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| ***Title of the course:***  Technical mechanics | | ***NEPTUN-code***  RKXME1EBNF | ***Weekly teaching hours:*** *l+cw+lw*  1+2+0 | ***Credit:*** 4  ***Exam type****:* tm |
| ***Course leader***  Dr. Szabó Lóránt | | ***Position:***  senior professor | ***Required preliminary knowledge: -***  no | |
| ***Curriculum:*** | | | | |
| Technical mechanics can be divided into four large parts, function of the studied object: mechanics of the no deformable bodies (mechanics of the rigid bodies), mechanics of the deformable bodies (strength of the materials, elasticity). Motion of the objects (point-like and rigid body, may be divided in other two parts: kinematics and dynamics (kinetics).  The aim of the course is to provide engineering students with the mechanical fundamentals that are essential for the mastery of mechanical engineering and professional subjects. They will gain an insight into, among other things, statics and strength of materials, as well as the description of the most important motions in engineering. | | | | |
| ***Detailed schedule of the course:*** | | | | |
| Weeks | ***Topics of lectures******and practices*** | | | |
| 1. | Statics. Basic concepts, fundamentals. Fundamental principles of theoretical mechanics. Vectors. The force in Cartesian system of reference. Three laws of Newton, for example: principle of the action and the reaction. Components of the force. Planar forces, force system. | | | |
| 2. | Moment of a force for a given point. Moment of the force for a given axis. Couple of two forces. Reduction of a force in a given point. Cases of reduction. Systems of parallel forces. Center of the parallel forces. | | | |
| 3. | Centre of gravity. Centres of gravity for homogeneous bodies. Laws of friction. Equilibrium of the particle with constraints with friction. | | | |
| 4. | Modelling the action of forces. Statics of the rigid body. Simple, hinged and fixed support. Loads. Beams (holders). Trusses. | | | |
| 5. | Theory of elasticity. Direct stresses (tensile state). Shearing stress. | | | |
| 6. | Bending stress. Instability (buckling stress). Strength calculation. | | | |
| 7. | Summary of statics and elasticity. Written test 1. | | | |
| 8. | Kinematics of the particle. Motion in one dimension. Position, velocity, and acceleration of the particle. | | | |
| 9. | Motion in two dimensions. Circular motions. Projectile motions. | | | |
| 10. | Summary of kinematics of point-like objects. | | | |
| 11. | Kinematics of the rigid body. Basic concepts, velocity and acceleration states, elemental and finite motions. | | | |
| 12. | The kinematics of relative motions. Kinetics. The laws of motion. Kinetics of the material point, axioms, general theorems. Forces of friction. Work, power, kinetic and potential energy. Work-kinetic energy theorem. | | | |
| 13. | The rotation of a rigid body around an axis, translational and plane motion of a rigid body. Written test 2. | | | |
| 14. | Summary of full semester. Replacement written test and solving the test. | | | |
| ***Mid-semester requirements:*** | | | | |
| *Attendance at lectures and practices:*  It is compulsory to attend the lectures and practices. The rules of education and exam directory () are the guidelines. | | | | |
| *Tests:*  Written test 1 (50 points) on the week 6.  Written test 2 (50 points) on the week 13.  Replacement written test on the week 14. | | | | |
| *Requirements for qualification:*  Two written tests. Total points: 100 (= 2·50 points). Term marks: 85-100%: excellent (5), 70-84%: good (4), 55-69%: average (3), 40-54%: pass (2), 0-39%: fail (1)  If the student has not met the requirements of obtaining the term mark (e.g., has not written or failed the in-class test, has not submitted the measurement report, etc.), he/she must be given one opportunity to make up for the term mark in the study period. If the student is still unable to obtain the term mark through this opportunity and the requirements of the course give an opportunity for it, then the student can make an attempt to obtain the term mark on one occasion on one of the first ten work days of the examination period against a fee specified in the “Regulations of ÓU on possible benefits for students and on fees and charges payable by them” (hereinafter RBF). | | | | |
| ***Professional competencies:*** | | | | |
| * Knowledge of the general and specific mathematical, scientific and social principles, rules and contexts necessary for the study of engineering. * Their multidisciplinary knowledge enables them to participate creatively in engineering work and to adapt to constantly changing requirements. * Open to professional cooperation with professionals in other fields related to their profession. * Strive to continuously improve their knowledge and keep their knowledge of the world up to date through self-education. | | | | |
| **Literature** | | | | |
| Serway Jewett: Physics for Scientist and Engineers  Lóránt Szabó: Physics for Undergraduate Students  Lóránt Szabó: The World of Engineering Mechanics (electronic book)  N. M. Belyaev: Strength of Materials | | | | |