Course offered for the PhD program
in Civil, Chemical and Environmental Engineering
Curriculum in Fluid Dynamics and Environmental Engineering
a.a. 2023/2024

(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.
Hints on Digital Images: image resolutions, principles of photogrammetry, orthorectification.
(If interested, look at the dedicated course on this topic).
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 2024, 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 10th of January 2024.

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.