



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Earth Observation for Geology

2223-1-F7401Q102

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#### Aims

The aim of the course is to provide expertise in the analysis and interpretation of remote sensing images for Earth Sciences applications.

#### Contents

Theory and practice for remote sensing data analysis using open-source software for image processing for geological applications.

#### Detailed program

Basis of remote sensing: electromagnetic spectrum, optical, thermal, lidar and microwave (radar) remote sensing, synthetic aperture radar (SAR), SAR interferometry, characteristics of active and passive remote sensing instruments and platforms (e.g. ESA – Sentinels satellites).

Data elaboration and image analysis: satellite image visualization; pre-processing techniques; image processing and extraction of biogeophysical parameters.

Applications: 1) lithological mapping using optical satellite data; 2) monitoring of the cryosphere (e.g. glaciers, rock glaciers) with active and passive remote sensing techniques; 3) thermal remote sensing for active fire detection, urban heat island mapping and monitoring of active volcanos; 4) flood monitoring with Sentinel-1 SAR data; 5) monitoring surface deformation related to landslides, volcanos and land subsidence with SAR interferometry.

Laboratory exercises: use of open-source softwares (e.g. ESA-SNAP, QGIS) for geological applications using the

above mentioned techniques. The exercises are a key part of the course and will be held using computer labs.

## **Prerequisites**

## **Teaching form**

Laboratory (4 credits)

*During the Covid-19 emergency, lectures will take place through video conference systems.*

## **Textbook and teaching resource**

Handouts and slides

Brivio, P.A., Lechi, G., and Zilioli E., 2006. Principi e metodi di Telerilevamento, De Agostini - Città Studi edizioni, Torino (Italy), pp. 525.

Lillesand T. & Kiefer R. (2015). Remote sensing and image interpretation, 7th edition, 736 p.

Jensen J.R. (2014). Remote Sensing of the Environment: An Earth Resource Perspective, 2nd edition, Pearson New International edition, 619 p.

## **Semester**

First semester

## **Assessment method**

The exam allows to evaluate the preparation reached in terms of theoretical and practical knowledge of the topics covered during the lessons and the laboratories.

The evaluation of the examination is established through a report on the resolution of a geological / environmental case study aimed at the evaluation of the student's skills to apply the remote sensing techniques in geological applications (40% of the final evaluation) and an oral examination with open questions which allow to verify the theoretical and practical knowledge of the topics covered during the lessons and the laboratories (60% of the final evaluation).

The expositive ability and adequacy of the student's language is also assessed. The examination is retained positive for an evaluation of 18-30/30.

*During the Covid-19 emergency the exams will be online and will be conducted using the Webex platform. A public link to the examination will be reported on the e-Learning page of the course.*

## **Office hours**

During working hours with email appointment to [micol.rossini@unimib.it](mailto:micol.rossini@unimib.it)

## **Sustainable Development Goals**

INDUSTRY, INNOVATION AND INFRASTRUCTURE

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