



Subject card

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|---|---|--|-------------------------------------|------------|--|---------|-----|
| Subject name and code | Mathematics I, PG_00044791 | | | | | | |
| Field of study | Geodesy and Cartography | | | | | | |
| 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 | 1 | ECTS credits | | | 9.0 | | |
| Learning profile | general academic profile | Assessment form | | | exam | | |
| Conducting unit | Mathematics Center -> Vice-Rector for Education | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr Krzysztof Radziszewski | | | | | |
| | Teachers | dr Krzysztof Radziszewski mgr inż. Dorota Żarek | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 45.0 | 45.0 | 0.0 | 0.0 | 0.0 | 90 |
| | 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 | 90 | 12.0 | | 123.0 | | 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. | | | | | | |

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| Learning outcomes | Course outcome | Subject outcome | Method of verification |
| | [K6_W02] has knowledge and understands mathematics concepts useful for coordinate calculus (in a set of real and complex numbers), for the purpose of field and volume calculations, mathematical statistics and vector calculus, as well as elementary topology | Student solves equations and inequalities with elementary functions. Student defines basic notions of differential calculus of one variable function. Student determines intervals of monotonicity of a given functions and its extrema. Student applies the basic rules and techniques of integration to calculate indefinite. Student lists geometrical applications of definite integrals. Student distinguishes between types of improper integrals. Student uses definite integral to solve geometrical tasks. Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in future. | [SW1] Assessment of factual knowledge |
| | [K6_U01] can apply the principles of physics and mathematics to a simple verification of measurement and computational methods and their results | Student solves equations and inequalities with elementary functions. Student defines basic notions of differential calculus of one variable function. Student determines intervals of monotonicity of a given functions and its extrema. Student applies the basic rules and techniques of integration to calculate indefinite. Student lists geometrical applications of definite integrals. Student distinguishes between types of improper integrals. Student uses definite integral to solve geometrical tasks. Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in future. | [SU1] Assessment of task fulfilment |
| 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 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 one variable functions: Definition of first derivative and differential. Rolle and Lagrange's theorems. Higher derivatives and differentials. Monotonicity and local extrema. Convexity, concavity and inflexion points of a function. De l'Hospital's Theorem. Asymptotes. Applications of differential calculus to studying properties of one variable functions. Integral 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 Theorem. 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 revolution. | | |
| Prerequisites and co-requisites | | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Midterm colloquium | 50.0% | 40.0% |
| | Written exam | 50.0% | 60.0% |
| Recommended reading | Basic literature | 1. Praca zbiorowa pod redakcją B. Wiekła, Matematyka - Podstawy z elementami matematyki wyższej, PG, Gdańsk 2007. 2. K. Jankowska, T. Jankowski, Zbiór zadań z matematyki, PG, Gdańsk 1997. 3. Praca zbiorowa pod red. E. Mieloszyka, Matematyka Materiały pomocnicze do ćwiczeń, PG, Gdańsk 2004. 4. R. Leitner, Zarys matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 2001. 5. R. Leitner, W. Matuszewski, Z. Rojek, Zadania z matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 1999. | |
| | Supplementary literature | 6. M. Gewert, Z. Skoczylas, Analiza matematyczna 1 Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2001. 7. M. Gewert, Z. Skoczylas, Analiza matematyczna 1 Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2001. 8. W. Krywicki, L. Włodarski, Analiza matematyczna w zadaniach I, Wydawnictwo Naukowe PWN, Warszawa 1998. | |

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| | eResources addresses | Adresy na platformie eNauczenie: WILiŚ - GiK sem.1 - Matematyka I 2023/24 (K.Radziszewski) - Moodle ID: 31177 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=31177 |
| Example issues/ example questions/ tasks being completed | 1. Find the domain and the set of values of the function $f(x)=\arcsin(3x-2)$. Determine the inverse function of f . 2. Find the derivative of $y=4x(3x^2+5)^5$. 3. Sketch the graph of the function $f(x)=x-\ln x$. Identify any local extrema and points of inflection. 4. Find the absolute extrema of $f(x)=4x-36x^{-1}$ on the interval $[1,6]$. 5. Calculate $\int 4x^2 \ln x \, dx$. 6. Find the area between the two curves $y=e^x$ and $y=3-e^x$ from $x=-2$ to $x=0$. | |
| Work placement | Not applicable | |

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