

SYLLABUS

Course description

Course code	Course	OBRABIARKI CNC		
MB/O/I/NST/C2A.4		CNC MACHINE TOOLS		
Language of instruction	English			
Academic year	2023/2024			
field of study:	mechanical engineering			
field of specialisation:	Designing and Manufacturing of Machines			
Educational level	first-cycle studies			
Education profile	general academic			
Mode of study	part-time study			
Semester(s)	5			
Affiliation with a group of classes	Specialization module			
Course status	obligatory			
Types of classes, instruction hours, ECTS credits	Types of classes	Number of instruction hours	Number of ECTS credits	
	Lecture	8[h]	3ECTS	
	Classes	16[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	3 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 online learning methods and techniques			
Prerequisites	Registration for the fifth semester			
Department	Faculty of Mechanical Engineering			
Coordinator	Dr hab. inż. Marek Kowalik			
The website of the basic organizational unit	www.wm.uniwersytetradom.pl			
E-mail address, phone number of the coordinator	m.kowalik@uthrad.pl			

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

Learning Objective:	The aim of the course is to familiarize students with the construction and machining capabilities of CNC machine tools
Curriculum Content:	<p>The content of the classes is related to the conducted scientific research.</p> <p>Lecture: Basic properties of machine tools. Elements and mechanisms of machine tools. Modular construction of CNC machine tools. Bodies and guiding connections of working units of machine tools. Requirements and classification of main motion drives in machine tools. Working spindles - requirements and ways of bearing. Rotary mechanical gears. Headstocks. Characteristics of feed motion drives. Gears transforming rotational into progressive motion. Motors used in feed motion drives. Measuring systems of position and displacement in machine tools. Automatic control of machine tools. Numerical control - basics and functional structure. Computer control of machine tools. Classification of lathes and turning centers. CNC center and chuck horizontal lathes. Modular construction of lathes. Turning machining centers. Automatic lathes. Classification of milling machines and milling centers. Multi-axis milling machines and CNC milling centers and their functional features. Classification of grinders. Technical solutions of modern grinders. Grinding machines for external and internal cylindrical grinding. Surface grinders. Directions of development of machine tools - productivity, technological flexibility, accuracy, work safety, ergonomics and ecology.</p> <p>Laboratory exercises: Construction and operation of the basic units of a CNC lathe and CNC milling machine. Construction of measuring sensors. Measurements of speed and displacement of working units of machine tools. Measurements of the positioning accuracy of working teams. Power measurements of propulsion engines. Rigidity measurements of working units of the machine tool. Checking the accuracy of circular interpolation on a lathe or milling machine</p>
Didactic (educational) methods:	1. lecture with elements of multimedia presentations; 2. didactic discussion; 3. work in groups; 4. laboratory experiment.
Course assessment type, the criteria for assessing the achieved learning outcomes, and the method of calculating the final grade:	The final grade for the lecture is determined depending on the result of the exam, the grade for laboratory classes depends on the degree of independence of work during the classes while performing individually assigned tasks and reports

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	He knows the construction and functions of the basic units of the CNC machine tool	K WG17	lecture	written exam	written exam
W2	He knows the machining possibilities basic groups of machine tools and their equipment	K WG14	lecture	written exam	written exam

W3...	He can choose a machine tool for a specific machining task	K WG16	lecture	written exam	written exam
U1	He can measure selected parameters characterizing the work of the machine tool	K UW07	laboratory	test	test
U2	Can analyze and interpret the results of the measurements	K UW09	laboratory	test	test
K1	He is aware of the risks that occur during the operation of CNC machine tools and knows the health and safety conditions that enable their safe use	K KK02	laboratory	observation	test

Literature and teaching aids
<ol style="list-style-type: none"> Honczarenko J.: Obrabiarki sterowane numerycznie. PWN, Warszawa 2017 Alan Overby :CNC Machining Handbook : Building, Programming, and Implementation McGraw-Hill . 2011. ISBN: 0071623019 / 9780071623018 Hans Kief, ;Helmut A. ;Roschiwal : CNC Handbook. McGraw-Hill, 2013. ISBN: 0071799486 / 9780071799485

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	8 [h]
Participation in classes/laboratory classes	X	X	16 [h]
Meeting with teachers during their duty hours	8 [h]	X	X
Preparation for lectures/classes/.... , Preparation for ... credit / exam	X	23 [h] 20 [h]	X
Total student workload	8 [h]/ 0,4 ECTS	43 [h]/ 1,7 ECTS	24 [h]/ 0,9 ECTS
ECTS credits for the course	75 h/ 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>

