



## Subject card

|   |   |  |                                     |                                      |  |         |     |
|---|---|--|-------------------------------------|--------------------------------------|--|---------|-----|
| Subject name and code                       | Mathematical methods of physics , PG_00027637   |  |                                     |                                      |  |         |     |
| Field of study                              | Mathematics   |  |                                     |                                      |  |         |     |
| Date of commencement of studies             | October 2024  | Academic year of realisation of subject  |                                     |                                      | 2026/2027  |         |     |
| Education level                             | first-cycle studies   | Subject group  |                                     |                                      | Optional subject group<br>Subject group related to scientific research in the field of study   |         |     |
| Mode of study                               | Full-time studies   | Mode of delivery   |                                     |                                      | at the university  |         |     |
| Year of study                               | 3   | Language of instruction  |                                     |                                      | Polish   |         |     |
| Semester of study                           | 6   | ECTS credits   |                                     |                                      | 4.0  |         |     |
| Learning profile                            | general academic profile  | Assessment form  |                                     |                                      | exam   |         |     |
| Conducting unit                             | Department of Probability Theory and Biomathematics -> Faculty of Applied Physics and Mathematics   |  |                                     |                                      |  |         |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor  | dr inż. Paweł Wojda  |                                     |                                      |  |         |     |
|   | Teachers  |  |                                     |                                      |  |         |     |
| Lesson types and methods of instruction     | 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  |  |                                     |                                      |  |         |     |
|   | Adresy na platformie eNauczenie:  |  |                                     |                                      |  |         |     |
| 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                                 |                                      | 35.0   |         | 100 |
| Subject objectives                          | To familiarize the student with with the mathematical methods used in physics   |  |                                     |                                      |  |         |     |
| Learning outcomes                           | Course outcome  | Subject outcome  |                                     |                                      | Method of verification   |         |     |
|   | K6_K02  | Students understand the need to popularize the application of differential equations in fields such as physics.  |                                     |                                      | [SK5] Assessment of ability to solve problems that arise in practice<br>[SK4] Assessment of communication skills, including language correctness |         |     |
|   | K6_U08  | Student knows how to calculate determinants and knows their property; can give a geometric interpretation of the determinant and understands its relationship with the mathematical analysis |                                     |                                      | [SU1] Assessment of task fulfilment  |         |     |
|   | K6_W03  | Student understands the construction of mathematical theories, mathematical formalism can be used to construct and analyze simple mathematical models in other sciences                      |                                     |                                      | [SW2] Assessment of knowledge contained in presentation  |         |     |
|   | K6_U05  | Student applies theorems and methods of differential calculus of functions of one and several variables  |                                     |                                      | [SU4] Assessment of ability to use methods and tools   |         |     |
| K6_K01                                      | knows the limits of his own knowledge and understands the need for further education  |  |                                     | [SK2] Assessment of progress of work |  |         |     |
| Subject contents                            | 1. Calculation of selected integrals useful in physics.<br>2. Mathematical description of physical phenomena: mathematical pendulum, free vibrations and suppressed harmonic oscillator, motion of a material point.<br>3. Fourier transform and Fourier series.<br>4. Formulating the initial-boundary problems of mathematical physics: mass diffusion, electric current conduction, wave phenomena.<br>5. Elements of tensor calculus. |  |                                     |                                      |  |         |     |

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| Prerequisites and co-requisites                                | Differential equations I<br>Partial differential equations |  |                               |
| Assessment methods and criteria                                | Subject passing criteria                                   | Passing threshold  | Percentage of the final grade |
|  | tests  | 50.0%  | 60.0%                         |
|  | exam   | 50.0%  | 40.0%                         |
| Recommended reading  | Basic literature   | 1. J. Rybicki: Metody matematyczne fizyki, Politechnika Gdańska, 1987.<br>2. A. Zagórski: Metody matematyczne fizyki, Oficyna Wydawnicza Politechniki Warszawskiej, 2014.<br>3. A.N.Tichonow, A.A.Samarski: Równania fizyki matematycznej, PWN 1963. |                               |
|  | Supplementary literature                                   | 1. F.W. Byron, R.W. Fuller: Matematyka w fizyce klasycznej i kwantowej. PWN, 1975.<br>2. W.A. Majewski: Metody Matematyczne Fizyki I. skrypt Uniwersytet Gdański, 1990.<br>3. E. Karaśkiewicz: Zarys teorii wektorów i tensorów. PWN, 1964.          |                               |
|  | eResources addresses                                       |  |                               |
| Example issues/<br>example questions/<br>tasks being completed | What are the free vibrations of the harmonic oscillator?   |  |                               |
| Work placement   | Not applicable   |  |                               |