

# Geographical information systems - course description

General information	
Course name	Geographical information systems
Course ID	11.3-WE-INF-D-GIS-Er
Faculty	<a href="#">Faculty of Computer Science, Electrical Engineering and Automatics</a>
Field of study	Computer Science
Education profile	academic
Level of studies	Second-cycle Erasmus programme
Beginning semester	winter term 2022/2023

Course information	
Semester	3
ECTS credits to win	4
Course type	optional
Teaching language	english
Author of syllabus	<ul style="list-style-type: none"><li>dr hab. inż. Artur Gramacki, prof. UZ</li></ul>

Classes forms					
The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	15	1	-	-	Credit with grade
Laboratory	30	2	-	-	Credit with grade

## Aim of the course

The aim of the course is to provide students with basic information about spatial information systems (digital maps), the principles of their creation, IT tools supporting this field of knowledge, types of analyzes performed.

## Prerequisites

Introduction to Databases

## Scope

Definition of basic terms in the field of GIS (Geographical Information Systems). Digital maps versus traditional paper maps. Cartographic projections. Spatial Reference System for the correct location of objects on the globe. EPSG codes. Presentation of selected reference systems, including those used in Poland and in the GPS system. Selected data storage formats for numeric maps. Selected IT tools for working with numeric maps (free and commercial). Database support for storing and analyzing spatial data. Storage of spatial data in MySQL database, dedicated data types, functions supporting spatial analysis. Open Geospatial Consortium (OGC) specifications. Open GeoJSON geo-spatial data exchange format. Examples of spatial analysis. Geostatistics. Presentation of the Google Maps and OpenStreetMap systems and the basics of their programming.

## Teaching methods

Lecture, laboratory exercises.

## Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Can provide the basic features of the GIS class systems		<ul style="list-style-type: none"><li>a multiple choice and open questions test</li></ul>	<ul style="list-style-type: none"><li>Lecture</li></ul>
Is able to define the concept of cartographic mapping and provide some of the most commonly used mappings		<ul style="list-style-type: none"><li>a multiple choice and open questions test</li></ul>	<ul style="list-style-type: none"><li>Lecture</li></ul>
Is able to define the concept of geostatistics and provide several examples of analyzes of this type.		<ul style="list-style-type: none"><li>a multiple choice and open questions test</li></ul>	<ul style="list-style-type: none"><li>Lecture</li></ul>
Is able to integrate spatial data with textual data		<ul style="list-style-type: none"><li>a quiz</li><li>carrying out laboratory reports</li></ul>	<ul style="list-style-type: none"><li>Laboratory</li></ul>
Knows the possibilities of selected database systems in the field of storage and analysis of spatial data		<ul style="list-style-type: none"><li>a quiz</li><li>carrying out laboratory reports</li></ul>	<ul style="list-style-type: none"><li>Laboratory</li></ul>
Knows the capabilities of Google Maps and OpenStreetMap and can create simple pages (scripts) using the API of these systems		<ul style="list-style-type: none"><li>a quiz</li><li>carrying out laboratory reports</li></ul>	<ul style="list-style-type: none"><li>Laboratory</li></ul>
Knows the concepts of Spatial Reference System and EPSG codes and is able to characterize selected codes		<ul style="list-style-type: none"><li>a multiple choice and open questions test</li></ul>	<ul style="list-style-type: none"><li>Lecture</li></ul>

Outcome description	Outcome symbols	Methods of verification	The class form
Is able to create, using selected IT tools, digital maps and present them		<ul style="list-style-type: none"> <li>• a quiz</li> <li>• carrying out laboratory reports</li> </ul>	<ul style="list-style-type: none"> <li>• Laboratory</li> </ul>

## Assignment conditions

## Recommended reading

1. Bivand, R.S., Pebesma, E.J., Gómez-Rubio V.: Applied Spatial Data Analysis with R, Springer, 2008.
2. Lovelace R, Nowosad J., Muenchow J.: Geocomputation with R. CRS Press, 2019 (<https://geocompr.robinlovelace.net/>)
3. Michael Dorman: Learning R for Geospatial Analysis, Packt Publishing, 2014
4. R Project documentation (<https://www.r-project.org/>)
5. MySQL database documentation wersja 8 (<https://dev.mysql.com/doc/>)
6. GoogleMaps documentation (<https://developers.google.com/maps/documentation>)
7. OpenStreetMap, documentation (<https://www.openstreetmap.org/help>)

## Further reading

## Notes

Modified by dr hab. inż. Artur Gramacki, prof. UZ (last modification: 20-04-2022 23:31)

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