



Laurea Magistrale Atmospheric Science and Technology (LMAST)



SUBJECT TITLE	Engineering Electromagnetics
TEACHER NAME(S)	Alessandro Galli (3 CFU), Marta Cavagnaro (3 CFU)
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<i>Teacher meeting</i>	Tuesday, h. 15-17
<i>Teacher office address</i>	Via Eudossiana 18, 00184 Rome, I
DISCIPLINE (SSD)	ING-INF/02
<i>Semester (1-4)</i>	2 (second) - Rome, at via Eudossiana 18
<i>Credits (CFU/ECTS)</i>	6 CFU
<i>Lecture hours (h)</i>	60 hs (45 lectures + 15 exercises/laboratory)
<i>Prerequisite and learning activity</i>	Basics of mathematics, physics, circuit and signal theory, electromagnetics
<i>Teaching language and method</i>	English – Lectures (blackboard and slides), exercises, and homework
<i>Assessment method</i>	Oral examination and optional dissertation on a selected state-of-the-art topic
SUBJECT WEBSITE	https://sites.google.com/a/uniroma1.it/alessandrogalli/

OBJECTIVES

The course is aimed to furnish the theoretical methods and the practical knowledge on the behavior of various devices and systems exploiting electromagnetics in modern technological applications. The acquired capabilities will be focused on the features of high-frequency systems with specific attention to the guided-wave propagation and to the generation, processing, and detection of the signals ranging from microwaves to optical systems. The course will be completed with the study of the electromagnetic computer-aided analysis and design procedures, of the instruments and the measurement techniques of high-frequency devices and circuits.

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

The course will allow the students to acquire capabilities concerning the analysis, design, and experimental testing of different devices for the generation, processing, and detection of the electromagnetic fields used in modern physics, electronics, and communications for different applications.

PROGRAM CONTENT

Introduction to the course – Foundations of electromagnetic fields in time and frequency domain;
Principles of electromagnetic wave propagation and radiation; Wave propagation in various complex media;
Characterization of microwave and optical devices and circuits; Active and passive microwave devices;
Microwave waveguiding and resonant structures; Printed circuits and dielectric waveguides;
Optical links and propagation features in optical fibers; Optical sources and detectors;
Electromagnetic interferences, signal integrity, and compatibility;
Numerical methods and CAD techniques for high-frequency circuit analysis and design;
Instruments and measurement techniques for high-frequency devices and circuits.

REFERENCES AND MATERIAL

Texts, notes, and slides provided by the teachers and available on the course website.