COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematical fundamentals of process engineering [S1IChiP1>MPIP]

Course

Field of study
Chemical and Process Engineering

Year/Semester
2/3

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
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
30

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of mathematics and physics in high school. Knowledge of the basics of calculus for a function of one variable. Fundamentals of linear algebra and matrix calculus. Basic news on ordinary differential equations.

Course objective

1. Obtaining knowledge of the basic mathematical analysis of the function of many variables. Improving skills in solving ordinary and partial differential equations. 2. Formulating problems in chemical and process engineering in mathematics language and solving them.

Course-related learning outcomes

Knowledge:
1. has knowledge of mathematics to the extent that allows the use of mathematical methods to describe chemical processes and perform calculations needed in engineering practice- k_w01

Skills:
1. is able to obtain information from literature, databases and other sources related to chemical and

process engineering, also in a foreign language, integrate it, interpret it and draw conclusions and form opinions - k_u01
2. can formulate and solve engineering issues typical of chemical and process engineering using both analytical, simulation and experimental methods - k_u07
3. is able to choose the right way to solve simple engineering tasks related to chemical and process engineering - k_u18

Social competences:
1. understands the need for further training and raising their professional and personal competences- k_k01

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
1. Assessment of activity during classes.
2. Colloquium at the end of the class.
3. Short tests.

Programme content

1 Metric spaces and the concept of function continuity,
2. Vector spaces, the concept of scalar product and vector product.
3. Derivatives of functions of many variables, complete differential.
4. Elements of field theory: partial derivative, gradient, divergence.
5. Iterated integrals, volume, surface and curvilinear integrals.
6. Divergence theorem. Integral and local balance equations.
7. Ordinary differential equations. Solving linear differential equations.
8. Partial differential equations: basic knowledge, formulation of boundary conditions, interpretation of equation terms.
9 Analytical solution of one-dimensional heat conduction equation.

Teaching methods

Lecture based on shared presentations, solving tasks from shared lists, discussion.

Bibliography

Basic
1. I. Foltyńska, Zb. Ratajczak, Z. Szafrański: Matematyka dla studentów uczelni technicznych Wydawnictwo Politechniki Poznańskiej 2000 (Część II i III).
2. W.Krasicki, L.Włodarski Analiza matematyczna w zadaniach, t1 i t2. PWN, Warszawa 2000.
Additional
1. Joel Hass,Maurice D. Weir, George B. Thomas, Jr., University calculus : early transcendentals, Pearson Education, Inc.
2. Stanley J. Farlow, Partial differential equations for scientists and engineers, DOVER Publication INV, New York, 1993.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50