UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

MICROWAVE MEASUREMENTS

Enrollment year	2020/2021
Academic year	2021/2022
Regulations	DM270
Academic discipline	ING-INF/02 (ELECTROMAGNETIC FIELDS)
Department	DEPARTMENT OF ELECTRICAL,COMPUTER AND BIOMEDICAL ENGINEERING
Course	ELECTRONIC ENGINEERING
Curriculum	Space Communication and Sensing
Year of study	2°
Period	1st semester (27/09/2021 - 21/01/2022)
ECTS	6
Lesson hours	58 lesson hours
Language	English
Activity type	ORAL TEST
Teacher	SILVESTRI LORENZO (titolare) - 6 ECTS
Prerequisites	Knowledge of electromagnetic field theory and microwave circuits, basic knowledge of antennas.
Learning outcomes	The course is taught in English. The course aim to present the techniques for the measurement and characterization of circuits and antennas for applications in the microwave frequency band. The student will basically learn how to select the most appropriate instruments and components to organize a measurement setup for a given circuit. Moreover, he/she will be able to conduct autonomously some standard measures.
Course contents	The course will address the following topics: - Component and devices for microwave measurements: directional couplers, circulators, attenuators, matching circuits, matched loads, filters and waveguides. In the course the main characteristics of

	connectors, cables, waveguides and transitions/connectors are presented. - Frequency and signal generators. - Power measurement: bolometers, thermistors and diode detectors. - Fundamentals of the Spectrum analyzer: working principles and block diagram and technical specifications. Some practical and specific examples of usage of the instrument are analyzed. - VNA (Vector Network Analyzer): working principle, block diagram and calibration techniques (SOLT, TRL). - Antenna measurement: the topic is subdivided in two main parts; indoor (anechoic chamber) and outdoor measurements. Both the far field and near field measurement (planar, cylindrical, spherical scan) are analyzed. - Material Characterization at microwave: several approaches aim at characterizing dielectric materials at microwave are presented as: coaxial probe, trasmission/reflection method, antenna method, cavity resonators. - Basics of dosimetry: The basics of microwave dosimetry are introduced with some highlights on the SAR measurements and ICNIRP specifications.
Teaching methods	Lectures (hours/year in lecture theatre): 30 Practical class (hours/year in lecture theatre): 20 Practicals / Workshops (hours/year in lecture theatre): 15
Reccomended or required readings	Provided by the teacher. The slides are complemented with various connections to text books and Internet links.
Assessment methods	Oral examination. The student can decide to prepare a short presentation about his/her favorite topic of the course. In any case, the second part of the exam comprises some questions about the overall course. The minimum score to pass the exam is 18/30, the maximum score is 30/30 cum laude.
Further information	=
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile