



Subject card

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|---|---|--|---|-------------------------------------|--|------------|-----|
| Subject name and code | Mathematical Analysis II, PG_00047364 | | | | | | |
| Field of study | Automatic Control, Cybernetics and Robotics | | | | | | |
| 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 Subject group related to scientific research in the field of study | | |
| Mode of study | Full-time studies | | Mode of delivery | | blended-learning | | |
| Year of study | 1 | | Language of instruction | | Polish | | |
| Semester of study | 2 | | ECTS credits | | 5.0 | | |
| Learning profile | general academic profile | | Assessment form | | assessment | | |
| Conducting unit | Mathematics Center -> Vice-Rector for Education | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr Barbara Wiekł | | | | |
| | Teachers | | mgr Anetta Brękwicz-Sieg | | | | |
| | | | dr Robert Fidytek | | | | |
| | | | mgr inż. Wojciech Dąbrowski | | | | |
| Lesson types and methods of instruction | | | dr Barbara Wiekł | | | | |
| | 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: 2.0 | | | | | | |
| 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 | | 5.0 | | 60.0 | 125 |
| Subject objectives | Students obtain competence in the range of using methods of full range 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] knows and understands, to an advanced extent, mathematics necessary to formulate and solve simple issues related to the field of study | | Student defines basic notions of some elements of field theory, line and surface integrals, infinite, function and trigonometric Fourier series, differential and partial differential equations. | | [SW1] Assessment of factual knowledge | | |
| | [K6_U01] can apply mathematical knowledge to formulate and solve complex and non-typical problems related to the field of study and perform tasks, in an innovative way, in not entirely predictable conditions, by:n- appropriate selection of sources and information obtained from them, assessment, critical analysis and synthesis of this information,n- selection and application of appropriate methods and toolsn | | Student computes some basic elements of field theory. Student calculates line and surface integrals. Student studies convergence of infinite and function series. Student determines general and particular solutions of some types of the first order differential equations and nth order linear differential equations with constant coefficients. | | [SU4] Assessment of ability to use methods and tools | | |
| Subject contents | Line integrals of scalar field. Line integrals of vector field. Path independence. Greens Theorem. Surface integrals of scalar fields. Surface integrals of vector fields. Stokes Theorem. GaussOstrogradsky Theorem. Applications of line and surface integrals. Some elements of field theory. Orthogonal coordinate systems. Vector and integro-differential operations in orthogonal coordinate systems. Operational calculus. Differential operators: gradient, divergence, rotation, Laplacian. Vector and scalar fields. First order differential equations. Variables separable, linear, Bernoulli, exact differential equations. Higher order linear differential equations with constant coefficients. Infinite series. Convergence tests. Alternating series test. Absolute and conditional convergence. Function and power series. Radius and interval of convergence of a power series. Taylor and Maclaurin series. Trigonometric Fourier series. | | | | | | |

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| Prerequisites and co-requisites | Knowledge of subject: "Basic Mathematics". | | |
| | Knowledge of subject: "Calculus". | | |
| | Knowledge of subject: "Linear Algebra". | | |
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| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Final colloquium | 50.0% | 60.0% |
| | Activity | 0.0% | 10.0% |
| | Tests | 50.0% | 30.0% |
| Recommended reading | Basic literature | 1. Gewert M., Skoczylas Z., "Analiza matematyczna 2. Definicje, twierdzenia, wzory", Oficyna Wydawnicza GiS 2. Gewert M., Skoczylas Z., "Analiza matematyczna 2. Przykłady i zadania", Oficyna Wydawnicza GiS 3. Gewert M., Skoczylas Z., "Analiza matematyczna 2. Kolokwia i egzaminy", Oficyna Wydawnicza GiS 4. Gewert M., Skoczylas Z., "Elementy analizy wektorowej. Teoria, przykłady, zadania", Oficyna Wydawnicza GiS 5. Gewert M., Skoczylas Z., "Równania różniczkowe zwyczajne. Teoria, przykłady, zadania", Oficyna Wydawnicza GiS 6. Jankowska K., Jankowski T., "Zadania z matematyki wyższej", Wydawnictwo Politechniki Gdańskiej | |
| | Supplementary literature | 1. McQuarrie D., "Matematyka dla przyrodników i inżynierów", tomy 1-3, Wydawnictwo Naukowe PWN 2. Stankiewicz W., Wojtowicz J., "Zadania z matematyki dla wyższych uczelni technicznych", Wydawnictwo Naukowe PWN | |
| | eResources addresses | Adresy na platformie eNauczanie: | |
| Example issues/ example questions/ tasks being completed | 1. Find the gradient of the scalar field $F(x,y,z) = x e^{yz}$. 2. Check if the vector field $W = [2xy+z^2, x^2, 2xz + \cos z]$ is potential. 3. Check whether the given series with general term $a_n = (n! 3^n) / (n^n)$ is convergent. 4. Find a particular solution of the differential equation $(x+1) y' + y = \ln x$ satisfying the initial condition $y(1)=10$. 5. Applying Laplace transform find a solution of the differential equation $y'' + 2 y' = 2 e^{-2x}$ satisfying the given initial conditions $y(0) = 0$ i $y'(0) = 1$. | | |
| Work placement | Not applicable | | |