

## I. Tantárgyleírás

### 1. Alapadatok

#### 1.1 Tantárgy neve

Engineering Works

#### 1.2 Azonosító (tantárgykód)

BMEEOHSA-B3

#### 1.3 Tantárgy jellege

Kontaktórák 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    | <a href="mailto:kovacs.tamas@emk.bme.hu">kovacs.tamas@emk.bme.hu</a> |

#### 1.8 Tantárgyat gondozó oktatási szervezeti egység

Hidak és Szerkezetek Tanszék

#### 1.9 A tantárgy weblapja

<https://epito.bme.hu/BMEEOHSA-B3>

<https://edu.epito.bme.hu/course/view.php?id=2462>

#### 1.10 Az oktatás nyelve

magyar és angol

#### 1.11 Tantárgy típusa

Szabadon választható az építőmérnöki (BSc) szakon

### 1.12 Előkövetelmények

Strong prerequisites:

- Reinforced Concrete Structures (BMEEOHSAT43)
- Underground Structures, Deep Found. (BMEEOGMAS42)

Weak prerequisites:

- Bridges and Infrastructures (BMEEOHSAS43)

### 1.13 Tantárgyleírás érvényessége

2022. szeptember 1.

## 2. Célkitűzések és tanulási eredmények

### 2.1 Célkitűzések

The goal of the subject is to get to know the basic methods to for designing the engineering works. Special importance has the following questions of the monolithic construction technology: waterproofing, thermal loading modelling the long term deformations. Further goal is to master the modelling of interaction between soil and construction, the design specialities reinforced concrete base slabs and pipelines. The student has to master also the formation and construction methods of other engineering works as water basins, silos, bunkers, underground garages. The student gets knowledge about dynamic effects on tower-like constructions and the way of protection of the load bearing structure.

### 2.2 Tanulási eredmények

A tantárgy sikeres teljesítése után a hallgató

#### A. Tudás

1. knows the waterproof concrete,
2. knows the static performance of slabs on elastic foundation,
3. knows the limitation of works space by cutoff walls,
4. knows the basics of membrane theory and the static performance of bent shells,
5. knows the theory of silo pressure,
6. knows the design methods of tower-like constructions,
7. knows the dynamic effects and the wind induced effects on of tower-like constructions,
8. knows the tuned mass damping and its application.

#### B. Képesség

1. is able to decide between solutions that ensure a water tightness of a concrete structure
2. is able to estimate the magnitude of the second order effects
3. is able can use the concept of metacentre,
4. is able to give an approximation for the critical load and the Eigen frequency of a complex structure by the using the summation formulas,
5. can conceptually define the differences between structural structures and evaluate their effectiveness,
6. is able to express his or her thoughts in an orderly manner in words and in writing.
7. delimits in the task of the load bearing structures the largely independent sub-tasks, and make them a priority,

#### C. Attitűd

1. endeavours for accurate and error-free workflow,
2. endeavours to use natural resources efficiently in the structures needed for society

**D. Önállóság és felelősség**

1. uses the systemic approach in its thinking

**2.3 Oktatási módszertan**

Lectures, communication in writing and oral, use of IT tools and techniques, optional work independently and teamwork, work organization techniques.

**2.4 Részletes tárgyprogram**

| <b>Week</b> | <b>Topics of lectures and/or exercise classes</b>                                                                                                            |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.          | Civil engineering structures and their specialities                                                                                                          |
| 2.          | Basics of theory of elastic plates, soil-supported structures                                                                                                |
| 3.          | Introduction to membrane theory. Circular shells                                                                                                             |
| 4.          | Permeability of concrete, watertight concretes. Watertight coatings. Concreting in large volume.                                                             |
| 5.          | Structures for water supply and waste water systems. Design aspects for reinforced concrete liquid-retaining tanks.                                          |
| 6.          | Reinforced concrete tanks at ground level: aspects of positioning, structural details, prestressing, tanks above rectangular and circular base. Pipe systems |
| 7.          | Stabilization of open building pits. Cut-off walls and soil anchors.                                                                                         |
| 8.          | Underground parking garages and parking buildings                                                                                                            |
| 9.          | Concrete pavements                                                                                                                                           |
| 10.         | Tunnels. Methods for improvement of soil stability. Excavation methods. Prefabricated and monolithic tunnels.                                                |
| 11.         | Prefabricated and monolithic tunnels.                                                                                                                        |
| 12.         | Reinforced concrete water towers                                                                                                                             |
| 13.         | Bunkers, silos. Silo pressure theory. Damage to silos, reparation and strengthening of silos                                                                 |
| 14.         | Special engineering structures. Telecommunication towers, industrial chimneys, cooling towers                                                                |

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) Textbooks:**

- Timoshenko: Theory of Plates and Shells, 1966
- Betonkalender 2006/1, Ernst & Sohn, 2006

**b) Online materials:**

- Electronic lecture notes on the homepage of the subject

c) Other literature:

- IITK-GSDMA: Guidelines for seismic design of liquid storage tanks, 2007

### 2.6 Egyéb tudnivalók

1. Attendance to lectures is compulsory. A student who has not participated in at least 70% of the lectures can not obtain the credit of the subject
2. Students are evaluated based on their individual performance.

### 2.7 Konzultációs lehetőségek

Consultation is available in given periods according to the website of the department. Furthermore, special appointments can be requested from the teachers via e-mail.

Jelen TAD az alábbi félévre érvényes:

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

The assessment of the learning outcomes specified in clause 2.2 above and the evaluation of student performance occurs via the results of the homework assignments and the written exam.

**3.2 Teljesítményértékelési módszerek**

| <b>Evaluation form</b>                   | <b>Abbreviation</b> | <b>Assessed learning outcomes</b>   |
|------------------------------------------|---------------------|-------------------------------------|
| Homework - part1 (partial evaluation)    | HW/1                | A.1-A.2; B.1, B.5-B.7; C.1-C.2; D.1 |
| Homework - part 2 (partial evaluation)   | HW/2                | A.3-A.4; B.5-B.7; C.1-C.2; D.1      |
| Homework - part 3 (partial evaluation)   | HW/3                | A.5-A.7; B.2-B.7; C.1-C.2; D.1      |
| Written examination (summary evaluation) | E                   | A.1-A.8; C.1-C.2; D.1               |

Assignment and submission dates of homework parts are included in the "Requirements for the subject" that is available on the website of the subject.

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**

| <b>Abbreviation</b>                         | <b>Score</b> |
|---------------------------------------------|--------------|
| HW/1                                        | 5%           |
| HW/2                                        | 13%          |
| HW/3                                        | 6%           |
| <b>Total achievable during the semester</b> | <b>24%</b>   |
| Exam                                        | 80%          |
| <b>Összesen</b>                             | <b>104%</b>  |

Achievement of less than 50% of the total score for the exam results in a failed exam.

**3.4 Az aláírás megszerzésének feltétele, az aláírás érvényessége**

To obtain signature at least 10 homework points (out of the total score of 24) need to be collected.

**3.5 Érdemjegy megállapítása**

| <b>Grade</b>     | <b>Points (P)</b>  |
|------------------|--------------------|
| excellent (5)    | $85 \leq P$        |
| good (4)         | $75 \leq P < 85\%$ |
| satisfactory (3) | $65 \leq P < 75\%$ |
| passed (2)       | $50 \leq P < 65\%$ |
| failed (1)       | $P < 50\%$         |

**3.6 Javítás és pótlás**

No delay or re-submission after deadline is allowed for homework 1-3 parts assignments. Any homework part assignment not submitted until the associated submission deadline is excluded from valuation.

**3.7 A tantárgy elvégzéséhez szükséges tanulmányi munka**

| <b>Activity</b>                       | <b>Hours/semester</b> |
|---------------------------------------|-----------------------|
| contact hours                         | 14×2=28               |
| homework                              | 3×8=24                |
| home studying of the written material | 15                    |
| preparation for the examination       | 23                    |
| <b>Sum</b>                            | <b>90</b>             |

**3.8 A tárgykövetelmények érvényessége**

2022. szeptember 1.

Jelen TAD az alábbi félévre érvényes: