SYLLABUS

Course description

Course code	Course	**MATEMATYKA**
ME/O/I/NST/A2		**MATHEMATICS**
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		part-time studies
Semester(s)		1,2
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	30[h]/15[h]	12 ECTS
	Classes	60[h]/30[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	0 ECTS
	with qualifications	It is used to acquire engineering competences by the student	12 ECTS
	with science discipline	Mechanical engineering	0 ECTS

Form of teaching	Traditional – classes organized at the University /classes conducted using distance learning methods and techniques
Prerequisites	Knowledge of basic issues and methods in the field of algebra and maths analysis at secondary school level
Department	Department of Mathematics
Coordinator	Dr inż. Monika Maj
The website of the basic organizational unit	http://wm.uniwersytetradom.pl
E-mail address, phone number of the coordinator	m.maj@uthrad.pl, tel. 48 3617817

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

Learning Objective:	Lecture: gaining knowledge and skills in the field of differential calculus and total function of one variable, linear algebra, analytic geometry, differential calculus functions of two variables, solving

	basic types of differential equations Exercises: using the learned mathematical apparatus to solve problems occurring in directional issues, use of Matlab to present the content of lectures.
Curriculum Content:	Lectures: Mathematical Logic. Elements of set algebra and arithmetic Functions and their properties Strings and numerical series Function limit and continuity Differential calculus of a function of one variable: derivative and its geometric interpretation, derivative and differences of higher orders, formulaLeibniz, Rolle and Lagrange theorems, conclusions from the Lagrange theorem, Taylor and Maclaurin patterns, extreme function, conciseness and convexity of the graph of functions, inflection points, del'Hospital theorem, asymptotes of the graph of functions, and the study of the course of variability Function Integral calculus of a function of one variable: the primary function, basic integration methods, integration of measurable functions, non-measurable, trigonometric and cyclometric, integer Riemann, its geometric interpretation, properties and applications, integers incorrect and their convergence criteria Complex numbers Matrices and determinants Systems of linear equations Differential calculus of functions of many variables: boundary and continuity, partial derivatives, total difference, extreme of many functions variables, extremes conditional Ordinary differential equations Completion of the lecture Exercises: Elements of logic and algebra of sets Function Property Examination, Function Submitting, Function Assignment inverse, drawing and transforming graphs functions Determining the boundaries of the numerical strings Boundary determination and function continuity test Calculation of derivatives. Determination of extremes and ranges monotony of functions. Determination of bending points and intervals the convexity and concavity of the graph of functions. Using de l'Hospital's theorem to define boundaries. Calculation of asymptotes. Use of derivatives to test functions, study of the course of the variability of functions. Application of derivatives to solving text problems with geometric and physical content. Optimization Basic rules and methods of integration. Basic methods integration for an unspecified integer, integration of selected function classes. Calculation of marked integers. Application of geometric integers marked. Calculation of wrong integers. Performing actions on complex numbers, drawing sets on Gaussian planes, solving equations Actions on matrices, determination of inverse matrix, calculation matrix determinant, determination of matrix order Solving systems of linear equations (tw. Cramera, tw. Kronecker Capelli, Gaussian elimination method) Calculation of scalar, vector and mixed product of vectors, determination of the plane and straight in space. Limit and Continuity of Functions of Multiple Variables, Determination of Derivatives partial and directional functions of many variables, local extremes. Solving ordinary differential equations Colloquium

Didactic (educational) methods:	Lecture: - traditional method supported by multimedia techniques; - elements of a conversational lecture Exercises: - accounting exercises; - discussion; - group work.
Course assessment type, the criteria for assessing the achieved learning outcomes, and the method of calculating the final grade:	The condition for passing the exercises is attendance at the classes (allowed missing two classes per semester) and achieving the required results education specified for the subject. The final grade of the exercises is the sum of assessments (points) from two colloquiums in the semester. In addition, students can earn extra points for activity in classes (relation 1plus=0. 5 points) possibly points for engagement for promotional and teaching activities Faculty (related to course content) . Assessment of the lecture on the basis of written credit in the first semester and written exam in the second semester. Obtaining positive grades from all forms of classes included a given subject is equivalent to its completion and achievement by the number of ECTS credits allocated to the subject.

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
P6S_WG	has knowledge in mathematics concerning: algebra, mathematical analysis, probability theory and selected numerical methods, including the knowledge necessary for: – modeling and analysis of mechanical systems; – performing calculations in the design of technological processes; description and prediction of operating characteristics of technical equipment, technical facilities and systems;	K_WG01	Lecture, exercises	Exam Colloquium Activity at classes	Written exam Credit with assessment
P6S_UW	can use analytical, simulation and experimental methods to formulate and solve engineering tasks.	K_UW02	Lecture, exercises	Exam Colloquium Activity at classes	Written exam Credit with assessment
P6S_KK	is ready to complete and critically evaluate specialized knowledge and is able to select sources of knowledge and methods of learning appropriate for himself/herself and others;	K_KK01	Lecture, exercises	Activity at classes	observation
P6S_KK	is willing to comprehensively analyze and effectively carry out assigned tasks, and in the event of difficulties in solving them, use expert opinion;	K_KK02	Lecture, exercises	Activity at classes	observation

Literature and teaching aids
Primary literature: 1. Edwards C.H., Jr. David E. Penney “Calculus and analytic geometry”, Prentice-Hall, Inc., 1986; 2. Lial M., Miller C. Finite Mathematics and Calculus with application.- Scott, Foresman and Company. 1989;

3. John E. Hutchinson ”Introduction To Mathematical Analysis”, Department of Mathematics School of Mathematical Sciences ANU, 1994;
4. Walter Rudin, “Principles of Mathematical Analysis”, McGraw-Hill, 1976;
Additional literature:
1. James Stewart, Calculus: Early Transcendentals (6th international metric edition), Brooks/Cole 2008, (selected sections);

Study aids: board

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	135 [h]
Preparation for lectures/classes/lab , Preparation for ... credit / exam	210 [h]	X
Total student workload	210 [h]/ 7,3ECTS	135[h]/ 4,7 ECTS
ECTS points per subject	12 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).