Tárgytematika / Course Description

Strength of Materials

GKNB_AMTA003

Tárgyfelelős neve / Teacher's name: dr. Pere Balázs

Félév / Semester: 2021/22/1

Beszámolási forma / Assesment: Vizsga

Tárgy heti óraszáma / Teaching hours(week): 2/2/0

Tárgy féléves óraszáma / Teaching hours(sem.): 0/0/0

OKTATÁS CÉLJA / AIM OF THE COURSE

The objective of this course is elaborate on the knowledge of engineering mechanics (statics) and to teach the students the purpose of studying strength of materials with respect to mechanical engineering design and analysis. The course introduces the students to the concepts of engineering mechanics of materials and the behavior of the materials and structures under applied loads.

To establish an understanding of the fundamental concepts of mechanics of deformable solids; including static equilibrium, geometry of deformation, and material constitutive behavior. To provide students with exposure to the systematic methods for solving engineering problems in solid mechanics. To discuss the basic mechanical principles underlying modern approaches for design of various types of structural members subjected to axial load, torsion, bending, transverse shear, and combined loading. To build the necessary theoretical background for further structural analysis and design courses.

TANTÁRGY TARTALMA / DESCRIPTION

Week 1	Course overview. Review of basic basic concepts of strength of materials. Introduction to stress and strain tensors
Week 2	Review of axially loaded bars state of stress and strain. Design of structures for working safely and verification.
Week 3	Review of bending moment loaded beams state of stress and strain. Description of differential equation of the elastic curve.
Week 4	Review of moment of inertia of the cross-sectional area. Steiner–law. Mohr's circle for moment of inertia. Principal axis of inertia and principal strains.
Week 5	Review of torsional moment loaded beams with circle and pipe cross sections state of stress and strain.
Week 6	Buckling analysis of columns.

Week 7	Review of general state of stress, principal stresses and principal axes. Mohr's circle for state of stress. **Mid-term written exam 1**
Week 8	Review of general state of strain, general Hooke's low. General theories of design of structures for working safely and verification. Review of equivalent stress theories (Mohr, von Mises).
Week 9	Review of strain measurement with strain gauges. Principle of superposition.
Week 10	Review of axial and bending moment combined loaded beams state of stress and strain. Review of unsymmetric bending moment loaded beams state of stress and strain.
Week 11	Review of bending and torsional moment combined loaded beams state of stress and strain. Eccentric axial loading.
Week 12	Transverse shear.
Week 13	Betti's theorem. **Mid-term written exam 2**
Week 14	Castigliano's theorem. **Complement exam**

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESMENT'S METHOD

Attendance at lectures is not mandatory.

Exams:

There will be two mid-term written exams and one final written exam. The exams contain 80% calculating tasks and 20% theoretical tasks. The two mid-term exams will take 50-50 minutes and in each mid-term exam students can score 20-20 points which will count into the final exam score. Students have to score at least 6 points out of 40 in the two mid-term exams, otherwise you will not get the instructor's signature for the subject. If you did not score min. 6 points, you can complete it in the complement exam last week of the semester. If students can not attend an exam due to a medical condition, certified by a doctor students can complete that exam in the complement exam but you must notify the instructor in advance. In the complement exam you can gain the instructor's signature if you score at least 6 point from 20. If students did not score at least 6 point in the two mid-term exam either in the complement exam you will not get the instructor's signature and you are not allowed to participate in the final exam. The final exam will take 100 minutes and you can score max. 40 points. Student who perfoms well in the mid-term exams, this means who score min. 30 points from 40, could get a final mark. This means if you score min. 30 point in the mid-term exams you will not have to take the final exam.

30 - 35	good (4)
36 - 40	excellent (5)

In exams students are not allowed to use smartphones, notes, books, smartwatches. Students must complete the exams on their own. In each exam studets have to identify themselfves with identity card or driving licence.

Grading Policy:

Score	Mark
under 48	fail (1)
48 - 61	pass (2)
62 - 75	satisfactory (3)
76 - 90	good (4)
91 - 130	excellent (5)

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

Égert J. – Jezsó K.: Mechanics - Strength of Materials, Universitas-Győr Kht. 2006.
Égert J. – Jezsó K.: Mechanics - Strength of Materials Workbook, Universitas-Győr Kht. 2004.