



## Subject card

|   |   |  |  |                                     |  |            |     |
|---|---|--|--|-------------------------------------|--|------------|-----|
| Subject name and code                       | Mathematics II , PG_00049154  |  |  |                                     |  |            |     |
| Field of study                              | Spatial Development   |  |  |                                     |  |            |     |
| Date of commencement of studies             | October 2021  | Academic year of realisation of subject                  |  |                                     | 2021/2022  |            |     |
| 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  |  |  |                                     |  |            |     |
|   | Adresy na platformie eNauczanie:  |  |  |                                     |  |            |     |
| 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                          | <p>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.</p> <p>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.</p> |  |  |                                     |  |            |     |
| 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   | <p>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 rational 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.</p> <p>Matrices. Matrix operations. Determinants. Properties of determinants.</p> <p>Vectors in three- dimensional space. Operations on vectors. The dot product of vectors. The cross product.</p> <p>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.</p> <p>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.</p> <p>Presentation of the capabilities of the AutoCAD software in the context of spatial development design and the methods of project organization:</p> <ul style="list-style-type: none"> <li>- Presentation of the idea of 'model space' and 'paper space' and the concepts associated with them</li> <li>- Discussion about layers, the standards and the states of layers</li> <li>- Organization of a project and the needed files. Blocks and external references. Importing maps online</li> <li>- Modeling: Solids, Surfaces and Mesh objects. Coordinate systems</li> <li>- Project presentation: camera angles, animations, materials and rendering</li> <li>- 3D model documentation: cross- sections, elevations ad details. Dimensioning and description.</li> </ul> |  |                   |                               |                    |       |       |                        |       |       |  |        |       |  |  |
|--|---|--|-------------------|-------------------------------|--------------------|-------|-------|------------------------|-------|-------|--|--------|-------|--|--|
| Prerequisites and co-requisites                              | No requirements   |  |                   |                               |                    |       |       |                        |       |       |  |        |       |  |  |
| Assessment methods and criteria                              | <table border="1"> <thead> <tr> <th>Subject passing criteria</th> <th>Passing threshold</th> <th>Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>evaluation of exam</td> <td>60.0%</td> <td>30.0%</td> </tr> <tr> <td>evaluation of the test</td> <td>60.0%</td> <td>20.0%</td> </tr> <tr> <td>substantive and graphical correctness of practical exercises</td> <td>100.0%</td> <td>50.0%</td> </tr> </tbody> </table>  | 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% |  |  |
| 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  | <p>Praca zbiorowa pod redakcją B. Wikeł, Matematyka - Podstawy z elementami matematyki wyższej, PG, Gdańsk 2007 K. Jankowska, T. Jankowski, Zbiór zadań z matematyki, PG, Gdańsk 1997</p> <p>User manuals - AutoCad 2016</p> <p>Randy H. Shih, AutoCAD 2016 Tutorial First Level 2D Fundamentals, www.sdcpublishations.com</p> |                   |                               |                    |       |       |                        |       |       |  |        |       |  |  |

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|--|--|---|
|  | 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. Kryszicki, L. Włodarski, Analiza matematyczna w zadaniach I i II, Wydawnictwo Naukowe PWN, Warszawa 1998<br><br>Lynn Allen's Tips and Tricks, AUTODESK AutoCAD 2016 |
|  | eResources addresses   |   |
| Example issues/<br>example questions/<br>tasks being completed | <ol style="list-style-type: none"> <li>1. Find local extremes and intervals of monotonicity of the function</li> <li>2. Determine indefinite integrals of the following functions using the method of integration by parts or the method of substitution....</li> <li>3. Find the domain and range of the function <math>f(x)=...</math> . Determine the inverse function of <math>f</math></li> <li>4. Find the area of the region bounded by <math>y=...</math>, <math>y=...</math> , <math>x=...</math> and <math>x=...</math> .</li> <li>5. Discuss the relative position of the given lines <math>l_1</math> and <math>l_2</math>.</li> </ol> <p>Calculation of spatial parameters using calculus (the specific parameters of the task given by the teacher)</p> <p>Importing and creating 2D symbol blocks<br/> Saving a block to a separate file.<br/> Connecting a file to the drawing as an external reference<br/> Modeling of a simple building (urban context)<br/> Buildings' settings as part of the frontage and/or city square<br/> Terrain modeling</p> |   |
| Work placement   | Not applicable   |   |