



Mobile GIS Systems

Course description sheet

Basic information

Field of study Geospatial Computer Science	Didactic cycle 2023/2024	
Major -	Course code DIGPS.li20.06474.23	
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	Stanisław Szombara	
Lecturer	Stanisław Szombara	
Period Semester 6	Method of verification of the learning outcomes Completing the classes	Number of ECTS credits 3
	Activities and hours Lectures: 10 Workshop classes: 20	

Goals

C1	The aim of the course is to familiarise students with the practical aspects of designing and using Mobile GIS technologies together with their theoretical foundations.
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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	the specificity and theoretical basis of Mobile Geographic Information Systems, differences and similarities to classical GIS.	G11A_W04, G11A_W09, G11A_W10	Execution of a project
W2	the principles of designing Mobile GIS applications including social data acquisition.	G11A_W04, G11A_W09, G11A_W10	Execution of a project
Skills - Student can:			
U1	design and implement a Mobile GIS component application.	G11A_U04, G11A_U10	Activity during classes, Execution of a project
U2	design and implement an application with functionalities that allow the public to retrieve spatial data.	G11A_U04, G11A_U10	Activity during classes, Execution of a project
Social competences - Student is ready to:			
K1	disseminate the possibilities of using Mobile GIS technology in building an information society.	G11A_K03	Activity during classes, Execution of a project

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

The subject is devoted to mobile Geographic Information Systems. Practical introduction to the methodology of planning, collecting and processing data in Mobile GIS technology. The course is based on practical projects with the use of Collector and QField applications (from planning the measurement, through its implementation to processing the results). Completed projects will allow for verification of all learning outcomes.

Student workload

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

* hour means 45 minutes

Program content

No.	Program content	Course's learning outcomes	Activities
1.	Introduction to Mobile Geographic Information Systems (Mobile GIS). Links, differences and similarities between Mobile GIS and classic GIS. Mobile GIS architecture. Mobile GIS applications. Measurement aspects of Mobile GIS. Field survey planning - aspects of data preparation and acquisition. Geographic data sources for Mobile GIS. Design aspects of social data acquisition in Mobile GIS.	W1, W2	Lectures
2.	During the semester, students will perform a series of projects in Mobile GIS technology in the areas of design and data acquisition. The projects will be grouped into two blocks. The first block will be performed in open source software: QGIS + QField application. The second block of projects will be done in ArcGIS Online technology: ArcGIS Desktop/ ArcGIS Pro + Collector application. In both blocks students will gradually learn more aspects of designing and using the mobile component of GIS like. Projects will include elements such as: preparing data for field mapping; acquiring data from geo-referenced spatial data sets; preparing database for field mapping in mobile GIS technology; implementing field projects; adapting project to application schema (e.g. project for acquiring data for BDOT10k, OSM etc.); visualizing field mapping results. One class will be devoted to the presentation of other Mobile GIS applications such as ArcPad.	W1, W2, U1, U2, K1	Workshop classes

Extended information/Additional elements

Teaching methods and techniques :

Lectures

Activities	Methods of verification	Credit conditions
Lectures	Activity during classes, Execution of a project	A prerequisite for passing the course is successful completion of projects carried out during the workshop and attendance at an appropriate number of workshop classes.
Workshop	Activity during classes, Execution of a project	A prerequisite for passing the course is successful completion of projects carried out during the workshop and attendance at an appropriate number of workshop classes.

Additional info

The course is delivered in modular form. The basis of communication with students is the course on the university e-learning platform (UPEL) or its current equivalent. Access to the course will be given to students during the first classes. Communication with students may also take place through the university's Office platform (Teams) or its current equivalent.

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 obtaining credit for workshop classes is active participation in classes, positive results of current verification that the assumed learning outcomes have been achieved by the student, passing all projects with a positive mark and due attendance in classes.

1. The workshop programme includes a number of projects carried out by the students throughout the semester.
2. Projects are evaluated on a scale consistent with the study regulations.
3. Ongoing control of the achievement of learning outcomes is based on the systematic verification of the projects carried out by the students in the form of reports, oral verification or another form indicated by the instructor. The student should at the request of the teacher present all stages of the project. The control takes place while submitting the project for assessment, at the next classes or during additional contact hours. The results of the control (reports, oral verification or other forms) may affect the final grade of the project.
4. One of the criteria for the assessment of projects is the submission of projects within the deadlines indicated by the teacher. Students will be consulted on the due dates, but the final decision will be made by the lecturer.
5. The student should keep all the data necessary for the implementation of the projects throughout the entire period of classes until obtaining a credit, and provide their own backups.
6. If the student does not work independently or uses unauthorised materials, this will result in a failing grade (2.0). In addition, detected cases of plagiarism will be reported to the dean's office.
7. Credit for workshop assignments is based on a review of the student's performance during the semester and should be completed by the last day of the semester in which the course is taught (Term 1). Failure to achieve credit by the specified deadline is equivalent to a failing grade (2.0). Two additional deadlines are set: Term 2 - by the end of the basic session, Term 3 - by the end of the re-sit session.

Method of determining the final grade

The basis for calculating the final grade is the arithmetic mean of all assessed projects carried out during workshop classes in a semester. The grades from the lectures and workshop classes are given on the basis of the average grade obtained respectively from all the credit terms. In the absence of a positive mark from the lecture workshop, the final grade is given as follows: fail.

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

Making up for missed classes may be done in the form of an additional project indicated by the teacher for credit or in another form agreed individually with the student.

Prerequisites and additional requirements

Intermediate knowledge of GIS systems, knowledge of basic GNSS (GPS) measurements.

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

Workshop attendance is compulsory. A maximum of one unexcused absence from class is allowed. Excuses may be justified by health reasons or other important random reasons recognised by the teacher. Absences should be excused immediately after they occur. Absences longer than 1/5 of the hours in a semester result in a failure to obtain credit. In exceptional cases, a student who, for important random reasons or due to a documented long-term illness, exceeds the above-mentioned limits may obtain the instructor's consent to pass the workshop.

Literature

Obligatory

1. GIS Teoria i praktyka*. Paul Longley, Michael F. Goodchild, David J. Maguire, David W. Rhind. Wydawnictwo Naukowe PWN, 2008
2. Dynamic and Mobile GIS, Investigating Changes in Space and Time*. Jane Drummond, Roland Billen. CRC Press 2007
3. Maria Antonia Brovelli, Marco Minghini, Giorgio Zamboni, Public participation in GIS via mobile applications, ISPRS Journal of Photogrammetry and Remote Sensing, Volume 114, April 2016, Pages 306-315, ISSN 0924-2716,
4. GIS Best Practices, Mobile GIS, Esri Press
5. Marcin Dąbrowski, Wykorzystanie oprogramowania klasy mobile gis dla potrzeb lokalizowania w terenie elementów uzbrojenia sieciowych systemów technicznych, Konferencja Innowacje w Zarządzaniu i Inżynierii Produkcji 2017

Scientific research and publications

Publications

1. Stanisław Szombara, Małgorzata Zontek, Augmented Reality in the Presentation of City Monuments: A Case Study of "Bielsko-Biała AR Guide" Mobile Application. Geoinformatica Polonica, Vol. 20 (2021), pp. 31-40
2. Determining peak altitude on maps, books and cartographic materials: multidisciplinary implications / Kamil MACIUK, Michal Apollo, Joseph M. Cheer, Ondřej Konečný, Krystian KOZIOŁ, Jacek KUDRYS, Joanna Mostowska, Marta RÓG, Bogdan SKORUPA, Stanisław SZOMBARA // Remote Sensing; ISSN 2072-4292. — 2021 vol. 13 iss. 6 art. no. 1111, s. 1-31.
3. The highest peaks of the mountains: comparing the use of GNSS, LiDAR Point Clouds, DTMs, databases, maps, and historical sources / Stanisław SZOMBARA, Marta RÓG, Krystian KOZIOŁ, Kamil MACIUK, Bogdan SKORUPA, Jacek KUDRYS, Tomáš Lepeška, Michal Apollo // Energies ; ISSN 1996-1073. — 2021 vol. 14 iss. 18 art. no. 5731, s. 1-29.
4. Mapa roślinności rzeczywistej Krakowa. Kraków 2008.

Learning outcomes prescribed to a field of study

Code	Content
GI1A_K03	rozumie potrzebę popularyzowania korzystania przez społeczeństwo z danych i danych przestrzennych
GI1A_U04	potrafi formułować i rozwiązywać zadania przestrzenne, posługując się zaawansowanymi funkcjami analitycznymi, w tym implementować adekwatne algorytmy obliczeniowe dla danych
GI1A_U10	potrafi posługiwać się technikami geoinformacyjnymi, w tym CAD/GIS/BIM, do realizacji wybranych zadań z zakresu inżynierii
GI1A_W04	zna podstawowe zasady pozyskania i źródła danych przestrzennych oraz środowiskowych
GI1A_W09	posiada podstawową wiedzę w zakresie modelowania i wizualizacji obiektów oraz zjawisk, a także o systemach i narzędziach informatycznych służących do realizacji takich zadań
GI1A_W10	ma wiedzę na temat metod i technik pozyskania danych przestrzennych i środowiskowych