



Subject code: GIS-229-3		Subject name: GIS programming	
Study cycle: I	Year: III	Semester: V	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:		Acquaintance and acquisition of students' knowledge about object-oriented programming - Acquainting and acquiring knowledge of students about the possibilities of scripting in a GIS environment - Familiarization and acquisition of students' knowledge about the implementation of adequate programming methods for GIS tasks	
Teaching units:		1. Introduction to GIS programming 2. Scripting capabilities in the GIS environment 3. Examples of script-based tools 4. Language syntax: Basic language structure: methods, functions and modules 5. Creating variables: strings, numbers and lists 6. Access to geoprocessing via script 7. Descriptive data 8. Using data properties in if statements to make decisions 9. The first test 10. Writing code 11. Work with lists of vector and raster data 12. Modifying attributive data values via script 13. String manipulation and formatting 14. Troubleshooting and creating publishing tools 15. Analysis of seminar papers	
Learning outcomes:		Knowledge: - The student describes the procedure of GIS programming - The student lists examples of scripting in a GIS environment Skills: - The student classifies methods, functions and modules of basic programming language structures - The student demonstrates the procedure of working with lists of vector and raster data	



	Competencies: - The student modifies the attribute values of databases through a script. - The student presents the process of GIS programming.																																																
Teaching methods:	Theoretical lectures and practical exercises of students using various multimedia tools and application software.																																																
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>22</td></tr><tr><td>Seminar paper</td><td>10</td><td>6</td></tr><tr><td>Final exam</td><td>40</td><td>21</td></tr><tr><td colspan="3"> </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 colspan="3"> </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	22	Seminar paper	10	6	Final exam	40	21				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
	<i>Maximum points</i>	<i>Minimum points</i>																																															
Attendance	5	3																																															
Participation on lectures	5	3																																															
Tests	40	22																																															
Seminar paper	10	6																																															
Final exam	40	21																																															
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																																															
Literature²:	Mandatory: 1. Zandbergen, P.A., 2020. Python Scripting for ArcGIS Pro. Redlands, CA, USA: Esri Press. 2. Chuvieco, E., 1993. Integration of linear programming and GIS for land-use modelling. International Journal of Geographical Information Science, 7(1), pp.71-83. 3. Etherington, T.R., 2016. Teaching introductory GIS programming to geographers using an open source Python approach. Journal of Geography in Higher Education, 40(1), pp.117-130. Recommended: 1. Ball, G.L., 1994. Ecosystem modeling with GIS. Environmental Management, 18, pp.345-349.																																																

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

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.