Laurea Magistrale
Atmospheric Science and Technology (LMAST)

SUBJECT TITLE	
TEACHER NAME(S)	Vincenzo Rizi
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Teacher phone	+39 366 6802 761
Teacher meeting	Tuesday 14:00-16:00
Teacher office address	DSFC/UNIVAQ Via Vetoio Building R. Ricamo (Coppito 1) L'Aquila
DISCIPLINE (SSD)	
Semester (1-4)	3 (UNIVAQ)
Credits (CFU/ECTS)	6
Lecture hours (h)	45h lectures + 15h laboratory/exercises
Prerequisite and learning activity	Electromagnetism and optics, basic quantum physics, familiarity with the laboratory procedures, basics of statistical data analysis.
Teaching language and method	English. Lectures, practical exercises and hands on instruments in lab.
Assessment method	Oral examination and preparation of individual laboratory work.
SUBJECT WEBSITE	TBD

OBJECTIVES

The student, from her/his starting knowledge of electromagnetism and optics, is guided along the main features of lidar techniques and designs. The course objectives: the student will be familiar with simple lidar technique and equipment, namely, the student will know how to face the specific parts, their specifications and performances of different atmospheric lidars, to analyze and interpret the observational data, to design from scratch a simple lidar experiment, analyze the errors of measurement.

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

Qualifications that signify completion of this module, are awarded to students who:

- have demonstrated understanding of the basic of lidar remote sensing techniques, that builds upon their knowledge of electromagnetism and optics;
- can apply their knowledge and understanding to perform simple lidar experiment for atmospheric science;
- have the ability to gather and interpret relevant data observed with more common lidars;

PROGRAM CONTENT

Introduction to lidar: lidar and the atmosphere, lidar history, lidar setup, lidar equation, lidar techniques. Polarization in lidar, lidar and multiple scattering. Lidar and atmospheric aerosol particles. High Spectral resolution lidar. Visibility and cloud lidar. Differential-Absorption Lidar for ozone, water vapor and temperature profiling. Raman Lidar. Temperature measurements with lidar. Resonance scattering lidar. Doppler wind lidar. Air-borne and space-borne lidar.

REFERENCES AND MATERIAL

Notes provided by the teacher.

Raymond M. Measures, Laser remote sensing, 1992.
Craig F. Bohren, Donald R. Huffman, Absorption and scattering of light by small particles, 1998.
Takashic Fujii, Tetsuo Fukuchi, Laser Remote Sensing, 2005.
Luca Fiorani, Valentin Mitev, Recent Advances in atmospheric lidars, 2010.