GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics II , PG_00049154		
Field of study	Spatial Development		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Mathematics Center -> Vice-Rector for Education		
Name and surname of lecturer (lecturers)	Subject supervisor	mgr Katarzyna Kujawska	
	Teachers	mgr Katarzyna Kujawska	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	30.0	0.0	0.0	0.0	60

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	60	8.0	57.0	125

Subject objectives

The need for knowledge of mathematics that teaches abstract understanding of technical problems. Understanding the basic concepts of linear algebra, geometry and mathematical analysis. The ability to efficiently perform calculations and use of mathematical knowledge.

The aim is to build the students' knowledge about the possibilities of using information and communication techniques in spatial planning practice, to develop basic skills in the area of digital visualization of the natural and built environment and in preparing graphic presentations using computer software.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U01] has the ability to abstractly understand technical problems; applies basic mathematical and simulation methods in urban planning and spatial planning	Student analyzes spacial sytuation on a basis of a digital map. Student has an ability of presenting suggested solutions in respect of issues connected with spatial development	[SU5] Assessment of ability to present the results of task
[K6_W03] has elementary knowledge in the field of mathematics and physics relating to issues related to space management, including the basic mathematical methods used in urban design, as well as analytical and design methods using information technology used in planning processes of settlement structures	Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem.	[SW2] Assessment of knowledge contained in presentation

Subject contents	Functions of one variable and their properties: The absolute value function – definition, solving equations and inequalities with absolute value, graphs of functions with absolute value. Power functions – solving power and polynomial equations and inequalities. Rational functions – solving national equations and inequalities. Exponential function – properties and graphs, solving exponential equations and inequalities. Logarithmic functions – properties and graphs, solving logarithmic equations and inequalities. Trigonometric and cyclometric functions – properties and graphs, solving trigonometric equations and inequalities. Limits and continuity: Infinite sequences. Fundamental definitions of limit of sequence, convergence and divergence, limit theorems. Applications to solving equation. Differential calculus of functions with one variable and applications of differential calculus of functions with one variable: Definition of first derivative and differential. Roll's and Lagrange's theorems. Higher derivatives and differentials. Monotonicity and local extrema. Convexity, concavity and inflexion points of a function. De l'Hospital's Thorem. Asymptotes. Applying differential calculus to studying the properties of functions with one variable. Inegral calculus of functions with one variable – antiderivatives: The process of finding antiderivatives and integration formulas – the substitution method of integration and integration by parts. Integration of rational, trigonometric and irrational functions. Definite integrals in Riemann's sense: Newton-Leibniz Thorem. Integration formulas, the substitution method of integration and integration by parts for definite integrals. Applications of integral calculus in computing areas of plane figures, lengths of arcs, volumes of solids of resolution. Matrices. Matrix operations. Determinants. Properties of determinants. Vectors in three- dimensional space. Operations on vectors. The dot product of vectors. The cross product. The scalar triple product of vector. Equations of a line in a space. Equations of a plane in a space. . Distance from a point to a plane. Angles between planes and lines. The possibilities of using the information contained in digital files from the projects documentation. The types of software used in spatial planning. The exchange of digital data, improvement of the workshop and striving to optimise individual and team design methods. Presentation of the capabilities of the AutoCAD software in the context of spatial development design and the methods of project organization: - Presentation of the idea of 'model space' and 'paper space' and the concepts associated with them - Discussion about layers, the standards and the states of layers - Organization of a project and the needed files. Blocks and external references. Importing maps online - Modeling: Solids, Surfaces and Mesh objects. Coordinate systems - Project presentation: camera angles, animations, materials and rendering - 3D model documentation: cross- sections, elevations ad details. Dimensioning and description.
Prerequisites and co-requisites	No requirements

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
evaluation of exam	60.0%	30.0%
evaluation of the test	60.0%	20.0%
substantive and graphical correctness of practical exercises	100.0%	50.0%

Recommended reading	Basic literature	Praca zbiorowa pod redakcją B. Wikieł, Matematyka - Podstawy z elementami matematyki wyższej, PG, Gdańsk 2007 K. Jankowska, T. Jankowski, Zbiór zadań z matematyki, PG, Gdańsk 1997 User manuals - AutoCad 2016 Randy H. Shih, AutoCAD 2016 Tutorial First Level 2D Fundamentals, www.sdcpublications.com

	Supplementary literature	Praca zbiorowa pod red. E. Mieloszyka, Matematyka – Materiały pomocnicze do ćwiczeń, PG, Gdańsk 2004 R. Leitner, Zarys matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 2001 R. Leitner, W. Matuszewski, Z. Rojek, Zadania z matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 1999 M. Gewert, Z. Skoczylas, Analiza matematyczna 1 – Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2001 M. Gewert, Z. Skoczylas, Analiza matematyczna 1 – Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2001 W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach I i II, Wydawnictwo Naukowe PWN, Warszawa 1998 Lynn Allen's Tips and Tricks, AUTODESK AutoCAD 2016
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	1. Find local extremes and intervals of monotonicity of the function 2. Determine indefinite integrals of the following functions using the method of integration by parts or the method of substitution… . 3. Find the domain and range of the function f(x)=... . Determine the inverse function of f 4. Find the area of the region bounded by y=…, y=… , x=… and x=… . 5. Discuss the relative position of the given lines l_1 and l_2. Calculation of spatial parameters using calculus (the specific parameters of the task given by the teacher) Importing and creating 2D symbol blocks Saving a block to a separate file. Connecting a file to the drawing as an external reference Modeling of a simple building (urban context) Buildings' settings as part of the frontage and/or city square Terrain modeling	
Work placement	Not applicable	