

GIS DEVELOPMENT

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OBJECTIVE

This course focusses on the development of Geographic Information Systems. The course introduces the concepts of Geographic Information, the data structures, geo-referencing systems, global positioning system, as well as the full stack of tools used to develop web-based GIS Applications. The course covers the main concepts of GIS referencing systems, raster GIS layers, vector GIS layers, Esri file data structure, operations with spatial layers, publishing GIS layers, storing spatial data in database systems, working with spatial data in the database. Managing GIS Data through a web application: Displaying layers (points, polylines, polygons), building thematic maps, editing layers, adding new layer elements (points, polylines, polygons), editing existing layer elements (points, polylines, polygons) Software platforms used in the course will be: GIS Mapping: Quantum GIS <https://qgis.org> , Database Systems: PostgreSQL with PostGIS Extension <https://www.postgresql.org>, <https://postgis.net> SQL Server Spatial Data <https://learn.microsoft.com/en-us/sql/relational-databases/spatial/spatial-data-sql-server>, GIS Server: GeoServer <https://geoserver.org> ,Back-End application development: ASP.NET or similar, Front-End : HTML, Javascript, OpenLayers <https://openlayers.org>. At the end of the course, the students will gain knowledge about GIS Systems, get familiarity with software tools and platforms used for managing GIS Data and develop web based GIS applications. The students will also learn to build a web based GIS application.

SYLLABUS

- Introduction to GIS Systems, geo-referencing, raster and vector layers, gis file data structures, shape, index and attributes.
- Managing Maps with QGIS, exploring existing maps, visualizing map layers to build thematic maps, editing map layers, creating your own maps.
- Publishing Maps on the web using GeoServer
- Storing Map data in a database system, PostGIS or SQL Server. Manipulating GIS data in a database.
- Building a web-based GIS Application, application architecture and environment setup.
 - Visualizing GIS layers using open layers:
 - Visualizing a points layer to a web page
 - Visualizing a polyline layer to a web page
 - Visualizing a polygon layer to a web page
- Interacting with the visualized GIS layers using open layers:
 - Catching events on a points layer element
 - Catching events on a polyline layer element
 - Catching events on a polygon layer element
- Editing the visualized GIS layers using open layers:
 - Add and modify points
 - Add and modify polylines
 - Add and modify polygons

LEARNING ASSESSMENT METHOD

The exam is in written form with a possible (not mandatory) oral discussion or through project. The project requires the student to develop a web application that stores GIS data in a database system and implements (Select, Insert, update, delete) on a layer using the stack of tools taught at the course. Projects will be presented at the end of the course as an alternative to the written exam.