



# Web GIS

## Course description sheet

### Basic information

<b>Field of study</b> Geospatial Computer Science	<b>Didactic cycle</b> 2024/2025
<b>Major</b> Remote Sensing and GIS	<b>Course code</b> DGEITGS.IIi4.07189.24
<b>Organisational unit</b> Faculty of Geo-Data Science, Geodesy, and Environmental Engineering	<b>Lecture languages</b> English
<b>Study level</b> Second-cycle (engineer) programme	<b>Mandatoriness</b> Elective
<b>Form of study</b> Full-time studies	<b>Block</b> Elective Modules in Foreign Language
<b>Profile</b> General academic	<b>Course related to scientific research</b> Yes
<b>Course coordinator</b>	Krystyna Michałowska, Mariusz Twardowski
<b>Lecturer</b>	Krystyna Michałowska, Mariusz Twardowski
<b>Period</b> Semester 3	<b>Method of verification of the learning outcomes</b> Completing the classes
	<b>Activities and hours</b> Lectures: 15 Project classes: 30
	<b>Number of ECTS credits</b> 3

### Goals

C1	The course aims to equip students with the knowledge and skills needed to effectively share GIS data using various network techniques, and to be able to design, develop, and implement web-based GIS applications that enable data sharing and collaboration. It will cover topics such as data sharing protocols, web mapping, and the use of online GIS platforms for collaboration and data sharing.
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## Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
<b>Knowledge - Student knows and understands:</b>			
W1	possible usages of network protocols and Web applications for GIS data sharing.	GEI2A_W02, GEI2A_W05	Test
<b>Skills - Student can:</b>			
U1	create Web services configuration through network protocols.	GEI2A_U03	Test
U2	use Python language for writing network applications.	GEI2A_U02	Project
<b>Social competences - Student is ready to:</b>			
K1	familiarize with new technologies used in data sharing.	GEI2A_K03	Activity during classes

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

Web application and Python usage for internet data sharing.

## Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lectures	15
Project classes	30
Realization of independently performed tasks	30
Examination or final test/colloquium	2
Contact hours	1
<b>Student workload</b>	<b>Hours</b> 78
<b>Workload involving teacher</b>	<b>Hours</b> 45

\* hour means 45 minutes

## Program content

No.	Program content	Course's learning outcomes	Activities
1.	<p>Lectures content:</p> <p>1. Introduction to network data sharing. HTTP/FTP servers for data sharing. Example implementations Apache Nginx VSFTpd. Configuration methods over SSH protocol. Network security rules and SSL certificates.</p> <p>2. Introduction to Python language Interpreter basics. Variable assignment, mathematical and logical operators. Base data types and their representation. Keywords and complex structures. Scripts and program flow control. Classes, objects, and modules. Language libraries selection Standard libraries and most important elements. Geospatial libraries GDAL, OGR, OSR. Reading, writing and processing raster and vector data. QT interface design.</p> <p>3. Python as a tool for Web application support. Introduction to Python as a method for Web application execution. Sharing and acquiring data with Python script. Libraries for easy Web rapid application design.</p> <p>4. Virtualization Introduction to virtualization concept. virtualization progress in recent years. Hypervisor examples. hardware requirements.</p> <p>5. Geoserver usage. introduction to Geoserver application as a method for data sharing. Raster and vector data load methods.</p>	W1, K1	Lectures

No.	Program content	Course's learning outcomes	Activities
2.	<p>Project classes content:</p> <p>1. Network data sharing. Installation of servers for data sharing through HTTP and FTP protocols. An example configuration of Apache, Nginx, VSFTpd servers. File edit over SSH protocol.</p> <p>2. Introduction to Python Active interpreter usage for variable assignment and expression evaluation. Type checking. String slicing. List, set and dictionary allocation. Keyword usage. Script autohohing tools. Error correction and interpretation. Conditionals, loops and exception handling. Class creation and method implementation. Inheritance examples. Object initialization and designator usage in method calls. Module import. Common standard library examples. Spatial library usage. Raster, vector and text data operations.</p> <p>3. Python as a too for Web application support Python usage for Web application execution. creating scripts for data sharing and acquisition. libraries for rapid application development. Web interface design using a selected toolkit.</p> <p>4. Virtualization Creating virtualized environments. Hypervisor selection. Configuring virtual hardware.</p> <p>4. Geoserver usage. Installation and configuration of Geoserver application. Graphical data loading for internet access.</p>	U1, U2, K1	Project classes

### Extended information/Additional elements

#### Teaching methods and techniques :

Lectures, E-learning

Activities	Methods of verification	Credit conditions
Lectures	Activity during classes, Test	
Project classes	Activity during classes, Test, Project	

#### 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

Cwiczenia zaliczane są na podstawie kolokwium. W przypadku braku zaliczenia możliwa będzie poprawa.

#### Method of determining the final grade

Lectures and project classes final grade will be based on the final test at the end of the semester. In case of a failed attempt, there will be possible 2 more tries. Retrying failed attempt does not have the impact on final grade.

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

Student nadrabia zaległości we własnym zakresie.

## **Prerequisites and additional requirements**

Ability to understand English.  
Computer usage knowledge.  
Basic Python language familiarity.  
Ability to use a web browser.

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

Lectures: Studenci uczestniczą w zajęciach poznając kolejne treści nauczania zgodnie z sylabusem przedmiotu. Studenci winni na bieżąco zadawać pytania i wyjaśniać wątpliwości. Rejestracja audiowizualna wykładu wymaga zgody prowadzącego.  
Project classes: Studenci wykonują prace praktyczne mające na celu uzyskanie kompetencji zakładanych przez sylabus. Ocenie podlega sposób wykonania projektu oraz efekt końcowy.

## **Literature**

### **Obligatory**

1. Ward Brian : "How Linux Works, 2nd edition", 2015
2. Dawson Michael: "Python Programming for Absolute beginner, 3rd edition". 2010
3. Python documentation: <http://pl.python.org>
4. Documentation for projects: Linux, Apache, WSGI

## **Scientific research and publications**

### **Publications**

1. M. Twardowski: "Sieciowy system agentowy w geoinformatyce obrazowej" - 2007
2. K. Pyka, M. Twardowski: "Miejsce wolnego oprogramowania w nauczaniu geoinformatyki". Archiwum Fotogrametrii, Kartografii i Teledetekcji. 2007.
3. K. Pyka, M. Słota, M. Twardowski - "Usage of stereo orthoimage in GIS: old concept, modern solution". XXII ISPRS congress. 2012

## Learning outcomes prescribed to a field of study

Code	Content
GEI2A_K03	aktywnego i kreatywnego włączenia się w dynamiczny rozwój geoinformacji, wzmocnienia jej roli w społeczeństwie oraz popularyzowania powszechnego korzystania z danych przestrzennych.
GEI2A_U02	programować, modyfikować i rozbudowywać istniejące aplikacje oraz łączyć różne technologie informatyczne w zakresie geoinformacji.
GEI2A_U03	stosować specjalistyczne metody przetwarzania obrazu i wykorzystania danych fotogrametrycznych i teledetekcyjnych.
GEI2A_W02	złożone zasady programowania oraz konstruowania algorytmów, niezbędne do czytania ze zrozumieniem, pisania, uruchamiania i weryfikacji programów.
GEI2A_W05	zasady i metody automatyzacji przetwarzania danych, pozwalające na rozwiązywanie zagadnień geoinformatycznych i inżynierskich.