COURSE DESCRIPTION CARD - SYLLABUS

Course name
Numerical methods in technique

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
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15	15	
Tutorials	Projects/seminars	

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:

Prerequisites

The student starting this subject should have knowledge and skills of a numerical methods course from first-cycle studies. Should know the limits of their own knowledge and understand the need for further education.

Course objective

Presentation of advanced numerical methods useful in solving complex engineering problems, including in the field of electrical engineering. Support of engineering calculations with appropriate IT tools.

Course-related learning outcomes

Knowledge

1. has extended and in-depth general knowledge of various branches of mathematics, including elements of discrete and applied mathematics, necessary for modeling and analysis of advanced

electrical devices and systems as well as description and analysis of the operation and synthesis of complex electrical systems

2. has expanded knowledge of advanced numerical methods used to solve complex technical problems in electrical engineering

3. has extended knowledge in the field of computer-aided design in electrical engineering

Skills

1. is able to obtain information from literature, databases and other sources, make their interpretation, evaluation, critical analysis and synthesis, as well as draw conclusions and formulate and comprehensively justify opinions;

2. is able to work individually and in a team, is able to manage the team in a way that ensures the implementation of the task within the set deadline; can determine the directions of further learning and organize the process of self-education and other people;

3. is able to - when formulating and solving engineering tasks - integrate knowledge from various sources and related disciplines and apply analytical, simulation and experimental methods.

Social competences

1. recognizes the importance of knowledge in solving cognitive and practical problems and understands that in technology knowledge and skills are quickly becoming obsolete and therefore require continuous replenishment;

2. is aware of the need to develop professional achievements and compliance with the principles of professional ethics, fulfill social obligations, inspire and organize activities for the benefit of the social environment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lecture is verified by a 45-minute colloquium consisting of variously scored questions (test and open). Passing threshold: 50% of points. Final issues on the basis of which questions are prepared will be forwarded to students during the lecture preceding the colloquium, or sent by e-mail using the university's e-mail system.

Skills acquired as part of the laboratory are verified on the basis of developed projects and final test. Passing threshold: 50% of points.

Programme content

Iterative algorithms for solving systems of linear equations.

Numerical determination of solutions of equations and systems of nonlinear equations.

Ordinary differential equations - initial problem.

Partial differential equations - boundary problems.

Teaching methods

1) lectures:

- lecture with presentation supplemented with examples given on the board,

- a lecture conducted in an interactive manner with formulating questions to a group of students or to specific students indicated,

- students' activity during classes is taken into account when issuing the final mark,

- during the lecture initiating the discussion,

- theory presented in close connection with practice,

- theory presented in connection with the current knowledge of students,

- presenting a new topic preceded by a reminder of related content known to students in other subjects.

2) laboratory:

- laboratories supplemented with multimedia presentations (including: drawings, photos, animations, sound, films),

- detailed reviewing of reports by the laboratory chair and discussions on comments,

- using tools that enable students to perform tasks at home (eg open source software),

- demonstrations,

- work in teams,

- computational experiments.

Bibliography

Basic

1. Kincaid D., Cheney W., Analiza numeryczna [Numerical Analysis: Mathematics of Scientific Computing (The Sally Series; Pure and Applied Undergraduate Texts, Vol. 2)], WNT, Warszawa 2006.

2. Fortuna Z., Macukow B., Wąsowski J., Metody numeryczne, WNT, Warszawa, 2017.

Additional

1. Markiewicz T., Szmurło R., Wincenciak S., Metody numeryczne. Wykłady na Wydziale Elektrycznym Politechniki Warszawskiej, OWPW, Warszawa, 2015.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	40	2,0
Student's own work (literature studies, preparation for laboratory, preparation for tests) [1]	10	0,0

[1] delete or add other activities as appropriate