


5.00 crédits	30.0 h + 30.0 h	Q2
--------------	-----------------	----

Enseignants	Craeye Christophe ;Lederer Dimitri ;
Langue d'enseignement	Anglais > Facilités pour suivre le cours en français
Lieu du cours	Louvain-la-Neuve
Préalables	Basic courses on physics and on engineering electromagnetics
Thèmes abordés	<p>Wireless systems have become ubiquitous and new technologies exploiting higher frequencies, with wider bandwidths, are reinforcing this trend. This calls for a deeper understanding of high-frequency electromagnetic fields, as they occur in microwave circuits and propagation problems.</p> <p>Regarding microwave circuits, an advanced study of guided waves appears necessary, taking into account the quite diverse types of transmission lines and the study of their dispersion analysis. This may include dispersion-engineered materials, such as metamaterials.</p> <p>Regarding propagation, spatial selectivity is becoming more intensively used, since phased arrays now fully entered the civilian domain, in both communication and radar front-ends. This calls for spatial-spectrum representation of fields, in Cartesian, cylindrical and spherical systems of coordinates. Those will also be applied to propagation problems, including for instance surface waves. A link with optics will be made, through the analysis of partially coherent fields, which are more thoroughly studied in optics than in microwaves.</p> <p>An introduction the different types of numerical methods for field analysis, including commercially available software, will be provided as well.</p> <p>The exposed concepts will also be put in practice through different labs, devoted mainly to guided waves and radar experiments.</p>
Acquis d'apprentissage	
Modes d'évaluation des acquis des étudiants	Open-book written exam based on problems, 75% of total mark 3 laboratory reports, 5% of total mark each 2 (short) software reports, 5 % of total mark each
Méthodes d'enseignement	The teaching method is based on lectures, accompanied by exercices (some of which include programming of basic field representations), by use of commercial EM software and by experiments in anechoic chamber.
Contenu	<ol style="list-style-type: none"> 1. Maxwell's equations 2. Uniform plane waves 3. Pulse propagation in dispersive media 4. Reflection and transmission 5. Fields in multi-layered structures 6. Oblique incidence and multi-layer applications 7. Spectral representation of fields 8. Reciprocity, Poynting and equivalence 9. Physical optics (+ including radar cross section) + laboratory 10. Green's functions 11. Fields in periodic structures + laboratory 12. Partially coherent fields + laboratory 13. Cylindrical and spherical waves
Autres infos	6 first courses based on book of Orfanidis 7 next courses based on dedicated syllabus
Faculté ou entité en charge:	ELEC

Programmes / formations proposant cette unité d'enseignement (UE)				
Intitulé du programme	Sigle	Crédits	Prérequis	Acquis d'apprentissage
Master [120] : ingénieur civil électricien	ELEC2M	5		
Master [120] : ingénieur civil physicien	FYAP2M	5		