Tadeusz Kosciuszko Cracow University of Technology

Course Card

Faculty of Civil Engineering

Field of study: Civil Engineering — Study profile: general academic

Study form: full-time — Field of study code: BUD

Study cycle: 1st

Specialty: no specialty

1 COURSE INFORMATION

Course name	Matematyka stosowana i metody numeryczne
Course name in English	Applied Mathematics and Numerical Methods
Course code	WIL BUD oIS B13 24/25
Course category	Przedmioty podstawowe
No. of ECTS points	4.00
Semester	3

2 CLASS TYPE, NUMBER OF HOURS ACCORDING TO THE STUDY PLAN

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
3	30	0	0	30	0	0

3 COURSE OBJECTIVES

Objective 1 To teach students some mathematical theorems that are a background of good understanding of the numerical methods and conduction of scientific research

Objective 2 To teach students how to apply computational methodologies to solve selected engineering problems

Objective 3 To teach students how to assess the error of computer modeling

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Basis of algebra and programming in Matlab

5 LEARNING OUTCOMES

LO1 Knowledge Understanding the basic mathematical notions and theorems that are necessary to proper use of selected numerical methods

LO2 Skills Knowing sources of errors of numerical methods

LO3 Knowledge Knowing which numerical methods should be applied to the solution of selected problems

LO4 Skills Knowing how to apply the basic numerical methods to the solution of selected problems

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Vectors, tensors and matrices	2
L2	Systems of linear and nonlinear equations	5
L3	Algebraic eigenproblem	4
L4	Approximation of functions and solutions of IVP, error estimation	6
L5	Numerical integration and differentiation	4
L6	Finite difference and Galerkin's methods for BVP	5
L8	Basis of optimization and statistics	4

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Recapitulation of programming in Matlab	2
K2	Vectors, tensors and matrices	2
K3	Systems of linear and nonlinear equations	4
K4	Algebraic eigenproblem	4
K5	Approximation of functions and solutions of IVP	4
K6	Numerical integration and differention	4

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K7	Finite difference and Galerkin's methods for BVP	6
K9	Basis of optimization and statistics	4

7 TEACHING TOOLS

N1 Laboratory sessions

N2 Lectures

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	60
Consultation hours	10
Exams and tests during session	20
Hours of autonomous student work	
Preparing for classes, studying literature	20
Developing results	0
Preparing of reports, projects presentations, discussion	10
Total number of hours devoted to the subject	**120**
Total number of ECTS points	4.00

9 Methods of grading

Partial grades

F1 Passing grade earned in Laboratory Sessions

Summary grade

P1 Final exam

Conditions for passing the course

L1 Passing grades earned in Laboratory Sessions and the Final Exam