Università degli Studi della Basilicata
Scuola di Ingegneria

COURSE: Methods and techniques for the Earth Observation

TEACHER: Guido Masiello

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Language Italian and English

ECTS: 9	n. of hours: 74	Academic year: 2014/15	Campus: Potenza	Semester:

TOPICS

Radiation-Matter interaction in the earth atmosphere. Absorption, Emission and Scattering. Thermal and Chemical Structure of earth atmosphere. Radiative transfer in grey atmosphere. Greenhouse Effect. Line by Line Radiative transfer. Inverse problems for the retrieval of geophysical parameters.

TEACHING METHODS (please tick one or more options)

x Theoretical lessons
x Tutorials in classroom
☐ Tutorials in laboratory
☐ Project works
☐ Technical visits
Other activities (please specify) _____

TEXTBOOKS

K. N. Liou, "An Introduction to Atmospheric Radiation", Academic Pres.

J. Houghton. "The Physics of Atmosphere", Cambridge University Press.

W. P. Menzel., "Remote Sensing Applications with Meteorological Satellites". WMO Technical Document

C. Serio et al. in PAUL N. FINDLEY. Environmental Modelling: New Research. p. 51-88, Nova Science Publishers.

ON-LINE EDUCATIONAL MATERIAL

web address: https://www.dropbox.com/s/3yvdyqzxwb0444e/mtot_current.pdf

LEARNING OUTCOMES

Knowledge of phenomena of Radiation-Matter interaction in the earth atmosphere. Solving inverse problems for geophysical parameters. Managing satellite data.

REQUIREMENTS

None

EVALUATION METHODS (please tick one or more options)

☐ Intermediate verifications
☐ Written examination
x Discussion of a project work
☐ Practical test
x Oral examination
Other methods (please specify) _____

DETAILED CONTENT

Fundamentals of Radiation for Atmospheric Application. Electromagnetic Spectrum. Wave Propagation. Planck's law for the Black Body. Wien's Law. Stefan–Boltzmann law. Absorption, Emission and Scattering. Kirchhoff's law. The Sun. Structure of the sun. Solar Radiation. Solar Constant. Atmospheric Basics of Thermodynamics. Chemical and Physical structure of the Earth Atmospheric Water Vapor. Adiabatic lapse rate. Cloud Formation. Fundamentals of Radiative transfer in grey atmosphere. Schwartzchild equation for Radiative Transfer. Radiative Equilibrium. Greenhouse Effect. Line by Line radiative transfer. Atomic Absorption Spectrum. Molecular Absorption Spectrum. Line Broadening and line shapes. Absorption Coefficient and transmittance. Radiative transfer in the Infrared. Radiative transfer models. Cloudy Radiative transfer. Cloudy detection. Inverse problems. Retrieval of Geophysical parameters. EOF (Empirical Orthogonal Function) methodology applied to hyperspectral satellite data.

SEMINARS BY EXTERNAL EXPERTS YES ☐ NO x

FURTHER INFORMATION