

230090 - ONELE - Electromagnetics Waves

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering
 Teaching unit: 739 - TSC - Department of Signal Theory and Communications
 Academic year: 2019
 Degree: BACHELOR'S DEGREE IN TELECOMMUNICATIONS TECHNOLOGIES AND SERVICES ENGINEERING (Syllabus 2015). (Teaching unit Compulsory)
 ECTS credits: 6 Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: Michaël Sicard
 Others: Federico Dios, David Artigas, Adolfo Comeron

Requirements

It is advisable to have studied: Fundamentals of Physics, Mathematics of telecommunication, Vector Calculation and Electromagnetism

Degree competences to which the subject contributes

Generical:

12 CPE N2. They will be able to identify, formulate and solve engineering problems in the ICC field and will know how to develop a method for analysing and solving problems that is systematic, critical and creative.

Teaching methodology

Most of lessons will be given on the blackboard, and others with multimedia material.

Learning objectives of the subject

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Study load

Total learning time: 150h	Hours large group:	52h	34.67%
	Hours small group:	13h	8.67%
	Self study:	85h	56.67%

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Content

1. Electromagnetics waves in free space	Learning time: 1h Theory classes: 1h
<p>Description: Wave equation. Plane and spherical waves. Waves in sinusoidal teady state.</p> <p>Related activities: Laboratory, P1</p>	
2. Wave polarization	Learning time: 6h Theory classes: 6h
<p>Description: Polarization types. Devices used to control and measure polarization.</p> <p>Related activities: Laboratory, P2</p>	
3. Incidence of plane waves	Learning time: 12h Theory classes: 12h
<p>Description: Incidence of plane waves on a separation surfaces between media. Parallel and perpendicular polarization. Brewster angle. Internal total reflection. Incidence on a perfect conductor. Stationary waves. Multilayers.</p> <p>Related activities: Laboratory, P3 and P4</p>	
4. Waveguides. Types and characteristics. Transmission lines	Learning time: 16h Theory classes: 16h
<p>Description: Planar waveguide with conductor walls. Transverse electric and transverse magnetic waves. Propagation modes. Cutt-off frequencies. Dispersion curves. Dielectric planar waveguides and optical fibers.</p> <p>Related activities: Laboratory, P5</p>	

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5. Foundations of radiation	Learning time: 12h Theory classes: 12h
<p>Description: Wave equation with charge and current densities. Electric potential and magnetic vector A. Radiating dipoles. Arrays of dipoles</p>	

Qualification system

Partial exam: 30%
Laboratory and work summaries: 10%
Final exam: 60%

Bibliography

Basic:

Dios, F. [et. al]. Campos electromagnéticos [on line]. Barcelona: Edicions UPC, 1998 [Consultation: 09/07/2015]. Available on: <<http://hdl.handle.net/2099.3/36160>>. ISBN 8483012499.

Cheng, D.K. Fundamentos de electromagnetismo para ingeniería. Wilmington: Addisson-Wesley iberoamericana, 1997. ISBN 9684443277.

Reitz, J.R.; Milford, F.J.; Christy, R.W. Fundamentos de la teoría electromagnética. 4a ed. Wilmington: Addisson-Wesley iberoamericana, 1996. ISBN 020162592X.