Structural Analysis I. - BMEEOTMAT43 - 2024/25/2

I. Tantárgyleírás

1. Alapadatok

1.1 Tantárgy neve

Structural Analysis I.

1.2 Azonosító (tantárgykód)

BMEEOTMAT43

1.3 Tantárgy jellege

Kontaktórás tanegység

1.4 Óraszámok

Típus	Óraszám / (nap)
Előadás (elmélet)	4

1.5 Tanulmányi teljesítményértékelés (minőségi értékelés) típusa

Vizsga

1.6 Kreditszám

4

1.7 Tárgyfelelős

név	Dr. Lengyel András
beosztás	Egyetemi docens
email	lengyel.andras@emk.bme.hu

1.8 Tantárgyat gondozó oktatási szervezeti egység

Tartószerkezetek Mechanikája Tanszék

1.9 A tantárgy weblapja

https://epito.bme.hu/BMEEOTMAT43
https://edu.epito.bme.hu/course/view.php?id=453

1.10 Az oktatás nyelve

magyar és angol

1.11 Tantárgy típusa

Kötelező az építőmérnöki (BSc) szakon

1.12 Előkövetelmények

Strong prerequisites:

- Introduction to Strength of Materials (BMEEOTMAT42)
- Mathematics A1a - Calculus (BMETE90AX00)

Recommended prerequisites:

- Matematics A2a (BMEETE90AX02)

1.13 Tantárgyleírás érvényessége

2022. szeptember 1.

2. Célkitűzések és tanulási eredmények

2.1 Célkitűzések

The aim of the subject is to introduce the fundamental concepts of displacements of elastic bar structures, the calculation of displacements using the method of equivalent displacements and the method of virtual forces, the concept of influence lines, the calculation of influence lines of internal forces and displacements in the case of statically determinate structures, the application of influence lines for the calculation of envelope curves of internal forces, the fundamental characteristics of statically indeterminate structures, the application of the force method for statically indeterminate structures in the cases of fix loads and influence lines, the application of the classical displacement method for statically indeterminate structures in the case of fix loads.

2.2 Tanulási eredmények

A tantárgy sikeres teljesítése utána a hallgató

A. Tudás

1. knows the fundamental concepts and relationships of diasplacements of planar bar structures,
2. knows the method of equivalent displacements and the method of virtual forces,
3. knows the concept of influence lines and their properties,
4. knows the calculation methods of influence lines of internal forces and displacements,
5. knows the fundamental properties of statically indeterminate structures and their role in engineering,
6. knows the principle of the force method, the calculation procedure, and its application for planar bar structures in the cases of static loading and influence lines,
7. knows the principle of the displacement method, the calculation procedure, and its application for planar bar structures in the case of static loading,
8. knows the concept and calculation procedure of envelope curves of internal forces,

B. Képesség

1. calculates the displacements of statically determinate bar structures under bending moments using the method of equivalent displacements,
2. calculates the displacements of statically determinate bar structures under bending moments and axial forces using the method of virtual forces,
3. is able to determine the influence lines of reaction forces and internal forces in statically determinate bar structures,
4. determines the influence lines of displacements in statically determinate bar structures under bending moments and axial forces,
5. is able to analyse statically indeterminate bar structures, and to determine the degree of indeterminacy,
6. applies the force method for the calculation of statically indeterminate bar structures in the case of fix loads,
7. applies the force method for the calculation of statically indeterminate bar structures in the case of influence lines,
8. applies the displacement method for the calculation of statically indeterminate bar structures in the case of fix loads,
9. is able to express his/her thoughts in an organized way in oral and written communication,

C. Attitűd

1. aims at learning and routinely using tools required for solving structural mechanics problems,
2. aims at accurate and flawless problem solving,
3. in written communication aims at producing organized, high-quality documentations fit for the standards of engineering society,

D. Önállóság és felelősség

1. is able to individually think over structural mechanics problems and to solve them using the given resources,
2. applies a systematic approach in his/her reasoning.

2.3 Oktatási módszertan

Lectures with theoretical knowledge and computational examples, written and oral communication, use of IT devices and techniques, optional practice problems solved individually.

2.4 Részletes tárgyprogram

Week	**Topics of lectures**
1.	Principle of small displacements, displacements of rigid bodies, displacements of elastic structures
2.	Calculation of displacements using the method of equivalent displacements
3.	Calculation of displacements using the method of virtual forces
4.	Influence lines of internal forces in statically determinate structures
5.	Influence lines of internal forces and displacements in statically determinate structures
6.	Calculation of statically indeterminate structures using the force method in the case of fix loads
7.	Calculation of statically indeterminate structures using the force method in the case of fix loads
8.	Calculation of statically indeterminate structures using the force method in the case of influence lines
9.	Calculation of statically indeterminate structures using the force method in the case of influence lines
10.	Calculation of statically indeterminate structures using the displacement method in the case of fix loads
11.	Calculation of statically indeterminate structures using the displacement method in the case of fix loads
12.	Calculation of statically indeterminate structures using the displacement method in the case of fix loads

13.	Calculation of statically indeterminate structures using the displacement method in the case of fix loads
14.	Most unfavourable internal forces, envelope curves of internal forces

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

Lecture notes: Lengyel A. - Hincz K.: Structural Analysis I.

2.6 Egyéb tudnivalók

- Students failing to prove to have attended at least 70% of the lectures based on their records of absences cannot obtain registry other than "Megtagadva" or "Nem teljesítette".
- Students attending checks must not communicate with others during the check without explicit permission, and must not hold any electronic or other communication device switched on.
- Students who have obtained a valid signature and have registered for a course other than examination course cannot lose their signature and eligibility for exam, but the final results are to be computed based on the new test results.

2.7 Konzultációs lehetőségek

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

Jelen TAD az alábbi félévre érvényes:

II. Tárgykövetelmények

3. A tanulmányi teljesítmény ellenőrzése és értékelése

3.1 Általános szabályok

- Evaluation of learning outcomes described in Section 2.2. is based on three mid-term written checks and a written check in the examination period.
- The duration of each mid-term test is 60 minutes, the duration of the written exam is 105 minutes.
- The dates of the checks can be found in the "Detailed semester schedule" on the website of the subject.

3.2 Teljesítményértékelési módszerek

Evaluation form	Abbreviation	Assessed learning outcomes
1st mid-term test (summarizing check)	ZH1	A.1-A.4; B.1-B.3, B.9
2nd mid-term test (summarizing check)	ZH2	A.1-A.6; B.1-B.7, B.9
3rd mid-term test (summarizing check)	ZH3	A.1-A.2, A.5, A.7; B.1-B.2, B.8-B.9
written exam (summarizing check)	V	A.1-A.8; B.1-B.9; C.1-C.3; D.1-D.2

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

Abbreviation	Score
ZH1	15%
ZH2	15%
ZH3	15%
V	70%
Sum	**100%**

Only the best two mid-term test results are considered (that is why the sum of the weights above is not 100%).

3.4 Az aláírás megszerzésének feltétele, az aláírás érvényessége

- Signature and eligibility for the exam is granted if the average of the best two mid-term test results is not less than 50%.
- A signature obtained previously will remain valid at a re-registering for the subject, but the new results are to be considered nevertheless.

3.5 Érdemjegy megállapítása

- In the case of complying with the requirements on attendance the results are determined as follows.
- No requirements are made on the successfulness of the tests.
- The semester performance is determined by the results of the best two mid-term tests.
- Written exam below 50% is regarded unsuccessful, the exam mark is "Failed".
- In the case of a successful exam the final result is computed by the weighted average A of the best two mid-term tests and the written exam as in section 3.3.:

Grade	**Points (A)**
excellent (5)	85%≤A
good (4)	75%≤A<85%
satisfactory (3)	65%≤A<75%
passed (2)	50%≤A<65%
failed (1)	A<50%

3.6 Javítás és pótlás

Mid-term test cannot be retaken in this subject.

3.7 A tantárgy elvégzéséhez szükséges tanulmányi munka

Activity	**Hours/semester**
contact lessons	28×2=56
preparation for lessons during the semester	28×1=28
preparation for the checks	6×2=12
preparation for the exam	24
Sum	**120**

3.8 A tárgykövetelmények érvényessége

2022. szeptember 1.

Jelen TAD az alábbi félévre érvényes: