

Name of the course: Thermal imagery for remote sensing: principles, methods, and engineering applications

Teacher: Giovanni Tanda; e-mail: giovanni.tanda@edu.unige.it

Duration of the course: 12 hours

Credits: 3

Language: Italian; in the presence of a request by foreign students, the course will be held in English.

Aims of the course: The course provides a survey of thermal imaging from remote platforms used in various engineering applications. Foundations of thermal radiation and infrared thermography are covered, along with the most recent methods of applying thermography for remote sensing purposes.

Teaching programme:

Part 1) Foundations of radiant heat transfer

The blackbody definition and laws

The solar radiation

The radiant heat transfer among blackbodies and real surfaces

The radiant properties of materials

Part 2) Detectors of thermal radiation

Infrared thermal cameras: measurement principles, thermal and quantum detectors, main performance parameters

Multispectral and hyperspectral cameras: measurement principles, sensors, and performance parameters

Examples of applications of infrared, multi- and hyper-spectral cameras

Part 3) Remote sensing platforms and procedures

Implementation of thermal radiation cameras for remote sensing: performance parameters and inspection requirements

Image processing (overlapping, mosaicking, etc.) and georeferencing

Remote platforms: UAV (drone), aircraft, and satellite

Part 4) Applications

Monitoring of photovoltaic plants

Applications in forestry, agriculture, and environment (marine pollution)

Monitoring of landfills

Estimation of heat leakages from buildings

Exam modality:

Written multiple-choice questionnaire proposed and completed during the last lesson of the course

Bibliography:

Slides (in English) provided by the teacher.