



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Matematyka (Mathematics)

Course

Field of study

Technologia chemiczna (Chemical Technology)

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

I/1

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

Other (e.g. online)

Tutorials

30

Projects/seminars

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

dr Andrzej Drozdowicz

Responsible for the course/lecturer:

Institute of Mathematics

email: andrzej.drozdowicz@put.poznan.pl

Prerequisites

Student has basic knowledge of elementary functions, algebraic operations, analytical geometry, trigonometry and mathematical analysis.

Students should be able to solve simple rational equations and inequalities, to give domains of elementary functions and to know their curves.

Students seriously treat the process of studying.

Course objective

The aim of subject is introduction to complex numbers and their some practical applications. Differential and integral calculus of one variable are presented together with their applications in mathematics and chemistry.



Course-related learning outcomes

Knowledge

After completing the first degree studies, the graduate has expanded and in-depth knowledge of various branches of higher mathematics and detailed knowledge on the application of mathematical methods and tools in engineering and chemical sciences - K_W2

Skills

After completing the first degree studies, the graduate:

- can use knowledge of higher mathematics; can build and analyse simple mathematical models; can use mathematical tools and methods, including numerical ones, to solve engineering problems - K_U13
- self-learning ability - K_U24

Social competences

After completing the first degree studies, the graduate:

- understanding the need for lifelong learning - K_K1
- understanding the need to improve professional and personal competences - K_K1

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture - written exam during session

Tutorials - 2 colloquia + short tests

Programme content

Complex numbers – short history; algebraic form (modulus, conjugate numbers, arithmetics, square roots), trigonometric form (de Moivre's formula, theorem about calculating roots), exponential form. Fundamental algebra theorem.

Definition of sequences. Monotonicity, boundedness and limits of sequences. Theorem about the uniqueness of a limit. Arithmetics of proper and improper limits. The sandwich theorem (about three sequences). Definition of Euler's constant. Many examples.

Definition of a function. Domain and range of functions. Monotonicity of functions. Odd and even functions. Periodicity. Compound functions. Inverse functions.



Review of elementary functions – polynomials, power functions, exponential functions, logarithmic functions, trigonometric ones, the inverse trigonometric functions (arcus) – formulas, graphs, properties.

Limits of the functions at a point. Arithmetics of proper limits. One-handed limits. Improper limits. Asymptotes of the graphs of functions. Continuity of functions.

Definition of the derivative at a point. Geometric interpretation. Equations for a tangent line and a normal line. Rules for differentiation (especially for compound functions).

Mean value theorems and their applications. Extrema of functions - global and local. Criteria for existing such extrema.

Indeterminate forms. De l'Hospital's theorem.

Antiderivative of a function, indefinite integrals. Integrals of elementary functions. Integration by parts and integration by substitution. Integration of rational functions. Integration of trigonometric functions (universal substitution). Integration of some irrational functions (Euler's substitutions and methods of variation of parameters).

Teaching methods

Lecture - multimedial presentation + examples on the blackboard

Tutorials - solving problems; discussion about obtained results

Bibliography

Basic

1. W. Żakowski, Matematyka, T.1 i T.2, WNT, Warszawa 2003.
2. I. Foltyńska, Z. Ratajczak, Z. Szafrąński, Matematyka dla studentów uczelni technicznych, tom 1,2 Wydawnictwo PP, Poznań 2000.



Additional

1. W. Kryszicki, L. Włodarski, Analiza matematyczna w zadaniach, T.1, T.2, PWN, Warszawa 2011.

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	70	3,0
Student's own work (literature studies, preparation for tutorials, preparation for tests and the final exam) ¹	55	2,0

¹ delete or add other activities as appropriate