Course code	
Type and description	Elective Course
ECTS credit	1
Course name	Numerical methods in engineering
Course name in Polish	Metody numeryczne w inżynierii
Language of instruction	English
Course level	8 PRK
Course coordinator	Piotr Ostrowski
Course instructors	Piotr Ostrowski

Delivery methods and course duration

	Lecture	Tutorials	Laboratory	Project	Seminar	Other	Total of teaching hours during semester
Contact hours	0	0	0	15	0	0	15
E-learning	No	No	No	No	No	No	
Assessment criteria (weightage)				1,00			

Course objective

Aims of the course:
1. to extend knowledge in the field of linear algebra and discrete mathematics,
2. to know how to solve numerically equation,
3. to know how to solve system of algebraic equations,
4. to know how to calculate integral numerically,
5. to know how to solve differential equations numerically.

Learning outcomes

After the course student:
1. knows how to calculate integral numerically (U4, W4),
2. knows and understands basic grounds of methods related to solver algorithms: system of linear algebraic equations, differential equations (U4),
3. knows and understands iterative methods in root finding (W4),
4. can solve numerically any linear problem and interpret results (K1, U4),
5. can present obtained results (K1, U4).

Assessment methods

Verification methods of learning outcomes:
effects no. 1-5: by worksheet project.

W4, U4 – written project
U4, K1 – project seminar presentation

The final grade is composed of:
75% - project
25% - oral presentation of achieved solutions in project.

Prerequisites

Course content with delivery methods

Significant figures, accuracy, precision.
Round-off and truncation errors.
Methods of root finding: bisection, Newton-Raphson method and secant method.
Linear algebraic equations: Gauss elimination, LU decomposition.
Numeric integration and differentiation.
Optimization: direct method, gradient method.
Curve fitting, least squares method.
Solvability of differential equations.

	Finite Element Method, Finite Difference Method
Basic reference materials	S.C. Chapra, R.P. Canale, *Numerical Methods for Engineers*, McGraw-Hill 2015
Other reference materials	
Average student workload outside classroom	10h
Comments	
Last update	25.04.2023