



## Subject card

|  |  |  |   |                                     |                               |            |     |
|--|--|--|---|-------------------------------------|-------------------------------|------------|-----|
| Subject name and code  | Application of Mathematics in Technology, PG_00042010  |  |   |                                     |                               |            |     |
| Field of study   | Power Engineering  |  |   |                                     |                               |            |     |
| Date of commencement of studies                                | October 2021   |  | Academic year of realisation of subject   |                                     | 2022/2023                     |            |     |
| Education level  | first-cycle studies  |  | Subject group   |                                     |                               |            |     |
| Mode of study  | Full-time studies  |  | Mode of delivery  |                                     | at the university             |            |     |
| Year of study  | 2  |  | Language of instruction   |                                     | Polish                        |            |     |
| Semester of study  | 3  |  | ECTS credits  |                                     | 3.0                           |            |     |
| Learning profile   | general academic profile   |  | Assessment form   |                                     | assessment                    |            |     |
| Conducting unit  | Department of Control and Power Engineering -> Faculty of Ocean Engineering and Ship Technology  |  |   |                                     |                               |            |     |
| Name and surname of lecturer (lecturers)                       | Subject supervisor   |  | dr inż. Klaudia Wrzask  |                                     |                               |            |     |
|  | Teachers   |  | dr inż. Klaudia Wrzask  |                                     |                               |            |     |
| Lesson types and methods of instruction                        | Lesson type  | Lecture  | Tutorial  | Laboratory                          | Project                       | Seminar    | SUM |
|  | Number of study hours  | 15.0   | 15.0  | 0.0                                 | 0.0                           | 0.0        | 30  |
|  | 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  | 30   |   | 3.0                                 |                               | 42.0       | 75  |
| Subject objectives   | Ability of mathematical methods application in engineering   |  |   |                                     |                               |            |     |
| Learning outcomes  | Course outcome   |  | Subject outcome   |                                     | Method of verification        |            |     |
| Subject contents   | Signal approximation and processing, Fourier series, Fourier transform, Fourier analysis, solving differential equations, Laplace transform, basic concepts and application of the theory of random processes, fuzzy set theory and its application, genetic algorithms and their applications.  |  |   |                                     |                               |            |     |
| Prerequisites and co-requisites                                | knowledge of mathematics fundamentals  |  |   |                                     |                               |            |     |
| Assessment methods and criteria                                | Subject passing criteria   |  | Passing threshold   |                                     | Percentage of the final grade |            |     |
|  | test   |  | 50.0%   |                                     | 50.0%                         |            |     |
|  | midterm colloquia  |  | 50.0%   |                                     | 50.0%                         |            |     |
| Recommended reading  | Basic literature   |  | [1] Cooper G.R., Mc Gillem C.D.: Probabilistic Methods of Signal and Systems Analysis. New York-Oxford University Press, 1999, [2] Jordan D.W., Smith P.: Mathematical Techniques. Oxford University Press, 1998, [3] Lathi B.P.: Signal Processing and Linear Systems. Berkeley Cambridge Press, 1998, [4] Fausett L.: Fundamentals of Neural Networks. Prentice Hall, 1994, [5] Hassoun M. H.: Fundamentals of Artificial Neural Networks. MIT Press, 1995, [6] Cox E.: The Fuzzy Systems Handbook. Academic Press, London 1994 |                                     |                               |            |     |
|  | Supplementary literature   |  | No requirements   |                                     |                               |            |     |
|  | eResources addresses   |  | Adresy na platformie eNauczanie:<br>Zastosowanie matematyki w technice, Energetyka, W/Ć, sem. 3, zima 22/23, (PG_00042010) - Nadróbka - Moodle ID: 25919<br><a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=25919">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=25919</a>   |                                     |                               |            |     |
| Example issues/<br>example questions/<br>tasks being completed | purpose of signal modelling using Fourier series, reason of applying both trigonometrical and exponential Fourier series, state space role in mathematical modelling of engineering processes, impulse response role in particular solution of vectorial differential equations, random process analysis using statistical characteristics, fuzzy logic and fuzzy set notion, engineering process analysis using fuzzy set method, analysis of engineering process dynamics using artificial neural network method, genetic algorithm application in design and control optimisation |  |   |                                     |                               |            |     |
| Work placement   | Not applicable   |  |   |                                     |                               |            |     |