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 (e.g. online)
0

Tutorials
18

Projects/seminars
0

Number of credit points

7,00

Coordinators

dr inż. Zenon Zbąszyniak
zenon.zbaszyniak@put.poznan.pl

Lecturers

dr inż. Zenon Zbąszyniak
zenon.zbaszyniak@put.poznan.pl

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 algebra and geometry, differential and integral calculus and the possibility of their application in subjects directional.

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 4 tests and activity in the classroom.

Programme content

Update 2020/2021
Lecture:
Functions of one variable; definition, limits, properties, inverse function, graphs of elementary functions. Differential calculus of one variable function; definition of derivative, geometric and physical interpretation, calculation of derivatives, Taylor"s and Maclaurin"s formula, mean value theorems, study of the properties of functions (de L"Hospit"s rule, extremes, monotonicity, inflection points, convexity, mean value). Integral calculus of functions of one variable; indefinite integral (original function, integration of sum and product, integration by substitution and parts, integration of rational, trigonometric and non-measurable functions), definite integral (determination, interpretation and relation to field, properties, applications - calculation of flat area fields, curve arc length , volume and surface area of rotational solids), improper integral. Selected ordinary differential equations, (first order equations with distributed variables, linear non-homogeneous order I, constant variation method, non-homogeneous linear order II with fixed coefficients, prediction method); general and specific solution, the initial issue. Matrices and their properties (operations on matrices, matrix determinant, inverse matrix, matrix equation). Systems of linear equations; Cramer"s method and Gauss elimination, Kronecker-Capelli theorem. Vectors in space; scalar and vector product and application in geometry. Differential calculus of functions of several variables; partial derivative, extremes of functions of two variables and entangled functions, complete differential.
Tutorials:
Complex numbers; algebraic, trigonometric form, effects on complex numbers, Moivre"s formula, Euler"s formula, complex equations of the second order. Elementary functions and their graphs. Limit of function. Calculation of derivatives. The de L"Hospital rule. Study of the properties of one variable function; extremes, monotonicity, point of inflection, convexity. Calculation of the indefinite integral; integration by parts and by substitution, integral of a rational function, selected integrals of an irrational function. Definite integral and its applications in geometry (area areas, arc length, volume and surface area of a rotating solid). Matrices and determinants; operations on matrices, properties of determinants. Systems of linear equations; Cramer"s method and Gauss elimination. Vector bill in space; scalar and vector product and application in geometry. Elements of the differential calculus of functions of two variables - partial derivatives. Complete differential.

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. H. Jurlewicz, Z. Skoczylas, Algebra liniowa 1, Oficyna Wydawnicza GiS, Wrocław 2006.
3. 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