MM/73/2025. 1st September 2025

NOTICE

Requirements on the subject **MECHANICS** (GETMET266-B2a)
in the autumn semester of academic year 2025/2026

This subject is a compulsory course. The key information concerning the subject is detailed below.

Aims

The main objective of this undergraduate course is to provide the student with an introduction to Statics and Mechanics of Materials. Emphasis is placed on the basic concepts, principles and methodologies and on how to apply them to solutions of engineering problems. There are formal lectures and practical classes per week.

Schedule

Week 1: Classification of Mechanics. Mathematical preliminaries and mechanical hypotheses. Definition of force. Resultant of a force system. Equilibrium of a particle.

Week 2: Rigid bodies: equivalent systems of forces. Moment of a force about a point and a given axis. Moment of a couple. Equivalent couples. Reduction of a force system to a single force and a couple.

Week 3: Equilibrium of a rigid body in two- and three dimensions. Kinematic constraints. Reactions at supports and connections for a two- and three-dimensional structure and their classification. Necessary and sufficient conditions for the equilibrium of a rigid body.

Week 4: Friction: Coulomb's law of dry friction. Coefficients and angles of friction. Static problems and their solutions for simple structures. Distributed force systems. Distributed forces along a curve, surface and volume. Reduction of distributed force systems.

Week 5: First moment of mass particle systems and rigid body. Center of gravity. First moments and centroids of lines, areas, and volumes. Systems of rigid bodies: analysis of structures, static indeterminacy and solvability.

Week 6: Trusses: definition of a truss, simple trusses. Analysis of trusses by the method of joints and sections. Frames and machines: structures containing multi-force members, analysis of frames and machines. Determination of reaction- and internal force system.

Week 7: Holiday.

Week 8: **The first mid-term exam**. Reduction of the internal force in beams. Shear force and bending moment in a beam. Differential and integral relations among loading, shear force and bending moment diagrams.

Week 9: Introduction to stress and strain: Fundamentals, characteristics of the displacement, deformation, stress and energetic state of a solid body. Young's modulus, Hooke's Law, material properties.

Week 10: Simple uses of bars. Axially loaded prismatic rod. Twisting of a prismatic beam with circular and ring cross-section. Bending of a prismatic beam. Stress and deformation in circular shafts under twisting loads.

Week 11: Complex stresses of prismatic beams. Mohr's stress circle diagram. Principal stresses and maximum shear stresses.

Week12: Analyzing structures under multiple types of loads simultaneously.

Week 13: **The second mid-term exam**. Deflection of beams.

Week 14: **The make up exam**. Examples and engineering applications with solutions. Summary.

Requirements

Students are required to learn the material from both lectures and practical classes in a satisfactory manner. For effective and systematic progress, regular attendance of the classes is compulsory. During the semester, there are two mid-term exams: the first mid-term exam in Week 8 and the second one in Week 13. The maximum score achievable by solving all tasks in the 45-minute mid-term exam is 40. The minimum requirement for both mid-term exams is 16 (40%) and, for the whole semester, 32 (40%).

If the score of the sum is below 32, the student can take a retake test of the whole semester materials once in Week 14. This make up exam lasts for 45 minutes, the passing score for the signature is 16 (40%) out of the total score 40.

If a student does not achieve the minimum required score, he/she does not get the signature and has no right to enter for the final exam. However, the student can make up for the signature at the beginning of the exam period (during the first two weeks). In this case, the conditions are stricter: the performance must be at least 50%, i.e., 20 points out of the maximum available score of 40.

Taking the final exam

There is a final examination at the end of the semester, which is a 45-minute written test, with a maximum score of 40. The grade awarded to a student depends on her/his performance in both midterms and final exams. To reward regular work in the midterm, one-quarter of the score above 32 points achieved in the first two mid-term exams will be added to the total score of the final exam. The course is graded on a five-level scale:

Score	0-19	20-23	24-27	28-31	32-
Mark	fail (1)	pass (2)	fair (2)	good (4)	excellent (5)

Textbooks

1. F. P. Beer, E. R. Johnston Jr., P. J. Cornwell, B. P. Self: *Vector Mechanics for Engineers: Statics*, 12th Edition, McGraw-Hill Education, New York, 2019.
2. D. W. Baker, W. Haynes: *Engineering Statics*, 2025. online: https://engineeringstatics.org/
3. F. P. Beer, E. R. Johnston Jr., J. T. DeWolf, D. F. Mazurek: *Mechanics of Materials*, McGraw-Hill, New-York, 2012.
4. D. J. Bello, F. A. Leckie *Strength and Stiffness of Engineering Systems*, Springer Science+Business Media LLC, 2009.

Sándor Szirbik
associate professor, Lecturer

Edgár Bertóti
full professor, Head of Institute