University of Gdańsk

Subject card

Subject name and code	Remote Sensing of the Geographical Environment - laboratory, PG_00193854						
Field of study	Geography						
Date of commencement of studies	October 2027		Academic year of realisation of subject	2029/2030			
Education level	Bachelor's studies		Subject group	Obligatory subject group in the field of study Optional subject group			
Mode of study	full-time studies		Mode of delivery	at the university			
Year of study	3		Language of instruction	Polish			
Semester of study	5		ECTS credits	3.0			
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	40.0	0.0	0.0	40
	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	40		4.0	31.0	75	
Subject objectives	Equipping students with theoretical knowledge and practical skills in acquiring, processing, and interpreting remote sensing data. The course focuses on the use of satellite imagery (optical and radar) for monitoring the condition and changes in the geographic environment, including vegetation ecosystems, water resources, and urban areas.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[GEOGRL3-W04] has advanced knowledge of the Earth's geographical environment, understood as a unified system of interconnected and interacting components; its diversity, functioning, and dynamics of change, including the interaction of environmental components in the area of the South Baltic Coast and Lake District	The student interprets multi-temporal satellite imagery to assess the dynamics of changes in the Southern Baltic Coasts and Lake Districts, and to identify anthropogenic and natural causes of these transformations.	[SW2] presentation/project/paper/ report
[GEOGRL3-W02] knows and understands key concepts and theories in geography, as well as advanced processes and phenomena related to spatial diversity and the distribution of processes and phenomena on the Earth's surface at various spatial scales, particularly in Poland	The student understands and applies key concepts and theories in Remote Sensing, GIS, and geography, including the analysis of processes and phenomena in a spatial context.	[SW2] presentation/project/paper/ report
[GEOGRL3-W06] knows advanced methods of acquiring, processing, and compiling geographic environmental data, as well as methods of analyzing and interpreting such data	The student independently acquires, processes, and analyzes remote sensing data in a GIS environment, creating databases using satellite imagery and radar data.	[SW2] presentation/project/paper/ report
[GEOGRL3-U03] can plan and conduct, independently and as part of a team, simple research in the field of geography under the supervision of a scientific advisor, based on the necessary information from professional literature and other sources	The student can plan and conduct remote sensing and GIS analyses based on diverse data sources, both individually and collaboratively in a team.	[SU5] implementation of a problem task
[GEOGRL3-U09] is able to work in a group and take on various roles within it, look after the equipment entrusted to them, and ensure their own safety and that of others.	The student ensures the security of data and IT infrastructure, applying proper GIS project archiving practices and adhering to health and safety regulations when working at a computer workstation.	[SU2] presentation/project/paper/ report [SU5] implementation of a problem task

Subject contents

1. Introduction to remote sensing of the geographic environment
2. Sources and characteristics of satellite imagery (spatial, spectral, radiometric, and temporal resolution)
3. Physical fundamentals of remote sensing electromagnetic radiation and spectral curves
4. Preparation of remote sensing data for analysis (corrections, color composites)
5. Spectral indices in environmental analysis
6. Remote sensing of vegetation and monitoring ecosystem health
7. Remote sensing of surface waters and coastal zones
8. Remote sensing of urban areas and spatial development analysis
9. Use of different classification methods in land cover and land use analysis (supervised and unsupervised methods)
10. Multi-temporal analysis of environmental changes
11. Radar remote sensing (SAR) in environmental studies
12. Project comprehensive analysis of a selected environmental problem using remote sensing data (report preparation and results presentation)

Prerequisites and co-requisites

Completion of GIS and Remote Sensing III

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
practical exercises	51.0%	65.0%
project	51.0%	35.0%

Recommended reading

Basic literature

- Kurczyński Z., 2006, Lotnicze i satelitarne obrazowanie Ziemi, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa.
- Sanecki J., 2006, Teledetekcja. Pozyskiwanie danych, Wydawnictwo Naukowo-Techniczne (WNT), Warszawa.
- Czachór Z., Sójka A. J., 2025, Europejski system obserwacji Ziemi prowadzonych z przestrzeni kosmicznej, Wydawnictwo Naukowe E-Book, Poznań.
- Hejmanowska B., Wężyk P. (red.), 2020, Dane satelitarne dla administracji publicznej, Polska Agencja Kosmiczna, Warszawa.
- Lillesand T. M., Kiefer R. W., Chipman J. W., 2015, Remote Sensing and Image Interpretation, John Wiley & Sons, New York.

	Supplementary literature	• Adamczyk J., Będkowski K., 2007, Metody cyfrowe w teledetekcji, Wydawnictwo SGGW, Warszawa. • Wyczałek I., 2007, Wykorzystanie wysokorozdzielczych obrazów satelitarnych w systemie informacji przestrzennej, Wydawnictwo Politechniki Poznańskiej, Poznań. • Szturc J., 2004, Teledetekcja satelitarna i radarowa w meteorologii i hydrologii, Wydawnictwo ATH, Bielsko-Biała. • Yang X. (red.), 2009, Remote Sensing and Geospatial Technologies for Coastal Ecosystem Assessment and Management, Springer, Berlin/Heidelberg.
	eResources addresses	
Example issues/ example questions/ tasks being completed	• Spectral signatures and vegetation indices • Selecting appropriate imagery parameters for research objectives	
Work placement	Not applicable	

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