Study program: Geoinformation Technologies

Qualification: PhD

General Information	
University	National University Architecture and Construction of Armenia (NUACA)
Course title	GIS For Environmental Studies
Course/Module code	
Course type	Electives
Year of Study	1st year
Term/Semester	2nd semester
Credits awarded	5 (40 hours)
Degree	PhD
Enrollment status	Full-Time
Prerequisites and co-requisites (if applicable):	• Basic knowledge of Geoinformation technologies. • Basic Cartography

Lecturer's details	
Name, surname	Narine Harutyunyan
Academic title	PhD, Associate Professor
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Office hours and consultation schedule	09:30-15:00 Monday, Thursday, Friday

Course Structure	
Type (compulsory/ optional):	Elective
Course Goal	• To carry out systematic geographical field study and data analysis for change assessment of natural resources and environment in a GIS based environment. • Management of field spatial databases, fauna and flora density maps, erosion studies, hydrological studies maps.

	• Evaluate the impact of natural resource exploitation and emissions on environmental quality.
Learning Outcomes	• Essential concepts used by a GIS system in environmental management projects elaboration. • Apply appropriate approaches, suitable methods, and techniques in the management and protection of the environment and natural resources. • An independent and individual project will be done on a relevant environmental issue where GIS is applied as a tool.
Course contents	**Introduction in geographical informational systems** • Vector, raster data models and other data models. Advantages and disadvantages of each data model. • QGIS graphic interface presentation **Main operations with vector data** • Add Web Services for Maps and Base Maps • Search for data, apply queries and filters • Select by data capture, location and attributes • Symbology layers: single symbol, by categories, by quantities, using graphs **Vector data models** • Create spatial data, create layers from X, Y coordinates points, digitalization techniques • Obtain new vector layers from sources • Convert CAD files to layers, edit existing layers • Table statistics and table conversion **Coordinate system, projection and georeferencing** • Coordinate systems and Projections • Coordinate systems and transformations • Image georeferencing, CAD files and layers **Geoprocessing tools and spatial analysis using vector and raster data** • Vector geoprocessing tools, feature extraction, proximity and overlay analysis

	- Multi-Criteria analysis, zonal statistics - Conversion tools, raster, vector, ASCII, KML - Generate digital models of elevation - Querying and masking raster data for obtaining information - Contour, slope, hillshade, aspect and visibility maps. **Advanced spatial analysis using raster data** - Reclassify rasters, distances, euclidean, boolean operations on layers, raster aggregation and data conversion - Map algebra (Raster calculator), mathematical operations between rasters, cell statistics - Data interpolation techniques (IDW, kriging, natural neighbor)
Assessment methods and criteria	- Exercises - Project - Exams
Recommended textbooks and links (in order of relevance):	1. David Buckley, 1997. The GIS primer. Michael L. Treglia, 2015. Tutorial intro to QGIS 2. Jian Guo Liu and Philippa J. Mason. Image processing and GIS for Remote sensing. Techniques and Applications. John Willey & Sons. 2016 3. Land Resources Monitoring, Modeling, And Mapping With Remote Sensing. Remote Sensing Handbook. Taylor & Francis Group. 2016 4. GIS V Ekologii. Dnepropetrovsk 2016. 5. https://gisgeography.com/best-free-gis-data-sources-raster-vector/ 6. https://plugins.qgis.org/planet/user/24/tag/tutorial/