



Visual Programming for GIS

Course description sheet

Basic information

Field of study Geospatial Computer Science	Didactic cycle 2023/2024
Major -	Course code DIGPS.li20.16531.23
Organisational unit Faculty of Geo-Data Science, Geodesy, and Environmental Engineering	Lecture languages English
Study level First-cycle (engineer) programme	Mandatoriness Elective
Form of study Full-time studies	Block Elective Modules in Foreign Language
Profile General academic	Course related to scientific research Yes
Course coordinator	Wojciech Drzewiecki
Lecturer	Wojciech Drzewiecki
Period Semester 6	Method of verification of the learning outcomes Completing the classes
	Activities and hours Lectures: 10 Workshop classes: 20
	Number of ECTS credits 3

Goals

G1	Making students aware of the possibilities of automating GIS analyses using dedicated visual programming languages.
----	---

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	the concept of a visual programming language and the role of visual programming languages in GIS	GI1A_W05, GI1A_W06	Test results
Skills - Student can:			
U1	analyze GIS processes formulated in selected visual programming languages used in GIS	GI1A_U05	Activity during classes, Test results, Oral answer
U2	create own GIS process model using the selected visual programming language	GI1A_U05	Activity during classes, Execution of a project, Report, Presentation, Oral answer
Social competences - Student is ready to:			
K1	describing, explaining and discussing the role of visual programming languages in GIS	GI1A_K02	Test results, Oral answer

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

The idea and role of visual programming languages in GIS. Overview of selected languages.

Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lectures	10
Workshop classes	20
Contact hours	5
Preparation of project, presentation, essay, report	30
Realization of independently performed tasks	10
Student workload	Hours 75
Workload involving teacher	Hours 30

* hour means 45 minutes

Program content

No.	Program content	Course's learning outcomes	Activities
1.	The idea of visual programming and the role of visual programming languages in GIS. An overview of visual programming languages for GIS with a broader overview of Model Builder (ArcGIS), Macro Modeler (Idrisi), and Processing Modeler (QGIS).	W1, U1, U2, K1	Lectures, Workshop classes
2.	Students create their own models of GIS processes using selected visual programming languages.	U2	Workshop classes

Extended information/Additional elements

Teaching methods and techniques :

Case study, Lectures

Activities	Methods of verification	Credit conditions
Lectures	Test results	The condition for passing is to obtain a positive assessment from passing test
Workshop	Activity during classes, Execution of a project, Report, Presentation, Oral answer	The condition for passing is participation in classes and execution of exercises and projects as well as presentation reports and/or presentation of the results obtained.

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 lectures is a positive result of the passing test. 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. 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

The final grade is the weighted average grade from the the passing test of lectures (30%) and grades from exercises (70%). To pass the subject, it is required to obtain positive grades (minimum 3.0) from each of the performed projects, tests and the passing test of lectures.

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

The conditions for compensating for arrears resulting from the student's absence will be determined in an individual manner based on: the number of absences, the type of arrears 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

Basic knowledge of GIS. Basic knowledge of ArcGIS and QGIS software.

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

Participation in the 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. Dobesova, Z. (2020). Visual Programming for GIS Applications. The Geographic Information Science & Technology Body of Knowledge (1st Quarter 2020 Edition), John P. Wilson (ed.). DOI: 10.22224/gistbok/2020.1.7

Optional

1. Allen David W.: Getting to Know ArcGIS ModelBuilder. ESRI Press 2011
2. Gandhi, Ujaval (2019) Automating Complex Workflows using Processing Modeler (QGIS3), http://www.qgistutorials.com/en/docs/3/processing_graphical_modeler.html
3. Eastman J.R.: TerrSet2020 Tutorial. ClarkLabs.(<https://clarklabs.org/wp-content/uploads/2020/05/TerrSet-Tutorial.pdf>)

Scientific research and publications

Publications

1. Wojciech DRZEWIECKI, Piotr Wężyk, Marcin Pierzchalski, Beata Szafrńska: Quantitative and qualitative assessment of soil erosion risk in Małopolska (Poland), supported by an object-based analysis of high-resolution satellite images. Pure and Applied Geophysics 2014 vol. 171 iss. 6, s. 867-895
2. Wojciech DRZEWIECKI, Małgorzata Jenerowicz, Sebastian Aleksandrowicz, Michał Krupiński: Modelowanie przestrzenne potencjalnych dróg przenikania granicy lądowej przez nielegalnych imigrantów. Roczniki Geomatyki, 2012 t. 10 z. 4, s. 49-64
3. Pirowski T., Drzewiecki W.: Mapa gęstości zaludnienia Krakowa – propozycja metodyki opracowania oraz przykładowe zastosowania. Roczniki Geomatyki, 2012 t. 10 z. 3, s. 95-106

Learning outcomes prescribed to a field of study

Code	Content
GI1A_K02	jest gotów do aktywnego i kreatywnego współdziałania w zespole
GI1A_U05	potrafi pisać, analizować, modyfikować, rozbudowywać algorytmy oraz kod oprogramowania
GI1A_W05	ma uporządkowaną wiedzę w zakresie programowania niezbędną do czytania ze zrozumieniem, pisania, uruchamiania, weryfikacji programów zapisanych w językach programowania
GI1A_W06	zna zasady i metody automatyzacji przetwarzania danych pozwalające na rozwiązywanie zagadnień geoinformatycznych i inżynierskich