Course guides
13961 - ADVEM - Advanced Electromagnetics for Communications Engineering

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 739 - TSC - Department of Signal Theory and Communications.
Degree: ERASMUS MUNDUS MASTER'S DEGREE IN RESEARCH ON INFORMATION AND COMMUNICATION TECHNOLOGIES (Syllabus 2009). (Optional subject).
MASTER'S DEGREE IN PHOTONICS (Syllabus 2009). (Optional subject).
ERASMUS MUNDUS MASTER'S DEGREE IN PHOTONICS ENGINEERING, NANOPHOTONICS AND BIOPHOTONICS (Syllabus 2010). (Optional subject).
MASTER'S DEGREE IN RESEARCH ON INFORMATION AND COMMUNICATION TECHNOLOGIES (Syllabus 2009). (Optional subject).

Academic year: 2015   ECTS Credits: 6.0   Languages: English

LECTURER
Coordinating lecturer: JUAN-MANUEL RIUS CASALS
Others: ALEXANDER HELDRING - EDUARDO UBEDA FARRE - JOSE MARIA GONZALEZ ARBESU

PRIOR SKILLS
Basic electromagnetics, vector analysis, differential and integral calculus.

REQUIREMENTS
None.

TEACHING METHODOLOGY
Teaching is based on lectures by teachers with slides presentation. Computer simulation software may be used by the teachers to clarify concepts, and students may be asked to write simple programs.

LEARNING OBJECTIVES OF THE SUBJECT
Background in electromagnetics applied to wireless communications, from and engineering point of view. Understanding of electromagnetic radiation and diffraction, and ability to analytically compute radiated and diffracted fields. Understanding of modern numerical methods for computer simulation of antenna radiation and field diffraction. Ability to write simple computer programs for numerical simulation.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours large group</td>
<td>39,0</td>
<td>31.20</td>
</tr>
<tr>
<td>Self study</td>
<td>86,0</td>
<td>68.80</td>
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Total learning time: 125 h
## CONTENTS

1- Fundamentals

2- Properties of matter, wave propagation, reflection and transmission

3- Electromagnetic radiation equations

4- Electromagnetic theorems and principles

5- Guided propagation

6- RCS, scattering and high-frequency techniques

7- Integral equations, Green’s functions and the Method of Moments

8- The Method of Moments

9- Numerical methods in Electromagnetics

10- Efficient programming

## GRADING SYSTEM

Students will solve a problem (or a few short exercises) at the end of each chapter (60%). In some chapters, the problem will consist on a MATLAB program to compute diffracted or radiated fields. Additionally, there will be final examination on January 2013 (40%).

## EXAMINATION RULES.

All exercises and the final examination are mandatory.