

# SYLLABUS

## Course description

Course code	Course	<b>MASZYNOZNAWSTWO</b>		
MB/O/I/NST/B1.3		<b>THEORY OF MACHINES</b>		
Language of instruction	English			
Academic year	2023/2024			
<b>field of study:</b>	Mechanics and machine construction			
<b>field of specialisation:</b>	All			
Educational level	first-cycle studies			
Education profile	General academic			
Mode of study	Part-time studies			
Semester(s)	1			
Affiliation with a group of classes	Core subjects			
Course status	Obligatory			
Types of classes, instruction hours, ECTS credits	Types of classes	Number of instruction hours	Number of ECTS credits	
	Lecture	16 [h]	2 ECTS	
	Classes	- [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		2 ECTS
	with qualifications	It is used to acquire engineering competences by the student		2 ECTS
	with science discipline	Mechanical engineering		2 ECTS
Form of teaching	Traditional – classes organized at the University /classes conducted using online learning methods and techniques			
Prerequisites	Basic knowledge on physics of high school level			
Department	Faculty of Mechanical Engineering, UTH Radom			
Coordinator	dr hab. inż. Mirosław Rucki, prof. UTH Radom			
The website of the basic organizational unit	<a href="http://www.wm.uniwersytetradom.pl">www.wm.uniwersytetradom.pl</a>			
E-mail address, phone number of the coordinator	m.rucki@uthrad.pl; tel. 48 361 7696			

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

Learning Objective:	C1 – The objective is to acquire the ability of understanding and classification of the machines according to the chosen criterion C2 – Knowledge on the failure mechanisms of machines and ability to assess effect of certain factors on the engineering system degradation process
Curriculum Content:	The course is related to the conducted scientific activity.  Types of energy and its resources. Criteria and classification of machines. Determination of basic technical parameters of machines. Overview and basic knowledge of hydrostatics. Pascal’s law and its application in the construction of hydraulic machines. Buoyancy of liquids and equilibrium of floating bodies. Liquid motion and its parameters. Basic laws of hydrodynamics. Types, construction and principle of operation of water turbines, their technical parameters. Classification and general characteristics of pumps. Principle of operation, types of dynamic and positive displacement pumps. Examples of pump installations. Hydraulic motors and cylinders. Characteristics and components of hydrostatic drives. Construction and application of hydrokinetic drives, e.g. gears and clutches. An outline of technical thermodynamics. Thermodynamic factor and its state parameters. Ideal gas transitions. Thermodynamic cycles. Classification of technical fuels. Types of heat transfer. Properties of water vapor. Steam engines and thermal power plants. Construction and basic elements of a boiler installation. Internal combustion engines. Characteristics and classification of internal combustion engines. Combustion turbines and jet and rocket engines. Compressors, fans and blowers – classification, application. Construction of dynamic and positive displacement compressors. General characteristics of vacuum pumps. Pneumatic mechanisms. Construction and application of pneumatic and pneumo-hydraulic drives. Refrigerators – types, principle of operation and application. Material handling equipment. Characteristics of cranes and conveyors. Typical design solutions for cranes and their technical parameters. Types and use of conveyors in production processes. Operation of machines and devices. Types of degradation of machines and devices. Factors influencing machine wear processes. Durability and reliability of machines and devices.
Didactic (educational) methods:	Traditional lecture with multimedia
Course assessment type, the criteria for assessing the achieved learning outcomes, and the method of calculating the final grade:	Examination

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 ( <b>W</b> ) knows and understands / ( <b>U</b> ) can / ( <b>K</b> ) is ready to:	Field of study learning outcome (KEU)	Types of classes	Form of verification (credits)	Methods of testing and assessment
W1	able to classify the machines and devices according to the chosen criterion	K_WG10	Lecture	Examination	Written exam
W2	knows the factors that cause failure of engineering systems, is able to assess their influence on the degradation process	K_WG10	Lecture	Examination	Written exam

U1	understands and is able to use terminology related to machines design and maintenance	K_UK14	Lecture	Examination	Written exam
U2	is able to draw a sketch to explain a machine operational principle, e.g. water turbine, combustion engine, etc.	K_UW08	Lecture	Examination	Written exam
K1	is aware of necessity to update own knowledge during entire life	K_KK01	Lecture	Examination	Written exam

Literature and teaching aids
1. Fosthoffer W.E.: Fosthoffer's Best Practice Handbook for Rotating Machinery. Elsevier, Amsterdam 2011. 2. Affonso L.O.A.: Machinery Failure Analysis Handbook. Gulf Publishing Company, Houston 2006. 3. Boyce M.P.: Gas Turbine Engineering Handbook. Gulf Publishing Company, Boston 2002. 4. Dincer I., Kanoglu M.: Refrigeration systems and applications. Wiley, Chichester 2010. 5. Kay M.G.: Material Handling Equipment. North Carolina State University 2012. Available online free <a href="https://mgkay.github.io/Material_Handling_Equipment.pdf">https://mgkay.github.io/Material_Handling_Equipment.pdf</a> 6. Boy G.A. (Ed.): The Handbook of Human-Machine Interaction. CRC Press, Boca Raton 2011.

Student workload required to achieve the assumed learning outcomes – the balance of ECTS credits			
Attendance, participation	Student workload [h].		
	Other contact hours (IGK)	Student's self-study hours Classes without a teacher (ZBN)	Classes
Participation in ... lectures	X	X	16 [h]
Participation in .... classes/laboratory classes	X	X	X
Meeting with teachers during their duty hours	2 [h]	X	X
Preparation for lectures/classes/.... , Preparation for ... credit / exam	X	28[h] 4 [h]	X
Total student workload	2 [h]/ 0.1 ECTS	32 [h]/ 1.3 ECTS	16 [h]/ 0.6 ECTS
ECTS credits for the course	2 ECTS		

Additional information, comments
<p>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.</p> <p>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).</p>

