



Subject card

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|---|--|---|---|------------|--|--|-----|
| Subject name and code | Mathematics I, PG_00022416 | | | | | | |
| Field of study | Electrical Engineering | | | | | | |
| Date of commencement of studies | October 2026 | Academic year of realisation of subject | | | | 2026/2027 | |
| 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 | | | | 6.0 | |
| 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 Anna Niewulis | | | | |
| | Teachers | | mgr Katarzyna Kiepiela mgr Justyna Woron dr Anna Niewulis | | | | |
| Lesson types | 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 | 10.0 | | 80.0 | 150 | |
| Subject objectives | The aim of this subject is to obtain the students competence in the range of using the basic methods of mathematical analysis and linear algebra. Furthermore, the student is able to use this knowledge to solve simple theoretical and practical problems that can be found in the field of engineering. | | | | | | |
| Learning outcomes | Course outcome | Subject outcome | | | Method of verification | | |
| | K6_U01 | Student is able to process the acquired information, analyze and interpret it, draw conclusions and reason opinions. Student understands the need of lifelong learning and improving their engineering knowledge. | | | [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools | | |
| | K6_K02 | Student is able to work individually and in a group, knows how to estimate the time needed to carry out the task, and is able to implement the work schedule. | | | [SK3] Assessment of ability to organize work [SK1] Assessment of group work skills | | |
| | K6_W01 | Student explains the concept of limit and continuity of functions. Student evaluates the limits of functions. Student defines the basic concepts of differential calculus of one variable function. Student determines intervals of monotonicity of a given function and it's extreme. Student uses the first and second derivatives of a function to analyze its properties. Student applies the basic rules and techniques of integration to calculate indefinite integrals. Student gives the graphic interpretation of definite integral. Student examines the convergence of improper integrals. | | | [SW1] Assessment of factual knowledge | | |

| Subject contents | <p>Course content – lecture</p> <p>Course Content Lecture</p> <p>Limits and continuity of functions:</p> <ul style="list-style-type: none"> • Basic definitions and theorems concerning limits and continuity of functions. <p>Differential calculus of a single-variable function:</p> <ul style="list-style-type: none"> • Definition of the derivative and the differential of a function. • Rolles and Lagranges theorems. • Higher-order derivatives and differentials. • Monotonicity and local extrema of functions. Concavity, convexity, and inflection points. Asymptotes of functions. • De l'Hospitals rule. Taylors theorem. <p>Integral calculus of a single-variable function:</p> <ul style="list-style-type: none"> • Indefinite integral: basic methods and techniques of integration, integration by parts and substitution. Integration of rational, trigonometric, and irrational functions. • Definite integral in the sense of Riemann: NewtonLeibniz theorem. Basic computational methods, substitution and integration by parts for definite integrals. • Improper integrals: definition and types. <p>Course Content Exercises</p> <p>Limits and continuity of functions:</p> <ul style="list-style-type: none"> • Calculating limits and examining continuity of functions. • Applications to solving equations. <p>Differential calculus of a single-variable function:</p> <ul style="list-style-type: none"> • Applications of differential calculus of a single-variable function. • Use in analyzing stages of investigating the behavior of functions. <p>Integral calculus of a single-variable function:</p> <ul style="list-style-type: none"> • Indefinite integral: integration by parts and substitution, integration of rational, trigonometric, and irrational functions. • Definite integral: substitution and integration by parts for definite integrals. • Applications of definite integrals in calculating areas of plane regions, arc lengths, and volumes of solids of revolution. | | | | | | | | | | | |
|--|---|--|--|--------------------------|-------------------|-------------------------------|--------------------|-------|-------|--------------|-------|-------|
| Prerequisites and co-requisites | Knowledge of the subject: Propedeutics to Mathematics | | | | | | | | | | | |
| Assessment methods and criteria | <table border="1"> <thead> <tr> <th data-bbox="448 1341 794 1375">Subject passing criteria</th> <th data-bbox="794 1341 1141 1375">Passing threshold</th> <th data-bbox="1141 1341 1487 1375">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 1375 794 1408">Midterm colloquium</td> <td data-bbox="794 1375 1141 1408">50.0%</td> <td data-bbox="1141 1375 1487 1408">50.0%</td> </tr> <tr> <td data-bbox="448 1408 794 1442">Written exam</td> <td data-bbox="794 1408 1141 1442">50.0%</td> <td data-bbox="1141 1408 1487 1442">50.0%</td> </tr> </tbody> </table> | | | Subject passing criteria | Passing threshold | Percentage of the final grade | Midterm colloquium | 50.0% | 50.0% | Written exam | 50.0% | 50.0% |
| Subject passing criteria | Passing threshold | Percentage of the final grade | | | | | | | | | | |
| Midterm colloquium | 50.0% | 50.0% | | | | | | | | | | |
| Written exam | 50.0% | 50.0% | | | | | | | | | | |
| Recommended reading | Basic literature | <p>B. Wikieł, Matematyka. Podstawy z elementami matematyki wyższej. Wydawnictwo PG, Gdańsk 2009</p> <p>W. Krysicki, 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> | | | | | | | | | | |
| | Supplementary literature | <p>W. Leksiński, I. Nabiątek, W. Żakowski, Matematyka. Definicje, twierdzenia, przykłady, zadania. WNT, Warszawa 2006</p> | | | | | | | | | | |
| | eResources addresses | | | | | | | | | | | |
| Example issues/ example questions/ tasks being completed | <ol style="list-style-type: none"> 1. Calculate limits $\lim_n ((2n-1)/(2n+3))^{2n+2}$ $\lim_{x \rightarrow 1} (x^3-1)/(x^4-1)$. 2. Calculate derivatives or multiple derivatives $(\ln(5x) + \ln(x^2) + \tan(x) \cos(x))'$, $(xe^x)''$. 3. Find the largest and the smallest value of the function $f(x)=2/x - 2 + x$ for x in $[1,4]$. Also discuss its monotonicity. 4. Find the inflection points and intervals of concavity/covexity for $f(x)=-x^4 + 12x^3 - 48x^2 + 60x + 1$. 5. Give two examples of applications of denite integrals, draw diagrams (if needed). 6. Find the area of a region between two curves: $y=x^2$ and $x=y^2$. | | | | | | | | | | | |
| Practical activites within the subject | Not applicable | | | | | | | | | | | |

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