

## Subject card

|                                             |                                                                                                                                                                                                                                                              |                                                          |                                         |                                     |                                                                          |            |     |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------|-------------------------------------|--------------------------------------------------------------------------|------------|-----|
| Subject name and code                       | Algorithms and their Application - lecture, PG_00201163                                                                                                                                                                                                      |                                                          |                                         |                                     |                                                                          |            |     |
| Field of study                              | Marine Hydrography                                                                                                                                                                                                                                           |                                                          |                                         |                                     |                                                                          |            |     |
| Date of commencement of studies             | October 2026                                                                                                                                                                                                                                                 |                                                          | Academic year of realisation of subject |                                     | 2029/2030                                                                |            |     |
| 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                               | 4                                                                                                                                                                                                                                                            |                                                          | Language of instruction                 |                                     | Polish                                                                   |            |     |
| Semester of study                           | 7                                                                                                                                                                                                                                                            |                                                          | ECTS credits                            |                                     | 2.0                                                                      |            |     |
| Learning profile                            | practical                                                                                                                                                                                                                                                    |                                                          | Assessment form                         |                                     | credit                                                                   |            |     |
| Conducting unit                             | Laboratory of Physical Oceanography -> Department of Physical Oceanography and Climate Research -> Faculty of Oceanography and Geography -> Rector                                                                                                           |                                                          |                                         |                                     |                                                                          |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                           |                                                          | dr Aleksandra Dudkowska                 |                                     |                                                                          |            |     |
|                                             | Teachers                                                                                                                                                                                                                                                     |                                                          |                                         |                                     |                                                                          |            |     |
| Lesson types                                | Lesson type                                                                                                                                                                                                                                                  | Lecture                                                  | Tutorial                                | Laboratory                          | Project                                                                  | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                        | 30.0                                                     | 0.0                                     | 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                                                       |                                         | 1.0                                 |                                                                          | 19.0       | 50  |
| Subject objectives                          | To explain the operation of widely used computer algorithms.To provide a basic knowledge of numerical methods and modern algorithms. This knowledge will enable you to make informed use of their possibilities in your professional work and everyday life. |                                                          |                                         |                                     |                                                                          |            |     |

|                                 |                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                     |                                                                                   |
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| Learning outcomes               | Course outcome                                                                                                                                                                                                                                                                                                                                      | Subject outcome                                                                                                                                                                                                                                                                                                     | Method of verification                                                            |
|                                 | [HML3-U08] is able to independently use the professional literature available in traditional and electronic form, make an assessment, critical analysis and synthesis as well as the correct interpretation of the information obtained                                                                                                             | is able to independently use specialized literature and online resources; is able to synthesize, evaluate, and correctly interpret the information obtained, and, based on this information, draw conclusions, form opinions, and take action                                                                       | [SU1] oral statement/conversation/discussion                                      |
|                                 | [HML3-U05] when identifying, formulating and solving engineering tasks, is able to integrate knowledge from various fields and disciplines and perceive their systemic and non-technical aspects, including ethical aspects                                                                                                                         | when formulating and solving engineering problems, is able to integrate knowledge from various fields and disciplines and apply a systems-based approach that also takes non-technical aspects into account                                                                                                         | [SU1] oral statement/conversation/discussion<br>[SU4] test/exam - oral or written |
|                                 | [HML3-W02] knows and understands, at an advanced level, selected phenomena and processes occurring in the hydrosphere, atmosphere, lithosphere and biosphere, their interconnections and relations, as well as practical applications of this knowledge in professional activities related to the field of study                                    | knows and understands, at an advanced level, concepts and terminology in the fields of engineering and technology, including electrical engineering, electronics, automation, and computer science, as well as in the fields of mathematics and the natural sciences, particularly Earth and environmental sciences | [SW4] test/exam - oral or written<br>[SW1] oral statement/conversation/discussion |
|                                 | [HML3-W01] knows and understands, at an advanced level, selected facts, phenomena and processes, as well as methods and theories concerning them, explaining the complex relationships between them, constituting basic general knowledge in the field of scientific disciplines forming the theoretical foundations specific to the field of study | knows and understands, at an advanced level, concepts and terminology in the fields of engineering and technology, including electrical engineering, electronics, automation, and computer science, as well as in the fields of mathematics and the natural sciences, particularly Earth and environmental sciences | [SW4] test/exam - oral or written<br>[SW1] oral statement/conversation/discussion |
| Subject contents                | Fundamentals of algorithms. Errors in numerical computing. Numerical algorithms: search and sort, Monte Carlo method, pseudo-random number generators, cellular automata, neural networks, machine learning and artificial intelligence, natural language processing, classification and recommendation.                                            |                                                                                                                                                                                                                                                                                                                     |                                                                                   |
| Prerequisites and co-requisites |                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                     |                                                                                   |
| Assessment methods and criteria | Subject passing criteria                                                                                                                                                                                                                                                                                                                            | Passing threshold                                                                                                                                                                                                                                                                                                   | Percentage of the final grade                                                     |
|                                 | colloquium                                                                                                                                                                                                                                                                                                                                          | 51.0%                                                                                                                                                                                                                                                                                                               | 100.0%                                                                            |
| Recommended reading             | Basic literature                                                                                                                                                                                                                                                                                                                                    | DASGUPTA S., PAPADIMITRIOU Ch., VAZIRANI U.: Algorytmy. Wyd. naukowe PWN, Warszawa 2019. (in Polish)<br><br>RUTKOWSKI L.: Metody i techniki sztucznej inteligencji: inteligencja obliczeniowa. Wyd. naukowe PWN, Warszawa 2019. (in Polish)<br><br>SEdgeWICK R.: Algorytmy. Helion, 2012.(in Polish)                |                                                                                   |
|                                 | Supplementary literature                                                                                                                                                                                                                                                                                                                            | recommended during classes by the teacher                                                                                                                                                                                                                                                                           |                                                                                   |
|                                 | eResources addresses                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                     |                                                                                   |
|                                 | Example issues/<br>example questions/<br>tasks being completed                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                     |                                                                                   |
| Work placement                  | Not applicable                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                     |                                                                                   |

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