

SYLLABUS

Course description

Course code		Course	Skanowanie 3D	
ME/O/I/ST/C1a			3D Scanning	
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)		5		
Affiliation with a group of classes		C . Group of courses to choose from		
Course status		Electable		
Types of classes, instruction hours, ECTS credits		Types of classes	Number of instruction hours	Number of ECTS credits
		Lecture	15[h]	3 ECTS
		Classes	[h]	
		Lab	30[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		ECTS
	with qualifications	It is used to acquire engineering competences by the student		3 ECTS
	with science discipline	Mechanical engineering		3 ECTS
Form of teaching		Traditional – classes organized at the University /classes conducted using distance learning methods and techniques		
Prerequisites		None		
Department		Faculty of Mechanical Engineering		
Coordinator		Marcin Migus, Ph.D. Eng.		
The website of the basic organizational unit		http://wm.uniwersytetradom.pl		
E-mail address, phone number of the coordinator		m.migus@urad.edu.pl		

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

Learning Objective:	The aim of the course is to provide students with a comprehensive understanding of modern 3D scanning technologies and their applications in engineering and manufacturing. Students will learn to operate various types of 3D scanners, process scanned data, and apply it in reverse engineering, quality control, and digital modeling. The course will also develop practical skills in data optimization, accuracy analysis, and integration of 3D scanning with CAD and additive manufacturing technologies.
Curriculum Content:	Lecture Topics Introduction to 3D Scanning Technologies Types of 3D Scanners and Their Working Principles Point Cloud Processing and Data Optimization 3D Scanning in Reverse Engineering and Quality Control Applications in manufacturing, precision mechanics, and metrology. Future Trends in 3D Scanning and Digital Twin Technology Innovations, AI-based enhancements, and integration with Industry 4.0. Laboratory Topics Hands-on Introduction to 3D Scanning Devices Calibration and Setup of a 3D Scanner Scanning Small and Complex Objects Creating and Processing Point Clouds Mesh Generation and Optimization Reverse Engineering with 3D Scanning Accuracy Analysis and Error Reduction in 3D Scanning 3D Scanning for Quality Control and Inspection Combining Photogrammetry with 3D Scanning
Didactic (educational) methods:	Lecture - Conventional lecture using audiovisual aids, verbal problem-solving method. Laboratory exercises – implementation of a practical task.
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 outcomes specified for the 3D Scanning 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	Knows and understands the principles of 3D scanning and digital modeling of mechanical components and structures.	K_WG09	Lecture	graded pass	Test
W2	Has knowledge of 3D scanning and metrology, understands the principles and methods of capturing and measuring physical objects, and is familiar with computational techniques and software tools necessary for processing scanned data and analyzing measurement results.	K_WG12	Lecture	graded pass	Test
U1	Is able to assess the suitability of various 3D scanning methods and tools for capturing and analyzing physical objects and can select and apply the appropriate techniques for digitization, reverse engineering, and quality control in engineering and manufacturing.	K_UW09	Laboratory	graded pass	Laboratory report

K1	Is ready to expand and critically evaluate specialized knowledge in 3D scanning and is able to identify relevant sources of information and learning methods suitable for both personal and professional development in the field.	K-KK01	Lecture Laboratory	-	Class participation
K2	Is willing to comprehensively analyze and effectively perform 3D scanning tasks, and in case of difficulties, seek expert opinions to ensure accurate data capture, processing, and analysis.	K-KK02	Lecture Laboratory	-	Class participation

Literature and teaching aids	
<p>Primary literature:</p> <p>Kloski, L. W., & Kloski, N. (2021). <i>Druk 3D. Praktyczny przewodnik po sprzęcie, oprogramowaniu i usługach. Wydanie II.</i> Gliwice: Helion. ISBN: 978-83-283-7076-3.</p> <p>France, A. K. (2014). <i>Świat druku 3D. Przewodnik.</i> Gliwice: Helion. ISBN: 978-83-246-9214-2.</p> <p>Gibson, I., Rosen, D. W., & Stucker, B. (2015). <i>Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing.</i> New York: Springer. ISBN: 978-1-4939-2112-6.</p> <p>Additional literature:</p> <p>Grimm, T. (2004). <i>User's Guide to Rapid Prototyping.</i> Dearborn: Society of Manufacturing Engineers. ISBN: 978-0-87263-697-6.</p> <p>Study aids:</p> <p>Dziubek, A. (2009). <i>Skaner 3D na bazie strukturalnego oświetlenia.</i> Praca magisterska, Uniwersytet Wrocławski. Dostępne online: https://ii.uni.wroc.pl/~anl/MGR/dziubek.pdf</p>	

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	45 [h]
Preparation for lectures/classes/lab, Preparation for credit / exam	30 [h]	X
Total student workload Preparation for credit / exam	30 [h]/ 1,2 ECTS	45 [h]/ 1,8 ECTS
ECTS points per subject	3 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, przewlekłe chorych).</p>