

I. Tantárgyleírás

1. Alapadatok

1.1 Tantárgy neve

Structures 2

1.2 Azonosító (tantárgykód)

BMEEOHSMT-1

1.3 Tantárgy jellege

Kontaktórás tanegység

1.4 Óraszámok

Típus	Óraszám / (nap)
Előadás (elmélet)	2
Gyakorlat	1

1.5 Tanulmányi teljesítményértékelés (minőségi értékelés) típusa

Vizsga

1.6 Kreditszám

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1.7 Tárgyfelelős

név	Dr. Kovács Nauzika
beosztás	Egyetemi docens
email	kovacs.nauzika@emk.bme.hu

1.8 Tantárgyat gondozó oktatási szervezeti egység

Hidak és Szerkezetek Tanszék

1.9 A tantárgy weblapja

<https://epito.bme.hu/BMEEOHSMT-1>
<https://edu.epito.bme.hu/course/view.php?id=2450>

1.10 Az oktatás nyelve

magyar és angol

1.11 Tantárgy típusa

Kötelező a Szerkezet-építőmérnök (MSc) szak Tartószerkezetek specializációján

1.12 Előkövetelmények

Recommended prerequisites:

- Structures 1. (BMEEOHSMS51)

1.13 Tantárgyleírás érvényessége

2020. február 5.

2. Célkitűzések és tanulási eredmények

2.1 Célkitűzések

The objective of the subject is the presentation of the hazards, structural reliability and their role in structural design. The behaviour of complex structures, curved steel and concrete shells, 3D truss structures and their design are introduced. The most important analytical solutions and the basics and assumptions of numerical solutions are presented. Additionally, the design methods of cable and membrane structures are concluded in the subject.

2.2 Tanulási eredmények

A tantárgy sikeres teljesítése után a hallgató

A. Tudás

1. will learn the basic methods of reliability analysis,
2. will learn the probability analysis of loads and resistance,
3. will learn the safety conceptions of design codes and the safety levels of Eurocode,
4. will learn the types of shells and to define curved surfaces,
5. will learn the static behaviour of edge girders,
6. will learn the behaviour of 3D truss-like grids,
7. will learn the behaviour of 3D grids constructed to curved surfaces,
8. will learn the behaviour of cable and membrane structures.

B. Képesség

1. will be able to apply the methods of structural reliability,
2. will be able to define the partial factors with the help of reliability analysis,
3. will be able to calculate the internal forces of cylindrical shells loaded with circularly symmetric loads,
4. will be able to solve membrane problems,
5. will be able to define the replacement continuum of 3D grids,
6. will be able to perform basic dynamic wind analysis.

C. Attitűd

1. cooperates with the tutor/lecturer and with fellow students,
2. continuously extends his/her knowledge,
3. is ready to apply numerical computational tools,
4. is intent on learning about structures,
5. is intent on precise and error-free problem solving,
6. is attending to the classes as a responsible member of the community.

D. Önállóság és felelősség

1. able to autonomously complete design calculations based on the literature,
2. is open to new design procedures, and autonomously evaluates the correctness and applicability of new design procedures,
3. is able to think in system.

2.3 Oktatási módszertan

Lectures, exercises, written and oral communications, application of IT tools and techniques, assignments solved individually.

2.4 Részletes tárgyprogram

Week	Topics of lectures and/or exercise classes
1.	Reliability models of loads and resistance. Safety conception of Eurocode. Partial factors.
2.	Uncertainty in structural design, Reliability analysis of structures. Reliability analysis of existing structures. Test based design.
3.	General methods of structural design. Selection of the proper structural material.
4.	Behaviour of shell structures. Membrane forces, shell supports.
5.	Elliptic, parabolic and hyperbolic shells.
6.	Stiffness, static behaviour of edge girders.
7.	3D truss structures, 3D grids, replacement continuum.
8.	3D grids win 3D behaviour, required supports of 3D grids
9.	Behaviour of one and two layered truss systems and 3D grids constructed to curved surfaces.
10.	Grid shells.
11.	Behaviour and types of cable structures.
12.	Behaviour of suspended roofs.
13.	Behaviour and types of membrane structures.
14.	Dynamic wind analysis

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**Textbooks**

1. Mérnöki építmények és Szerkezetek. Szerkesztette Kollár Lajos, Akadémiai kiadó, 2000.
2. Prékopa: Valószínűségelmélet. Műszaki Könyvkiadó. 1980.
3. Faber: Risk and safety in civil, environmental and geomatic engineering
4. Sorensen: Structural reliability theory and risk analysis

Online materials

1. Lectures and slides
2. Practices

3. Sample problems

2.6 Egyéb tudnivalók

1. Attendance to lectures and exercise classes is compulsory. The signature and credits from the subject will be refused to students missing more than what is defined in the Code of Studies of BME.
2. Students are evaluated based on their actual individual performance. Students are required to show evidence of their own knowledge and skills. Submitting a work of others, obtaining or giving unauthorized help (e.g. during an exam or test) cheating and plagiarism in any form is unacceptable. Whoever violate the respective 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.

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:

kovacs.nauzika@epito.bme.hu pap.zsuzsa@epito.bme.hu

Jelen TAD az alábbi félévre érvényes:

2023/2024 semester II

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 a test and examination.

3.2 Teljesítményértékelési módszerek

Evaluation form	Abbreviation	Assessed learning outcomes
1. midterm test	MT1	A.1-A.5; B.1-B.4; C.1-C.3, C.5; D.1-D.3
Written examination	E	A.1-A.8; B.1-B.6; C.1-C.6; D.1-D.3

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
MT1	20%
Total achievable during the semester	20%
E	80%
Sum	100 %

Criterion for completion of the subject is to collect at least 50% of the total points of the Test. Moreover, unsatisfactory performance during the Exam will lead to a final mark 'failed' (1) independently of the result of the Test.

3.4 Az aláírás megszerzésének feltétele, az aláírás érvényessége

Criterion for the signature is to collect at least 50% of the total points of the Test according to Section 3.3. If the applicant does not take the examination course with an earlier acquired signature, his or her points are overwritten by his or her new points.

The previously acquired point can be taken into account in the next 6 semesters.

3.5 Érdemjegy megállapítása

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 Javítás és pótlás

1. The midterm test can be repeated – once without fee – at a previously determined date given in the course schedule.
2. In case of repetition of the test, the better result will be taken into account for the calculation of the final mark.

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3. If the first repetition is also unsatisfactory (failed), then the test can be repeated once more on the repetition week by paying a fee.

3.7 A tantárgy elvégzéséhez szükséges tanulmányi munka

Activity	Hours/semester
contact hours	$14 \times 3 = 42$
preparation for the courses	$14 \times 1 = 14$
preparation for the tests	$1 \times 16 = 16$
home studying of the written material	8
preparation for the examination	40
Sum	120

3.8 A tárgykövetelmények érvényessége

2020. február 5.

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