**Mechanics 2 (ECTS credits: 6)**

Language: the course is offered in Serbian and Hungarian.

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**Course description:**

The course covers the following topics:

Basic Concepts of Kinematics. Determination of Motion of a Particle – Vector and Natural. Particle Velocity. Determination of Particle Velocity in Various Types of Coordinate Systems. Particle Acceleration. Determination of Particle Acceleration. Basic Terms of Kinematics of a Rigid Body. Translation. Rotation of a Rigid Body about a Fixed Axis. Angular Velocity and Angular Acceleration of a Rigid Body. Planar Kinematics of a Rigid Body. Spherical Kinematics of a Rigid Body. Relative Motion of a Particle. Velocity and Acceleration of a particle in Relative Motion. Free Particle Dynamics. Direct and Inverse Tasks of Dynamics. System of Particles. Constraints. Euler’s and Lagrange’s equations of Motion of a Particle. Center of Inertia. Moments of Inertia. Linear Momentum of a Particle and a Mechanical System. Impulse. Impulse-Linear Momentum Theorem and Law of Conservation of Linear Momentum. Angular Momentum of a Particle and a Mechanical System. Angular Impulse-Angular Momentum Theorem and Law of Conservation of Angular Momentum. Differential and Total Work of a Force. Force Field. Force Function. Conservative Force. Kinetic Energy of a Particle and a Mechanical System. Work-Kinetic Energy Theorem and Law of Conservation of Kinetic Energy of a Particle and a Mechanical System.

**Aims:**

* to provide students’ knowledge of the fundamental principles of Kinematics and Particle Dynamics
* to enable students to master the determination of motion, properties of motion of mechanical objects and determination the causes of motions
* to prepare students for solving the problems in different engineering and scientific fields

**Learning outcomes:**

Upon successful completion of this course, students will be able to:

* Analyse motion of a particle in various coordinate systems
* Solve problems related to kinematics of a particle, i.e. to determine line of motion, trajectory, velocity, acceleration and sector velocity
* Describe certain types of body motion: translation, rotation of a body about a fixed line, plane motion, spherical motion and general motion of a rigid body, as well as to determine kinematic quantities of a body (angular velocity and angular acceleration) and to determine velocity and acceleration of some points of a body
* Solve kinematic problems related to the relative motion of a particle
* Determine center of mass and inertia moments of a particle system and a rigid body.
* Form expressions for momentum and angular momentum of a particle, a system of particles and a rigid body
* Determine kinetic energy of a particle, a system of particles and a rigid body
* Apply impulse-linear momentum theorem, angular impulse-angular momentum theorem and work-kinetic energy theorem of a particle, a system of particles and a rigid body