COURSE DESCRIPTION CARD - SYLLABUS

Course name
Numerical Analysis and Statistics [N2IŚrod2>MNiS]

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

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
8

Laboratory classes
18

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Student knows - within the scope embraced by the mathematical training at the undergraduate level - the concepts in matrix algebra, in differential and integral calculus, and in differential equations Student is aware of the importance of mathematics in the description of scientific and engineering problems and understands the need for learning and improving mathematical skills by themself

Course objective

1) to familiarize students with the terminology and methods for the numerical solution of mathematical problems and statistical description of phenomena, 2) to show the specificity of numerical calculations and that of statistical elaborations, 3) show the area where the above applies.

Course-related learning outcomes

Knowledge:
1. student knows basic concepts in numerical analysis and basic numerical methods
2. student knows basic concepts in descriptive and mathematical statistics
3. student has a broader and deeper mathematical knowledge which is appropriate for issues found in environmental engineering

4. student knows basic methods, techniques, tools and materials which are necessary to treat complex engineering tasks.

Skills:
1. a critical evaluation of the results obtained in theoretical considerations and in calculations, including these produced by computers
2. the ability to find information in the literature and in the Internet

Social competences:
1. student is aware of the importance of mathematics in the description of scientific and engineering problems
2. student understands the need in continuous education
3. student understands the importance of precision, especially when (s)he is involved in any co-operation

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Grade from lecture is issued with written exam. Grades from laboratory classes are measured by short tests written at the beginning of classes and one final test involving content acomplished in class.

Programme content

Lecture and laboratory classes : floating-point arithmetics, stability, conditioning, correctness, efectivity result, polynomial collocation and least-square approximation, methods to numerical find zeros of nonlinear algebraic equations, numerical differentation and quadratures, numerical treatment of ordinary differential equations, statistical description of random samples, incl. linear correlation and Pearson coeffcient, theoretical discrete distributions (Binomial, Geometrical, Poisson), theoretical continuous distributions.

Course topics

none

Teaching methods

Lecture with multimedia presentation, supplemented by examples given on the board, taking into consideration students' current knowledge.
Laboratory classes with usage of computers with appropriate software and multimedia presentation.

Bibliography

Basic:
1. Z.Fortuna, B.Macukow, J.Wąsowski, Metody numeryczne, WNT
2. M.Liskowski, Podstawy statystyki praktycznej, WSHiG Poznań 2003

Additional:
1. A.Bjorck, G.Dahlquist, Metody numeryczne, PWN 1987
2. G.I.Marczuk, Modelowanie matematyczne problemów środowiska naturalnego, PWN 1985

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	26	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	49	2,00