

**Course offered for the PhD program  
in Civil, Chemical and Environmental Engineering  
Curriculum in Fluid Dynamics and Environmental Engineering  
a.a. 2021/2022**

(due to the interdisciplinary nature of the topic,  
students from other curricula or PhD courses are welcome)

**1. Title**

Geospatial data and their processing in GIS

**2. Course Description**

*The Geographic Information System (GIS):* operating logic and basic functionality, overview of application fields, the main existing software (in particular free and open source).

*Reference systems and map projections:* definitions and features of the most common ones, the EPSG standard codes, the process of geo-referencing.

*Numerical cartography:* an outline of acquisition methods, conceptual and logic data models, the spatial, semantics and topological components, nominal scale and resolution, metadata and the INSPIRE European Directive, the official Italian cartography.

*Digital Terrain Model (DTM):* features and data structures, planimetric and altimetric precisions, an outline of interpolation methods for their production; digital models derived from LiDAR survey: acquisition modes, resolutions, strengths and difficulties of use.

*Digital image:* principles of photogrammetry, the orthorectification process, main characteristics of aerial and satellite images.

*GeoDataBase:* definitions and structure of relational DataBase, SQL queries, the space component and the interaction with GIS software.

*GeoWebService:* characteristics and methods of use of web services for sharing and distribution of geographic data; main cartographic portals; the OpenStreetMap project.

*Free e Open Source Software:* main features of QGIS and GRASS GIS; consultation and simple processing of geographic data through QGIS.

**3. Course Organization**

The course consists of lectures (8h) and a computer exercise (4h) in GIS environment.

**4. Teacher**

Bianca Federici

**5. Duration and credits**

12 hours, 2 credits

**6. Activation mode and teaching period**

The course will be held in January or February 2022, according to the need of the participants.

For registration and information send an email to bianca.federici.et.unige.it

**7. Deadline for registration**

Registration within the 10<sup>th</sup> of January 2022.

**8. Final exam**

The final examination will be an oral presentation of a theoretical deepening or of an application of management and elaboration of geospatial data in a GIS environment. The date will be agreed with the students.