

I. Tantárgyleírás**1. Alapadatok***1.1 Tantárgy neve***ENGINEERING STRUCTURES FOR GEOTECHNICAL ENGINEERS***1.2 Azonosító (tantárgykód)***BMEEOHSMsFST20-00***1.3 Tantárgy jellege*

Kontaktórás tanegység

1.4 Óraszámok

Típus	Óraszám / (nap)
Előadás (elmélet)	2

1.5 Tanulmányi teljesítményértékelés (minőségi értékelés) típusa

Vizsga

1.6 Kreditszám

3

1.7 Tárgyfelelős

név	Dr. Kovács Tamás
beosztás	Egyetemi docens
email	kovacs.tamas@emk.bme.hu

1.8 Tantárgyat gondozó oktatási szervezeti egység

Hidak és Szerkezetek Tanszék

1.9 A tantárgy weblapjaepito.bme.hu<https://edu.epito.bme.hu/course/view.php?id=5321>*1.10 Az oktatás nyelve*

magyar

1.11 Tantárgy típusa

Kötelező a Szerkezet-építőmérnök (MSc) szak Geotechnika és mérnökgeológia specializációján

*1.12 Előkövetelmények**1.13 Tantárgyleírás érvényessége*

2025. szeptember 1.

2. Célkitűzések és tanulási eredmények

2.1 Célkitűzések

One of the objectives of the course is to enable students to understand the basic principles of reinforced concrete structures in civil engineering, and then, based on this, to learn about the relevant design principles and appropriate construction technologies. Particular emphasis is placed on the interaction between the soil and the structure and its modeling, other geotechnical aspects, the relationship between structural form and force interaction, and the fluid tightness of concrete structures. Main topics: water supply and wastewater treatment structures (liquid storage basins and other tanks), below-ground building structures (underground garages) and the structures supporting their working pits, transport infrastructure structures (concrete pavements, tunnels), above-ground storage structures (bunkers, silos), industrial tower structures (chimneys, cooling towers, wind turbines), as well as the special effects acting on them and appropriate construction technologies (sliding formwork). The aim is to understand the forces acting on these structures, the relevant approximate and detailed analysis methods, and the appropriate reinforcement systems. Another objective of the course is for all students to significantly improve their problem recognition, problem understanding, and problem-solving skills in relation to their own initial level of competence. To this end, students may also seek individual assistance from instructors. The goal is for students to deepen their knowledge of digital technologies (design software) through independent work at home and to acquire such complex knowledge in the field of civil engineering that their competence can be presented as part of their portfolio.

2.2 Tanulási eredmények

A tantárgy sikeres teljesítése után a hallgató

A. Tudás

1. Knows the structural materials most commonly used in civil engineering, their properties and conditions of use. 2. Knows the principles of structural design to ensure the strength required for the function. 3. Knows the conditions affecting the interaction between the soil and the supporting structure, the principles of modeling, and the methods of analysis. 4. Knows the basic design principles and methods used in practice. 5. Knows both the basic and special construction technology procedures used in civil engineering. 6. Knows the typical foundation principles and methods. 7. Knows the design principles of typical structures in the field of civil engineering. 8. Knows the most important standards related to the field of civil engineering.

B. Képesség

1. Understands the functioning, design principles, structural behavior, and influencing circumstances and effects of civil engineering structures. 2. Applies typical design procedures, calculation methods, and technical representation techniques for common types of structures. 3. Applies technical specifications related to the design of civil engineering structures. 4. Communicates in a technical manner (e.g., based on plans and sketches). Understands and uses technical documentation throughout the technical process. 5. Independently solves simpler design and development tasks within their narrower field of expertise, and provides meaningful engineering assistance in more complex design and development tasks under supervision. 6. Is capable of professional cooperation with representatives of related fields (e.g., geotechnics, concrete technology). 7. Is able to identify structural and technological errors and, in simpler cases, is able to formulate proposed solutions. 8. Processes and utilizes professional literature sources.

C. Attitűd

1. Strives to perform their duties to the best of their ability and to a high standard. 2. Is open to performing their duties independently, but in consultation with others involved in the task. 3. Strives to perform their tasks and make decisions in consultation with colleagues involved in the task, preferably in cooperation with them. 4. Is open to learning about professional and technological developments and innovations in the field of civil engineering. 5. Strives for continuous self-improvement. 6. In their work, they pay attention to environmental protection, quality issues, the principle and application of equal access, occupational health and safety, and the basic principles of engineering ethics. 7. They carry out work processes as efficiently as possible, avoiding waste of materials, time, and energy to the greatest extent possible.

D. Önértékelés és felelősség

1. Independently makes professional decisions in simpler design, construction, maintenance, and operational tasks in the field of civil engineering. 2. Monitors legal, technical, technological, and administrative changes

related to the field. 3. Uses specific working methods to carry out activities with little or no supervision. 4. Uses cognitive skills to make decisions and to move logically from one idea to another.

2.3 Oktatási módszertan

Lectures in attendance, calculation tasks in the form of homework assignments, written and oral communication, use of IT tools and techniques.

2.4 Részletes tárgyprogram

1. Typical structures and specific characteristics of civil engineering 2. Interaction between soil and supporting structures, and the conditions that influence it. Fundamentals of plate theory, forces acting on structures resting on soil. 3. Relationship between structural form and forces. Introduction to membrane theory. Force interaction in rotationally symmetric curved cylindrical shells and approximate calculation methods. 4. Permeability of concrete, fluid closure in concrete, waterproof concrete. Waterproofing systems and waterproof coatings. Large-volume concreting. 5. Water and wastewater storage and treatment structures. Design considerations for reinforced concrete fluid storage tanks. 6. Above-ground reinforced concrete pools: installation considerations, structural details, tensioned tanks, rectangular and circular pools, pipelines and pipe penetrations. 7. Water towers. 8. Open workspace boundaries. Retaining walls and anchors. 9. Types, design principles, and construction technologies of underground garages and parking structures. 10. Types, design principles, and construction technologies of concrete pavements. 11. Types of tunnels. Methods for increasing soil stability. Excavation methods. 12. Prefabricated and monolithic tunnel structures. The relationship between force and construction technology. 13. Storage structures for granular materials. Bunkers, silos. Theory of silo pressure. Silo failure, repair, reinforcement 14. Special civil engineering structures (transmission towers, industrial chimneys, cooling towers) and construction technologies (sliding formwork).

A félév közbeni munkaszüneti napok miatt a program csak tájékoztató jellegű, a pontos időpontokat a tárgy honlapján elérhető "Részletes féléves ütemterv" tartalmazza.

2.5 Tanulástámogató anyagok

a) Handbooks Timoschenko: Theory of plates and shells, 1966 Betonkalender 2006/1, Ernst & Sohn, 2006 b) Online materials Lecture notes

2.6 Egyéb tudnivalók

Homework assignments must be completed independently based on the material covered in class, with verbal consultation assistance, by the specified deadlines.

2.7 Konzultációs lehetőségek

Individual consultation at a pre-arranged time, on a weekly basis.

Jelen TAD az alábbi félévre érvényes:

II. Tárgykövetelmények**3. A tanulmányi teljesítmény ellenőrzése és értékelése***3.1 Általános szabályok*

The assessment of learning outcomes according to 2.2 is based on the results of three homework assignments (HF) and the end-of-semester written exam. A maximum of 15 points (HF1-3) can be earned for the homework assignments, a maximum of 35 points for the exam, for a total of 50 points (100%). A score below 17.5 on the exam is considered a failure.

3.2 Teljesítményértékelési módszerek

Assessment Name (Type)	Code	Assessed Learning Outcomes
Homework 1	HW1	A.1-4,6-8; B.1-5; C.1-3,7; D.1,3-4.
Homework 2	HW2	A.1-4,6-8; B.1-5; C.1-3,7; D.1,3-4.
Homework 3	HW3	A.1-4,6-8; B.1-5; C.1-3,7; D.1,3-4.
Written exam	E	A.1-8; B.1-8; C.1,4-7; D.1-4.

A szorgalmi időszakban tartott értékelések pontos idejét, a házi feladatok ki- és beadási határidejét a "Részletes féléves ütemterv" tartalmazza, mely elérhető a tárgy honlapján.

3.3 Teljesítményértékelések részaránya a minősítésben

Code	Weight
HW1	10%
HW2	10%
HW3	10%
E	70%
Total	100%

3.4 Az aláírás megszerzésének feltétele, az aláírás érvényessége

1) attendance at at least 70% of lectures 2) obtaining a total of at least 7.5 points from homework assignments

3.5 Érdemjegy megállapítása

Grade	Score (P)
excellent (5)	$85 \leq P$
good (4)	$75 \leq P < 85\%$
satisfactory (3)	$65 \leq P < 75\%$
pass (2)	$50 \leq P < 65\%$
fail (1)	$P < 50\%$

3.6 Javítás és pótlás

Homework assignments that are not submitted by the deadline specified in the detailed schedule and in the manner described therein cannot be submitted late or made up. Retake exams are possible in accordance with the rules set out in the CoS. The result of the retake exam overrides the result of the last successful exam.

3.7 A tantárgy elvégzéséhez szükséges tanulmányi munka

Activity	Hours/Semester
contact hours	28
preparation of homeworks	24
preparation to exam	38

3.8 A tárgykövetelmények érvényessége

2025. szeptember 1.

Jelen TAD az alábbi félévre érvényes: