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COURSE: Methods and techniques for the Earth Observation

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TEACHER: Guido Masiello

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Language Italian and English

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ECTS: 9

n. of hours: 74

Academic year: 2015/16

Campus: Potenza

Semester: I

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#### 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.

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#### TEACHING METHODS (please tick one or more options)

Theoretical lessons

Tutorials in classroom

Tutorials in laboratory

Project works

Technical visits

Other activities (please specify) \_\_\_\_\_

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#### 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.

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#### ON-LINE EDUCATIONAL MATERIAL

web address: [https://www.dropbox.com/s/3yvdyqzxb0444e/mtot\\_current.pdf](https://www.dropbox.com/s/3yvdyqzxb0444e/mtot_current.pdf)

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#### LEARNING OUTCOMES

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

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#### REQUIREMENTS

None

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#### EVALUATION METHODS (please tick one or more options)

Intermediate verifications

Written examination

Discussion of a project work

Practical test

Oral examination

Other methods (please specify) \_\_\_\_\_

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#### 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.

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#### EXAMINATION SESSIONS (FORECAST)

8 and 22 February 2016, 16 May 2016, 27 June 2016, 25 July 2016, 5 e 19 September 2016, 19 December 2016

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Università degli Studi della Basilicata  
**Scuola di Ingegneria**

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SEMINARS BY EXTERNAL EXPERTS    YES     NO

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FURTHER INFORMATION

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