

5.0 credits	30.0 h + 30.0 h	1q
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Teacher(s) :	Janvier Danielle ; Flandre Denis ;
Language :	Français
Place of the course	Louvain-la-Neuve
Main themes :	Identical to the contents of the course
Aims :	<p>This course consists of two parts</p> <p>1. Devices and electronic circuits :</p> <ul style="list-style-type: none"> - understand - and predict - the behavior of semi-conductor devices - develop usable model of these devices <p>2. Electromagnetism :</p> <ul style="list-style-type: none"> - write down the equation and calculate the electrostatic and magnetostatic fields for various conductors and charges topologies, - solve the Maxwell's equations with their boundary conditions, - calculate the equivalent circuit (R, L, C) of a 3D structure with electromagnetic fields, - calculate the fundamental parameters of uniform transmission lines, - define and use the reflection coefficient and VSWR as well as the Smith Chart, - calculate transients on lossless transmission lines. <p><i>The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".</i></p>
Content :	<p>1. Devices and electronic circuits :</p> <ul style="list-style-type: none"> - Principles of conductivity : Solids and semiconductors, doping - effect of potential, temperature, light, Poisson equation and basics of the current equation - Analysis of the PN junction : Internal potential - static current computation, dynamic behavior, limits of the modeled behavior - models and use (photodiode) - Technology : Basic material - photo-lithography and basic technologic steps - building circuit elements - Analysis of electronic devices : Two transistors are analyzed, in order to deduce amplifier and switching properties, the bipolar and the MOS transistors. For each one, the next points are considered : . physical structure and principles . static analysis of the various functional modes, limits of approximations . dynamic behavior . models and practical examples - Integrated circuits : Principles of bipolar and MOS technologies, critical parameters and limits, comparison - complexity and verification (tests). <p>2. Electromagnetism</p> <ul style="list-style-type: none"> - Electrostatic and magnetostatic equations in vacuum, - Dielectric and magnetic materials, - Maxwell's equations, - Circuit elements (R, L, C 3D structures), skin effect, eddy currents, magnetic circuits - Fundamental equations of uniform transmission lines in sinusoidal regime, voltage, current, characteristic impedance, reflection coefficient and VSWR, - Use of the Smith Chart for matching with transmission lines (open or shorted stubs) - Transients on lossless transmission lines

<p>Other infos :</p>	<p>Prerequisites : BAC11 and BAC12 engineering courses or equivalent</p> <p>Supporting material : 1.Devices and electronic circuits : The copy of the lecture notes and slides used during the course may be found at : http://www.icampus.ucl.ac.be/ELEC2755 2. Electromagnetism "Electromagnetisme, champs, circuits", A. Vander Vorst, De Boeck</p> <p>Assessment : Written examination (exercises), during the session, with personal documents</p> <p>For more information : http://www.icampus.ucl.ac.be/ELEC2755</p>
<p>Cycle and year of study :</p>	<p>> Bachelor in Engineering</p>
<p>Faculty or entity in charge:</p>	<p>ELEC</p>