DIPARTIMENTO DI SCIENZE

COURSE: Remote Sensing of Environment			
ACADEMIC YEAR: 2017/2018			
TYPE OF EDUCATIONAL ACTIVITY: Basic			
TEACHER: Nicola Pergola			
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phone: 0971427268		mobile (optional): 3204349369	
Language: English			
ECTS: 6 4 lessons 2 practice	n. of hours: 56 32 lessons 24 practice/Lab	Campus: Potenza Dept./School: Dipartimento di Scienze Program: Geosciences and Georisources **(LM74)**	Semester: II II Semestre: 05-03-2018 15-30 GIUGNO 2018

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The course is the first in Remote Sensing of the Environment. It is devoted to the basic elements and physical principle behind the Earth Observation from space. It will also address the main technologies and methodologies used, focusing on the passive optical techniques. The main objective of the course is to make students able to acquire knowledge about satellite remote sensing methods and principle and to make them capable to perform basic satellite data analysis for environmental applications.

PRE-REQUIREMENTS

Sintetizzare in lingua inglese i contenuti riportati nella scheda in lingua in italiana.

- Basic of Mathematics and Geometry concepts
- Basic of Classic Physics and electromagnetism
- Knowledge of Office programs Excel and Powerpoint

SYLLABUS

Module 1. Introduction to Remote Sensing. (4 hours)

Introduction to Remote Sensing. Natural sources and signals. Earth Observation from space: spectral, spatial, temporal and intensity signatures.

Module 2. Physic Laws (6 hours)

Fundamental physic laws: Planck's law, Wien's law, Stefan-Boltzmann's law, Rayleigh-Jeans and Wien approximations. Brigthness temperature definition. Radiation-matter interactions.

Module 3. Basics of multi-spectral observation. (6 hours of lessons + 6 hours of practice)

Basic principle of the multi-specctral observation. Spectral signatures. Basic of spectroscopy. Rutherford-Bohr theory. Atomic spectra.

Practice: computing Planck's function; Rayleigh-Jeans approximation verification. Spectral signatures measure and data processing and analysis.

Module 4. Remote Sensing technologies (8 hours lessons + 4 hours practice)

Main characteristics of satellite sensors. Scanning and non-scanning radiometers. Satellite platforms: near-polar and geostationary orbits. Constraints on passive sensor resolutions. Overview of the main satellite Earth observation systems and missions. Technical visit to a satellite receiving system.

Module 5. Remotely sensed Image processing (6 hours of lessons + 8 hours of practice)

Digital image definition and pre-processing. Calibration, navigation and correction of satellite imagery. Enhancement and filtering techniques. Classification methods. Practice: supervised and unsupervised image classification.

Module 6. Satellite Remote Sensing application for the Environment (2 hours lessons + 6 hours practice)

Examples of satellite remote sensing applications for the environment (e.g. vegetation, temperature)

Practice: Processing and interpretation of multi-spectral satellite images.

TEACHING METHODS

Theoretical lessons, Laboratory tutorials, Technical visits

EVALUATION METHODS

Oral examination.

The exam will be devoted not only at verifying the level of knowledge achieved by the students regarding the topics treated during the course but also to evaluate their ability to link and compare different aspects and contents.

The exam is intended passed if a minimum vote of 18/30 is obtained.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

R. P. Gupta Remote Sensing Geology, Springer & Verlag, (1991).

W.G. Rees, Physical Principles of Remote Sensing, Cambridge University Press (1990)

SLides presented during the theoretical lessons

Other possible books:

P.J. Curran, Principle of Remote Sensing, Longmann (1985).

J.B. Campbell Introduction to Remote Sensing, Taylor & Francis (1996)

N. M. Short The Remote Sensing Tutorial Edited by Jon Robinson: disponibile in biblioteca come iper-testo su CD-ROM e consultabile sul sito internet della NASA: http://code935.gsfc.nasa.gov/Tutorial/TofC/Coverpage.html

P. M. Mather, Computer Processing of remotely-sensed images, J. Wiley & sons (2006).

INTERACTION WITH STUDENTS

Riportare in lingua inglese i contenuti riportati nella scheda in lingua in italiana.

During the course, the professor will make all the material (i.e. slides) available for the students, periodically updating it.

Receiving timetable: Wednesday and Friday, 10:00 to 12:00 at CNR-IMAA, C.da S. Loja, Zona Industriale di Tito Scalo. In addition, the professor is available by e-mail.

EXAMINATION SESSIONS (FORECAST)[1]

18/01/2018, 22/02/2018, 22/03/2018, 14/06/2018, 18/07/2018, 24/10/2018, 11/12/2018

SEMINARS BY EXTERNAL EXPERTS YES ☐ NO ☒

FURTHER INFORMATION

[1] Subject to possible changes: check the web site of the Teacher or the Department/School for updates.