# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Numerical methods [N1Bud1>MO]

## Course

Field of study
Civil Engineering

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
part-time

Requirements
compulsory

## Number of hours

Lecture
10

Laboratory classes
20

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

## Number of credit points

3,00

## Coordinators

dr hab. Albert Kubzdela
albert.kubzdela@put.poznan.pl

## Lecturers

## Prerequisites

Basic knowledge on linear algebra, mathematical analysis and probability theory.

## Course objective

Theoretical background and knowledge of numerical methods used in engineering practice. Develop programming skills, get basic experience in creating computing applications.

## Course-related learning outcomes

Knowledge:
1. The student knows basic numerical methods, used in engineering practice - [KB_W01, KB_W11]
2. The student knows the possible use of selected computer programs to realize specific numerical algorithms - [KB_W01, KB_W11]
3. The student knows the basic ways to design numerical algorithms - [KB_W11]

Skills:
.1. Student is able to choose proper computational model to solve specific engineering tasks - [KB_U03, KB_U05]

2. Students can select the right algorithm needed to solve the numerical tasks - [KB_U03, KB_U05, KB_U06]
3. Students can make a critical evaluation of the results of numerical analysis - [KB_U06]

Social competences:
. The student can work independently and in the team on the specific task - [KB_K01]
2. Students can formulate conclusions - [KB_K02, KB_K09]

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lecture: check test knowledge through a written test,
Laboratory: test the knowledge and skills by:
a) assessment of student activity in the classroom,
b) an assessment of the project tasks performed during the course during the semester (standalone, or in small teams) involving the preparation of a brief application executing indicated numerical algorithm,
c) ending course test - working alone at the computer.

## Programme content

Numerical methods of basic numerical tasks, in particular
- Solving systems of linear and nonlinear equations,
- Interpolation and approximation, determine the regression model
- Optimization tasks,
- Numerical differentiation and integration,
- Using of Monte Carlo methods.

## Teaching methods

Informative lecture, Programmed text, Classical problem method

## Bibliography

Basic
1. D. Kincaid, W. Cheney, Analiza Numeryczna, PWN, Warszawa 2006.
2. Z. Fortuna, B. Macukow, J. Wąsowski, Metody numeryczne, WNT, Warszawa 2005.
Additional
1. S. Rosłaniec, Wybrane metody numeryczne z przykładami zastosowań w zadaniach inżynierskich, Oficyna Wydawnicza Politechniki Warszawskiej, 2002.
2. A. Bjorck, G. Dahlquist, Metody numeryczne, PWN, Warszawa 1983.
3. A. Brozi, Scilab w przykładach, Nakom, Poznań 2007.

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 100 | 4,00 |
| Classes requiring direct contact with the teacher | 28 | 1,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 72 | 3,00 |