COURSE DESCRIPTION CARD - SYLLABUS

Course name
Numerical methods and statistics

Course

Field of study
ENVIRONMENTAL ENGINEERING
Year/Semester
1/1
Area of study (specialization)
Water supply, water and soil protection
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	Laboratory classes	Other (e.g. online)
18	10	
Tutorials	Projects/seminars	

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
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ul. Piotrowo 3A 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

The student has a knowledge of mathematics (range: linear algebra, differential and integral calculus, initial value problems for ordinary differential equations).
The student is able to solve math problems analytically within the range specified above.
The student is aware of the level of his knowledge.
The student is aware of deepening and expanding knowledge.

Course objective

To get to know of the basic numerical methods and basics of statistical calculations. Applying them to solve some engineering problems. Supporting mathematical and engineering calculations with appropriate IT tools. Verification of obtained solutions.

Course-related learning outcomes

Knowledge

1. Getting to know the basic concepts of numerical analysis and selected numerical methods.

2. Getting to know the basic concepts of probability theory and statistics.

Skills

1. The student is able to obtain information from literature, databases and other information sources (also in English) in environmental engineering; can integrate and interpret obtained information as well as draw conclusions.
2. The student knows how to use a foreign language to the extent that it is possible to use English-language software.
3. The student is able to solve selected engineering problems using numerical methods.

Social competences

1. The student is aware of deepening and expanding knowledge.
2. The student is aware of the role of mathematical modeling of natural and technical phenomena occurring in issues typical for environmental engineering.
3. The student is able to think and act in a creative way, is aware of the responsibility for the effects of the work of the team, as well as its individual participants.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures:

The knowledge acquired during the course is verified on the basis of the presented report on the application of numerical methods and / or statistics in environmental engineering. The assessment takes into account: the subject, presentation of the issue, sources: literature (Polish and English), Internet links, etc., the form and quality of the presentation. The report should be submitted by eCourses by the end of the semester.

Laboratory exercises:

The skills related to the implementation of four laboratory exercises (Octave or Matlab with reports) are assessed. Tasks are posted on through eCourses. Each task is scored at 10 points. There are 40 points to score in total. Passing threshold = 50% (20 points)

Programme content

Update: 30.09.2020.

1. Floating point arithmetic, numerical errors.
2. Stability and accuracy of algorithms.
3. Polynomial interpolation.
4. Numerical solutions of nonlinear equations.
5. Initial-value problems for first-order ordinary differential equations.
6. Introduction to difference methods for the initial-boundary problems of partial differential equations.

7. Random sample and its statistical description.
8. Correlation coefficient.
9. Probabilistic methods. Classic and geometric probability.

Teaching methods

Lectures with multimedia presentations supplemented with examples given on the blackboard,
lectures conducted in an interactive manner with formulating questions for students,
theory presented in connection with practice and the current knowledge of students,
taking into account different aspects of the issues presented,
presentation of a new topic preceded by a reminder of related content known to students in other subjects;

Laboratory classes are supplemented with presentations of selected computational algorithms,
work in teams,
computational experiments.

Bibliography

Basic

1. Fortuna, Macukow, Wąsowski, Metody numeryczne, WNT: PWN, 2017
2. Liskowski, Tauber, Podstawy statystyki praktycznej, WSHiG Poznań 2003
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. Marczuk, Modelowanie matematyczne problemów środowiska naturalnego, PWN 1985,

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation of a final project of lectures, preparation for laboratory classes, preparation of laboratory tasks with reports) [1]	45	2,0

[1] delete or add other activities as appropriate