QGIS COURSE - ROUTE ANALYSIS, FINDING THE SHORT PATH IN QGIS

ONLINE TRAINING
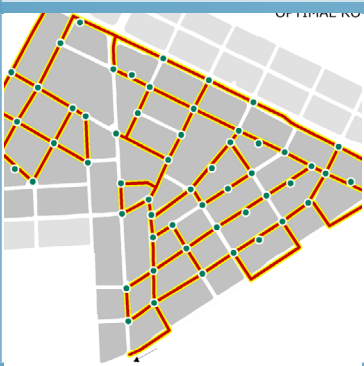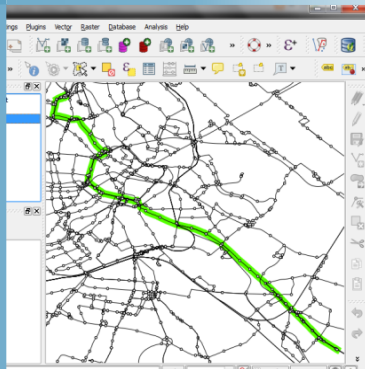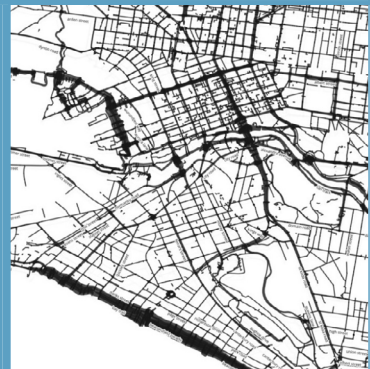
COURSE

The objective of this course is to initiate the student in route analysis using QGIS. The training material approach also information about: geoprocessing tools, mapping basic concepts, performing spatial analysis.
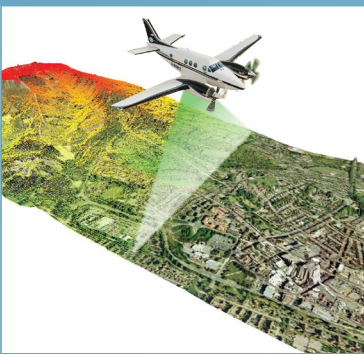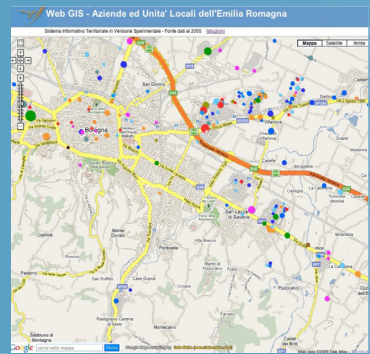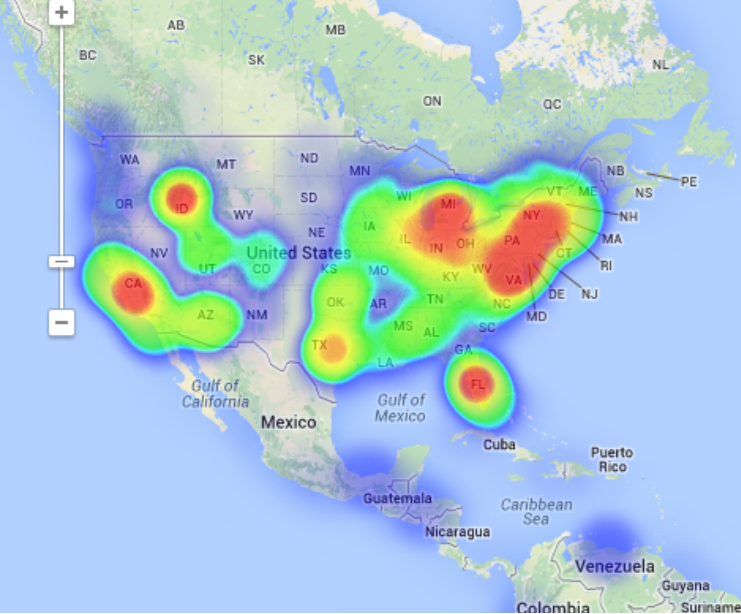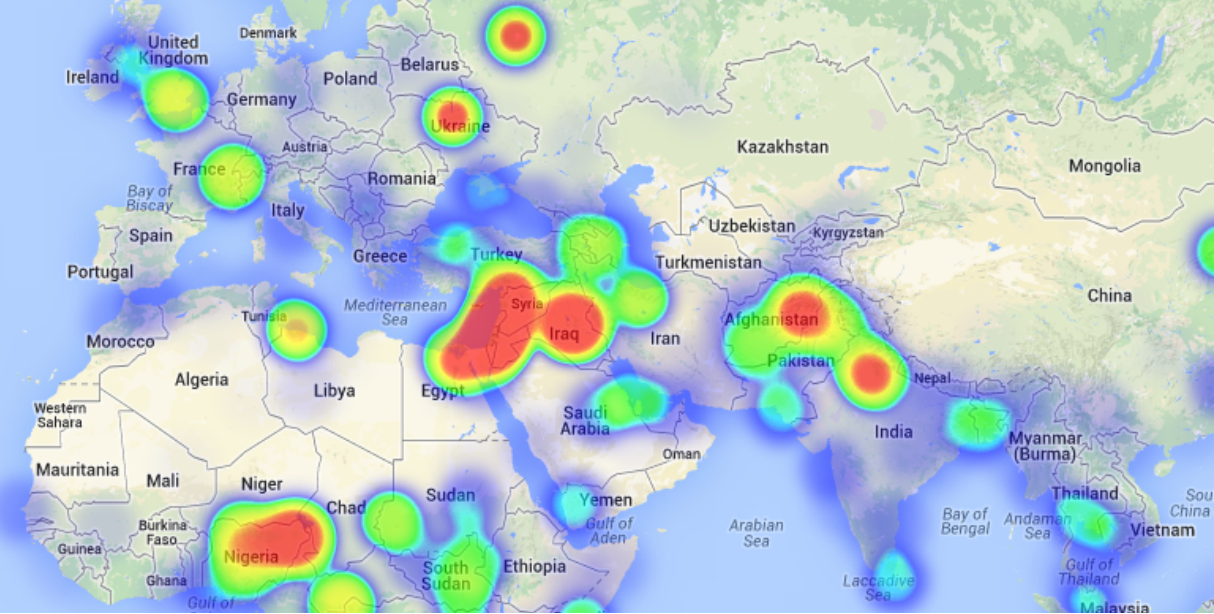
Two additional modules: Introduction to Relational Databases with PostGIS/ PostgreSQL and Programming using Python are included.

GOALS

- Highlight the importance and utility of a Geographic Information System (GIS), its integration and applicability in a variety of professional sectors.

- General overview about the basic skills needed in QGIS and GRASS GIS handling and essential concepts used by a GIS system.

- Learn about GIS key tools in an appropriate and professional way, usage of vector and raster data information in order to develop complex spatial analysis.

- Find about all possible difficulties which you may encounter in the execution of GIS projects, and their solutions through practical exercises.

- Gain experience in data preparation, layout development, map creation and high quality products delivery.

- Start programming with Python and develop your own complex tools to facilitate your work.

METHOLOGY

Enrolled students in this online course will have access to our virtual e-learning platform (which is available 24 hours), where they will find the content of the course, practical exercises, forum discussion and additional content. One of the advantages of this online platform, is that students can benefit of real time support and assistance offered by the instructor (2 hours per week), whom they can contact via direct messages, regarding course related issues, at any moment. They can also contact the instructor via email.

STUDENTS PROFILE

The course is aimed at students and professionals in Engineering, Architecture, Biology, Geography, Geology and Environmental Sciences who are interested in the application of Geographic Information Systems in sectors of transport, distribution, waste collection and, in general, those activities in which the analysis of accessibility is important.

INSTRUCTORS

Alfonso Noriega Díaz

With a Bachelor's Degree in Environmental Sciences and a Master in Safety, Hygiene and Ergonomics from University of Almeria, Alfonso has an extensive experience in GIS/CAD and topography training programs.
His expertise extends also on private sector as he worked as a co-director in final career projects and PRL Technician during the construction of "Helios Campos de San Juan I y II".
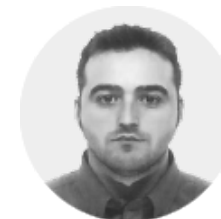
Ricardo Gárcia Álvarez

With a Bachelor´s Degree in Geography from Autonom University of Madrid and a Master in Geographic Information Systems from Pontificia University of Salamanca, Ricardo is a Specialist in GIS/Remote Sensing business, with more than 15 years of work experience.
His area of expertise extends over transport networks project management, spatial accessibility studies with GIS, sustainable urban mobility plans, traffic studies (macro and micro simulation) and cartography products development (orthorectification, digital restitution and photogrammetry consulting). As an instructor he is responsible for the training program in different private companies like Tragsa (Tragsatec Group) or Prointec (Indra Group).

Beatriz Ramos López

Beatriz holds a Bachelor Degree in Biology at University of Sevilla, a Master in Geographic Information Systems and another one in Geographic Information Technologies, both of them at the University of Alcala. She has experience in the execution of Web GIS related projects, in the usage of open source software products and in the development of cartographic viewers.

INTRODUCTION IN GEOGRAPHICAL INFOR-MATIONAL SYSTEMS

Basic concepts and definitions
Capabilities and applications of Geographic Information Systems
Geographic information: vector data models, raster data models and other data models (CAD, TIN, etc.).
Main characteristics, advantages and disadvantages of each data model
QGIS graphic interface presentation

DATA VISUALIZATION

First steps in QGIS
Operations in attribute table
Query and search tools
Selection tools
Symbology in QGIS
Labeling and how to add text on a map

COORDINATE SYSTEMS, PROJECTIONS AND IMAGE GEOREFERENCING

Introduction to Coordinate Systems and Projections
Definition of Coordinate System
Coordinate Systems and Transformations
Image georeferencing, CAD files and layers

VECTOR DATA MODELS. GENERATE AND EDIT VECTOR DATA

Generate and edit spatial information
Select and export data from an existing vector layer
Create a new point layer vector from coordinates points
Convert shp files to CAD files
Create and edit shapefiles
Edit vectors, digitization
Create and edit table information

VECTOR DATA MODELS. TABLE RELATIONS

Database design
Database connections, combine tables with UNION
Spatial joins, generate new statistics and new data

using table and spatial data information

GEOPROCESSING TOOLS AND SPATIAL ANALYSIS USING VECTOR DATA

Vector geoprocessing tools, feature extraction, proximity and overlay analysis
Create sampling grids
 Multi-Criteria Analysis, zonal statistics, optimal site location

GENERATE CARTOGRAPHIC PRODUCTS

How to generate maps and cartographic products
Create maps using QGIS

INTRODUCTION IN RELATIONAL DATABASES SYSTEMS

Types of data that can be included in a database
About installing PostgreSQL
Create and manage data using PostGIS
How to use PostGIS with QGIS, import and export shapefiles

Information sources and resources found on WEB
IDEE (Infrastructura de Datos Espaciales de Espana)
Portal for regional, European and international data
Download cartographic products
Web map services
Cartographic viewers
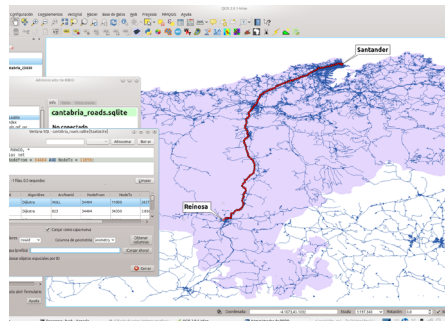
INTRODUCTION TO NETWORK ANALYSIS WITH QGIS

Definition
Types of network
 · Geometric
 · Transport
Network components
 · Arches
 · Nodes
 · Flows
Network Impedances
 · Distances
 · Time
 · Speed
 · Summary

NETWORK GRAPH

Introduction
Road graph
 · CNIG portal for spatial data download
 · OpenStreetMap
 · Download data from openstreetmap.org
 · Download data using QGIS
 · Geofabrik data
 · Summary
Digitization
Intersection points
Set minimum attributes
 · Length (Distance)
 · Speed
 · Time
 · Direction (one way)
 · Cost and reverse cost
 · Summary
Spatial databases in QGIS
 · PostgreSQL /PostGIS
 · SQLite
Network topology
 · Graph topology
 · Topology in PostgreSQL/PostGIS

ROUTE AND PATHS CALCULATIONS

Introduction
- · Necessary components
- · Direct and indirect calculation

Route calculation in PostgreSQL/PostGIS
    pgAdmin
    Algorithms used for route calculations
- · Dijkstra
- · Kdijkstra
- · Astar
- · Ksp
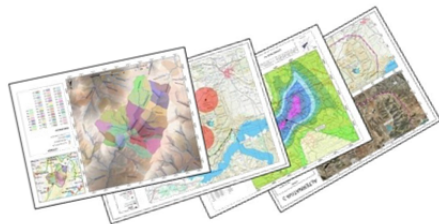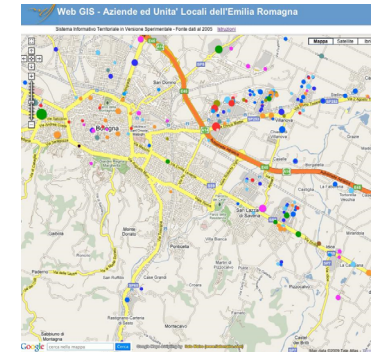- · Trsp - with turn restrictions

    Computation of Isochrones in road networks
- · Drivendistance
- · Alphapshape

    Origin-Destination Matrix (Cost Matrix analysis)
TSP

Route calculations in QGIS with Pgrouting

TYC GIS Training

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