



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mathematic

Course

Field of study

Aviation

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

30

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

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60-965 Pozna, ul. Piotrowo 3A

Prerequisites

The student should have knowledge of complex numbers, matrix calculus and its application, differential and integral calculus of functions of one variable in terms of the first semester.

Course objective

Acquainting with problems of differential and integral calculus of functions of many variables and ordinary differential equations. Developing students' skills to solve simple mathematical problems by using different types of equations.

Course-related learning outcomes

Knowledge

1. has extended and in-depth knowledge of mathematics including algebra, analysis, theory of



differential equations, probability, analytical geometry as well as physics covering the basics of classical mechanics, optics, electricity and magnetism, solid state physics, thermodynamics, useful for formulating and solving complex technical tasks related to engineering aeronautical and modeling.

Skills

1. can use the mathematics (differential and integral calculus) to describe simple engineering problems.

Social competences

1. is aware of the importance of knowledge in solving engineering problems and knows examples and understands the causes of faulty engineering projects that have led to serious financial and social losses, or to a serious loss of health and even life.

2. is aware of the social role of a technical university graduate, in particular understands the need to formulate and provide the society, in an appropriate form, with information and opinions on engineering activities, technological achievements, as well as the achievements and traditions of the engineer profession.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

1. Lecture: Knowledge acquired as part of the lecture is verified by a 60-minute exam conducted in the exam session. Assessment threshold: 50% of points and student activity in class. Lecture for grades. Exam issues, on the basis of which questions are developed. They will be sent via e-mail using the university e-mail system.

2. Knowledge acquired during the classes is verified by two tests carried out during 7 and 14 classes and activity during classes. Each test consists of the same number of points. Passing threshold: 50% of points obtained from tests.

Programme content

DIFFERENT CALCULUS OF FUNCTIONS OF SEVERAL VARIABLES: definition of the function of two variables, partial derivative, Schwarz theorem, extrema of functions of two variables.

MULTIPLE INTEGRALS: normal area, double integral - evaluating, reversing the order of integration, exchange of variables in the double integral – polar coordinates, the use of a double integral in geometry and mechanics – Cartesian and polar coordinates.

LINE INTEGRALS: not-directed line integral and directed line integrals - applying them, directed line integral independent of the path, directed line integrals along simple closed curve, Green's theorem, the area and work using the line integrals.

ORDINARY DIFFERENTIAL EQUATIONS: definition of ordinary differential equation, general, particular and singular solution, differential equation with separated variables, first order linear differential equation, method of constant change, Bernoulli's differential equation, second order linear differential equation with real constant coefficients, the method of variation of parameters and undetermined coefficients.



PART - 66 (THEORY -33.75 hours)

MODULE 1. MATHEMATICS

1.1. Arithmetic

Arithmetic terms and symbols, multiplication and division methods, fractions and decimals, coefficients and multiples, weights, measures and conversion factors, ratios and proportions, averages and percentages, areas and magnitudes, second powers, third powers, square and cube roots. [2]

1.2. Algebra

a) Calculation of simple algebraic expressions, addition, subtraction, multiplication and division, using parentheses, simple algebraic fractions; [2]

b) Linear equations and their solutions; Exponents and powers, negative and fractional powers; binary and other systems; Equivalent equations and equations of the second degree with one unknown; [1]

Teaching methods

1. Lecture: multimedia presentation, illustrated with examples given on the board. Conducted in an interactive way with the formulation of questions to a group of students. Initiating discussions during the lecture.

2. Exercises: solving tasks given by the teacher on the board along with analyzing the next stages. The method of solving the task by students on the board is reviewed by the tutor. Completed with tasks for independent solution at home.

Bibliography

Basic

1. W. Krywicki, L. Włodarski, *Analiza matematyczna w zadaniach*, T. 1-2, PWN, Warszawa 2011.

2. I. Foltynska, Z. Ratajczak, Z. Szafranski, *Matematyka dla studentów uczelni technicznych*, T. 1-3, Wydawnictwo Politechniki Poznańskiej, Poznań 2004.

M. Gewert, Z. Skoczylas, *Analiza matematyczna 2/Definicje, twierdzenia, wzory/ Oficyna Wydawnicza GiS, Wrocław 2011.*

4. M. Gewert, Z. Skoczylas, *Analiza matematyczna 2/Przykłady i zadania/ Oficyna Wydawnicza GiS, Wrocław 2011.*

5. F. Leja, *Rachunek różniczkowy i całkowy*, PWN, Warszawa 2008.

Additional

1. W. Żakowski, *Matematyka*, T. 1-2, WNT, Warszawa 2003.

2. W. Stankiewicz, J. Wojtowicz, *Zadania z matematyki dla wyższych uczelni technicznych*, T. 1-2, PWN, Warszawa 2003.



3. M. Lassek, Matematyka dla studentów technicznych, T. 1-2, Wydawnictwo Wspierania procesu edukacji, Warszawa 2004.

Breakdown of average student's workload

	Hours	ECTS
Total workload	81	3,0
Classes requiring direct contact with the teacher	46	1,5
Student's own work (literature studies, preparation for exercises and lecture, preparation for passing the exercises and exam the lecture) ¹	38	1,5

¹ delete or add other activities as appropriate