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**ACADEMIC YEAR: 2019-2020**

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COURSE: Remote sensing applied to forest resources monitoring

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TYPE OF EDUCATIONAL ACTIVITY: Optional

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TEACHER: Angelo Nolè

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web:

<https://scholar.google.it/citations?user=4tPhnWoAAAAJ&hl=it>

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telefono: 0971 205358

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Lingua di insegnamento: italiano

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ECTS: 4 (3 frontal lectures; 1 practice)	n. of hours: 24 hours lectures 16 hours practice	Campus: Potenza School: SAFE Program: LM Forest and Environmental Sciences	Semester: I & II
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**EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES:**

The aim of the module is the transfer of knowledge related to remote sensing applied to the monitoring of forest resources, with particular reference to the following topics: general principles of remote sensing, digital representation of electromagnetic radiation, main characteristics of digital images, main types of sensors and satellite platforms, image pre-processing, calculation of the main vegetational and environmental spectral indices, land use classification.

- **Knowledge and understanding:** the course provides the general principles on the main techniques and sensors for remote sensing of forest resources. The course will be focused on remote sensing basics and applications and will be supported by practical exercises and applications.
  - **Applying Knowledge and understanding:** the skills acquired in the course will be supported by laboratory activities mostly devoted to the use of the main freeware softwares (QGIS, ESA SNAP) applied to remote sensing image pre-processing, band combination and spectral vegetation indices calculation and analysis.
  - **Making judgements:** The student will gain the ability to identify and apply the most suitable remote sensing techniques and sensors to analyze vegetation for forest resources monitoring.
  - **Communication skills:** The student will acquire the terminology and technical language related to remote sensing and will be able to transfer the skills gained during the course in remote sensing vegetation analysis and forest resources monitoring.
  - **Learning skills:** The student will be able to organize logically all the information coming from the course, by identifying time after time the most suitable tools to face issues related to the remote sensing of forest resources and integrating them with information coming from the relevant literature
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**PREREQUIREMENTS**

- LT (3-year degree)
  - Physics;
  - Forest ecosystem
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**SYLLABUS**

**Lessons**

CFU-1: Remote sensing basics: principles of optics; digital representation of electromagnetic radiation; optical sensors and satellite platforms; properties and management of remote sensing imagery (spatial resolution, radiometric, spectral and estimated review time); spectral signatures of plant and natural surfaces; online portals for remote sensing data acquisition.

CFU-2: Image pre-processing: geometric correction, radiometric calibration; atmospheric correction; image band colour combination; remote sensing image analysis; spectral indices.

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CFU-3: Remote sensing applied to the forest resources monitoring: Image Classification Techniques in Remote Sensing (supervised, automatic and semi-automatic); Land Use – land cover map (CORINE Land Cover); Spectral indices calculation, laser scanning principles and application to forest resources. Forest productivity modelling and remote sensing.

CFU 4: (Laboratory practice) Main freeware software (QGIS, ESA SNAP) application for image pre-processing and analysis; spectral vegetation indices calculation.

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#### TEACHING METHODS

24 hours of lessons, 16 hours of laboratory practices. During practices students will be asked to apply the skills acquired during the course

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#### EVALUATION METHODS

Oral examination at the end of the course. Three questions, one of which related to topics addressed during practices.

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#### TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- On-line educational material available at: [https://drive.google.com/drive/folders/1KYVf0XnbriH-bMIok9MiE\\_7B76SaKErS?usp=sharing](https://drive.google.com/drive/folders/1KYVf0XnbriH-bMIok9MiE_7B76SaKErS?usp=sharing)
- Teaching material distributed in classroom and available on-line
- Brivio P.A., Lechi G., Zilioli E. (2006) Principi e Metodi di Telerilevamento. CittàStudi Edizioni
- Dainelli N. (2011). L'osservazione della terra. Fotointerpretazione. Dario Flaccovio Editore.
- Remote Sensing and Image Interpretation - T.M. Lillesand, R.W. Kiefer, J.W. Chipman, Wiley International Edition
- Mario A. Gomarasca, Elementi di Geomatica. ASITA. 2004

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#### INTERACTIONS WITH STUDENTS

- in the office at planned days/hours (usually on Wednesday)
- e-mail
- mobile

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#### EXAMINATION SESSIONS (Forecast)

Dates of examination sessions will be available on line at <https://unibas.esse3.cineca.it/Home.do>

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#### EVALUATION BOARD

Angelo Nolè  
Antonio Coppola  
Agostino Ferrara  
Francesco Ripullone

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SEMINARS BY EXTERNAL EXPERTS YES

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