




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, AA2.5 • AA4.1, AA4.2, AA4.4 • AA5.3, AA5.5, AA5.6, AA5.7 <p>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 | <p>The course includes :</p> <ul style="list-style-type: none"> • 14 theoretical lectures • 6 exercices 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 | <p>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:</p> <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 | <p>Moodle</p> <p>https://moodle.uclouvain.be/course/view.php?id=1124</p> |
| Bibliography | <p><u>Supports</u></p> <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 |

| 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 | |  |