Dzemal Bijedic University of Mostar Faculty of Mehcanical Engineering		
Subject title:	**Mechanics 2**	
Cycle level, years of study, semester	I cycle	I year / II semester
Lecturer on the subject:	Assoc. prof. Emir Nezirić	
Contact details:	emir.neziric@unmo.ba	
Total number of subject hours:	45 + 45	
Credit value ECTS-a:	6	
Basic Qualification:	I cycle	
Subject status:	Mandatory	
Preliminary Examination Obligations	-	
Access limitations on the subject:	-	
Explanation of ECTS value:	90 hours of in-class (lectures and excercises) = 75/25 = 3 ECTS 25 hours of homeworks = 35/25 = 1,4 ECTS 35 self-paced learning = 40/25 = 1,6 ECTS TOTAL: 6 ECTS	
Subject goal:	The aim of this course is to equip students with the skills to solve engineering tasks involving the kinematics and dynamics of machines, vehicles, robots, manipulators, and similar systems. Throughout this course, students will enhance their understanding of fundamental principles, thereby improving their ability to solve a variety of interdisciplinary engineering problems.	
Description of general and specific competences (knowledge and skills) / learning outcomes	Apply principles and fundamental knowledge from the fields of natural and technical sciences to identify and describe simpler problems in mechanical engineering. Break down problems into simpler tasks and propose activities for their resolution. Recognize influences and understand interactions among elements of technical systems and processes. Utilize appropriate modeling techniques for basic technical systems and processes to solve simpler problems in mechanical engineering. Calculate and dimension basic elements of technical systems and processes.	
Course content:	Task, role, and significance of kinematics in mechanical engineering. Kinematics of a particle. Equation of motion of a particle. Rectilinear motion of a particle. Concept of velocity and acceleration. Uniform motion of a particle, uniformly varied motion of a particle. Non-uniform motion of a particle. Types of problems in rectilinear motion; dependence of acceleration on time, velocity, and position. Curvilinear motion of a particle. Average and instantaneous velocity of a particle. Average and instantaneous acceleration of a particle. Velocity and acceleration of a particle expressed in Cartesian rectangular coordinates, polar coordinates, polar cylindrical coordinates, and spherical coordinates. Velocity and acceleration in the natural method of determining the motion of a particle. Sector velocity. Hodograph of velocity vector of a particle. Circular motion of a particle. Uniform circular motion of a particle, uniformly accelerated (decelerated) and non-uniform circular motion of a particle. Complex motion of a particle. Relative, transfer, and absolute motion of a particle. Absolute velocity and acceleration of a particle. Kinematics of rigid bodies. Basic types of motion of a rigid body. Translation of a rigid body. Rotation of a rigid body about a fixed axis. Law of rotation, angular velocity, and angular acceleration. Special cases of body rotation about a fixed axis. Rotation of a rigid body about a fixed axis. Velocities and accelerations of points of a rotating body. Angular velocity and acceleration of a body as a vector. Planar motion of a rigid body. Instantaneous velocity pole. Determination of point velocities using instantaneous velocities pole. Method of projected velocities.	

	Analytical determination of point velocities of a planar figure. Velocity plan of points of a planar figure. Accelerations of points of a planar figure. Acceleration plan. Instantaneous center of acceleration. Theorem of center of rotation for finite displacement of a planar figure. Theorem of rolling of a moving figure on a stationary centroid. Introduction to dynamics. Basic concepts, tasks, and divisions of dynamics. Newton's laws. Non-free motion of a particle, constraints, principle of release from constraints, division of constraints. Equations of motion of a particle. D'Alembert's principle. Types of forces studied in dynamics: gravitational force, elastic force, contact forces, friction forces, tension forces, resistance forces in fluid, applied forces. Momentum and impulse of force. Law of conservation of momentum for a particle. Moment of momentum of a particle. Law of conservation of momentum of a particle. Work-energy principle for a particle. Power. Work of conservative forces. Work of friction force. Potential energy. Mechanical energy. Law of conservation of mechanical energy for a particle. Theory of collisions. Central impact. Oblique impact. Impact with a stationary base. Determination of coefficient of restitution. Central force. Motion of a point under the action of a central force. Orbital motion Kepler's laws. Cosmic velocities. Potential energy of celestial bodies. Laws of dynamics in relative motion of a particle. Dynamics of systems of particle. Laws of dynamics for a system of particle.
Teaching methods /learning methods:	Lectures, auditory practical lectures, homework, office hours.
Other Student Obligations (if foreseen):	Homeworks and tasks
Assessment Methods / Methods of Examination	Homeworks – 5%. Partial exams – 30%+30% = 60% Final (oral) – 35% -
List of basic literature and Internet web references:	1. I. Karabegović: Kinematika, Tehnički fakultet Bihać, 2004 2. V. Določek: Kinematika, Mašinski fakultet Sarajevo, 2005 3. L. Rusov: Mehanika II, Naučna knjiga, Beograd, 1992 4. I. Karabegović: DINAMIKA,Svjetlost,Sarajevo, 1997. 5. V. Doleček: DINAMIKA, Mašinski fakultet Sarajevo, 2007. 6. L. Rusov: Mehanika-Dinamika, Naučna knjiga Beograd, 1989. 7. Meriam,L.G. Kraige: Engineering Mechanics_ Dynamics, 1998. 8. E. Nezirić: Tehnička mehanika – Kinematika, UNMO, 2023.
Quality assurance and performance of the subject	Anonymous survey on the quality of lectures and lecturers.