	A.6-A.8; B.7; C.1-C.5; D.1-D.3
3. homework	HF3	A.9; B.7; C.1-C.5; D.1-D.3

The dates of midterm tests and deadlines of assignments/homework can be found in the detailed course schedule on the subject's website.

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3.3 Evaluation system

Abbreviation	Score
ZH1	25%
ZH2	15%
ZH3	15%
HF1	15%
HF2	15%
HF3	15%
Total achievable during the semester	100%
Sum	100%

All three midterm tests and the three homeworks are failed if the sum points of the tests are less than the 50% of the obtainable points. It is also required to reach at least 50% of the points for every evaluation.

3.4 Requirements and validity of signature

There is no signature for this subjects.

3.5 Grading system

Determination of the final grade is according to the below described consideration:

The final grade is the sum of the percentage result of the midterm test and the homework tasks (summing up to a maximum of 100 points.

Grade	Points (P)
excellent (5)	$80 \leq P$
good (4)	$70 \leq P < 80\%$
satisfactory (3)	$60 \leq P < 70\%$
passed (2)	$50 \leq P < 60\%$
failed (1)	$P < 50\%$

3.6 Retake and repeat

1. The 3 midterm tests can be retaken once each. A second retake is possible for only one midterm test.
2. Homework can be submitted with delay - after the payment of the fee determined in the Studies and Exam Regulations – until 16:00 of the last day of the supplementary period, or submitted in electronic format until 23:59 on the same day.

3.7 Estimated workload

Activity	Hours/semester
contact hours	$14 \times 4 = 56$
preparation for the courses	$7 \times 2 = 14$
preparation for the tests	$2 \times 8 + 2 \times 2 = 20$
homework	10
home studying of the written material	20
Sum	120

3.8 Effective date

1 September 2022

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2023/2024 semester I