

## Subject card

|                                             |                                                                                                                                                                                         |                                                          |                                                                                                                                                                                                                                                          |                                     |                                                                          |            |     |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------|------------|-----|
| Subject name and code                       | Numerical algorithms, PG_00168340                                                                                                                                                       |                                                          |                                                                                                                                                                                                                                                          |                                     |                                                                          |            |     |
| Field of study                              | Informatics                                                                                                                                                                             |                                                          |                                                                                                                                                                                                                                                          |                                     |                                                                          |            |     |
| Date of commencement of studies             | October 2024                                                                                                                                                                            |                                                          | Academic year of realisation of subject                                                                                                                                                                                                                  |                                     | 2025/2026                                                                |            |     |
| Education level                             | Bachelor's studies                                                                                                                                                                      |                                                          | Subject group                                                                                                                                                                                                                                            |                                     | Obligatory subject group in the field of study<br>Optional 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                           | 4                                                                                                                                                                                       |                                                          | ECTS credits                                                                                                                                                                                                                                             |                                     | 5.0                                                                      |            |     |
| Learning profile                            | practical                                                                                                                                                                               |                                                          | Assessment form                                                                                                                                                                                                                                          |                                     |                                                                          |            |     |
| Conducting unit                             |                                                                                                                                                                                         |                                                          |                                                                                                                                                                                                                                                          |                                     |                                                                          |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                      |                                                          | dr inż. Łukasz Kuszner                                                                                                                                                                                                                                   |                                     |                                                                          |            |     |
|                                             | Teachers                                                                                                                                                                                |                                                          |                                                                                                                                                                                                                                                          |                                     |                                                                          |            |     |
| Lesson types                                | Lesson type                                                                                                                                                                             | Lecture                                                  | Tutorial                                                                                                                                                                                                                                                 | Laboratory                          | Project                                                                  | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                                   | 30.0                                                     | 0.0                                                                                                                                                                                                                                                      | 30.0                                | 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                                                       |                                                                                                                                                                                                                                                          | 0.0                                 |                                                                          | 0.0        | 60  |
| Subject objectives                          | The aim of the course is to familiarize students with numerical methods, their applications and problems arising during such calculations.                                              |                                                          |                                                                                                                                                                                                                                                          |                                     |                                                                          |            |     |
| Learning outcomes                           | Course outcome                                                                                                                                                                          |                                                          | Subject outcome                                                                                                                                                                                                                                          |                                     | Method of verification                                                   |            |     |
|                                             | [INFL3_W01] has knowledge in mathematics covering the basics of algebra, discrete mathematics (elements of logic and set theory, combinatorics and graph theory), probabilistic methods |                                                          | the student knows the iterative method and examples of its application the student knows methods of solving linear equations the student knows the issues of interpolation and approximation the student knows the error types numerical data processing |                                     | [SW4] test/exam - oral or written                                        |            |     |
| Subject contents                            | 1. Numerical errors<br>2. Systems of linear equations<br>3. Nonlinear equations<br>4. Interpolation<br>5. Approximation<br>6. Numerical integration                                     |                                                          |                                                                                                                                                                                                                                                          |                                     |                                                                          |            |     |
| Prerequisites and co-requisites             | <ul style="list-style-type: none"><li>Object-oriented programming</li><li>Linear algebra</li><li>Algorithms and data structures</li></ul>                                               |                                                          |                                                                                                                                                                                                                                                          |                                     |                                                                          |            |     |
| Assessment methods and criteria             | Subject passing criteria                                                                                                                                                                |                                                          | Passing threshold                                                                                                                                                                                                                                        |                                     | Percentage of the final grade                                            |            |     |
|                                             |                                                                                                                                                                                         |                                                          | 51.0%                                                                                                                                                                                                                                                    |                                     | 50.0%                                                                    |            |     |
|                                             |                                                                                                                                                                                         |                                                          | 51.0%                                                                                                                                                                                                                                                    |                                     | 50.0%                                                                    |            |     |

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| Recommended reading                                            | Basic literature         | <p>T. Ratajczak, Metody numeryczne. Przykłady i zadania, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2007.</p> <p>Z. Fortuna, B. Macukow, J. Wąsowski, Metody numeryczne, WNT, Warszawa 2006.</p> <p>David Monniaux, The pitfalls of verifying floating-point computations. ACM Transactions on Programming Languages and Systems (TOPLAS), ACM, 2008, 30 (3).</p> |
|                                                                | Supplementary literature | Wojciech Kordecki, Karol Selwat, Metody numeryczne dla informatyków, Helion, Gliwice, 2020                                                                                                                                                                                                                                                                        |
|                                                                | eResources addresses     |                                                                                                                                                                                                                                                                                                                                                                   |
| Example issues/<br>example questions/<br>tasks being completed |                          |                                                                                                                                                                                                                                                                                                                                                                   |
| Work placement                                                 | Not applicable           |                                                                                                                                                                                                                                                                                                                                                                   |

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