COMMUNICATION ENGINEERING AND ELECTRONIC TECHNOLOGIES

(Lecce - Università degli Studi)

Insegnamento MICROWAVES

GenCod A003099

Docente titolare Luca CATARINUCCI

Insegnamento MICROWAVES

Insegnamento in inglese MICROWAVES

Settore disciplinare ING-INF/02

Corso di studi di riferimento COMMUNICATION ENGINEERING AND

Tipo corso di studi Laurea Magistrale

Crediti 9.0

Ripartizione oraria Ore Attività frontale: 81.0

Per immatricolati nel 2021/2022

Erogato nel 2021/2022

Anno di corso 1

Lingua ITALIANO

Percorso PERCORSO COMUNE

Sede Lecce

Periodo Secondo Semestre

Tipo esame Orale

Valutazione Voto Finale

Orario dell'insegnamento https://easyroom.unisalento.it/Orario

BREVE DESCRIZIONE DEL CORSO	Microwave course is aimed at providing both theoretical and practical knowledge on the main aspects of microwave engineering. It also serves as the necessary prerequisite for more advanced courses in communication engineering.
PREREQUISITI	Electromagnetic Fields
OBIETTIVI FORMATIVI	After the course the student should be able to * Apply microwave analysis methods to determine the main properties of high-frequency circuits. * Apply knowledge on transmission lines and waveguides particularly for their use as elements in impedance matching and filter circuits. * Design an impedance matching network with either distributed or lumped elements through the Smith Chart. * Evaluate both analytically and experimentally the scattering parameters of N-Port microwave devices * Illustrate the main aspects of N-Port networks, microwave filters and resonant cavities
METODI DIDATTICI	Frontal lessons mainly in "chalk and blackboard" to allow students to follow each mathematical passage slavishly. Use of power point presentations for some specific lessons where graphical support is useful for understanding. At least three practical experiences are also foreseen to introduce students to the simulation of radiofrequency circuits and their electromagnetic characterization.
MODALITA' D'ESAME	An oral exame is foreseen. It is aimed at verifying the knowledge and understanding of the course topics acquired by the student (maximum overall duration: 45 minutes).

ALTRE INFORMAZIONI UTILI	**Office Hours:** By appointment; contact the professor by email or at the end of class meetings. Official office hours will be defined once the course agenda will be definited.
PROGRAMMA ESTESO	**activities)** Introduction: the main differences between low-frequency and hi-frequency circuits (**2 hours frontal lesson**). Transmission lines and waveguides: transmission lines theory. Smith chart. Line-Load matching through single and double stub techniques using the Smith chart. Quarter-wave matching. Properties of the most common transmission lines: coaxial cable, microstrip line, coplanar stripline. Properties of the most common waveguides: rectangular, circular, and "ridge" (**24 hours frontal lesson**). Solutions of assigned exercises and practical examples of use of the Smith Chart. (**12 hours practical exercitations**). Microwave junctions. N-port junctions. Scattering matrix. 2-port, 3-port and 4-port cases. (**8 hours frontal lesson**) Microwave devices: functional description of the main passive components used in microwave circuits. Attenuators. Circulators. Dividers and combiners (Resistive, T-junction, Wilkinson). Directional couplers theory. Two-hole couplers. Branch-Line. Rat-Race. Magic-T. (**12 hours frontal lesson**) Resonant cavities: brief overview on resonant cavities. Rectangular and circular resonant cavities. Application as filters and frequency meters. (**4 hours frontal lesson**) Microwave filters: general information on Microwave filters. Main design techniques for a microwave filter. (**6 hours frontal lesson**) Passive RFID technology : overview on passive RFID technology. The conjugate matching techniques in the design of RFID tags. (**5 hours frontal lesson**) Microwave circuits analysis (Laboratory Activity): Introduction to microwave CAD programs; analysis of microwave circuits. Examples of design of simple microwave circuits. (**5 hours laboratory activity**) S-Parameter evaluation (Laboratory Activity): Vector Network Analyzer description. Laboratory measurement of the scattering parameters of various microwave devices (rat race, Wilkinson divider, etc.). (**3 laboratory activity**)
TESTI DI RIFERIMENTO	[1] David M. Pozar, *Microwave Engineering*, John Wiley & Sons Inc [2] Sorrentino Roberto, Bianchi Giovanni, *Microwave and RF Engineering*, John Wiley & Sons Inc