Transitional work on geo-informatics in remote sensing – individually selected issue solved under the supervision of a tutor

Course description sheet

Basic information

Field of study Remote Sensing and Geo Informatics **Major** All **Organisational unit** Faculty of Geo-Data Science, Geodesy, and Environmental Engineering **Study level** Second-cycle studies **Form of study** Full-time studies **Profile** General academic	**Didactic cycle** 2026/2027 **Course code** DRSGIS.II1.15494.26 **Lecture languages** English **Mandatoriness** Obligatory **Block** Major Modules **Course related to scientific research** Yes

Course coordinator	Beata Hejmanowska, Ewa Głowienka
Lecturer	Beata Hejmanowska, Ewa Głowienka, Mariusz Twardowski, Urszula Marmol, Sławomir Mikrut, Natalia Borowiec, Wojciech Drzewiecki, Tomasz Pirowski, Antoni Rzonca

Period Semester 1	**Method of verification of the learning outcomes** Exam **Activities and hours** Control and transitional thesis: 80	**Number of ECTS credits** 10

Goals

C1	To carry out a transition work, the purpose of which is to perform scientific research work on the Python application in Earth observation and Geoinformation Science, prepare a report and defend it in the form of an exam.

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	advanced knowledge of remote sensing	RSGI2A_W01, RSGI2A_W02, RSGI2A_W03, RSGI2A_W04, RSGI2A_W05, RSGI2A_W06, RSGI2A_W07	Examination, Report, Involvement in teamwork, Preparation and conduct of scientific research
W2	advanced knowledge in geoscience	RSGI2A_W01, RSGI2A_W04, RSGI2A_W06, RSGI2A_W07	Examination, Report, Involvement in teamwork, Preparation and conduct of scientific research
W3	Python tools for remote sensing and geoscience	RSGI2A_W03, RSGI2A_W04, RSGI2A_W05	Examination, Report, Involvement in teamwork, Preparation and conduct of scientific research
Skills – Student can:			
U1	apply remote sensing knowledge in practice	RSGI2A_U01, RSGI2A_U02, RSGI2A_U05, RSGI2A_U06	Participation in a discussion, Report, Case study, Involvement in teamwork, Preparation and conduct of scientific research
U2	use Python in remote sensing and geoscience	RSGI2A_U03, RSGI2A_U04, RSGI2A_U05, RSGI2A_U06	Report, Case study, Involvement in teamwork, Preparation and conduct of scientific research
U3	perform advanced spatial analysis using remote sensing data	RSGI2A_U01, RSGI2A_U03, RSGI2A_U04, RSGI2A_U05, RSGI2A_U06	Report, Case study, Involvement in teamwork, Preparation and conduct of scientific research
Social competences – Student is ready to:			
K1	intentionally select fit-to-use data	RSGI2A_K01, RSGI2A_K02, RSGI2A_K03	Participation in a discussion, Examination, Involvement in teamwork
K2	solve ethical problems related to the use of spatial analysis in decision support	RSGI2A_K01, RSGI2A_K02, RSGI2A_K03	Participation in a discussion, Examination, Involvement in teamwork

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

The student will acquire advanced knowledge of the possibilities of using geo-informatics in remote sensing. The student chooses an individual project from the available selection of topics or proposes his/her own topic. This module is fully elective in terms of both the subject matter and the instructor.

Student workload

Activity form	Average amount of hours* needed to complete each activity form
Control and transitional thesis	80
Realization of independently performed tasks	80
Preparation of project, presentation, essay, report	120
Examination or final test/colloquium	2
Contact hours	5

Student workload	**Hours** 287
Workload involving teacher	**Hours** 80

* hour means 45 minutes

Program content

No.	Program content	Course's learning outcomes	Activities
1.	Within the block of classes, the student practically applies knowledge and skills from two modules completed in the first part of the semester: Earth observation and Geoinformation Science and Python for remote sensing. The student chooses an individual project from the available selection of topics or proposes his/her own topic. Within the lecture part, the student is introduced to the knowledge of the performed topics. He or she learns the characteristics of scientific research: conducting a literature review, critical analysis, defining the research problem, making a hypothesis, planning an experiment, conducting and documenting the research developing a report. The workshop part consists of performing comprehensive work to solve the selected problem. The work includes the design part, data collection, data pre-processing, preparation of an application in Python, preparation of a report. During the workshop, the student consults the results of his research with the supervisor. The class ends with the defense of the interim work at the exam.	W1, W2, W3, U1, U2, U3, K1, K2	Control and transitional thesis

Extended information/Additional elements

Teaching methods and techniques :

Discussion, E-learning, Case study, Group work, Design thinking, Problem Based Learning, Mentoring, Workshop

Activities	Methods of verification	Credit conditions
Control and transitional thesis	Participation in a discussion, Examination, Report, Case study, Involvement in teamwork, Preparation and conduct of scientific research	Verification of the knowledge during the exam as part of the transitional work passing. Worshops are mandatory. Credit is based on student's activity.

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

Credit of the workshop - on the basis of attendance at classes. A student may proceed to a resit twice.

Method of determining the final grade

Final grade = average of exam and worshop assignments.

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

Compensating for the backlog caused by absence: depending on the classes subject – self-realisation of excercises with the help of individual consultations with the instructor.

Prerequisites and additional requirements

Knowledge of courses: Earth observation and Geoinformation Science and Python for remote sensing

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

Classes in the semester are conducted in blocks. Transitional work is preceded by blocks: Earth observation and Geoinformation Science and Python for Remote Sensing.
Workshops include the training of practical application of the knowledge and is compulsory.

Literature

Obligatory

1. DissertationAdviser.com http://dissertationadviser.com/dissertation-writing-tutorial-mastering-the-apa-format.aspx (access: 25.11.2022)

Optional

1. First Call Magazine.com http://www.firstcallmagazine.com/what-is-a-dissertation (access: 25.11.2022)

Scientific research and publications

Research

1. 2020-2022 Integration of remote sensing data for control in the agricultural direct payments system (IACS), Excellence Initiative - Research University - AGH
2. 01.01.2018 – 31.03.2019 AMMER: Automated Method for Measuring Eutrophication of Inland Water Using Remote Sensing,
3. 12.06.2016-30.06.2018 - CHT2 - Cultural Heritage Through Time, project no 013/DSAP-JG/HERITAGEPLUS/2016, Joint Programming Initiative on Cultural Heritage and Global Change: a new challenge for Europe HERITAGE PLUS Call, team leader

Publications

1. Hejmanowska, B.; Kramarczyk P. (2022). Crop Identification Using One-Shot Airborne Hyperspectral Images, 12th EARSeL Workshop on Imaging Spectroscopy in Potsdam
2. Hejmanowska, B.; Kramarczyk, P.; Głowienka, E.; Mikrut, S. Reliable Crops Classification Using Limited Number of Sentinel-2 and Sentinel-1 Images. Remote Sens. 2021, 13, 3176. https://doi.org/10.3390/rs13163176
3. Hejmanowska B., Glowienka E., Michalowska K., Mikrut S., Kramarczyk P., Opalinski P., Twardowski M., Guidi G., Gonizzi Barsanti S., Micoli L., Shafqat Malik U., Gonzalez-Aguilera D., Sanchez-Aparicio L.J., Rodríguez-Gonzálveza P.R.,, Muñoz-Nieto A.L., , Mills J., Peppa M.V., 2019 - “The Comparison of the Web GIS Applications Relevant for 4D Models Sharing” - IOP Earth and Environmental Sciences
4. Rodríguez-Gonzálvez P., Muñoz-Nieto A.L, del Pozo S., Sanchez-Aparicio L.J, GonzalezAguilera D., Micoli L., Barsanti S.G, Guidi G., Mills J., Fieber K., Haynes J., Hejmanowska B. 2017 - “4D reconstruction and visualization of cultural heritage: Analyzing our legacy through time”, The International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, Vol. 42, Copernicus GmbH
5. Michałowska K., Głowienka E., Hejmanowska B., 2017- "Remote Sensing Methods in the Study of the Impact of Long-Term Process of Sulphur Mining on Environmental Changes of the Carpathian Foreland," 2017 Baltic Geodetic Congress (BGC Geomatics), Gdansk, 2017, pp. 292-296. doi: 10.1109/BGC.Geomatics.2017.80

Learning outcomes prescribed to a field of study

Code	Content
RSGI2A_K01	is ready to resolve conflicts, negotiate, work in a team
RSGI2A_K02	is ready for creative time management, working under time pressure
RSGI2A_K03	maintain an ethical attitude while performing and presenting the results of assigned tasks
RSGI2A_U01	can apply knowledge of mathematics and physics to analyze geospatial data
RSGI2A_U02	can acquire remote environmental data
RSGI2A_U03	is able to process geospatial data and automate data processing in an advanced manner
RSGI2A_U04	is able to use IT tools for spatial data processing
RSGI2A_U05	can work both individually and in teams; can prepare a proposal for a research project
RSGI2A_U06	is able to communicate on specialist topics in the field of remote sensing and geoscience with a diverse audience; Student can use a foreign language at the B2 + level of the European System for the Description of Languages and specialist and proper Terminology
RSGI2A_W01	has a deep knowledge of mathematics in remote sensing data analysis
RSGI2A_W02	has an enhanced knowledge of physics necessary to understand the interaction of electromagnetic radiation in the atmosphere and with the Earth's surface
RSGI2A_W03	has a deep understanding of remote environmental data acquisition methods
RSGI2A_W04	has a deep understanding of methods, algorithms and automation of spatial data processing
RSGI2A_W05	has an enhanced knowledge of the use of computer science in geoscience
RSGI2A_W06	knows selected social, economic and legal aspects of the geo-information society
RSGI2A_W07	knows the basic concepts and principles of intellectual property protection, copyright and patent information resources