



Photo Interpretation

Course description sheet

Basic information

Field of study Geospatial Computer Science	Didactic cycle 2024/2025
Major Remote Sensing and GIS	Course code DGEITGS.IIi1.07198.24
Organisational unit Faculty of Geo-Data Science, Geodesy, and Environmental Engineering	Lecture languages English
Study level Second-cycle (engineer) programme	Mandatoriness Obligatory
Form of study Full-time studies	Block Major Modules
Profile General academic	Course related to scientific research Yes
Course coordinator	Wojciech Drzewiecki
Lecturer	Wojciech Drzewiecki, Antoni Rzonca, Ewa Głowienka, Tomasz Pirowski, Aleksandra Wagner
Period Semester 1	Method of verification of the learning outcomes Exam
	Activities and hours Lectures: 15 Project classes: 30
	Number of ECTS credits 4

Goals

C1	To introduce the students to the principles of visual and computer-aided interpretation of aerial photographs and remotely sensed data, especially for environmental applications
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Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge - Student knows and understands:			
W1	knows principles of visual and computer-aided interpretation of airborne and satellite images and ALS data	GEI2A_W01, GEI2A_W03	Examination
W2	knows computer techniques for remote sensing image enhancement and information extraction	GEI2A_W03	Examination
Skills - Student can:			
U1	has developed skills of visual and computer-aided interpretation of airborne and satellite images and ALS data for different purposes	GEI2A_U01, GEI2A_U03, GEI2A_U09	Activity during classes, Execution of exercises, Project, Examination
U2	use computer techniques for remote sensing image enhancement and information extraction, to facilitate the interpretation of airborne and satellite images and ALS data	GEI2A_U01, GEI2A_U03, GEI2A_U09	Activity during classes, Execution of exercises, Project, Examination
Social competences - Student is ready to:			
K1	responsible usage of remotely sensed data in practical applications	GEI2A_K01	Activity during classes, Project, Examination

Program content ensuring the achievement of the learning outcomes prescribed to the module

The course will introduce students to the principles of visual and computer-aided interpretation of aerial photographs and remotely sensed data, especially for environmental applications.

Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lectures	15
Project classes	30
Preparation for classes	15
Realization of independently performed tasks	10
Examination or final test/colloquium	2
Contact hours	2
Preparation of project, presentation, essay, report	40
Student workload	Hours 114
Workload involving teacher	Hours 45

* hour means 45 minutes

Program content

No.	Program content	Course's learning outcomes	Activities
1.	1) Basic techniques for image enhancement and information extraction from remotely sensed data. 2) Large scale land use/land cover mapping project (on-screen interpretation of LU/LC, field verification, accuracy assessment). 3) Application focused interpretation of remote sensing data (eg. agriculture, impervious surfaces, hydrology, soils, vegetation, change detection, etc.)	U1, U2, K1	Project classes
2.	Principles of visual interpretation of aerial photographs and satellite imagery. Principles of application-oriented interpretation of ALS data. Computer techniques for image enhancement and information extraction. Land use/land cover (LU/LC) interpretation and mapping. Vegetation interpretation and mapping. Interpretation and mapping of surface waters and hydrology. Cultural heritage oriented applications. Interpretation of soils and geological features. Multitemporal analyses.	W1, W2, K1	Lectures

Extended information/Additional elements

Teaching methods and techniques :

Demonstration, Workshop, Project Based Learning, E-learning, Group work, Lectures

Activities	Methods of verification	Credit conditions
Lectures	Activity during classes, Project, Examination	
Project classes	Activity during classes, Execution of exercises, Project, Examination	

Conditions and the manner of completing each form of classes, including the rules of making retakes, as well as the conditions for admission to the exam

The basis for passing the exercises is active participation in classes and positive results of the current checking whether the assumed learning outcomes have been achieved by the student. To pass the exercises it is necessary to complete all project tasks and present appropriate reports or/and presentations. In the case of project tasks, the following will be evaluated: the correctness of the adopted methodology of solving the task, its final effect, the timeliness of execution and the way of presenting the results, as well as answers to questions asked by the lecturer during the presentation of results. The grade from the exercises will be the arithmetic mean of the grades from individual projects. Additional bonus may be granted based on activity and participation in discussion during classes. To pass the subject, it is required to obtain positive grades (minimum 3.0) from each of the projects carried out. The student who participated in compulsory classes (i.e. missed no more than 2 classes without excuse) is eligible for two additional approaches to pass the project or the passing test.

Method of determining the final grade

Final grade = 0.5*project grade + 0.5* exam grade Both, project and exam, has to be graded at least 3.0

Manner and mode of making up for the backlog caused by a student justified absence from classes

The conditions of making up for the backlog resulting from the student's absence will be determined in an individual manner

based on: the number of absences, the type of the backlog and the degree of advancement of the student in the performance of his exercises. A way to compensate for the backlog may be to take exercise classes in another exercise group (after prior notification and with the consent of the lecturer) or the student's own work with the possibility of consulting it with lecturers.

Prerequisites and additional requirements

Prerequisites: Basic knowledge of remote sensing imaging techniques and methods of remotely sensed data processing.

Rules of participation in given classes, indicating whether student presence at the lecture is obligatory

Participation in the exercise classes is mandatory. A maximum of 2 (in words: two) unjustified absences is allowed in the semester. The excuse for absence may be health reasons or other important reasons recognized by the instructor. The student is obliged to justify absence from the first classes after the reason for the absence has ceased. Exceeding the threshold of 20% of unjustified absence results in the inability to pass the exercises. In exceptional cases, a student who has important random causes or due to a documented, long-term illness exceeded the above-mentioned limits, can obtain the consent of the teacher to pass the exercises.

Literature

Obligatory

1. Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman: Remote Sensing and Image Interpretation, 7th Edition. Wiley 2015
2. John R. Jensen: Remote Sensing of the Environment: An Earth Resource Perspective, 2nd Edition. Pearson 2007.

Scientific research and publications

Publications

1. Sebastian Aleksandrowicz, Anna Wawraszek, Wojciech DRZEWIECKI, Michał Krupiński: Change detection using global and local multifractal description. IEEE Geoscience and Remote Sensing Letters 2016 vol. 13 no. 8, s. 1183-1187
2. Dorota Maryniak, Wojciech DRZEWIECKI: Zmiany pokrycia terenu Pustyni Błędowskiej w latach 1926-2005 — Land cover changes in Błędowska Desert area between 1926 and 2005. Archiwum Fotogrametrii, Kartografii i Teledetekcji, 2010 vol. 21, s. 245-256
3. Wojciech DRZEWIECKI: Sub-pixel classification of middle-resolution satellite images - evaluation of regression trees applicability to monitor impervious surfaces coverage. Geomatics and Environmental Engineering, 2010 vol. 4 no. 4, s. 61-75
4. Wojciech DRZEWIECKI: Monitoring zmian pokrycia i użytkowania terenu na podstawie wieloczasowych obrazów teledetekcyjnych — Land-use/land cover monitoring based on multitemporal remote sensing images. Roczniki Geomatyki 2008 t. 6 z. 3 spec., s. 131-142.
5. Stanisław MULARZ, Wojciech DRZEWIECKI: Interpretacja głównych elementów krajobrazu na teledetekcyjnych obrazach lotniczych i satelitarnych — Interpretation of main landscape elements on aerial and satellite photographs . Czasopismo Techniczne, R. 105 z. 4. Architektura , 2008 , s. 101-107
6. Mierzwa W., Rzonca A., 2003 - Skanowanie powierzchni jako nowa metoda rejestracji i interpretacji szczegółów architektonicznych (Surface scanning as a new method of recording and interpretations of architecture details), Archiwum Fotogrametrii, Kartografii i Teledetekcji vol. 13B, Wrocław 2003
7. Gabor K., Rzonca A., 2014 - Development of a system for monitoring of technical condition of a historical site on the example of barracks in the former Auschwitz-Birkenau camp - Opracowanie systemu monitoringu obrazowego stanu technicznego obiektu zabytkowego na przykładzie baraków byłego obozu Auschwitz-Birkenau. Pomiary, Automatyka, Kontrola. 2014 vol. 60 nr 2, s. 122-125
8. Majek K., Rzonca A., 2016 - Lidarometry as a Variant of Integration of Photogrammetric and Laser Scanning Data Lidarometria jako wariant integracji danych fotogrametrycznych oraz skaningowych, MAM 2016 nr 08, s. 268-273
9. Tomasz PIROWSKI, Bartłomiej Szypuła, Michał Marciak: Interpretation of multispectral satellite data as a tool for 10. 11. 12. detecting archaeological artifacts (Navkur Plain and Karamleis Plain, Iraq). Archaeological and Anthropological Sciences, 2022 — vol. 14 iss. 9 art. no. 166, s. 1-21.
10. Tomasz PIROWSKI, Michał Marciak, Marcin Sobiech: Potentialities and limitations of research on VHRS data: Alexander the Great's military camp at Gaugamela on the Navkur Plain in Kurdish Iraq as a test case. Remote Sensing, 2021 —

vol. 13 iss. 5 art. no. 904, s. 1-31

11. Krystyna Michałowska, Ewa GŁOWIENKA: Multi-temporal analysis of changes of the southern part of the Baltic Sea coast using aerial remote sensing data. *Remote Sensing*, 2022 — vol. 14 iss. 5 art. no. 1212, s. 1-17.
12. Rafał GAWAŁKIEWICZ, Aleksandra WAGNER: Morphometric parameters of the water bodies of Bagry Wielkie and Bagry Małe in the biodiversity context — Parametryzacja morfometryczna zbiorników Bagry Wielkie i Bagry Małe na tle bioróżnorodności, *Geoinformatica Polonica* ; ISSN 1642-2511. — 2023 — vol. 22, s. 35-51. — Bibliogr. s. 50-51

Learning outcomes prescribed to a field of study

Code	Content
GEI2A_K01	samosdoskonalenia, a także postępowania profesjonalnego, odpowiedzialnego i zgodnego z zasadami etyki zawodowej.
GEI2A_U01	stosować zaawansowane metody pozyskiwania, integracji i przetwarzania informacji pochodzących z różnych źródeł danych.
GEI2A_U03	stosować specjalistyczne metody przetwarzania obrazu i wykorzystania danych fotogrametrycznych i teledetekcyjnych.
GEI2A_U09	pracować indywidualnie i kierować zespołem; szacować czas potrzebny na realizację zleconego zadania; potrafi opracować i zrealizować harmonogram prac zapewniający dotrzymanie terminów; przygotować i przedstawiać wyniki przeprowadzonych analiz oraz opracować specjalistyczne raporty z realizacji powierzonego zadania.
GEI2A_W01	złożone zasady pozyskiwania z różnych źródeł danych przestrzennych oraz środowiskowych.
GEI2A_W03	zaawansowane metody i techniki, w tym teledetekcyjne, stosowane do pozyskiwania i przetwarzania danych przestrzennych i środowiskowych na potrzeby geoinformacji.