COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics [N1Trans1>MAT]

Course

Field of study
Transport

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
36

Laboratory classes
0

Other
0

Tutorials
18

Projects/seminars
0

Number of credit points

7,00

Coordinators

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Lecturers

Prerequisites

1. The basic mathematics of secondary school. 2. Logical thinking, learning with understanding, the use of textbooks. 3. Awareness of the purpose of learning and acquiring new knowledge.

Course objective

1. Getting to know the issues of differential and integral calculus and the possibility of their application in subjects directional. 2. Getting to know the problems of differential and integral calculus of functions of several variables and ordinary differential equations. Indication of examples of the application of the learned issues in technology.

Course-related learning outcomes

Knowledge:
The student has an extended and deepened knowledge of mathematics useful for formulating and solving complex technical tasks concerning various means of transport

Skills:
The student is able to take into account in the process of formulating and solving tasks in the field of

transport engineering also non-transport aspects, in particular social, legal and economic issues

Social competences:
The student correctly identifies and solves dilemmas related to the profession of a transport engineer

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lecture: Assessment on the basis of a written exam conducted during the exam session at the end of the semester. The assessment also takes into account the student"s activity during classes.
Classes: assessment on the basis of 3 tests and activity in the classroom.

Programme content

Update 2024/2025
Functions of one variable.
Differential calculus of the function of one variable.
Indefinite integral. Definite integral.
DIFFERENT CALCULUS OF FUNCTIONS OF SEVERAL VARIABLES.
MULTIPLE INTEGRALS.
ORDINARY DIFFERENTIAL EQUATIONS.

Course topics

Update 2024/2025
Functions of one variable
(number sequences, monotonicity and limit, Euler number, limit and continuity of functions, indeterminate symbols). Differential calculus of the function of one variable (derivative of a function, determination, interpretation, calculation, differential of function and its application, theorems on average value and their applications - extremes of function, concavity and convexity, inflection points, de LHospital rule, function test). Indefinite integral (original function, integration of sum and product, integration by substitution and parts, integration of rational functions and non-measurable ones). Definite integral (determination, interpretation and relation to the field, properties, improper integrals, applications - calculation of flat area fields, curve arc length, volume and surface area of rotational solids).
DIFFERENT CALCULUS OF FUNCTIONS OF SEVERAL VARIABLES; definition of the function of two variables, limits and continuity of the function of two variables, partial derivative, Schwarza theorem, a total differential, extreme of functions of two variables, derivative of a entangled function.
MULTIPLE INTEGRALS; normal area, double integral; evaluating, a iterated integral, 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.
ORDINARY DIFFERENTIAL EQUATIONS; definition of ordinary differential equation, general, particular and singular solution, initial-value, 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 prediction and variation of constants.

Teaching methods

Lecture:
At the lecture, the theory is supported by examples. The lecture is conducted in an interactive way with formulating questions towards students. Completed with self-solve tasks, which are verified and have an impact on the final grade.
Tutorials:
The exercises include an example of solving tasks on the blackboard (by the teacher and students) along with the analysis of subsequent stages. The way students solve the problem on the blackboard is reviewed by the tutor.

Bibliography

Basic
1. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, t. I. PWN, Warszawa 2006.
2. F. Leja, Rachunek różniczkowy i całkowy. Państwowe Wydawnictwo Naukowe, Warszawa 1978
3. I. Foltyńska, Z. Ratajczak, Z. Szafrański, Matematyka cz. I i II, Wydawnictwo Politechniki Poznańskiej, Poznań 2001
Additional
1. M. Gewert, Z. Skoczylas, Analiza matematyczna 1, Oficyna Wydawnicza GiS, Wrocław 2006.
2. Dennis G. Zill, Calculus with Analytic Geometry, Prindle,Weber & Schmidt, Boston 1985.

Breakdown of average student's workload

	Hours	ECTS
Total workload	154	7,00
Classes requiring direct contact with the teacher	54	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	100	4,00