

# SYLLABUS

## Course description

Course code	Course	<b>PROGRAMOWANIE I METODY NUMERYCZNE</b>		
MB/O/I/ST/C1A.1		<b>PROGRAMMING AND NUMERICAL METHODS</b>		
Language of instruction	English			
Academic year	2023/2024			
<b>field of study:</b>	Mechanical Engineering			
<b>field of specialisation:</b>	CAE			
Educational level	first cycle studies			
Education profile	general academic			
Mode of study	full-time studies			
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	15 [h]	2 ECTS	
	Project	15 [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 (general academic profile)		0 ECTS
	with qualifications	serves the student to acquire engineering competences		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	-			
Department	Faculty of Mechanical Engineering			
Coordinator	Przemysław Motyl, PhD			
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	p.motyl@uthrad.pl			

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

Learning Objective:	<p>The aim of the course is to provide basic information on numerical methods in engineering calculations.</p> <p>The aim of the course is to provide basic information on the use of programming techniques to implement selected numerical methods.</p>
Curriculum Content:	<p>Lectures and laboratories:</p> <p>Concepts and programming techniques. Programming paradigms. Object-oriented, functional, logic and concurrent programming. The basic elements of the programming language.</p> <p>Introduction to numerical methods. Horner scheme. Calculation of the value of implicit functions. Solving systems of linear equations. Nonlinear equations. Function interpolation. Numeric differentiation. Numeric integration methods. Approximation. Initial issues for ordinary differential equations.</p> <p>Development of simple programs in accordance with the concept of imperative programming for engineering calculations as part of individual projects.</p>
Didactic (educational) methods:	<p>feeding methods (information lecture, lecture, reading), problem methods (problem lecture, conversational lecture), activating methods (case method, situational method, didactic games, seminar, didactic discussion), exposing methods (film, exhibition, show), programmed methods (with the use of a computer), practical methods,</p>
Course assessment type, the criteria for assessing the achieved learning outcomes, and the method of calculating the final grade:	<p>The condition for passing a subject is to achieve all the required learning outcomes specified for a given subject. Obtaining positive grades in all forms of classes included in the course is tantamount to passing it and gaining by the student the number of ECTS points assigned to the subject. The final grade is the average of grades from all forms of classes included in the course.</p>

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	The student has knowledge in the field of coding computer programs for engineering and design calculations and their running and testing in the selected programming environment.	K_WG11	Lectures, exercises and laboratories	Test	Colloquium
W2	The student has knowledge in the field of solving nonlinear equations and algebraic systems of linear and nonlinear equations, numerical differentiation and integration.	K_WG01	Lectures, exercises and laboratories	Test	Colloquium
W3	The student has knowledge in the field of numerical methods used in technology.	K_WG17	Lectures, exercises and laboratories	Test	Colloquium
U1	The student is able to write, run and test a computer program based on a	K_UW05	Laboratories	Evaluation of the	Grade based on points

	computational algorithm for engineering calculations.			exercises performed	
U2	The student is able to use and modify ready-made computer programs to solve basic engineering tasks using numerical methods.	K_UW02 K_UW05	Laboratories	Evaluation of the exercises performed	Grade based on points
K1	The student knows how to work in a team.	K_KK02	Laboratories	Verbal evaluation	-

Literature and teaching aids	
Basic and supplementary literature	
Bjarne Stroustrup, The C++ Programming Language, ISBN-13: 978-0321958327 J. Douglas Faires, Numerical Methods, ISBN-13: 978-0495114765	

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	15 [h]
Participation in .... classes/laboratory classes	X	X	15 [h]
Meeting with teachers during their duty hours	2 [h]	X	X
Preparation for lectures/classes/.... , Preparation for ... credit / exam	X	5 [h] / 10 [h] 3 [h]	X
Total student workload	2 [h]/ 0,1 ECTS	18[h]/0,7 ECTS	30[h]/ 1.2 ECTS
ECTS credits for the course	50 h / 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>

