



Subject code: GIS-211-4	Subject name: GIS		
Study cycle: I	Year: II	Semester: IV	ECTS credits: 6
Status: Mandatory		Contact hours: 60 Lectures: 30 Practical courses: 30	
Assigned professors and assistants:	Lecturers and assistants selected for the field to which the course belongs		
Prerequisites:	/		
Subject objectives:	The main objectives of the course are: • To familiarize students with geographic information systems (GIS) and GIS software. • To acquaint students with GIS databases, their creation, operations, and management. • To introduce students to GIS analyses on different data types and their application in space optimization and conflict resolution. • To familiarize students with Earth observation satellite data and its application in various scientific fields and economic sectors. • To introduce students to multicriteria analyses and the creation of new 2D and 3D thematic maps of researched spatial phenomena and processes. • To acquaint students with the content and usage of data contained in the digital atlas of Bosnia and Herzegovina, individual continents, and the world. • To introduce students to geoinformatics management models of spatial phenomena and processes. • To familiarize students with the application possibilities of digital thematic data sets in regional and spatial planning.		
Teaching units:	1. Geographic Information System (GIS) – concept, definitions, development, and organizational structure. GIS division. Main user and functional levels of GIS. GIS hardware. Basic GIS software. 2. GIS user interface – methodological concept of interface organization and its use. Methodological concept of managing and working with geodata. 3. GIS databases – concept, definitions, structure, and organization. Types of GIS databases. Sources of GIS databases. Creating GIS databases. Metadata. GIS process models and scripts. Geoprocessing data.		



	Geovisualization of data. 4. Thematic sets and models of GIS data. Types of GIS data. Vector data – concept, types, and significance. Point vector data. Line vector data. Polygon vector data. Working with vector data. 5. Raster data – concept, types, and significance. Structure of raster data. Formats of raster data. Satellite images – concept, types, and significance. Aerial photos – concept, types, and significance. Working with raster data. 6. First knowledge check. 7. Creating data for GIS. Attributes and attribute tables. Analog geographical maps. Methods and processes for preparing data for GIS. Data editing. 8. GIS catalog. Converting basic GIS data types. Converting raster to vector data. Converting vector to raster data. GIS and AutoCAD. GPS data. 9. Topological analyses – concept, aim, and significance. Types of topological analyses. Basic topological analyses with GIS maps. Basic topological analyses with geodatabases. 10. Spatial GIS analyses. Methods and models of 2D spatial data interpolation. Spline spatial interpolator. IDW spatial interpolator. Kriging spatial interpolator. Working with spatial data. 11. 3D spatial analyses. Basic mathematical and functional analysis of surface topography. Zonal statistics. 12. Managing GIS databases. Spatial references of geodatabases. Global coordinate systems – overview and transformations in GIS. Georeferencing. 13. ArcGIS – user levels and types. Arc Catalog. ArcMap. ArcGlobe. Model Builder. ArcGIS Desktop – user organization and functional levels. ArcView. ArcEditor. ArcInfo. Optional extensions for ArcGIS Desktop. 14. – 15. Analysis of seminar papers.
Learning outcomes:	Knowledge: • Students define and describe GIS databases, isolate geographical data, and describe their creation and extension possibilities. • Students give examples of GIS analyses on different data types and their application in space optimization and conflict resolution.



	Skills: • Students recognize and locate satellite observation data of Earth and their application in various scientific fields and economic sectors. • Students apply multicriteria analyses and identify possibilities for creating new 2D and 3D thematic maps of researched spatial phenomena and processes. Competencies: • Students explore the possibilities of using data contained in the digital atlas of Bosnia and Herzegovina, individual continents, and the world. • Students discuss geoinformatics management models of spatial phenomena and processes. • Students present the application possibilities of digital thematic data sets in the educational process in primary and secondary schools. • Students present the application possibilities of digital thematic data sets in regional and spatial planning and tourism planning.																																										
Teaching methods:	Multimedia presentation and discussion (lectures); independent student research and practical work in relevant application software (practical courses).																																										
Knowledge testing methods with grading structure¹:	<table><tr><td></td><td><i>Maximum Points</i></td><td><i>Minimum points</i></td></tr><tr><td>Attendance</td><td>5</td><td>3</td></tr><tr><td>Participation on lectures</td><td>5</td><td>3</td></tr><tr><td>Tests</td><td>40</td><td>21</td></tr><tr><td>Seminar paper</td><td>10</td><td>6</td></tr><tr><td>Final exam</td><td>40</td><td>22</td></tr><tr><td>TOTAL</td><td>100</td><td>55</td></tr></table> Assessment: <table><tr><td><i>Grade</i></td><td><i>ECTS grade</i></td><td><i>Points scale</i></td></tr><tr><td>10</td><td>(A) excellent</td><td>95 - 100</td></tr><tr><td>9</td><td>(B) very good</td><td>85 - 94</td></tr><tr><td>8</td><td>(C) good</td><td>75 - 84</td></tr><tr><td>7</td><td>(D) satisfactory</td><td>66 - 74</td></tr><tr><td>6</td><td>(E) sufficient</td><td>55 - 64</td></tr><tr><td>5</td><td>(F, FX) insufficient</td><td>55</td></tr></table>		<i>Maximum Points</i>	<i>Minimum points</i>	Attendance	5	3	Participation on lectures	5	3	Tests	40	21	Seminar paper	10	6	Final exam	40	22	TOTAL	100	55	<i>Grade</i>	<i>ECTS grade</i>	<i>Points scale</i>	10	(A) excellent	95 - 100	9	(B) very good	85 - 94	8	(C) good	75 - 84	7	(D) satisfactory	66 - 74	6	(E) sufficient	55 - 64	5	(F, FX) insufficient	55
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¹ The structure of points and point criteria for each subject is determined by the Council of the organizational unit before the beginning of the academic year in which the subject is taught in accordance with Article 64, paragraph 6 of the Law on Higher Education of Sarajevo Canton



Literature²:

Mandatory:

- Đug S., Drešković N., Odžak S. (2015): Daljinska istraživanja – principi i primjena u prirodnim naukama. University Textbook. University of Sarajevo, Sarajevo.
- Burrough P.A., McDonnell R.A. (2006): Principles of Geographical Information Systems – Second Edition. Oxford University Press. Translated from English.
- Heywood I., Cornelius S., Carver S. (2006): An Introduction to Geographical Information Systems. Pearson Education Limited.
- Longley P. A. et al. (2006): Geographic Information Systems and Science. John Wiley & Sons Ltd, London.

Recommended:

- Fotheringham A. S., Rogerson P. A. (1994): Spatial Analysis and GIS. Technical Issues in Geographic Information Systems. Taylor and Francis, London.
- ESRI (2012): ArcGIS 10. Using Arc GIS Desktop. ESRI, Redlands, USA.

² The Senate of the higher education institution as an institution or a council of the organizational unit of the higher education institution as a public institution determines mandatory and recommended textbooks and manuals, as well as other recommended literature on the basis of which exams are prepared by a special act which is required to be published on its website before the beginning of the academic year in accordance with Article 56, paragraph 3 of the Law on Higher Education of the Sarajevo Canton.