

DESCRIPTION OF THE COURSE OF STUDY

Course code	0532.6.GEO1.B/C.TŚ	
Name of the course in	Polish	<i>Teledetekcja środowiska</i>
	English	<i>Remote Sensing of Environment</i>

1. LOCATION OF THE COURSE OF STUDY WITHIN THE SYSTEM OF STUDIES

1.1. Field of study	Geography
1.2. Mode of study	stationary / extramural
1.3. Level of study	First - Bachelor's Degree
1.4. Profile of study*	general academic
1.5. Person/s preparing the course description	Grzegorz Walek PhD
1.6. Contact	grzegorz.walek@ujk.edu.pl, tel. 41-349-64-09

2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

2.1. Language of instruction	Polish
2.2. Prerequisites*	Basic GIS knowledge

3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

3.1. Form of classes	Lecture, classes
3.2. Place of classes	Classes in the classrooms of the Jan Kochanowski University
3.3. Form of assessment	Credit with grade
3.4. Teaching methods	Lecture, and with the use of a computer: blended learning (work with the software with the support of the teacher, tasks to be solved), demonstration, discussion.
3.5. Bibliography	Required reading
	Further reading

Kurczyński Z., 2006, Lotnicze i satelitarne zobrazowania Ziemi. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa.
 Będkowski K., 2016, Podstawy fotogrametrii i teledetekcji dla leśników. Wyd. SGGW Warszawa.
 United States Geological Survey, 2019, Landsat 7 (L7) Data Users Handbook, Version 2.0.
 Ciołkosz A., Miszański J., Ołędzki J., 1999, Interpretacja zdjęć lotniczych, PWN, Warszawa.
 Wężyk P., red., 2015, Podręcznik dla uczestników szkoleń z wykorzystania produktów LiDAR, Wyd. 2., Warszawa.
 United States Geological Survey, 2019, Landsat 8 (L8) Data Users Handbook, Version 5.0.

4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED LEARNING OUTCOMES

<p>4.1. Course objectives (including form of classes)</p> <p>C1 - equipping students with information on remote sensing in terms of its use in environmental protection C2 - getting to know the sensors used in remote sensing, principles of their operation and characteristics of exemplary applications of remote sensing sensors C3 - learning to practically use, read and interpret the content of aerial and satellite images with the use of GIS tools</p>
<p>4.2. Detailed syllabus (including form of classes)</p> <p>Lectures</p> <p>Remote sensing as a method of studying the geographical environment. Outline of the history of remote sensing development. Electromagnetic radiation and its use in remote research of the Earth. Levels of retrieving remote sensing data. Historical and contemporary techniques and remote sensing systems. Digital processing of satellite images. Basics of interpretation of aerial photos and satellite images. Remote sensing of the geographic environment. Remote sensing of anthropogenic objects, phenomena and processes. Monitoring of the geographical environment and its importance in spatial planning and environmental protection. Possibilities and directions of development of environmental remote sensing applications. Remote sensing data sources. (including e-learning)</p> <p>Classes</p> <p>Introduction to issues related to remote sensing. Presentation of classic methods of aerial photography analysis. Review of available aerial photos and satellite imagery and sources of their acquisition. Processing and interpretation of satellite images. Statistical analysis of the image and contrast stretching. Creating color compositions. Digital classification of multispectral images. Generating a land cover / use map based on satellite imagery. Possibilities of using geometrically uncorrected aerial photography in geomorphological analyzes. Orthorectification and photo georeferencing. Airborne laser scanning.</p>

4.3 Intended learning outcomes

Code	A student, who passed the course	Relation to learning outcomes
within the scope of KNOWLEDGE:		
W01	Describes the methods of identifying the state of the environment with the use of environmental remote sensing techniques	GEO1A_W03
W02	He knows the sources of remote sensing data used in environmental analyzes as well as the formal and legal principles of their use	GEO1A_W04
W03	Describes research methods of modern remote sensing, including techniques of data acquisition and processing in the GIS environment, in solving problems in the field of physical and socio-economic geography	GEO1A_W06
within the scope of ABILITIES:		
U01	Uses available remote sensing data and software to perform calculations of selected indicators and classification procedures aimed at creating land cover maps	GEO1A_U01
U02	Uses geographical terminology, uses scientific language, taking part in discussions and debates	GEO1A_U02
U03	Searches, downloads and analyzes remote sensing data from domestic and foreign sources	GEO1A_U03
U04	Analyzes the problems related to the natural environment using the methods of modern remote sensing and GIS	GEO1A_U08
within the scope of SOCIAL COMPETENCE:		
K01	Is aware of the role of modern remote sensing in the assessment of the state of the natural environment and its protection	GEO1A_K03

4.4. Methods of assessment of the intended learning outcomes

Teaching outcomes (code)	Method of assessment (+/-)																				
	Exam oral/written*			Test*			Project*			Effort in class*			Self-study*			Group work*			Others* e.g. standardized test used in e-learning		
	Form of classes			Form of classes			Form of classes			Form of classes			Form of classes			Form of classes					
	L	C	...	L	C	...	L	C	...	L	C	...	L	C	...	L	C	...	L	C	...
W01				X							X										
W02				X							X										
W03				X							X										
U01								X						X							
U02								X			X			X							
U03								X						X							
U04								X						X							

*delete as appropriate

4.5. Criteria of assessment of the intended learning outcomes

Form of classes	Grade	Criterion of assessment
lecture (L) (including e-learning)	3	The student has elementary knowledge of historical and contemporary remote sensing techniques and data. Can distinguish between types of remote sensing data.
	3,5	As above, and moreover, the student defines the concept of remote sensing and gives examples of remote sensing data made from various platforms. Can describe the principle of operation of passive and active remote sensing techniques.
	4	As above, and moreover, the student is able to specify the most important contemporary sources of remote sensing data. He knows the definition of unsupervised and supervised classification. Distinguishes between the terms georeference and orthorectification.
	4,5	As above, and moreover, the student characterizes the most important sets of remote sensing data and gives examples of their practical application.
	5	As above, and moreover, the student knows the principles of calculating basic spectral indices and characteristics.
classes (C) (including e-learning)	3	The student has elementary knowledge of historical and contemporary remote sensing techniques and data. Can distinguish between types of remote sensing data.
	3,5	As above, and moreover, the student is able to obtain remote sensing data from a specific platform for a specific area. Has the ability to process basic remote sensing data, including contrast stretching,

4	As above, and moreover, the student is able to generate color compositions and spectral enhancements. Can georeference an aerial photo.
4,5	As above, and moreover, the student is able to classify supervised and unsupervised based on appropriate remote sensing data. Is able to generate a numerical terrain model and a numerical land cover model based on a point cloud from airborne laser scanning.
5	As above, and moreover, the student is able to correctly interpret the results obtained during the classification of remote sensing data, improve the accuracy of the classification and create land cover maps.

5. BALANCE OF ECTS CREDITS – STUDENT’S WORK INPUT

Category	Student's workload	
	Full-time studies	Extramural studies
<i>NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/</i>	60	29
<i>Participation in lectures*</i>	15	7
<i>Participation in classes, seminars, laboratories*</i>	45	22
<i>Preparation in the exam/ final test*</i>		
<i>Others (please specify e.g. e-learning)*</i>		
<i>INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/</i>		
<i>Preparation for the lecture*</i>		
<i>Preparation for the classes, seminars, laboratories*</i>		
<i>Preparation for the exam/test*</i>		
<i>Gathering materials for the project/Internet query*</i>		
<i>Preparation of multimedia presentation</i>		
<i>Others *</i>		
TOTAL NUMBER OF HOURS	100	100
ECTS credits for the course of study	4	4

**delete as appropriate*

Accepted for execution (date and legible signatures of the teachers running the course in the given academic year)

.....