COURSE DESCRIPTION CARD - SYLLABUS

Course name
Numerical methods [S1Eltech1>MN]

Course

Field of study
Electrical Engineering

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

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Prerequisites

The student should have knowledge of mathematics (linear algebra, differential and integral calculus) and computer science (basic data structures and programming). The student should be aware of the need to expand their competences, understand the need for further education, and be ready to cooperate within the team.

Course objective

1. Familiarizing students with topics related to numerical methods, e.g. with the differences between real and computer arithmetic, numerical errors, discretization, and basic numerical algorithms. 2. Application of learned algorithms to solve selected mathematical problems and simple engineering tasks in the field of electrical engineering. 3. Supporting calculations with appropriate IT tools. 4. Verification of the obtained solutions.

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 formulate correct algorithm and describe its implementation; He knows at least one programming language.
2. The student is able to choose and apply the correct numerical method to solve simple engineering tasks of a practical nature.
3. The student has the skills of self-education; can perform measurements and computer tests, interpret the results and draw conclusions

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:

The knowledge acquired during the lectures is verified by a colloquium consisting of differently scored questions. Passing threshold: 50% of points. Assessment issues on the basis of which the questions are developed will be provided to students during the lecture preceding the colloquium and/or posted via e-courses.

The skills acquired during laboratory classes are verified by obtaining a Matlab certificate and completing two projects. Additionally, points are scored: student's preparation for laboratory classes, implementation of laboratory exercises, and assessment of teamwork skills. Passing threshold: 50% of points.

Programme content

1. Floating point arithmetic, round-off errors.
2. Numerically stable and unstable algorithms, 'well-conditioned' and 'ill-conditioned' problems.
3. Polynomial approximation (Interpolation, Taylor polynomials).
4. Numerical integration.
5. Numerical solutions of nonlinear equations.

Teaching methods

Lectures:
1.Lecture with multimedia presentation supplemented by examples given
on the blackboard.
2.Lecture conducted in an interactive way of formulating questions to 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. introducing a new topic, preceded by a reminder of related content, known to students from other subjects.

Laboratories:
1. computational experiments,
2. reviewing reports by the laboratory"s leader,
3. work in teams,

Bibliography

Basic
1. Fortuna, Macukow, Wąsowski, Metody numeryczne, WNT: PWN, 2017
2. Kincaid, Cheney, Analiza numeryczna, WNT 2006,

Additional
1. Burden, Faires, Numerical analysis, Prindle, Weber&Schmidt, Boston,
2. D.Spałek, Metody numeryczne w elektrotechnice, Wyd.Politechniki Śląskiej2020.
3. E. Kącki, A. Małolepszy, A. Romanowicz, Metody numeryczne dla inżynierów, Wyd. Politechniki Łódzkiej 2000
4. Magnucka-Blandzi, Dondajewski, Gleska, Szyszka, Metody numeryczne w MatLabie. Wybrane zagadnienia, Wyd. Politechniki Poznańskiej 2013,

Breakdown of average student's workload

	Hours	ECTS
Total workload	68	3,00
Classes requiring direct contact with the teacher	34	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	34	1,50