

## COURSE OUTLINE

### 1. Study programme information

1.1 Higher education institution	West University of Timisoara
1.2 Faculty / Department	Chemistry-Biology-Geography/Geography
1.3 Sub-department	
1.4 Field of study	Geography
1.5 Level of study	Master Programme
1.6 Study programme / Qualification	Geographic Information Systems (GIS)

### 2. Course information

2.1 Course title	Web GIS						
2.2 Course convenor/ Lecturer	Dr. Alin-Ionuț Pleșoianu						
2.3 Teaching assistant	Dr. Alin-Ionuț Pleșoianu						
2.4 Year of study	I	2.5 Semester	II	2.6 Type of assessment	E	2.7 Course type	Mandatory

### 3. Total estimated time (hours of didactic activities per semester)

3.1 Number of hours per week	3	of which: 3.2 lecture	1	3.3 seminar/laboratory	2
3.4 Total hours in the curriculum	42	of which: 3.5 lecture	14	3.6 seminar/laboratory	28
<b>Time distribution:</b>					<b>hours</b>
Studying textbooks, course materials, bibliography and notes					14
Further research on electronic platforms (e.g. tutorials)					20
Preparing seminars/ laboratories, homework, ePortofolio					20
Examinations					4
Other activities .....					
<b>3.7 Total hours of individual study</b>	<b>58</b>				
<b>3.8 Total hours per semester</b>	<b>100</b>				
<b>3.9 Number of credits</b>	<b>4</b>				

### 4. Prerequisites (if applicable)

4.1 based on curriculum	<ul style="list-style-type: none"> <li>Basic knowledge of GIS;</li> <li>Basic knowledge of programming in Python.</li> </ul>
4.2 based on competencies	<ul style="list-style-type: none"> <li>Basic knowledge of GIS software (Esri platform, OpenSource solutions)</li> </ul>

### 5. Conditions (if applicable)

5.1 for the course	<ul style="list-style-type: none"> <li>Presence is mandatory. Maximum 3 absences are allowed</li> </ul>
5.2 for the seminar/laboratory	<ul style="list-style-type: none"> <li>Presence is mandatory. Maximum 3 absences are</li> </ul>

	<p>allowed</p> <ul style="list-style-type: none"> <li>• Development of a web application where published web services (map services, cached services, feature services) have to be embedded;</li> <li>• Documentation of published web services and developed web application;</li> <li>• Presentation of the semester project;</li> </ul>
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## 6. Accumulated specific competencies

Professional competencies	<ul style="list-style-type: none"> <li>• Knowledge of the different methods of sharing geospatial data within web infrastructures;</li> <li>• Understanding the advantages and disadvantages of Web GIS technologies;</li> <li>• Understanding the web services technologies;</li> <li>• Understanding GeoJSON and eXtensible Markup Language (XML) data encoding formats;</li> <li>• Publishing different type of services (mapping services, feature services, cached map services) using GeoServer (open source software) and ArcGIS Online platform (with Esri Developer Accounts);</li> <li>• Developing web clients using ArcGIS Online builders;</li> <li>• Developing web clients using OpenLayers and ArcGIS API for JavaScript libraries;</li> </ul>
Transversal competencies	<ul style="list-style-type: none"> <li>• Acquisition and improvement of organizational skills through independent planning of various tasks;</li> <li>• Ability to work in groups;</li> <li>• Expanding the array of self-taught skills through different online learning instruments.</li> </ul>

## 7. Course objectives (as resulting from the accumulated specific competencies)

7.1 General objective	<ul style="list-style-type: none"> <li>• Students will understand the key Web GIS technologies and will get practice in publishing web services and embedding them into web applications using both open-source and proprietary software.</li> </ul>
7.2 Specific objectives	<ul style="list-style-type: none"> <li>• Explain the Web GIS architecture and technologies;</li> <li>• Describe the key functionalities of geospatial web services;</li> <li>• Publish spatial data as map service, feature service, image service and cached map service;</li> <li>• Outline the advantages of publishing spatial analysis tools as geoprocessing services and web API's;</li> <li>• Developing user friendly web applications using online builders or by coding.</li> </ul>

## 8. Content

8.1 Lecture	Teaching methods	Observations
1. Introduction to Web GIS technologies	Lectures  Discussions about presented Web GIS concepts and technologies  Direct instructions	
2. Spatial data sharing initiatives (Spatial Data Infrastructure, Open data initiatives)		
3. Web GIS architecture		
4. Web Services technology		
5. Services to visualize vector and raster spatial data		
6. Raster and image services		
7. Services to interact with spatial data online		
8. Online spatial analysis		
9. Web applications builders		
10. Development of web applications		
<b>Bibliography</b>		
Fu, P., Sun, J., 2011. <i>Web GIS Principles and Applications</i> , ESRI Press, Redlands, California		
Fu, P., 2020, <i>Getting to know WebGIS</i> , ESRI Press, Redlands, California		
Tiwari A. & Jain K., 2017, <i>Concepts and Applications of Web GIS</i> , Nova Science Publishers		
8.2 Seminar / laboratory	Teaching methods	Observations
1. Enterprise GIS Databases (SQL, PostgreSQL)	Problem solving Discussions High-tech student centered	
2. Creating eXtensible Markup Language Documents (XML), XML schemas (.xsd), XML and JSON documents	Problem solving Discussions High-tech student centered	
3. Searching and using data and web services discovered in available geoportals	Problem solving Discussions High-tech student centered	
4. Publishing vector and raster data as map service GeoServer and cached map service using ArcGIS Online	Problem solving Discussions High-tech student centered	
5. Publishing feature services using GeoServer and ArcGIS Online platform and interacting with the published service	Problem solving Discussions High-tech student centered	
6. Perform online spatial analysis (geocoding, driving distance calculation etc.) using ArcGIS Online platform	Problem solving Discussions High-tech student centered	
7. Creating web applications using web builders	Problem solving Discussions High-tech student centered	
8. Developing a web application using OpenLayers and ArcGIS JavaScript API	Problem solving Discussions High-tech student centered	
<b>Bibliography</b>		
GeoServer Tutorial. Online resource available at: <a href="http://docs.geoserver.org">http://docs.geoserver.org</a> (last accessed 09.17.2021)		
ArcGIS Online Tutorial. Online resource available at: <a href="https://www.esri.com/en-us/arcgis/products/arcgis-online/resources">https://www.esri.com/en-us/arcgis/products/arcgis-online/resources</a> (last accessed 09.17.2021)		
OpenLayers Tutorial. Online resource available at: <a href="http://openlayers.org/">http://openlayers.org/</a> (last accessed 09.17.2021)		
ArcGIS API for Python. Online resource available at: <a href="https://developers.arcgis.com/python/">https://developers.arcgis.com/python/</a> (last accessed 09.17.2021)		

09.17.2021)

ArcGIS API for JavaScript. Online resource available at: <https://developers.arcgis.com/javascript/> (last accessed 09.17.2021)

ArcGIS Learn. Online resource available at: <https://learn.arcgis.com/en/> (last accessed at 09.17.2021)

9. Corroborating course content with the expectations held by the representatives of the epistemic community, professional associations and typical employers in the field of the study programme

The students will get practice into developing Web GIS solutions using both GeoServer (open source) and ArcGIS Online (proprietary) software.

#### 10. Assessment

Type of activity	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final mark
10.4 Lecture	Active participation in answering the questions prepared at the end of each class	Direct feedback	12%
10.5 Seminar / laboratory	ePortofolio's quality	ePortofolio	28%
	Web applications developed during the semester project	Web application	42%
	Quality of the presentation of the semester project	Presentation	12%
	Active participation during the discussions about presented semester projects		6%
10.6 Minimum performance standard			
<ul style="list-style-type: none"><li>• Maximum 3 absences are allowed</li></ul>			

Date

Course convenor's signature

Teaching assistant's signature

09.17.2021

Date of approval in the department

Head of department's signature