

I. Tantárgyleírás**1. Alapadatok***1.1 Tantárgy neve***STRUCTURES 1***1.2 Azonosító (tantárgykód)***BMEEOHSMs51***1.3 Tantárgy jellege*

Kontaktórás tanegység

1.4 Óraszámok

Típus	Óraszám / (nap)
Előadás (elmélet)	3
Gyakorlat	1

1.5 Tanulmányi teljesítményértékelés (minőségi értékelés) típusa

Vizsga

1.6 Kreditszám

5

1.7 Tárgyfelelős

név	Dr. Kollár László
beosztás	Egyetemi tanár
email	kollar.laszlo@emk.bme.hu

1.8 Tantárgyat gondozó oktatási szervezeti egység

Hidak és Szerkezetek Tanszék

1.9 A tantárgy weblapja<https://epito.bme.hu/BMEEOHSMs51><https://edu.epito.bme.hu/course/view.php?id=5667>*1.10 Az oktatás nyelve*

magyar és angol

1.11 Tantárgy típusa

Kötelező a Szerkezet-építőmérnök (MSc) szakon

*1.12 Előkövetelmények**1.13 Tantárgyleírás érvényessége*

2020. február 5.

2. Célkitűzések és tanulási eredmények

2.1 Célkitűzések

The objective of the subject is the modelling of beams, membrans, plates and the simplest circular shell structures. The most important analytical solutions, the basics and assumptions of numerical solutions are introduced. It's presented that the different structural considerations can be implemented in the design codes and regulations. The fundamental membrane solutions, shear lag effect, effective width, shear deformation, second-order effects and large deformations, anisotropy and the vibration of floors are also analysed. The main focus of the subject is the analysis of plates and slabs.

2.2 Tanulási eredmények

A tantárgy sikeres teljesítése után a hallgató

A. Tudás

1. Knowledge of the methods of design and calculation of load bearing supporting structures.
2. Knowledge of the behaviour and design of disc(plate)-like structures.
3. Knowledge of the limitations of numerical calculations.
4. Knowledge of the characteristics of the behaviour of beams.
5. Knowledge of the calculation methods of stresses and strains of plate structures.
6. Knowledge of the behaviour and design principles of plates.
7. Knowledge of the principles of plastic design.
8. Knowledge of the basic design principles and methods applied in civil engineering practice.

B. Képesség

1. Able to calculate discs, beams, plates.
2. Able to determine the shear deformation in beams and to take into account the second-order effect.
3. Able to calculate and design plates, to take into account the second-order effects.
4. Able to calculate the vibration of plates also in the case of beam supports.
5. Understands the behaviour of engineering structures and the phenomena influencing engineering tasks.
6. Communicates in a technical manner and accurately.
7. Processes and uses literature sources.

C. Attitűd

1. Expands his/her knowledge through continuous learning.
2. Is open to the use of numerical tools.
3. Strives to understand the behaviour of load bearing structures.
4. Strives to solve problems accurately and without errors.
5. Participates in classes as a responsible member of the community.

D. Önállóság és felelősség

1. Openly accepts and considers new knowledge.
2. Uses a systematic approach during thinking.
3. Uses a unique way of working to carry out activities with little or no supervision.
4. Uses cognitive skills to make decisions and to logically move from one idea to another.

2.3 Oktatási módszertan

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

2.4 Részletes tárgyprogram

1. Introduction. Modelling of structures, types of bar and surface structures. 2D equations of elasticity, stresses and their transformation. Failure criteria.
2. Strains and their transformation, material equations, anisotropy. Fibrous structures and plane lattices.
3. 3D equations of elasticity, failure criteria. Plane strain and plane stress state
4. Notable plate solutions: "exact" solution of bars, stresses in the vicinity of holes, frame corners, strip foundation, shear-lag effect.
5. Problem solving.
6. Euler-Bernoulli and Timoshenko beam models and their applications. Limitations of beam models.
7. 3D bar models, Saint-Venant torsion and restrained warping.
8. Elastic, elastic-brittle, elastic-plastic and composite material (glass, wood, stone, steel, reinforced concrete) beams.
9. First and second order calculation, beams subjected to compression and bending, large deflections of beams. Problem solving.
10. Theory of thin plates and their load-bearing. Rectangular plates.
11. Large deflections of plates. Orthotropic plates. Vibrations of slabs, vibrations of slabs supported by beams.
12. Vibrations of slabs (continuation). Plates on elastic foundation. Winkler and half-space model. Ponding.
13. Problem solving.
14. Stability of floating structures. Load-bearing as a bar, plate, shell. Elastic and plastic calculation.

Due to holidays during the semester, the program is for informational purposes only; the exact dates are included in the "Detailed Semester Schedule" available on the course website.

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

Kollár L. P., Tarján G.: Tartószerkezetek elmélete és számítása, 2015

2.6 Egyéb tudnivalók

2.7 Konzultációs lehetőségek

The instructors are available for consultation during their office hours, as advertised on the department website.

Jelen TAD az alábbi félévre érvényes:

2026/2027 semester I

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 tests and the examination.

3.2 Teljesítményértékelési módszerek

Evaluation form	Abbreviation	Assessed learning outcomes
1. midterm test	MT1	A.1-A.3; B.1, B.5-B.7; C.1-C.5, D.1-D.4
2. midterm test	MT2	A.4, A.7-A.8; B.1-B.2, B.5-B.7; C.1-C.5; D.1-D.4
1.-3. Homework	HW1-HW3	A.1-A.8; B.1-B.7; C.1-C.5; D.1-D.4
written examination	V	A.1-A.8; B.1-B.7; C.1-C.5; D.1-D.4

The exact dates of assessments held during the semester and the deadlines for submitting homeworks are included in the "Detailed Semester Schedule", which is available on the subject's website.

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%
MT2	20%
HW1	3%
HW2	3%
HW3	3%
Exam	60%
Sum	100% (109% achievable with bonus points)

3.4 Az aláírás megszerzésének feltétele, az aláírás érvényessége

In order to obtain a signature, the student must have passed the midterm tests according to point 3.3 and have achieved at least 50% (20.0 points) of the total number of points in the semester.

20 points can be reached in each midterm test, to pass the tests (and obtain the signature) minimum 50% should be reached separately on each test (min 10 points from each test). Two midterm tests can be repeated during the retake period.

Homework assignments worth 3 (bonus) points each, for a total of 9 (bonus) points, the homework are not compulsory. No points will be awarded for homeworks submitted after the deadline.

Any student who takes a regular (non-examination) course with a signature received in a previous semester will have his/her previous result overwritten by his/her result for the current semester. Mid-semester results obtained previously in the subject and taken into account for the determination of the examination grade may be accepted retroactively back to 6 semesters.

3.5 Érdemjegy megállapítása

Grade	Points (P)
excellent (5)	85% ≤ P
good (4)	75 ≤ P < 85%
satisfactory (3)	60 ≤ P < 75%
passed (2)	50 ≤ P < 60%
failed (1)	P < 50%

Final grade is determined on the basis of the sum of the points obtained during the semester and the exam. For successfully pass the subject beside the signature min. 40% (24 points) should be obtained during the exam.

3.6 Javítás és pótlás

One midterm test can be repeated during the retake period.

3.7 A tantárgy elvégzéséhez szükséges tanulmányi munka

Activity	Hours/semester
contact hours	14×3=42
preparation for the courses	14×1=14
preparation for the tests	2×9=18
preparing the homework	3×10=30
preparation for the examination	30
Sum	150

3.8 A tárgykövetelmények érvényessége

2020. február 5.

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2026/2027 semester I