University of Gdańsk

Subject card

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| Subject name and code | GIS and Remote Sensing II - laboratories, PG_00120427 | | |
| Field of study | Geography | | |
| 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>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 | 2 | Language of instruction | Polish |
| Semester of study | 3 | ECTS credits | 1.0 |
| Learning profile | academic | Assessment form | credit |
| Conducting unit | Geographic Information System (GIS) Laboratory -> Faculty of Oceanography and Geography -> Rector | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr Maciej Markowski | |
| | Teachers | | |

**Lesson types**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 0.0 | 0.0 | 15.0 | 0.0 | 0.0 | 15 |

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 | 15 | 5.0 | 10.0 | 30 |

**Subject objectives**

- Familiarization with the capabilities and practical applications of GIS
- Learning the principles of cartographic image composition
- Understanding selected methods of graphic analysis
- Ability to analyze geographic data using GIS
- Presentation of results, map composition, and printing
- Proficiency in GIS software (ArcGIS/ArcGIS Pro or QGIS) at basic and intermediate levels
- Knowledge of analytical methods in processing aerial and satellite images
- Basic skills in remote sensing of the geographic environment
- Ability to conduct remote sensing analyses using ArcGIS/SNAP/QGIS

Learning outcomes

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [GEOGRL3-W08] at an advanced level methods and principles development of data on the natural and anthropogenic environment, and methods of their analysis and interpretation | Student knows and understands advanced methods and principles for processing data on the natural and anthropogenic environment, as well as methods for their analysis and interpretation using GIS tools. Additionally, he/she knows and understands advanced methods and principles used in remote sensing for processing data on the natural and anthropogenic environment, as well as the research and measurement techniques used during visual and digital interpretation in the process of acquiring geographic and social data. Contents: B.1-B.17 | [SW4] test/exam - oral or written |
| [GEOGRL3-U05] find and select the necessary information from professional literature and other sources, including electronic sources | The student is capable of locating and selecting necessary spatial data information from specialized literature and other sources, including electronic sources, and employs remote sensing terminology to a degree enabling the retrieval and selection of essential information from specialized literature and other sources, including electronic sources. Contents: B.1-B.17 | [SU2] presentation/project/paper/ report<br>[SU4] test/exam - oral or written<br>[SU5] implementation of a problem task |
| [GEOGRL3-U06] apply methods and research tools of geographic sciences, including conducting observations and field measurements, and assess their suitability for the tasks in which the application objective of geography can be achieved | The student is able to apply methods and research tools in physical geography by utilizing GIS tools, and assess their suitability for achieving tasks with practical geographic applications. Moreover, by employing appropriate methods and research tools in remote sensing, the student gathers data from aerial and satellite photographic images and digital imagery, which are utilized for remote sensing of the geographic environment, identifying spatial locations of its elements, and determining relationships between them necessary for human activity planning, as well as identifying areas threatened by anthropogenic pressures. Contents: B.1-B.17.<br>The student can apply their knowledge to solve complex and atypical problems, and perform tasks under conditions that are not entirely predictable by selecting appropriate sources and information from them, as well as by employing suitable methods and tools, including advanced information and communication technology (ICT) techniques. Contents: B.3-B.17 | [SU2] presentation/project/paper/ report<br>[SU4] test/exam - oral or written<br>[SU5] implementation of a problem task |
| [GEOGRL3-U07] use geoinformatics techniques and simple statistical tools and methods of spatial analysis to determine relationships between a variety of variables specific to the geographic environment and present the results of the analyses performed | The student can utilize geoinformatic techniques along with basic statistical tools and spatial analysis methods to determine relationships between various variables characteristic of the geographic environment and present the results of conducted analyses. Contents: B.3-B.17 | [SU2] presentation/project/paper/ report<br>[SU4] test/exam - oral or written<br>[SU5] implementation of a problem task |
| [GEOGRL3-K03] work in a group and perform various roles in it, take care of the entrusted equipment and the safety of themselves and others | Working independently or as part of a team, the student takes responsibility for their own work and jointly undertaken tasks. They ensure the proper care of entrusted equipment and prioritize safety in their own work and for others. Contents: B.1-B.17 | [SK8] observation of student's independent or team work |

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| Subject contents | B.1 Understanding GIS concepts and GIS software<br>B.2 Application of metadata and ability to acquire, process, and create them<br>B.3 Creating cartographic compositions according to cartographic principles<br>B.4 Working with non-spatial point data<br>B.5 Acquisition and processing of vector data<br>B.6 Georectification of raster and vector sources<br>B.7 Importing and processing data in various formats<br>B.8 Exploration and analysis of spatial data<br>B.9 Modeling vector data in interpolation<br>B.10 Digital Elevation Model (DEM) analysis<br>B.11 Discussion and utilization of vector and raster analysis functions<br>B.12 Methods for delineating watersheds and streams based on DEM<br>B.13 Automation of spatial data processing and analysis processes<br>B.14 Traditional techniques of remote sensing analysis<br>B.15 Analysis of natural disaster impacts and flood extent<br>B.16 Vegetation indices in remote sensing |
| Prerequisites and co-requisites | |
| Assessment methods and criteria | |

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| test | 51.0% | 40.0% |
| practical i theoretical exercises | 51.0% | 60.0% |

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| Recommended reading | Basic literature | - Davis D., 2004, GIS dla każdego, Wydawnictwo Mikom, Warszawa.<br>- Gotlib D., Iwaniak A., Olszewski R., 2007. GIS. Obszary zastosowań. PWN Warszawa.<br>- Urbański J., 2012, GIS w badaniach przyrodniczych (ebook), Centrum GIS, Uniwersytet Gdański.<br>- Sitek Z., 1997. Wprowadzenie do teledetekcji lotniczej i satelitarnej, Wydawnictwa AGH, Kraków.<br>- Adamczyk J., Będkowski K, 2007. Metody cyfrowe w teledetekcji. Wydawnictwo SGGW.<br>- Kurczyński Z., 2006. Lotnicze i satelitarne obrazowanie Ziemi, Oficyna wydawnicza Politechniki Warszawskiej, Warszawa<br>- Kryza M., Szymanowski M., Wieczorek M., 2007, The Application of Selected Interpolation Methods for Modelling Extreme Air Temperature in South-Western Poland, Przegląd Geofizyczny, 52(1):61-82. |
| | Supplementary literature | - Richards J.A., Jia X., 2006. Remote sensing digital image analysis. Springer.<br>- Butowtt J., Kaczyński R., 2003, Fotogrametria, Wojskowa Akademia Techniczna, Warszawa.<br>- Lyon J.G., 2003, GIS for water resources and watershed management, CRC Press.<br>- Tomlinson R., Thinking about GIS, 2013, Esri Press.<br>- Zwoliński Z. (red.), 2010, GIS woda w środowisku. Bogucki Wydawnictwo Naukowe, Poznań.<br>- Markowski M., Golus W., Kwidzińska M., 2015, Aplikacyjność metod oceny wielkości opadów zasilających oczka Pomorza Gdańskiego [w:] D. Absalon, M. Matysik, M. Ruman [red.] Nowoczesne metody i rozwiązania w hydrologii i gospodarce wodnej, Komisja Hydrologiczna Polskiego Towarzystwa Geograficznego, Sosnowiec, s. 287-298.<br>- Bajkiewicz-Grabowska E., Markowski M., Lemańczyk K., 2016, Application of geoinformation techniques to determine zones of sediment resuspension induced by wind waves in lakes (using two lakes from Northern Poland as examples), Limnological Review 1/2016. |
| | eResources addresses | Basic<br>https://pro.arcgis.com/en/pro-app/get-started/pro-quickstart-tutorials.html - ArcGISPro tutorials |
| Example issues/ example questions/ tasks being completed | | |
| Work placement | Not applicable | |

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