GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|---|---|---|---|
| Subject name and code | Mathematics II, PG_00024047 | | | | | | |
| Field of study | Automation, Robotics and Control Systems | | | | | | |
| Date of commencement of studies | October 2025 | | Academic year of realisation of subject | 2025/2026 | | | |
| 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 | 2 | | ECTS credits | 8.0 | | | |
| 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-Tlałka | | | | |
| | Teachers | | | | | | |
| 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 | | 10.0 | 100.0 | 200 | |
| Subject objectives | Students obtain competence in the range of using methods of mathematical analysis and linear algebra and knowledge to solve simple problems that can be found in the field of engineering. | | | | | | |

## Learning outcomes

| Course outcome | Subject outcome | Method of verification |
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| [K6_K02] can work in a group taking on different roles in it | Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem. Student understands the need of lifelong learning. Student is able to inspire others and organize their learning process. | [SK1] Assessment of group work skills<br>[SK2] Assessment of progress of work |
| [K6_U01] can obtain information from literature, databases and other sources; integrate the information obtained, interpret it and draw conclusions, formulate and justify opinions | Student is able to process the acquired information, analyze and interpret it, draw conclusions and reason opinions. Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in the future. Student recognizes the importance of self-expanding knowledge. | [SU1] Assessment of task fulfilment<br>[SU2] Assessment of ability to analyse information<br>[SU3] Assessment of ability to use knowledge gained from the subject |
| [K6_W01] has basic knowledge in the field of mathematics including algebra, geometry, mathematical analysis, probabilistics, numerical methods - necessary to describe and analyze automation and robotics systems | Student determines convergence of number series. Student calculates the radius of convergence and the interval of convergence of a power series. Student expands a function in Taylor and Maclaurin series. Student determines the Fourier series of a given function. Student examines functions of several variables, using the concept of a limit, continuity and derivatives. Student determines local and global extremes of functions of two variables. Students calculates double integrals, and explains the method of substitution in the double integral. Student applies double integrals in solving geometrical problems. Student demonstrates some techniques for solving ordinary differential equations. Student determines general and particular solutions of certain types of the first-order differential equations. Student finds the right method for solving the second - order ordinary differential equations. Student determines general and particular solutions of the second -order linear differential equations with constant coefficients. | [SW1] Assessment of factual knowledge<br>[SW3] Assessment of knowledge contained in written work and projects |

## Subject contents

Function sequences and series. Number series. Power series, Taylors, Maclaurins and Fourier series. Functions of two variables, partial derivatives, applications (maxima and minima). Double integral, polar coordinates, applications. Ordinary differential equations - definition of the differential equation and its solution, general and particular solution, the Cauchy initial value problem. Variables separable equations. First order linear differential equations. Second order linear differential equations with constant coefficients.

## Prerequisites and co-requisites

- active participation in tutorial - passing written tests and colloquiums

## Assessment methods and criteria

| Subject passing criteria | Passing threshold | Percentage of the final grade |
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| Written and oral exam | 50.0% | 50.0% |
| Midterm written and oral colloquium | 50.0% | 50.0% |

## Recommended reading

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| Basic literature | 1. Gewert M., Skoczylas Z.: Analiza matematyczna 2. GiS, Wrocław, 2004. 2. Gewert M., Skoczylas Z.: Równania różniczkowe zwyczajne. GiS, Wrocław, 2004. 3. Krysicki W., Włodarski L.: Analiza matematyczna w zadaniach, cz.I., cz.II. PWN, Warszawa 2006. 4. Leksiński W., Nabiałek I., Żakowski W.: Matematyka. Definicje, twierdzenia, przykłady, zadania. WNT, Warszawa, 2003. |
| Supplementary literature | 1. Jankowska K., Jankowski T.: Zadania z matematyki wyższej. Wyd. PG, Gdańsk, 1999. 2. Żakowski W., Kołodziej W.: Matematyka, cz.II. WNT, Warszawa, 1995. 3. Żakowski W, Leksiński W.: Matematyka, cz.IV. WNT, Warszawa, 1995. |
| eResources addresses | Adresy na platformie eNauczanie: |

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| Example issues/ example questions/ tasks being completed | 1. Compute the sum of the given series with general term an.<br><br>2. Check whether the given series is convergent using the ratio test, the root test, the comparison test or the integral test.<br><br>3. Compute partial differentials of the second order for the given function f(x,y) .<br><br>4. Find extreme values of the function f(x,y).<br><br>5. Compute the double integral of the given function f(x,y) over the region D.<br><br>6. Find a particular solution of the differential equation .... satisfying the given initial conditions .<br><br>7. Find the general solution of the differential equation . by the method of variation of parameters . |
| Work placement | Not applicable |

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