



5.00 credits

30.0 h + 30.0 h

Q1

Teacher(s)	Lederer Dimitri ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Main themes	It is a course giving a basic knowledge about microwave methods, techniques and measurements used in wireless systems and communications. The originality of the microwave frequency range is that the wavelength is of the order of magnitude of the size of the devices. This course presents the fundamentals of microwave engineering and is proposed as the basic course in this domain for the telecommunication and electronic orientations.
Learning outcomes	<p>At the end of this learning unit, the student is able to :</p> <p>In consideration of the reference table AA of the program "master in electrical engineering ", this course contributes to the development, to the acquisition and to the evaluation of the following experiences of learning:</p> <ul style="list-style-type: none"> • AA1.1, AA1.2, AA1.3 • AA2.2, AA2.4 • AA5.3 <p>1 After this course the students will be able to :</p> <ul style="list-style-type: none"> • calculate the parameters of various microwave transmission lines • analyse the parameters of various passive circuits and assess their performances • design basic passive devices, in waveguide and planar technology • measure S-parameters of 2-port and 4-port microwave devices, using a Vector Network Analyser (VNA) • understand the operation of non-reciprocal devices and microwave sources • use adequate active devices in the frequency range of interest
Evaluation methods	Written examination (exercices to be solved with open textbook and slides). The project is evaluated on the basis of a written report, and counts for 25% of the total mark gained for the course
Teaching methods	The course includes : <ul style="list-style-type: none"> • 14 theoretical lectures • 6 exercises modules with tutorial and solutions posted on Moodle • Training modules using microwave CAD and simulation softwares. • A project, using ADS design program of Agilent, where each student individually has to design, simulate and measure a passive planar device.
Content	The course will provide students with necessary knowledge and tools for designing RF and microwave circuits, and illustrate the limitations induced by a lumped-element circuit approach. Topics addressed include: <ul style="list-style-type: none"> • wave formalism and S-parameter • transmission lines and resonators (planar lines, waveguides) • passive devices (obstacles, junctions, couplers, filters, non-reciprocal circuits, matching networks) • measurement of circuit parameters : reflection, transmission, power and noise • instrumentation : network analysers, spectrum analyser, calibration methods • sources and active components : vacuum tubes, semiconductors (diodes, transistors)
Inline resources	Moodle https://moodle.uclouvain.be/course/view.php?id=1124
Bibliography	<u>Supports</u> <ul style="list-style-type: none"> • Transparents disponibles sur Moodle • Livres de référence disponibles à la BST
Other infos	A basic knowledge in transmission lines and electronics is a must

Faculty or entity in charge	ELEC
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Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Electrical Engineering	ELEC2M	5		
Master [120] in Physical Engineering	FYAP2M	5		
Master [120] in Electro-mechanical Engineering	ELME2M	5		