UNIVERSITY OF SARAJEVO – FACULTY OF SCIENCE
SUBJECT DESCRIPTION

Subject code: *GIS-211-3*	Subject name: *GIS*		
Study cycle: *I*	Year: *II*	Semester: *IV*	ECTS credits: *5*
Status: *Mandatory*	Contact hours: *60* *Lectures: 30* *Exercises: 30*		
Assigned professors and assistants:	*Teachers and associates who are selected for the teaching area to which the subject belongs*		
Prerequisits:	/		
Subject objectives:	*The main Subject objectives are:* *- Exploring and acquiring knowledge of students about geographic information systems and software for GIS;* *- Exploring and acquiring knowledge of students about GIS databases, their design and operations and management;* *- Exploring and acquiring knowledge of students about GIS analysis on the different types of data and their potential application in optimization of the use of space and solving spatial conflicts;* *- Exploring and acquiring knowledge of students about the data of satellite observations of the Earth and their application in various fields of science and industry segments;* *- Exploring and acquiring knowledge of students with multicriteria analysis and possibilities of creating new 2D and 3D sets of thematic maps of the investigated physical phenomena and processes;* *- Exploring and acquiring knowledge of students with the content and the possibilities of using data contained in a digital atlas of Bosnia and Herzegovina, individual continents and the world;* *- Exploring and acquiring knowledge of students about models of geoinformatics management of geo-ecological phenomena and processes;* *- Exploring and acquiring knowledge of students about the possibilities of applying different GIS modules and operations for the purpose of creation of new tourism value;* *– Exploring and acquiring knowledge of students about the possibilities of applying different GIS modules and operations for the purpose of creating spatial geobases in accordance to various spatial planning categories.*		
Teaching units:	1. *Geographic Information System (GIS) - concept, definition, development and organizational structure. Distribution of*		

	GIS. The main operation and functional levels of GIS. Hardware in GIS. Basic GIS softwares. 2. GIS user interface - methodological concept of organisation of interfaces and its use. GIS methodological concept of management and labor with geodata. 3. GIS database - concept, definition, structure and organization. Types of GIS database. Sources of GIS database. 4. Creating a GIS database. Metadata. GIS process models and scripts. Geoprocessing of data. Geovisualization of data. 5. Themed sets and models of GIS data. Types of GIS data. Vector data - concept, types and importance. Point type of vector data. Line type of vector data. Polygon type of vector data. Working with vector data. 6. A raster data type - concept, types and importance. Structure of raster data. The formats of raster data. Satellite images - concept, types and significance. Air images - concept, types and importance. Working with raster data. 7. The first test 8. Creating data for GIS. Attributes data and attribute tables. Analog geographical maps. Methods and processes of preparing data for GIS. Editing data. 9. GIS catalog. Convert the basic GIS data types. Converting raster to vector data. Convert the vector the raster data. GIS and AutCAD. GPS data. 10. Topological analysis - concept, purpose and significance. Types of topological analysis. Basic topological analysis with GIS maps. Basic topological analysis with geodatabases. 11. Spatial GIS analysis. Methods and Models 2D spatial interpolation of data. Spline spatial interpolator. IDW spatial interpolator. Kriging spatial interpolator. Working with spatial data. 12. 3D spatial analysis. Basic mathematical and functional analysis of the surface topography. The zonal statistics. 13. Management of GIS databases. Spatial reference of geodatabases. World coordinate systems - Overview and transformation into a GIS. Georeferencing. 14. ArcGIS - user levels and types. Arc Catalog. ArcMap. ArcGlobe. Model Builder. ArcGIS Desktop - The user organizations and functional levels. ArcView. ArcEditor. ArcInfo. Optional extensions for ArcGIS Desktop. 15. Analysis of seminar papers
Learning outcomes:	**Knowledge:** - Student defines and describes GIS databases, highlights

	geographical data and describes opportunities for their creation and expansions; *- The student gives examples of GIS analysis on different types of data and the possibilities of their application in optimization use of space and resolving spatial conflicts.* **Skills:** *- The student recognizes and finds satellite data of Earth observations and their applications in various scientific areas and economic grenades;* *- The student recognizes and applies multicriteria analyzes and singles out opportunities for creation new 2D i 3D sets of thematic maps on researched spatial phenomena and processes.* **Competencies:** *- The student explores the possibilities of using the data contained in the digital atlas of Bosnia and Herzegovina, continents and world;* *- The student discusses about geoinformatic models of management of spatial phenomena and processes;* *- Student shows opportunities of application of digital sets of thematic data in educational process in primary and secondary schools.* *- The student presents the possibilities of applying digital sets of thematic data in the process of regional, spatial, and tourist planning.*
Teaching methods:	*Multimedia presentation and discussion (lectures); practical work, educational material analysis and discussion (exercises).*
Knowledge testing methods with grading structure[1]:	*Points* *Attendance* *5* *Participation on lectures* *5* *Tests* *40* *Seminar paper* *10* *Final exam* *40* *TOTAL* *100* **Assessment:** *Grade ECTS grade Points scale* *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*

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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

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	5　　(F, FX) insufficient　　55
Literature[2]:	**Mandatory**: 1. Đug S., Drešković, N., Odžak, S. (2015): Daljinska istraživanja – principi i primjena u prirodnim naukama. University textbook. University of Sarajevo. Sarajevo. 2. Burrough, P.A., McDonnel, R.A. (2006): Principles of Geographical Information Systems – 2nd Edition. Oxford University Press. 3. Heywood, I., Cornelius, S., Carver, S. (2006): An Introduction to Geographical Information Systems. Pearson Education Limited. **Recommended:** 1. Fortheringham, A. S., Rogerson, P. A. (1994): Spatial Analysis and GIS. Technical Issues in Geographic Information Systems. Taylor and Francis. London. 2. ESRI (2012) ArcGIS 10. Using ArcGIS Desktop. ESRI. Redlands. USA.

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[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.