

**Course offered for the PhD program  
in Civil, Chemical and Environmental Engineering  
a.y. 2024/2025 (XL cycle)**

(course is open for participation of students from other PhD cycles or programs)

**1. Title**

Satellite and aerial images: automatic processing in GIS

**2. Contents, Objectives and Description**

The course is intended to provide theoretical basis on digital images and their processing, and to provide initial experience in processing them in a GIS environment.

The contents of the course are:

- *Digital images*: the colour and its compositions, digital images, formats and resolutions; ortophotos;
- *Introduction to Satellite Remote Sensing*: elements of radiometry and radiation propagation, spectral signature of natural surfaces, the atmospheric effect on remotely sensed data; main satellite missions for environmental remote sensing;
- *Introduction to image pre-processing*: histogram modification and filtering, band composite and spectral indices; possible applications to case studies in civil protection (floods, fires) and environmental monitoring;
- *Image processing*: georeferencing, supervised and unsupervised automatic classification; object based and pixel based classifiers;
- *Geodata and GIS*: Hints on reference systems, cartographic projection and the EPSG code, on raster and vector data, and on GeoWebServices;
- *Exercise lessons on geodata visualization and image processing in QGIS*

A basic knowledge of geodata and their processing in GIS is required.

**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 - February 2025, 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 2025.

**8. Final exam**

The final examination will be an oral presentation of a theoretical deepening or an experience of automatic processing and analysis of aerial or satellite optical images. The date will be agreed with the students.