



## Subject card

|                                             |                                                                                                                                                                                                                                                                                                                    |                                                          |                                                                                                                                                                                                                                                                          |                                     |                                       |            |     |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------|------------|-----|
| Subject name and code                       | Algorithms and Data Structures, PG_00047803                                                                                                                                                                                                                                                                        |                                                          |                                                                                                                                                                                                                                                                          |                                     |                                       |            |     |
| Field of study                              | Informatics                                                                                                                                                                                                                                                                                                        |                                                          |                                                                                                                                                                                                                                                                          |                                     |                                       |            |     |
| Date of commencement of studies             | October 2021                                                                                                                                                                                                                                                                                                       |                                                          | Academic year of realisation of subject                                                                                                                                                                                                                                  |                                     | 2021/2022                             |            |     |
| Education level                             | first-cycle studies                                                                                                                                                                                                                                                                                                |                                                          | Subject group                                                                                                                                                                                                                                                            |                                     | Optional subject group                |            |     |
| Mode of study                               | Part-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                             | Department of Algorithms and Systems Modelling -> Faculty of Electronics, Telecommunications and Informatics                                                                                                                                                                                                       |                                                          |                                                                                                                                                                                                                                                                          |                                     |                                       |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                                                                                 |                                                          | dr Marcin Jurkiewicz                                                                                                                                                                                                                                                     |                                     |                                       |            |     |
|                                             | Teachers                                                                                                                                                                                                                                                                                                           |                                                          | dr Marcin Jurkiewicz                                                                                                                                                                                                                                                     |                                     |                                       |            |     |
| Lesson types and methods of instruction     | Lesson type                                                                                                                                                                                                                                                                                                        | Lecture                                                  | Tutorial                                                                                                                                                                                                                                                                 | Laboratory                          | Project                               | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                                                                              | 30.0                                                     | 0.0                                                                                                                                                                                                                                                                      | 0.0                                 | 15.0                                  | 0.0        | 45  |
|                                             | E-learning hours included: 0.0                                                                                                                                                                                                                                                                                     |                                                          |                                                                                                                                                                                                                                                                          |                                     |                                       |            |     |
|                                             | Adresy na platformie eNauczanie:                                                                                                                                                                                                                                                                                   |                                                          |                                                                                                                                                                                                                                                                          |                                     |                                       |            |     |
| 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                                                                                                                                                                                                                                                                                              | 45                                                       |                                                                                                                                                                                                                                                                          | 8.0                                 |                                       | 147.0      | 200 |
| Subject objectives                          | The aim of the course is to teach students skills and present necessary tools to evaluate the effectiveness of a existing code, and to efficiently solve simple algorithmic problems.                                                                                                                              |                                                          |                                                                                                                                                                                                                                                                          |                                     |                                       |            |     |
| Learning outcomes                           | Course outcome                                                                                                                                                                                                                                                                                                     |                                                          | Subject outcome                                                                                                                                                                                                                                                          |                                     | Method of verification                |            |     |
|                                             | [K6_U07] can apply methods of process and function support, specific to the field of study                                                                                                                                                                                                                         |                                                          | Student is able to analyze problems and create appropriate models, data structures and heuristic algorithms, assess their computational complexity.                                                                                                                      |                                     | [SU1] Assessment of task fulfilment   |            |     |
|                                             | [K6_W06] Knows and understands the basic processes occurring in the life cycle of devices, facilities and systems specific to a given field of study.                                                                                                                                                              |                                                          | Student is able to analyze problems and create appropriate models, data structures and heuristic algorithms, assess their computational complexity.                                                                                                                      |                                     | [SW1] Assessment of factual knowledge |            |     |
|                                             | [K6_U43] can analyse date and formulate, apply and assess appropriate formal models and algorithms for solving problems in the field of information systems and applications                                                                                                                                       |                                                          | Student knows combinatorial optimization algorithms, methods of construction, analysis and evaluation of algorithms. Student is able to analyze problems and create appropriate models, data structures, heuristic algorithms and assess their computational complexity. |                                     | [SU1] Assessment of task fulfilment   |            |     |
| Subject contents                            | Introduction to computational complexity analysis and the NP-completeness theory. Basic and advanced data structures (dictionaries, hashed arrays, trees, etc.) Sorting algorithms. Exact and greedy algorithms. Heuristics and approximate methods. Graph algorithms. Dynamic programming. Real complex networks. |                                                          |                                                                                                                                                                                                                                                                          |                                     |                                       |            |     |
| Prerequisites and co-requisites             | basic knowledge of C language                                                                                                                                                                                                                                                                                      |                                                          |                                                                                                                                                                                                                                                                          |                                     |                                       |            |     |
| Assessment methods and criteria             | Subject passing criteria                                                                                                                                                                                                                                                                                           |                                                          | Passing threshold                                                                                                                                                                                                                                                        |                                     | Percentage of the final grade         |            |     |
|                                             | Project                                                                                                                                                                                                                                                                                                            |                                                          | 50.0%                                                                                                                                                                                                                                                                    |                                     | 50.0%                                 |            |     |
|                                             | Lecture                                                                                                                                                                                                                                                                                                            |                                                          | 50.0%                                                                                                                                                                                                                                                                    |                                     | 50.0%                                 |            |     |
| Recommended reading                         | Basic literature                                                                                                                                                                                                                                                                                                   |                                                          | T.Cormen i in. "Introduction to data structures<br>M.Kubale "Optymalizacja Dyskretna"                                                                                                                                                                                    |                                     |                                       |            |     |

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|                                                                | Supplementary literature | L.Banachowski i in. Algorytmy i struktury danych<br>N.Wirth Algorithms + data structures = computer programs<br>L.Banachowski i in. Analiza algorytmów i struktur danych<br>M.Sysło i in. Algorytmy optymalizacji dyskretnej<br>Krzysztof Goczyła Struktury danych |
|                                                                | eResources addresses     |                                                                                                                                                                                                                                                                    |
| Example issues/<br>example questions/<br>tasks being completed |                          |                                                                                                                                                                                                                                                                    |
| Work placement                                                 | Not applicable           |                                                                                                                                                                                                                                                                    |