



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Numerical methods

### Course

Field of study

Power Engineering

Area of study (specialization)

Level of study

Second-cycle studies

Form of study

part-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

10

Laboratory classes

10

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

dr inż. Barbara Szyszka

Responsible for the course/lecturer:

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Faculty of Control, Robotics and Electrical  
Engineering

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### Prerequisites

The student has a knowledge of mathematics at the first-cycle engineering studies, and computer science (in high-level language programming).

The student is able to solve math tasks in the field of studies of the first-cycle studies.

The student is able to implement a computer program.

The student is aware of the need to expand their competences.

He understands the need for learning.

### Course objective

Learning of basic numerical methods and apply them to solve simple engineering problems in



mathematics and the field of electrical engineering.

The support of engineering calculations by relevant IT tools.

### Course-related learning outcomes

#### Knowledge

1. The student has basic knowledge of numerical methods for solving simple engineering tasks.
2. The student knows at least one computer package supporting numerical calculations.

#### Skills

1. The student is able to choose and apply appropriate numerical methods to solve simple engineering tasks.
2. The student is able to use at least one computer package supporting calculations.
3. The student is able to carry out computer measurements and tests, interpret obtained results and draw conclusions.
4. The student is able to work individually and in a team.
5. The student is able to develop detailed documentation of the results of the project task.

#### Social competences

1. The student knows the limitations of their knowledge and understands the need for further education.
2. The student is aware of the validity of the effects of engineering calculations.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

#### Lecture:

- \* assessment of knowledge and skills during the written exam,
- \* control of perception during lectures.

#### Laboratory:

- \* carrying out design tasks with documentation of results,
- \* continuous assessment, during each class - rewarding the increase in the ability to use known principles and methods,

Obtaining additional points for activity in the classroom, and in particular for:

- \* proposal to discuss additional aspects of the task;
- \* the effectiveness of applying knowledge when solving a given problem;
- \* comments relating to the improvement of teaching materials;

### Programme content

Update 31.01.2020.

1. Floating point arithmetic, numerical errors.
2. Stability and accuracy of algorithms.
3. The approximation of functions (Interpolation, Taylor series).
4. Numerical integration.



5. Numerical differentiation.
6. Initial value problem for ordinary differential equations.

### Teaching methods

Lectures:

1. Lecture with multimedia presentation (including: drawings, photos) supplemented by examples given on the blackboard.
2. Lecture conducted in an interactive way of formulating questions to a group of students or indicated specific students.
3. Student activity is taken into account during the course of the assessment.
4. Theory presented in connection with practice.
5. Theory presented in connection with the current knowledge of students,
6. Taking into consideration various aspects of the presented issues,

Laboratories:

1. Laboratories supplemented with multimedia presentations (including drawings, photos).
2. Demonstrations.
3. Computational experiments.

### Bibliography

Basic

1. Kincaid, Cheney, Analiza numeryczna, WNT 2005,
2. Fortuna, Macukow, Wąsowski, Metody numeryczne, WNT,
3. Magnucka-Blandzi, Dondajewski, Gleska, Szyszka, Metody numeryczne w MatLabie. Wybrane zagadnienia, Wyd. Politechniki Poznańskiej 2013,

Additional

1. Burden, Faires, Numerical analysis, Prindle, Weber&Schmidt, Boston,
2. Rośloniec, Wybrane metody numeryczne z przykładami zastosowań w zadaniach inżynierskich, Oficyna Wydawnicza politechniki Warszawskiej 2008

### Breakdown of average student's workload

	Hours	ECTS
Total workload	68	3,0
Classes requiring direct contact with the teacher	24	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation for exam, the execution of the project) <sup>1</sup>	44	2,0

<sup>1</sup> delete or add other activities as appropriate