COURSE DESCRIPTION CARD - SYLLABUS

Course name

Numerical methods in techniques

Course

Field of study

Electrical Engineering

Year/Semester

1/2

Area of study (specialization)

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

10

Laboratory classes

10

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Faculty of Control, Robotics and Electrical Engineering

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Responsible for the course/lecturer:

Prerequisites

The student has an expanded and in-depth knowledge of:
* mathematics (range: linear algebra, matrix functions, differential calculus of several variables, solving ordinary differential equations of the first and higher orders, solving partial differential equations of the first order and second order, initial and boundary value problems),
* computer science (for programming in high level language),
* numerical methods (for studies of the first-cycle studies).
The student is able to solve math problems analytically within the range specified above.
The student is able to implement a computer program.
Can solve simple tasks in the area of electrical engineering using numerical methods for studies of the

first degree.
The student is aware of the need to expand their competences.
He understands the need for learning.

Course objective

Learning advanced numerical methods and apply them to solve complex engineering problems in the field of electrical engineering.
The support of engineering calculations by relevant IT tools.

Course-related learning outcomes

Knowledge

1. The student knows the theoretical basis of approximate methods of calculation and computer techniques used to solve complex technical issues.
2. The student knows the advanced numerical methods used to solve engineering tasks.

Skills

1. The student can get specialized information from literature and the Internet, work individually and as a team.
2. Can apply their knowledge in mathematics, computing and advanced numerical methods to technical issues.

Social competences

1. The student understands the need to learn and become familiar with scientific journals .
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:
* assess the knowledge and skills in the written form,
* control of perception during lectures.
Laboratory:
* during the last laboratory the verifying of the ability to solve complex engineering problems in the area of electrical engineering using the computer program,
* Rewarding knowledge necessary to carry out laboratory tasks.
* continuous assessment, during each lesson - rewarding the increase of the ability to use the new methods,
* assess the knowledge and skills related to the implementation of the tasks.
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 30.01.2020.
Initial-value problems for ordinary differential equations:(Higher-order equations and systems of differential equations).
Numerical differentiation.
Boundary and initial-boundary value problems for partial differential equations – finite difference methods.

Teaching methods

Lectures:
1.Lecture with multimedia presentation (including: drawings, photos) supplemented by examples given on the board.
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,
7.Presenting a new topic preceded by a reminder of related content known to students from other subjects.
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. Kącki, Równania różniczkowe cząstkowe w elektrotechnice, WNT, Warszawa,
3. Burden, Faires, Numerical analysis, Prindle, Weber&Schmidt, Boston,

Additional
1. Magnucka-Blandzi, Dondajewski, Gleska, Szyszka, Metody numeryczne w MatLabie. Wybrane zagadnienia, Wyd. Politechniki Poznańskiej 2013,
2. Zarowski, An introduction to numerical analysis for electrical and computer engineers, Wiley

Breakdown of average student's workload

	Hours	ECTS
Total workload	47	2,0
Classes requiring direct contact with the teacher	24	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation for final test/project) [1]	23	1,0

[1] delete or add other activities as appropriate