



## Subject card

|   |   |  |  |            |         |         |     |
|---|---|--|--|------------|---------|---------|-----|
| Subject name and code   | Mathematics I, PG_00055785  |  |  |            |         |         |     |
| Field of study  | Design and Construction of Yachts   |  |  |            |         |         |     |
| 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   | 1   | ECTS credits   | 9.0  |            |         |         |     |
| Learning profile  | practical profile   | Assessment form  | exam   |            |         |         |     |
| Conducting unit   | Mathematics Center -> Vice-Rector for Education   |  |  |            |         |         |     |
| Name and surname of lecturer (lecturers)  | Subject supervisor  | dr Cezary Mrozicki                                       |  |            |         |         |     |
|   | Teachers  | dr Cezary Mrozicki                                       |  |            |         |         |     |
| Lesson types and methods of instruction   | Lesson type   | Lecture  | Tutorial                                       | Laboratory | Project | Seminar | SUM |
|   | Number of study hours   | 45.0   | 60.0   | 0.0        | 0.0     | 0.0     | 105 |
|   | E-learning hours included: 0.0  |  |  |            |         |         |     |
| WIMiO - Projektowanie i budowa jachtów - sem. 1- Matematyka 2021/2022 (C. Mrozicki) - Moodle ID: 18688<br><a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18688">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18688</a> |   |  |  |            |         |         |     |
| 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   | 105  | 20.0   | 100.0      | 225     |         |     |
| Subject objectives  | Students obtain competence in the range of using methods of mathematical analysis and knowledge how to solve simple problems that can be found in the field of engineering. |  |  |            |         |         |     |

| Learning outcomes | Course outcome  | Subject outcome  | Method of verification   |
|-------------------|---|--|--|
|                   | K6_W01  | <p>The student lists the basic properties of elementary functions.</p> <p>The student solves equations and inequalities containing elementary functions.</p> <p>The student interprets geometrically the study of graphs of functions using the concept of limit and continuity of functions.</p> <p>The student defines the basic concepts of differential calculus of one variable.</p> <p>The student analyses the properties of functions on the basis of an examination of its first and second derivative.</p> <p>The student applies the basic rules and techniques of integration to calculate indefinite integrals.</p> <p>The student lists geometrical applications of definite integrals.</p> <p>The student distinguishes between types of improper integrals.</p> <p>The student solves equations using complex numbers.</p> | <p>[SW1] Assessment of factual knowledge</p> <p>[SW2] Assessment of knowledge contained in presentation</p> <p>[SW3] Assessment of knowledge contained in written work and projects</p>  |
|                   | K6_U02  | The student combines knowledge of mathematics with knowledge from other fields.  | <p>[SU1] Assessment of task fulfilment</p> <p>[SU2] Assessment of ability to analyse information</p> <p>[SU3] Assessment of ability to use knowledge gained from the subject</p> <p>[SU4] Assessment of ability to use methods and tools</p> <p>[SU5] Assessment of ability to present the results of task</p> |
| Subject contents  | <p>Functions of one variable and their properties:<br/>The absolute value function definition, solving equations and inequalities with absolute value, graphs of functions with absolute value.<br/>Power, exponential, logarithmic, trigonometric and cyclometric functions properties and graphs, solving equations and inequalities.</p> <p>Limits and continuity:<br/>Infinite sequences.<br/>Fundamental definitions of limit of sequence, convergence and divergence, limit theorems.<br/>Applications to solving equation.</p> <p>Differential calculus of functions with one variable and applications of differential calculus of functions with one variable:<br/>Definition of first derivative and differential.<br/>Rolls and Lagranges theorems.<br/>Higher derivatives and differentials.<br/>Monotonicity and local extrema.<br/>Convexity, concavity and inflexion points of a function.<br/>De l'Hospitals Theorem. Taylors Theorem.<br/>Asymptotes.<br/>Applying differential calculus to study the properties of one variable functions.</p> <p>Integral calculus of functions with one variable indefinite integral:<br/>Basic methods and ways of integration - integration by parts and substitution.<br/>Integration of rational functions, trigonometric and irrational.</p> <p>Definite integrals in Riemanns sense:<br/>Newton-Leibnitz Theorem.<br/>Integration formulas, the substitution method of integration and integration by parts for definite integrals.<br/>Applications of integral calculus in computing areas of plane figures, lengths of arcs, volumes of solids of resolution.</p> <p>Improper integral:<br/>Definition. Types of integrals.</p> <p>Analytic geometry in 3-space:<br/>Basic vectors definitions and properties. Eigenvectors and Eigenvalues.<br/>Dot product, cross product, triple scalar product - their properties and applications.<br/>Equations for lines and planes in 3-space.<br/>The distance from a point to a plan.<br/>Angles between planes and lines.</p> <p>Complex numbers:<br/>Algebraic form, equality, conjugation, operations, modulus, trigonometric form, operations in polar form, roots, solving equations.</p> |  |  |

|  |   |  |                               |
|--|---|--|-------------------------------|
| Prerequisites and co-requisites                                | There are no preliminary or additional requirements.  |  |                               |
| Assessment methods and criteria                                | Subject passing criteria  | Passing threshold  | Percentage of the final grade |
|  | Written exam  | 50.0%  | 50.0%                         |
|  | Midterm colloquium  | 50.0%  | 50.0%                         |
| Recommended reading  | Basic literature  | <p>Pod redakcją B. Wikiel, Matematyka. Podstawy z elementami matematyki wyższej. Wydawnictwo PG, Gdańsk 2009</p> <p>W. Kryszicki, L. Włodarski, Analiza matematyczna w zadaniach 1, Wydawnictwo Naukowe PWN, Warszawa 2008</p> <p>M. Gewert, Z. Skoczylas, Analiza matematyczna 1. Definicje. Twierdzenia. Wzory. Oficyna Wydawnicza GIS, Wrocław 2008</p> <p>M. Gewert, Z. Skoczylas, Analiza matematyczna 1. Przykłady i zadania. Oficyna Wydawnicza GIS, Wrocław 2008</p> <p>T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1. Definicje. Twierdzenia. Wzory. Oficyna Wydawnicza GIS, Wrocław 2006</p> <p>T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1. Przykłady i zadania. Oficyna Wydawnicza GIS, Wrocław 2006</p> <p>K. Jankowska, T. Jankowski, Zbiór zadań z matematyki, Wydawnictwo PG, Gdańsk 2008</p> <p>K. Jankowska, T. Jankowski, Zadania z matematyki wyższej, Wydawnictwo PG, Gdańsk 2008</p> <p>K. Jankowska, T. Jankowski, Funkcje wielu zmiennych. Całki wielokrotne. Geometria analityczna, Wydawnictwo PG, Gdańsk 2008</p> |                               |
|  | Supplementary literature  | W. Leksiński, I. Nabiałek, W. Żakowski, Matematyka. Definicje, twierdzenia, przykłady, zadania. WNT, Warszawa 2006   |                               |
|  | eResources addresses  |  |                               |
| Example issues/<br>example questions/<br>tasks being completed | <ol style="list-style-type: none"> <li>1. Investigate the monotonicity of the sequence <math>(a_n)</math>.</li> <li>2. Enter the properties of the function <math>f(x) = \dots</math></li> <li>3. Calculate the derivative of the function <math>f(x) = \dots</math></li> <li>4. Determine the indefinite integral of the function <math>f(x) = \dots</math></li> </ol> |  |                               |
| Work placement   | Not applicable  |  |                               |