

SYLLABUS

Course description

| Course description | | | | |
|---|----------------------------|---|-----------------------------------|------------------------|
| Course code | | Course | Programowanie i metody numeryczne | |
| ME/O/I/ST/ A8 | | | Programming and Numerical Methods | |
| 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) | | 2,3 | | |
| Affiliation with a group of classes | | B . Group of obligatory course core subject | | |
| Course status | | Obligatory | | |
| Types of classes, instruction hours, ECTS credits | | Types of classes | Number of instruction hours | Number of ECTS credits |
| | | Lecture | 0 [h] | 4 ECTS |
| | | Classes | 30 [h] | |
| | | Project | 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 | | 4 ECTS |
| | with qualifications | It is used to acquire engineering competences by the student | | 4 ECTS |
| | with science discipline | Mechanical engineering | | 4 ECTS |
| Form of teaching | | Traditional – classes organized at the University /classes conducted using distance learning methods and techniques | | |
| Prerequisites | | knowledge of mathematics, Fundamentals of engineering | | |
| Department | | Faculty of Mechanical Engineering | | |
| Coordinator | | DSc, PhD, Eng. Michał Pająk, prof. URad | | |
| The website of the basic organizational unit | | http://wm.uniwersytetradom.pl | | |
| E-mail address, phone number of the coordinator | | m.pajak@urad.edu.pl | | |

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

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|---------------------|---|
| Learning Objective: | C1. The aim of the course is to provide basic information on numerical methods in engineering calculations. |
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| | C2. The aim of the course is to provide basic information on the use of programming techniques to implement selected numerical methods. |
| Curriculum Content: | Classes: Concepts and programming techniques. Programming paradigms. Object-oriented, functional, logic and concurrent programming. The basic elements of the programming language. 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. Project: Development of simple programs in accordance with the concept of imperative programming for engineering calculations as part of individual projects |
| Didactic (educational) methods: | Conventional lecture with the use of audiovisual means, verbal problem method. Conventional classes, verbal problem method. Projects. |
| Course assessment type, the criteria for assessing the achieved learning outcomes, and the method of calculating the final grade: | 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 |

| 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 | has knowledge of numerical methods used in simulation and analysis of mechanical systems, as well as in the process of their design, manufacturing and operation; | K_WG17 | Classes | Final grade | Exam |
| W2 | has knowledge of industrial sensors, robotics and the construction, programming and control of robots and manipulators; | K_WG19 | Classes | Final grade | Exam |
| U1 | is able to use computer methods in solving engineering tasks in the field of design, manufacturing and operation of machinery and equipment; | K_UW05 | Project | Evaluation of project | Grade based on points |
| K1 | 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 | Project | Evaluation of project | Grade based on points |
| K2 | 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 | Project | Verbal evaluation | Verbal evaluation |

| Literature and teaching aids |
|---|
| <ol style="list-style-type: none"> 1. Nuruzzaman Mohammad, Digital Image Fundamentals in MATLAB, AuthorHouse, 2023 2. Bjarne Stroustrup, The C++ Programming Language, 4th Edition 4th Edition, Addison-Wesley Professional, 2014 3. Marc Gregoire, Tech Today, Professional C++, John Wiley & Sons, 2024 4. Moore Holly, MATLAB for Engineers. Global Edition, Pearson Education, 2021 |

| 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 | 60[h] |
| Preparation for lectures/classes/lab , Preparation for ... credit / exam | 40 [h] | X |
| Total student workload Preparation for ... credit / exam | 40 [h]/ 1,5ECTS | 60 [h]/ 2,5ECTS |
| ECTS points per subject | 4 ECTS | |

| Additional information, comments |
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| <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> |

