Laurea Magistrale
Atmospheric Science and Technology (LMAST)

SUBJECT TITLE	**Environmental meteorology** **Part 2. Environmental monitoring techniques**
TEACHER NAME(S)	Giovanni Pitari (3 cfu)
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Teacher meeting	Wednesday, h. 11.30-12-30
Teacher office address	Via Vetoio Coppito, 67100 L'Aquila
DISCIPLINE (SSD)	FIS/06
Semester (1-4)	3 (third) & Coppito L'Aquila
Credits (CFU/ECTS)	3
Lecture hours (h)	30 (15 lectures + 15 laboratory)
Prerequisite and learning activity	Atmospheric Physics and Chemistry, Statistics, Matlab programming
Teaching language and method	English & Lectures, homeworks, PC programming for analysis of observed data
Assessment method	Periodic written reports and final oral exam based on a specific laboratory work
SUBJECT WEBSITE	

OBJECTIVES

Main goals are:
- to introduce to professional instruments for mass density monitoring of boundary layer atmospheric aerosols;
- to introduce to UV analyzers for boundary layer ozone monitoring;
- to introduce to scintillation cell instruments for monitoring radon and environmental radioactivity;
- to illustrate data analysis techniques for aerosols, O_3, Rn and their correlation with boundary layer dynamical quantities and with other pollutants (NO_x in particular);
- to introduce to statistical data treatment on Matlab platform.

OUTCOMES (Dublin descriptors: knowledge, understanding, explain, skill, ability)

After the successful completion of this module, the student should be able to:
- acquire knowledge and understanding on setting up environmental monitoring activities;
- apply knowledge and understanding on experimental tools and methodologies;
- make informed judgments and choices on the suitability of measurement and data analysis techniques;
- communicate study results with written reports;
- have capacity to continue learning in atmospheric monitoring technics.

PROGRAM CONTENT

MASS DENSITY MEASUREMENTS OF BOUNDARY LAYER ATMOSPHERIC AEROSOLS. Atmospheric aerosols. Production and loss mechanisms. Log-normal size distribution. Modes of the distribution. Methods for mass density measurements: total mass and multichannel spectrometer. Correlations aerosol-NOx. Average diurnal and seasonal cycles of boundary layer aerosols. Average seasonal cycle of the log-normal size distribution parameters for the different modes.

MEASUREMENTS OF BOUNDARY LAYER OZONE WITH A UV ANALYZER. The chemistry of tropospheric ozone. Mechanisms of production (NO_x-VOC) and destruction (dry deposition). Observed trends of tropospheric ozone and role of large-scale transport. UV analyzer for ozone measurements in the atmospheric surface layer. Average diurnal and seasonal cycles of boundary layer ozone.

SURFACE RADON MEASUREMENTS WITH A SCINTILLATION CELL INSTRUMENT. Environmental radioactivity. Radon decay chain. Decay constant and e-folding lifetime. Measurements of atmospheric radon activity via emission of alpha particles: scintillation cell instrument. Ozone-radon correlation and role of small-scale convective transport in the atmospheric boundary layer.

REFERENCES AND MATERIAL

1. Jacobson, M.Z.: Atmospheric pollution, Cambridge University Press, 2002.
2. Climate change 1994: Radiative forcing of climate change. *Cambridge University Press*, 1994.
3. Climate change 2001: The scientific basis. *Cambridge University Press*, 2001.
4. Teacher-provided articles on scientific journals of the sector.
5. Teacher-provided notes.