

<p align="center">Programme of “Elettronica delle Microonde” “Microwave Electronics”:</p>		
<p align="center">Number of ECTS credits: 9 (workload is 225 hours; 1 credit = 25 hours)</p>		
<p>I2E011, Compulsory 2nd Cycle in ELECTRONIC ENGINEERING, 2nd year , 1st semester</p>		
<p>Teacher: Giorgio Leuzzi</p>		
1	Course objectives and Learning outcomes	<p>The goal of this course is to provide the main concepts for the design of microwave circuits, for applications to information technology. The main circuit types are described, together with the relevant design methods, including CAD.</p> <p>On successful completion of this module, the student should understand the behaviour of the main microwave circuits and systems, and master the main design methods. The student should also be able to design and test a practical circuit at microwave frequencies.</p>
2	Dublin descriptors	<p>Topics of the module include:</p> <p>Linear and nonlinear techniques: Linear analysis methods, main nonlinear analysis methods and algorithms. Implementation in commercial CAD programmes.</p> <p>Amplifiers: Linear amplifiers: gain, stability, impedance matching, bandwidth, noise, multistage and balanced amplifiers. Power amplifiers: power, efficiency, distortion, special amplifiers (Envelope Tracking, Doherty, etc.).</p> <p>Oscillators: Stability and oscillation condition: parallel and serial configurations. Design methods. Free-running oscillators: frequency stability, frequency pulling, phase noise. Voltage-Controlled Oscillators: bandwidth, tunable elements.</p> <p>Mixers: Frequency conversion with nonlinear elements. Design methods. Active and passive mixers, single- and double-balances configurations.</p> <p>Design and testing: Design of a practical circuit, fabrication (by Faculty personnel), testing, and reverse engineering if needed.</p> <p>On successful completion of this module, the student should</p> <ul style="list-style-type: none"> - have profound knowledge of the basic principles of operation of microwave circuits, - have knowledge and understanding of the relevant design methods. - understand and explain the behaviour of microwave circuits and their performances, in connection with microwave systems development and use; - understand the principles of microwave circuit design and applications in advanced information systems. - demonstrate skill in circuit analysis and design via CAD programmes, in circuit testing, and reverse engineering; - demonstrate capacity for solving problems in the operation of microwave systems, including fault detection and correction.
3	Prerequisites and learning activities	<p>The student must have basic notions in electronics and electromagnetic fields, contained in the exams Elettronica I & II, and Campi Elettromagnetici.</p>
4	Teaching methods and language	<p>Lectures and exercises. Language: Italian/English</p> <p>Ref. Text book G.Vendelin, A.Pavio, U.Rohde, <i>Microwave Circuit Design Using Linear and Nonlinear Techniques</i>, 2nd ed., Wiley, 2005</p>
5	Assessment methods	<p>Oral exam; design and testing of a microwave circuit.</p>