

I. Tantárgyleírás**1. Alapadatok***1.1 Tantárgy neve***STRUCTURAL DESIGN***1.2 Azonosító (tantárgykód)***BMEEOHSMsFST07-00***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

5

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 weblapjaepito.bme.hu<https://edu.epito.bme.hu/course/view.php?id=5008>*1.10 Az oktatás nyelve*

magyar

1.11 Tantárgy típusa

Kötelező a Szerkezet-építőmérnök (MSc) szak Tartószerkezetek specializációján

*1.12 Előkövetelmények**1.13 Tantárgyleírás érvényessége*

2025. szeptember 1.

2. Célkritériumok és tanulási eredmények

2.1 Célkritériumok

The objective of the subject is to provide the student with a comprehensive knowledge on the structural 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. The structural arrangement and the design methods of cable and tensioned membrane structures are concluded in the subject. The digital teaching methodology used in the course effectively supports students' skills development and the acquisition of the outcome requirements.

2.2 Tanulási eredmények

A tantárgy sikeres teljesítése után a hallgató

A. Tudás

1. Know the types of shells and to define curved surface
2. Know the static behaviour of edge girders.
3. Know the behaviour of column like 3D trusses.
4. Known the behaviour of hell like 3D trusses.
5. Know the behaviour and structural arrangements of grid shells.
6. Known the behaviour and structural arrangements of cable structures and cable roofs.
7. Know the behaviour and structural arrangements of tensegrity structures and cable domes.
8. Know the behaviour and structural arrangements of tensioned membrane structures.
9. Know the concept of AI application in structural design.
10. Know the concept of parametric design.

B. Képesség

1. Able to calculate the internal forces of cylindrical shells loaded with circularly symmetric loads.
2. Able to solve membrane problems.
3. Able to define the identical continuum of 3D grids.
4. Able to understand the structural behaviour of shell like 3D trusses.
5. Able to define the structural behaviour of cable structures.
6. Able to understand the structural behaviour of tensegrity structures and cable domes.
7. Able to understand the structural behaviour of tension membrane structures.
8. Able to process and use literature sources.
9. Able to understand the concept of AI application in structural design.
10. Able to understand the concept of parametric design.

C. Attitűd

1. Is intent on completing the tasks to the best of their ability, to a high standard, accurately and without errors.
2. Open to learning about professional, technological development and innovation in the field of structural engineering.
3. Continuously extends his/her knowledge.
4. Is intent on learning about complex structures and understand their structural behaviour.
5. Attending to the classes as a responsible member of the community

D. Önállóság és felelősség

1. Complete home work individually, in case of difficulty asks help from teachers or fellow students.
2. Is open to new design procedures.
3. Uses cognitive skills to make decisions and to move logically from one idea to another.
4. Uses a specific working method to carry out its activities with or without little supervision.

2.3 Oktatási módszertan

Lectures, exercises, written and oral communications, application of IT tools and techniques, assignments solved individually. At the end of the semester, industry invited speakers will present the design and construction processes of built structures relevant to the subject, the presentations will be interactive, and student questions and interest will be encouraged.

2.4 Részletes tárgyprogram

1. General methods of structural design. Selection of the proper structural material.
 2. Behaviour of shell structures. Membrane forces, shell supports.
 3. Elliptic, parabolic and hyperbolic shells.
 4. Stiffness, static behaviour of edge girders.
 5. 3D truss structures, elements of 3D trusses, identical continuum. Behaviour and structural arrangements of column like 3D trusses.
 6. Behaviour and structural arrangements of shell like 3D trusses.
 7. Behaviour and structural arrangements of gris shells. Behaviour and structural arrangements of cable structures.
 9. Behaviour and structural arrangements of suspended roofs and cable roofs. Behaviour and structural arrangements of cable domes.
 10. Types, design method and structural behaviour of membrane structures.
 11. AI assisted design
 12. Paraméteres tervezés
 - 13-14. Invited lecturers: life cycl analysis, carbon fotprint, case studies of 3D trusses, cable structures, membrane structures. 14. Invited lecturers - case studies of 3D trusses, cable structures, membrane structures.
- 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

Online materials 1. Lectures and slides 2. Practices 3. Sample problems 4. Sample exams

2.6 Egyéb tudnivalók

1. Attendance to lectures 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.

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 a midterm test and examination.

3.2 Teljesítményértékelési módszerek

Assessment Name (Type)	Code	Assessed Learning Outcomes
1. midterm test	MT1	A.1-A.2; B.1-B.2
class activity	A	A.9-10; B.9-10
Written exam	E	A.1-A.8; B.1-B.8; C.1-C.5; D.1-D.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
MT1	20%
A	20%
E	60%
Total	100%

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 study period 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	Score (P)
excellent (5)	$80 \leq P$
good (4)	$70 \leq P < 80\%$
satisfactory (3)	$60 \leq P < 70\%$
pass (2)	$50 \leq P < 60\%$
fail (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.
3. Class activity can be re-submitted by the end of the week of the lecture, when the activity was completed.

3.7 A tantárgy elvégzéséhez szükséges tanulmányi munka

Activity	Hours/Semester
contact hours	$14 \times 3 = 42$
preparation for the lectures	$14 \times 1 = 14$
preparation for the midterm tests	$1 \times 16 = 16$
home studying of the written material	28
preparation for the exam	50

3.8 A tárgykövetelmények érvényessége

2026. február 11.

Jelen TAD az alábbi félévre érvényes:

