# GDAŃSK UNIVERSITY OF TECHNOLOGY

## Subject card

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| Subject name and code | Applications of geographic information systems, PG_00045324 |
| Field of study | Data Engineering |

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| Date of commencement of studies | October 2023 | Academic year of realisation of subject | 2025/2026 |
| Education level | first-cycle studies | Subject group | Optional subject group 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 | English |
| Semester of study | 6 | ECTS credits | 3.0 |
| Learning profile | general academic profile | Assessment form | assessment |

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| Conducting unit | Department of Geoinformatics -> Faculty of Electronics, Telecommunications and Informatics |

| Name and surname of lecturer (lecturers) | Subject supervisor | dr hab. inż. Marcin Kulawiak |
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| | Teachers | dr hab. inż. Marcin Kulawiak |

| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|---|
| | Number of study hours | 18.0 | 0.0 | 15.0 | 12.0 | 0.0 | 45 |
| | 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 |
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| | Number of study hours | 45 | 4.0 | 26.0 | 75 |

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| Subject objectives | The aim of the course is to familiarize students with advanced methods of spatial data acquisition, storage, processing, analysis and multidimensional visualization. |

| Learning outcomes | Course outcome | Subject outcome | Method of verification |
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| | [K6_U06] Independently solves complex engineering tasks using literature, materials and devices, prepares extensive documentation of the developed solution using appropriate description techniques. | Student can expand the functionality of simple GIS solutions. | [SU4] Assessment of ability to use methods and tools |
| | [K6_U03] analyses problems and creates appropriate models, data structures and algorithms (including heuristic and numerical ones), assesses their computational complexity, estimates errors of the received solutions | Student can analyse spatial data obtained from various sources. | [SU1] Assessment of task fulfilment |
| | [K6_W03] Knows the applications of geoinformation systems, spatial data formats, methods of creating and analysing digital maps, architecture and services of satellite navigation systems. | Student knows the basics of constructing GIS applications. | [SW1] Assessment of factual knowledge |

| Subject contents | 1. Advanced methods of obtaining geospatial data from active and passive sensors. |
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| | 2. Advanced geospatial data formats and models (data from laser sensors, data from acoustic sensors, data from GPS; GML, KML, GeoJSON, LAS, Shapefile, 3DTiles). |
| | 3.Advanced methods of geospatial data processing and analysis (correlation, regression, IDW, Kriging, Minimum Curvature, trend analysis, modeling and simulation of physical phenomena in GIS) |
| | 4. Programming of Web-GIS |
| | 5. GIS in the context of mobile devices (including GIS programming for mobile devices, obtaining high-quality data using smartphones) |
| | 6. Programming of multidimensional simulations in the context of Spatial Information Systems (3D and 4D modeling and visualization using popular GIS libraries) |

| Prerequisites and co-requisites | Knowledge of Java, Javascript, C++ and python languages, ability to use Unix/Linux, Windows operating systems, |
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| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
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| | written test | 60.0% | 34.0% |
| | project | 60.0% | 33.0% |
| | laboratory | 60.0% | 33.0% |

| Recommended reading | Basic literature | Longley, P.A., Goodchild, M.F., Maguire, D.J. and Rhind, D.W., 2015. *Geographic information systems and science*. John Wiley & Sons. |
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| | Supplementary literature | Cressie, N., 1990. The origins of kriging. *Mathematical geology*, *22*(3), pp.239-252. |
| | eResources addresses | Adresy na platformie eNauczanie: |

| Example issues/ example questions/ tasks being completed | 1. Methods of raster spatial data acquisition |
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| | 2. Methods of spatial data analysis |

| Work placement | Not applicable |
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