

Course code: **POSTGIS**

Course title: **PostGIS as a platform for spatial data storage, processing and analysis**

Days: 3

## Description:

### Course intended for:

The training is designated for beginner programmers and administrators wishing to get familiar with the issues of spatial data and their functioning in PostgreSQL + PostGIS.

### Course objective:

The training objective is to get the participants familiar with the theoretical and practical issues of supplying, storage, edition, analysis and sharing of spatial data using PostgreSQL and PostGIS add-on.

The training participants will learn to do the following in PostGIS:

- Import spatial data
- Effectively store and manage spatial data saved in the database structure
- Edit, analyze and process spatial data using in-built PostGIS mechanisms
- Export and deliver spatial data in standard formats

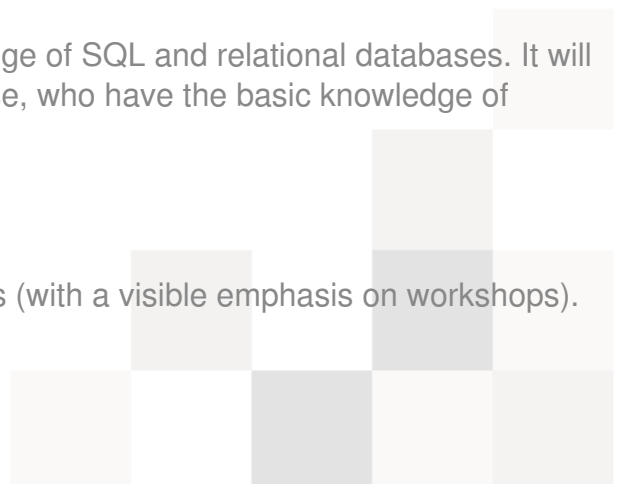
After the training, the participants will be able to use PostGIS on their own in all aspects of spatial data storage in a database.

### Requirements:

The participants are required to have basic knowledge of SQL and relational databases. It will be easier to understand the training content for those, who have the basic knowledge of geographic information systems and PL/pgSQL.

### Course parameters:

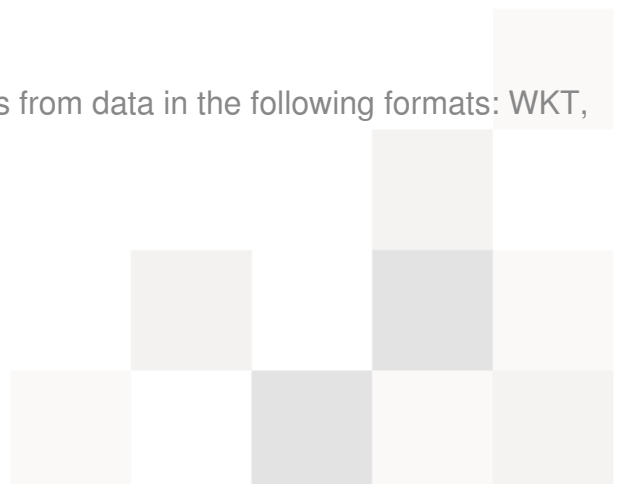
3\*8 hours (3\*7 net hours) of lectures and workshops (with a visible emphasis on workshops).



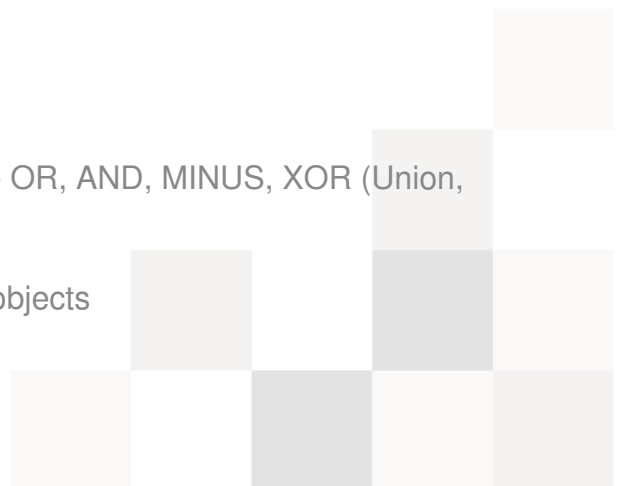
Group size: no more than 10 participants.

## Course curriculum:

1. Introduction – what is GIS?
2. Installation and development of spatial databases
3. Vector spatial data in PostGIS
  - Geometric objects in the database
  - Geometric metadata
  - Systems of coordinates
4. Import of data to PostGIS
  - INSERT manual
  - Data loading from files (shp2pgsql, QuantumGIS)
5. Establishing and using of spatial indexes
6. Raster data management
  - Raster data type
  - Raster loading and creation (raster2pgsql, in-built functions, QuantumGIS)
  - Cataloguing of raster information in the database
  - Downloading of rasters from database – the example of PHP
7. Analysis, edition and processing of spatial data in the database
  - Geometry constructors
    - Generation of geometry types from data in the following formats: WKT, WKB, GML, GeoJSON, KML
  - Geometry properties extraction



- Obtaining of geometry type information
- Downloading of geometry components
- Validation of geometric data
- Specification of object location in the system of coordinates (SRID, bbox, minimum and maximum coordinates)
- Edition of geometric data
  - Adding and removing of vertices in a geometric object
  - Conversions between geometric types
  - Adding of third dimension information
  - Turning, moving, scaling, snapping
- Functions of conversion of geometry to standard formats
  - GeoJSON
  - GML
  - KML
  - SVG
  - WKT and WKB
- Spatial relations and measurements
  - Calculation of length, area, perimeters, distances, azimuths
  - Defining of spatial relations between objects (Intersects, Touches, Crosses, Covers, CoveredBy, Contains, Overlaps, Disjoint, Equals)
  - using DE-9IM matrix
- Geometry processing
  - Operations on geometry type OR, AND, MINUS, XOR (Union, Intersection, Difference)
  - Generalization of geometric objects



- Building of buffer zones
- Repairing of improperly defined geometry
- Linear Referencing
  - Adding information on measures to geometric objects
  - Measure handling and use
- Aggregation functions
- Raster operations
  - Raster data constructors in the database
  - Use of raster data properties
  - Obtaining detailed information on raster channels and pixels
  - raster, channel, pixel edition
  - processing and analysis of raster data
  - conversion to standard formats

## 8. Export of spatial data

\* Use of external applications and libraries (GDAL/OGR, OpenJUMP, QuantumGIS)

