MECHANICS
(title of the course in English)

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LAIS course code	Meha2001
Form of evaluation	3 Tests. Homework
Academic credit points (ECTS credit points)	3 ECTS
The total number of contact lessons	16
The number of lectures	8
The number of practical classes	8
Prerequisites	High school math and physics level
Part of the study programme	General education study courses

Study course objective

Establish the importance of Mechanics as an area of Physics and its impact on the development of other areas. Understand the close connection between mathematics and physics by modelling different process and verifying those models by practice.

Study results

After this course, the student will be able to:
- understand the motion of bodies and its description using different models.
- use calculus to solve mechanics problems.
- apply and verify theoretical relationships in practice.
- get proficiency in planning and executing mechanics experiments, data processing and estimationg errors in measurements and results.
- get proficiency in using measuring instruments, sensors, data loggers.

Organization mode of students' individual work

Regular course of study substances learning through lecture materials, textbooks, internet resourses. Regular homework performance. Weekly teacher consultations. Students work in groups. Preparing for the exam.

Evaluation of study results

Course assessment consists of two parts:
Homework (25%)
Three exams (25% each one) according to the main topics of the course.

Study course outline

No.	Title of the topic
1.	**Kinematics:** Kinematics of a point object. Free fall. Motion in 2 Dimentions. Parabolic motion.
2.	**Laws of Motion:** Linear momentum. Newton's Laws. Motion in a gravitational field. Weight.
3.	**Energy and Collisons:** Work. Energy. Power. Collisions. Conservation laws.
4.	**Circular Motion:** Rotational kinematics. Angluar momentum. Rotational dynamics. Rigid-body rotation. Non-inertial reference frames.
5.	**Static Equilibrium and Elasticity:** Equilibrium conditions. Center of gravity. Elastic properties of solids: Young's modulus.
6.	**Oscillations and Waves:** Free oscillations. Energy of an oscillator. Pendulum. Damped and forced oscillations. Resonance. Waves, type of waves and Interactions. Sinusoidal waves on strings. Sound waves. Doppler effect.
7.	**Fluid Mechanics:** Pressure. Archimides's Principle. Equation of Continuity. Bernoulli's equation.

Study course schedule

No. of the class (by week)	Title of the topic	Type of class (lectures, seminars, practical classes, laboratory work), amount of academic hours
1.	**Kinematics:** Quantities and units.	Lecture and practical class
2.	Kinematics of a point object. Free fall.	Lecture and practical class
3.	Motion in two dimensions. Parabolic motion.	Lecture and practical class
4.	**Laws of Motion:** Linear momentum. Newton's laws. Motion in a gravitational field. Weight.	Lecture and practical class
5.	**Energy and Collisions:** Work. Energy. Power. Test for weeks 1-3	Lecture and practical class **Test**

No. of the class (by week)	Title of the topic	Type of class (lectures, seminars, practical classes, laboratory work), amount of academic hours
6.	Collisions.	Lecture and practical class
7.	**Circular Motion:** Rotational motion kinematics.	Lecture and practical class
8.	Rotational motion dynamics. Rigid-body rotation Non-inertial reference frames	Lecture and practical class
9.	**Static Equilibrium and Elasticity:** Equilibrium conditions. Center of gravity. Elastic properties of solids: Young's modulus.	Lecture and practical class
10.	Test for weeks 4-9	**Test**
11.	**Oscillations and Waves:** Free oscillations. Energy of an oscillator. Pendulum.	Lecture and practical class
12.	Damped and Forced oscillations. Resonance.	Lecture and practical class
13.	Waves, type of waves and interactions. Sinusoidal waves on strings	Lecture and practical class
14.	Sound waves Doppler effect	Lecture and practical class
15.	**Fluid Mechanics:** Pressure. Archimide's principle. Equation of continuity. Bernoulli's eqation.	Lecture and practical class
16.	Test for weeks 11-15	**Test**

Basic literature

D.C. Giancoli "Physics for Scientists & Engineers" Pearson.

H.D. Young & R.A. Freedman "Sears and Zemansky's University Physics" Pearson.

D. Halliday, R. Resnick & J. Walker "Fundamentals of Physics" Wiley.

Supplementary literature

M. Alonso & E.J. Finn "Physics" Addison-Wesley (Pearson).

R.P. Feynman, R.B. Leighton & M. Sands "The Feynman Lectures on Physics" Addison-Weslay (Pearson).

Other source of information

https://www.khanacademy.org/science/physics