



UNIVERSITY OF SARAJEVO – FACULTY OF SCIENCE  
SUBJECT DESCRIPTION

Form SP2

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<b>Subject code:</b> <i>FG-107.1-1</i>	<b>Subject name:</b> <i>Mathematical Cartography</i>		
<b>Study cycle:</b> <i>I</i>	<b>Year:</b> <i>I</i>	<b>Semester:</b> <i>I</i>	<b>ECTS credits:</b> <i>5</i>
<b>Status:</b> <i>Mandatory</i>		<b>Contact hours:</b> <i>125</i> <i>Lectures: 30</i> <i>Exercises: 30</i>	
<b>Assigned professors and assistants:</b>			
<b>Prerequisites:</b>	/		
<b>Subject objectives:</b>	<ul style="list-style-type: none"> <li>• <i>To achieve knowledge of the Earth shape and its representing on 2D map</i></li> <li>• <i>To understand coordinate systems and their practical application</i></li> <li>• <i>To get the knowledge of mathematical elements of map: scale, cartographic projections, geodetic markers and map frame</i></li> <li>• <i>To achieve the skills of methodology of cartographic projections</i></li> <li>• <i>To achieve the skills of mapping and use mathematical fundament of maps</i> <ul style="list-style-type: none"> <li>– <i>the graphical construction of map projection</i></li> <li>– <i>construction of map scale</i></li> <li>– <i>calculating mathematical-geographical (<math>\varphi, \lambda</math>) and rectangular coordinates (<math>x, y</math>)</i></li> </ul> </li> </ul>		
<b>Teaching units:</b>	<ol style="list-style-type: none"> <li>1. <i>Cartography/ Mathematical Cartography - definition, subject, division and tasks</i></li> <li>2. <i>Geographic map - definition, characteristics, types and elements of map (mathematical)</i></li> <li>3. <i>Map scale- definition, types, meaning and use; basics of construction</i></li> <li>4. <i>Geodetic markers: rectangular and geographic coordinates; triangulation</i></li> <li>5. <i>The Earth shape and size- aprx.: geoid, sphere, sferoid/ elipsoid, WGS84</i></li> <li>6. <i>Cartographic projection - definition, characteristics, distortions; Ellipse of distortion</i></li> <li>7. <i>TEST 1</i></li> <li>8. <i>Cartographic projections- definition, division and types</i></li> <li>9. <i>Planar azimuthal projections - perspective: ortographic, stereographic, gnomonic (central); characteristics and construction</i></li> </ol>		



	<p>10. Planar azimuthal projections - nonperspective: Lambert, Postel; characteristics and construction</p> <p>11. Cylindrical projections - perspective and nonperspective: Lambert, Gall, Mercator, characteristics and construction; Gaus-Krüger, UTM, characteristics and its practical application (use)</p> <p>12. Pseudocylindrical projections: Sanson, characteristics and construction</p> <p>13. Conic projections: Ptolemy, characteristics and construction</p> <p>14. Alternative projections: Nicolosi globular; characteristics and construction</p> <p>15. TEST 2</p>														
<p><b>Learning outcomes:</b></p>	<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>• Knowledge of the mathematical elements of the map.</li> <li>• Complexity of cartographic projection.</li> <li>• Types of projections and characteristics.</li> </ul> <p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>• Understanding the mathematical and technical nature of maps and cartography.</li> <li>• Making and interpreting projections and map scales.</li> <li>• Understanding coordinate systems and calculating coordinates.</li> </ul> <p><b>Competencies:</b></p> <ul style="list-style-type: none"> <li>• Construction, calculation, interpretation of mathematical elements of the map.</li> <li>• Understanding the map and the possibilities of its practical use - application of the map.</li> </ul>														
<p><b>Teaching methods:</b></p>	<p>Interactive method, Dialogic method, Method of oral presentation, Practical work, Method of working with text, Audio-visual method, Method of demonstration, Method of written and graphic works, Individual work, Group work, Work in pair</p>														
<p><b>Knowledge testing methods with grading structure<sup>1</sup>:</b></p>	<table border="1"> <thead> <tr> <th></th> <th style="text-align: right;">Points</th> </tr> </thead> <tbody> <tr> <td>Attendance</td> <td style="text-align: right;">5</td> </tr> <tr> <td>Participation on lectures</td> <td style="text-align: right;">5</td> </tr> <tr> <td>Tests</td> <td style="text-align: right;">40</td> </tr> <tr> <td>Seminar paper</td> <td style="text-align: right;">10</td> </tr> <tr> <td>Final exam</td> <td style="text-align: right;">40</td> </tr> <tr> <td><b>TOTAL</b></td> <td style="text-align: right;"><b>100</b></td> </tr> </tbody> </table>		Points	Attendance	5	Participation on lectures	5	Tests	40	Seminar paper	10	Final exam	40	<b>TOTAL</b>	<b>100</b>
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<sup>1</sup> 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



	<p><b>Assessment:</b></p> <table><thead><tr><th>Grade</th><th>ECTS grade</th><th>Points scale</th></tr></thead><tbody><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></td><td></td></tr><tr><td></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></td></tr><tr><td>&lt;55</td><td></td><td></td></tr></tbody></table>	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	5	(F, FX) insufficient		<55		
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<p><b>Literature<sup>2</sup>:</b></p>	<ol style="list-style-type: none"><li>1. Campbell, J.E., Shin, M. (2012): "Geographic Information System Basics". University of Carolina, Los Angeles</li><li>2. Kennedy, M. (2000): "Understanding Map Projections". Environmental Systems Research Institute, New York</li><li>3. Snyder, J.P. (1987): "Map Projections- A Working Manual". The U.S. Department of The Interior (DOI), Washington</li><li>4. Pavišić, N. (1976): "Osnovi kartografije", Obod, Cetinje</li><li>5. Gašparović, R. (1969): "Matematička geografija". Geografsko društvo SR BiH, Sarajevo, 67-124</li><li>6. Šobić, D. (1955): "Matematička kartografija". Geografski institut Jugoslovenske narodne armije, Beograd</li><li>7. Toskić, A. "Kartografske projekcije". Skripta predavanja, pdf. Odsjek za geografiju Prirodno-matematičkog fakulteta Univerziteta u Zagrebu</li><li>8. Maps &amp; Cartography. Geospatial Resources &amp; Map Collection, Maps tutorial: The Elements of a Map. Ball State University Libraries, Indiana, USA</li><li>9. Elektronska zbirka: GIS; USA University Host; NASA modeli i prikazi</li></ol>																											

<sup>2</sup> 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.