SYLLABUS

Course description

Course code	Course	Mechanika ogólna
ME/O/I/ST/A3		Engineering mechanics
Language of instruction		English
Academic year		2025/2026
field of study:		Mechanical Engineering
field of specialisation:		All
Educational level		first-cycle studies
Education profile		General academic
Mode of study		Full-time studies
Semester(s)		I, II
Affiliation with a group of classes		A. Group of basic course
Course status		Obligatory

Types of classes, instruction hours, ECTS credits	Types of classes	Number of instruction hours	Number of ECTS credits
	Lecture	45 [h]	7.5 ECTS
	Classes	45 [h]	
	Lab	- [h]	

Linkage of the course			
	with the education profile	Related to the conducted scientific activity in the discipline to which the field of study is assigned	7.5 ECTS
	with qualifications	It is used to acquire engineering competences by the student	7.5 ECTS
	with science discipline	Mechanical engineering	7. 5 ECTS

Form of teaching	Traditional – classes organized at the University /classes conducted using distance learning methods and techniques
Prerequisites	knowledge of mathematics and physics at secondary school level
Department	Faculty of Mechanical Engineering
Coordinator	Krzysztof Kołodziejczyk
The website of the basic organizational unit	http://wm.uniwersytetradom.pl
E-mail address, phone number of the coordinator	k.kolodziejczyk@urad.edu.pl; +48 48 361 71 16

LEARNING OUTCOMES, CURRICULUM CONTENT, TEACHING CLASSES, VERIFICATION OF LEARNING OUTCOMES

Learning Objective:	C1 - Learning the principles and laws of statics in formulating and solving the equilibrium of forces acting on the body remain at rest.

	C2 - Acquisition of skills in the kinematics of particle and kinematics of rigid bodies in motion C3 - Understanding the laws and principles of mechanics for bodies in motion under the action of forces
Curriculum Content:	**Lecture :** STATICS: Basic concepts of mechanics. Vectors. Newton's laws of motion. Principles of statics. Forces. Statics of a rigid bodies: external and internal forces, moment of a force about point. moment of a force about a axis, moment of a couple, reduction of a system of forces, equilibrium of rigid bodies, centroids and centers of gravity, analysis of trusses. Friction: the laws of dry friction, coefficients of friction, angles of friction, wheel friction – rolling resistance, belt friction. KINEMATICS: Kinematics of particles: rectilinear and curvilinear motion of particles: position, velocity and acceleration. Kinematics of rigid bodies: translation, rotation about a fixed axis, general planar motion, absolute and relative velocity and acceleration in planar motion, instantaneous center of rotation in planar motion, motion of a particle relative to a rotating frame – Coriolis acceleration, motion about a fixed point. 3D kinematics of a rigid body. DYNAMICS: Kinetics of particle: Newton's second law. The first and second task of dynamics.. Kinetics of particle: force and acceleration, work and energy, impulse and momentum. Planar motion of rigid bodies: forces and accelerations. Planar motion of rigid bodies: energy and momentum methods. 3D kinetics of a rigid body. **Classes :** STATICS: Vectors. Forces in plane and in space. Resolution of a force into components. Resultant of several convergent and concurrent forces. Reactions at supports and connections. Free body diagram. Solving problems of equilibrium of rigid bodies in two dimensions. Centers of gravity of solids, surfaces and lines. Analysis of static determinate trusses. Solving problems with friction. Solving problems of equilibrium of rigid bodies in three dimensions. KINEMATICS: Motion of a point in rectilinear and curvilinear motion. Position, velocity and acceleration of a point in a Cartesian coordinate system. Position, velocity and acceleration of a point in a the polar coordinate system in the plane. Relative motion of a particle. Motion of a rigid body about a fixed point. Planar motion of a rigid body – velocities and accelerations. 3D motion of a rigid body. DYNAMICS: The dynamics of the free and constrained motion of a particles: the first and second task of dynamics. Law variation of momentum and energy of a particle and a system of particles. Law variation of momentum, energy and angular momentum of a rigid body. Planar motion of a rigid body. 3D motion of a rigid body.
Didactic (educational) methods:	Conventional lecture using audiovisual means. During classes solving problems using classical and computer-aided methods.
Course assessment type, the criteria for assessing the achieved learning outcomes, and the method of calculating the final grade:	The condition for passing the course is to achieve all the required learning out comes specified for the course.

Learning outcomes for the course in relation to the field of study learning outcomes and the type of classes				Methods of verifying learning outcomes	
Learning outcome number	Description of the learning outcomes for the course (PEU) A student who has passed the course (**W**) knows and understands / (**U**) can / (**K**) is ready to:	Field of study learning outcome (KEU)	Types of classes	Form of verification (credits)	Methods of testing and assessment

W1	Student has knowledge in the field of formulating and solving the equilibrium conditions of forces acting on bodies at rest	K_WG02, K_WG05	lecture	credit/exam	written exam (theory + tasks)
W2	Student knows the methods of describing the position and determining the velocities and accelerations of a point using various reference systems, as well as methods of describing the positions and determining the velocities and accelerations of bodies in motion	K_WG02, K_WG05	lecture	credit/exam	written exam (theory + tasks)
W3	Student knows the laws and principles of dynamics of a point in curvilinear motion and the laws and principles of dynamics of a body in motion	K_WG02, K_WG05	lecture	credit/exam	written exam (theory + tasks)
U1	Student is able to make reductions and formulate equilibrium conditions of any system of forces	K_UW01, K_UW02	classes	credit	solution of tasks
U2	Student is able to use the methods of describing the kinematics of a point in curvilinear motion with the use of various reference systems, as well as the methods of determining the velocities and accelerations of bodies in motion	K_UW01, K_UW02	classes	credit	solution of tasks
U3	Student is able to formulate dynamic equations of motion of a point and a rigid body in motion, is able to use the laws of variation of momentum and energy	K_UW01, K_UW02	classes	credit	solution of tasks
K1	Student is aware of the need to expand knowledge of mechanics and is able to choose the appropriate methods of expanding this knowledge for effective solving of technical problems	K_KK01	lecture, classes	Verbal evaluation	Verbal evaluation
K2	Student is aware that in the case of tasks that go beyond their competences, they can use the support of experts.	K_KK02	lecture, classes	Verbal evaluation	Verbal evaluation

Literature and teaching aids
Primary literature: 1. Hibbeler R.C., Engineering Mechanics, Statics, Pearson Prentice Hall 2. Hibbeler R.C., Engineering Mechanics, Dynamics, Pearson Prentice Hall 3. Gross D. et al., Engineering Mechanics 1 & 3, Springer Additional literature: 1. McGill D.J., King W.W., Engineering Mechanics: An Introduction to Statics and Dynamics, PWS Publishers 2. Beer F.P. et al., Vector Mechanics for Engineers, McGraw-Hill 3. Hibbeler, R.C. Statics and Mechanics of Materials, SI Edition. Prentice-Hall, 2004

Student workload required to achieve the assumed learning outcomes – the balance of ECTS credits		
Attendance, participation	Student workload [h].	
	Student's self-study hours Classes without a teacher (ZBN)	Classes
Participation in lectures/classes/lab	X	90 [h]
Preparation for lectures/classes/lab Preparation for credit / exam	77.5 [h] 20 [h]	X

Total student workload Preparation for ... credit / exam	97.5 [h]/ 3.9 ECTS	90 [h]/ 3.6 ECTS
ECTS points per subject	7.5 ECTS	

Additional information, comments
In the case of students with special needs, including disabilities, and chronic illnesses, the methods and forms of verification of learning outcomes specified above (in the syllabus) are adapted to the individual needs of these students, as appropriate. Detailed rules and forms of support for students with special needs, including those with disabilities and chronically ill, during classes, credits, and exams are specified in: University Regulations (Regulamin Studiów Uniwersytetu Technologiczno-Humanistycznego w Radomiu), Study Regulations (Zasady Studiowania), and Procedure for Ensuring Accessibility of the Educational Process to Students with Special Needs, Including Those with Disabilities and Chronically ill (Procedura dotycząca zapewnienia dostępności procesu kształcenia studentom ze szczególnymi potrzebami, w tym: z niepełnosprawnością, przewlekle chorych).