

Tárgytematika / Course Description

Dynamics

GKNB_AMTA004

Tárgyfelelős neve /

Teacher's name: dr. Antali Máté

Félév / Semester: 2023/24/2

Beszámolási forma /

Assesment: Vizsga

Tárgy heti óraszám /

Teaching hours(week): 2/2/0

Tárgy féléves óraszám /

Teaching hours(sem.): 0/0/0

OKTATÁS CÉLJA / AIM OF THE COURSE

The subject presents the dynamical analysis, design, and principles of safe operation of machines on the base of knowledge of mathematics, physics, statics, and strength of materials acquired in previous studies. The subject helps to understand and solve problems of design, operation, maintenance of vehicles.

TANTÁRGY TARTALMA / DESCRIPTION

week 1	Basic concepts of dynamics. Kinematics of point masses. Displacement, velocity and acceleration functions. Special motions: (recti)linear and planar motions.
week 2	Harmonic oscillation and circular motion. Ballistic trajectories. The hodograph, phoronomic/kinematic curves.
week 3	Kinematics of rigid bodies. Velocity and acceleration of rigid bodies. Elementary and finite motions. Velocity and acceleration diagram, velocity and acceleration pole.
week 4	Special motions: rolling motion and pendulum motion.
week 5	Kinematics of relative motions. Stationary and moving coordinate systems. Relationship between velocities and accelerations measured in different coordinate systems.
week 6	Kinetics of point masses. Linear and angular momentum, kinetic energy, power and work. Basic laws of kinetics: Newton's laws. D'Alembert's principle, theorem of angular momentum, theorem of work.
week 7	Conservative force fields. Free motions, constrained motions.
week 8	Coulomb's law of friction. Problems for kinematics of point masses. Kinetics of relative motions. 1st Midterm Test
week 9	Kinetics of rigid bodies. Static moments, center of gravity. Moments of inertia, Steiner's theorem. Linear and angular momentum of rigid bodies. Kinetic energy of rigid bodies.

week 10	Theorem of linear and angular momentum of rigid bodies. Theorem of mechanical energy. Theorem of work.
week 11	Collision of bodies. Head-on collisions, collision diagrams.
week 12	Exercises in kinetics of rigid bodies.
week 13	Kinetics of complex structures with one degree of freedom. 2nd Midterm Test
week 14	Balancing of rotating masses. Exercises. Retake Test

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESSMENT'S METHOD

Two times in the semester (somewhen in the 6th and 12th weeks) **tests will be given** from the topics of the lectures of the previous weeks. Each tests are worth maximum 20 points. (2 pages: each page contains a problem solving for 8 points and

a theoretical question for 2 points.)

If one reaches at least 30 points in the two midterm tests, (s)he gets an offered grade. The points aquired in laboratory practice can modify the offered grade:

- 30-34 points good (4)

- 35-50 points excellent (5)

Conditions for signature (to be fulfilled during the class-period and necessary for acquiring the grade):

At least **6 points** (from 40 points) must be reached in the **two midterm tests**.

If some one does not reach 6 point in the two midterm tests, (s)he can write a retake test in the last week. The maximum is

20 points in this test. At least 6 points are needed for the signature.

Laboratory practice (it is not obligatory):

A laboratory test has to be written before the laboratory practice. One can get maximum 5 points for it. Who does not get at least 3 points is not allowed to attend the laboratory practice.

It can be get maximum another 5 points for the measurement report.

Exam (grade):

The sum of the points of the mid-term tests, laborytory practice, and exam determines the mark. The grading is as follows

- 0-47 points fail (1)

- 48-61 points pass (2)

- 62-75 points satisfactory (3)

- 76-90 points good (4)

- 91-130 points excellent (5)

Students must provide proof of their identity with an official card (eg. ID card, passport, driving license, etc.) at the tests. Those students, who apply unauthorized means (book, lecture notes, infocommunication means, etc.) different from those

listed in the course requirement or adopted by the lecturer in charge of the course assessment will be disqualified from the

exam as a consequence of their action, and the exam mark will automatically become "Fail (1)".

Consultation:

Each lecturer will have one hour per week for consultation. Time and place will be determined according to the needs of students.

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

Égert J. – Nagy Z.: Mechanika – Mozgástan, BSc jegyzet, Universitas-Győr Kht. 2005.

AJÁNLOTT IRODALOM / RECOMMENDED MATERIAL