



Subject card

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|---|---|--|--|-------------------------------------|---|------------|-----|
| Subject name and code | Mathematics I, PG_00060447 | | | | | | |
| Field of study | Mechanical and Naval Engineering | | | | | | |
| Date of commencement of studies | October 2024 | Academic year of realisation of subject | | | 2024/2025 | | |
| Education level | first-cycle studies | Subject group | | | Obligatory subject group in the field of study | | |
| Mode of study | Part-time studies | Mode of delivery | | | blended-learning | | |
| Year of study | 1 | Language of instruction | | | Polish | | |
| Semester of study | 1 | ECTS credits | | | 10.0 | | |
| 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 Anita Dąbrowicz-Tlalka | | | | |
| | Teachers | | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 27.0 | 36.0 | 0.0 | 0.0 | 0.0 | 63 |
| | E-learning hours included: 27.0 | | | | | | |
| 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 | 63 | | 17.0 | | 170.0 | 250 |
| Subject objectives | Students obtain competence in the range of using methods of mathematical analysis and linear algebra 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_U01] is able to acquire information from specialized literary sources, databases and other resources, essential for solving engineering tasks; is able to compile the obtained information pieces and to interpret them, additionally is able to form conclusions and present justified opinion | | Student uses gained knowledge in basic mathematics to analyse results of experiments and justify solutions to engineering problems. | | [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment | | |
| | [K6_W01] possesses mathematical knowledge within the range of linear algebra and mathematical analysis useful in characterising and interpreting mechanical systems, technological processes and operational properties of devices | | Student mentions basic properties of elementary functions. Student solves equations and inequalities with elementary functions. Student uses the basic operations on complex numbers. Student defines basic notions of matrix calculus. Student uses basic notions and formulas of matrix calculus in solving systems of linear equations. Student gives the definition of basic notions of differential calculus. Student uses basic notions and formulas of differential calculus. Student determines intervals of monotonicity of a given functions and its extrema. Students calculates antiderivatives using the substitution method of integration and integration by parts. Student applies definite integrals to solving geometrical problems. | | [SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge | | |

| Subject contents | <p>Functions of one variable:</p> <ul style="list-style-type: none"> • definitions, graphs, properties • absolute value, equations and inequalities • polynomials, rational functions, power functions, trigonometric and inverse trigonometric functions, exponential and logarithmic functions • equations and inequalities involving these functions <p>Complex numbers</p> <p>Elements of linear algebra:</p> <ul style="list-style-type: none"> • matrices, their properties and operations on matrices • determinants. Inverse of a square non-singular matrix • dot product, cross product, their properties and its applications • the triple scalar product and applications. <p>Systems of linear equations.</p> <ul style="list-style-type: none"> • Cramer patterns • the rank of the main and completed matrix • Kronecker-Capelli theorem. <p>Single variable calculus - derivative:</p> <ul style="list-style-type: none"> • first order derivative • Rolle's and Lagrange's theorems and their applications • L'Hospital's Rule • monotonicity and local/global extrema (optimization problems) • higher order derivatives • concavity, inflection points • applications of single variable differential calculus <p>Single variable calculus - integral</p> <ul style="list-style-type: none"> • definite and indefinite integral, Fundamental Theorem of Calculus • basic integration formulas • integration by substitution, by parts, by partial fractions • applications of integral calculus | | | | | | | | | | | | | | | | | |
|---------------------------------|--|-------------------------------|--|--------------------------|-------------------|-------------------------------|------------------------|------|-------|------|-------|-------|---------------------------------|------|------|-------|------|-------|
| Prerequisites and co-requisites | | | | | | | | | | | | | | | | | | |
| Assessment methods and criteria | <table border="1"> <thead> <tr> <th data-bbox="456 1576 794 1603">Subject passing criteria</th> <th data-bbox="799 1576 1137 1603">Passing threshold</th> <th data-bbox="1142 1576 1469 1603">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 1610 794 1637">Aktywność na zajęciach</td> <td data-bbox="799 1610 1137 1637">0.0%</td> <td data-bbox="1142 1610 1469 1637">19.0%</td> </tr> <tr> <td data-bbox="456 1644 794 1671">Exam</td> <td data-bbox="799 1644 1137 1671">50.0%</td> <td data-bbox="1142 1644 1469 1671">50.0%</td> </tr> <tr> <td data-bbox="456 1677 794 1704">Active learning during lectures</td> <td data-bbox="799 1677 1137 1704">0.0%</td> <td data-bbox="1142 1677 1469 1704">7.0%</td> </tr> <tr> <td data-bbox="456 1711 794 1738">Tests</td> <td data-bbox="799 1711 1137 1738">0.0%</td> <td data-bbox="1142 1711 1469 1738">24.0%</td> </tr> </tbody> </table> | | | Subject passing criteria | Passing threshold | Percentage of the final grade | Aktywność na zajęciach | 0.0% | 19.0% | Exam | 50.0% | 50.0% | Active learning during lectures | 0.0% | 7.0% | Tests | 0.0% | 24.0% |
| Subject passing criteria | Passing threshold | Percentage of the final grade | | | | | | | | | | | | | | | | |
| Aktywność na zajęciach | 0.0% | 19.0% | | | | | | | | | | | | | | | | |
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| Active learning during lectures | 0.0% | 7.0% | | | | | | | | | | | | | | | | |
| Tests | 0.0% | 24.0% | | | | | | | | | | | | | | | | |
| Recommended reading | <p>Basic literature</p> <ul style="list-style-type: none"> - E. Mieloszyk : Macierze, wyznaczniki i układy równań, Wydawnictwo PG, 2000 - K. Jankowska, T. Jankowski : Zadania z matematyki wyższej, Wydawnictwo PG, 2010 - K. Jankowska, T. Jankowski : Zbiór zadań z matematyki, Wydawnictwo PG, 2010. | | | | | | | | | | | | | | | | | |

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| | Supplementary literature | <p>- R. Leitner : Zarys matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne Warszawa 1999</p> <p>- W. Kryszewski, L. Włodarski : Analiza matematyczna w zadaniach, Wydawnictwo Naukowe PWN</p> <p>- W. Stankiewicz : Zadania z matematyki dla wyższych uczelni technicznych, Wydawnictwo Naukowe PWN</p> |
| | eResources addresses | Adresy na platformie eNauczenie: |
| Example issues/ example questions/ tasks being completed | <ol style="list-style-type: none"> 1. . Find the domain and the set of values of the function $f(x) = \dots$ 2. Find solutions of the equation ... in the set of complex numbers. 3. Determine the matrix inverse to the matrix... 4. Discuss the solvability of the given system of equations 5. Find the derivative of $f(x) = \dots$ 6. identify any local extrema and points of inflection of the function $f(x) = \dots$ 7. Use the definite integral to determine the volume of the solid formed by the rotation of the curve ... around the axis Ox. | |
| Work placement | Not applicable | |