Subject name	**Engineering Mechanics I i II**	**Kod:**	**M190**
Degree of studies	**I**		
Form of studies	**full time studies**		
Field of studies	**MiBM/MTR/IPEH**		
Type of subject	**Obligatory**		
Specialisation	**All**		
Form of studies	**60W, 60Ć**		

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A brief outline:	
Lecture:	1.Subject of Mechanics, its branches and fields. Basic notions, Newton's laws. Historic outline. 2.Mass geometry. Mass and grawity centers. Moments of inertia of bodies and figures. 3.Statics: models of rigid bodies, forces, constraints and types of supports, geometric and analytical conditions of equilibrium, dry friction and its effects in statics. 4.Kinematics of a particle: position, velocity and acceleration of a particle in Cartesian and cylindrical/polar coordinate systems and in the natural directions. 5.Dynamics of a particle: equations of motion of a free and constrained particle, momentum and angular momentum laws, kinetic energy law. 6.Dynamics of multiparticle systems: equations of motion, constraints, momentum, angular momentum and kinetic energy laws. 7.Kinematics of a rigid body: description of spatial position of a rigid body, Euler's angles. Velocities and accelerations of a rigid body in translation, plane motion, rotation about fixed point and fixed axis. 8. Motion of a particle in a moving reference frame. Velocity and acceleration of a particle in a resultant motion. Coriolis acceleration. Dynamics of relative motion. 9.Dynamics of a rigid body: kinetic energy, momentum and angular momentum laws. Dynamics of a rigid body in translation, plane motion (incl. Dynamics of vehicles), rotation about fixed axis (incl. bearing reactions of unbalancerd rotors) and rotation about fixed point (incl. gyroscopic effect). 10.Elements of analytical mechanics: constraints and generalized coordinates of multibody systems, virtual displacements, virtual work and d'Alembert's principles. Lagrange's equations. 11.Impact phenomena. Collision of a particle with a fixed barrier. Collision of two particles. Impact center of a body. Collision of two bodies in plane motions. 12.Dynamics of a particle with variable mass. Equation of motion of a particle with continously varying mass. Examples and applications.

Exercises:	1.Calculations of moments of inertia and mass centers of rigid bodies. 2.Solving problems of statics: calculating support and joint forces, equilibrium positions, dry friction effects for rigid bodies and mechanisms. 3.Determining motions, velocities and accelerations of particles in various reference frames. 4.Deriving differential equations of motion of a free and constrained particle, solving and discussing the results. 5.Making use of momentum, angular momentum and kinetic energy laws to solve dynamical problems of a particle. 6.Solving dynamical problems of multiparticle systems. 7. Calculating positions, velocities and accelerations of points in a rigid body in particular motions: translation, plane motion, rotation about fixed axis and regular precession. 8.Determining velocities and accelerations of a particle in its resultant motion. 9. Deriving and solving dynamic equations of relative motion of a particle in a moving reference frame. 10.Calculating velocities and accelerations in a rigid body from the momentum, angular momentum and kinetic energy laws. 11.Determining dynamic bearing reactions of unbalanced rotors. 12.Solving dynamic problems of plane motions of a rigid body (incl. rolling vheel). 13.Deriving dynamic equations of motion of multibody systems by means of Lagrange equations. 14.Solving impact problems of particles and rigid bodies in plane motions. 15.Solving exemplary dynamical problems of a particle with variable mass.