

## 230602 - AAM - Antennas and Microwaves

Coordinating unit:	230 - ETSETB - Barcelona School of Telecommunications Engineering
Teaching unit:	739 - TSC - Department of Signal Theory and Communications
Academic year:	2019
Degree:	MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Teaching unit Optional) MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Teaching unit Optional)
ECTS credits:	5
Teaching languages:	English

### Teaching staff

Coordinator:	Joan O'Callaghan
Others:	Joan O'Callaghan, Jordi Romeu

### Prior skills

background in engineering, math or physics

### Degree competences to which the subject contributes

Specific:

1. Ability to apply advanced knowledge in photonics, optoelectronics and high-frequency electronic
2. Ability to integrate Telecommunication Engineering technologies and systems, as a generalist, and in broader and multidisciplinary contexts, such as bioengineering, photovoltaic conversion, nanotechnology and telemedicine.
3. Ability to develop radio-communication systems: antennas design, equipment and subsystems, channel modeling, link dimensioning and planning.
4. Ability to implement wired/wireless systems, in both fix and mobile communication environments.
5. Ability to design radio-navigation and location systems, as well as radar systems.

Transversal:

6. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.
7. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.
8. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

### Teaching methodology

- Lectures
- Study of technical documents and multimedia material
- Laboratory classes
- Homework (problems and exercises)
- Oral presentations
- Short answer test (Control)
- Extended answer test (Final Exam)

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### Learning objectives of the subject

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To understand the different concepts of radiation, propagation and interaction with matter, and reception of electromagnetic waves from microwave up to optical frequencies. Its application to different communication and sensing systems will be studied, giving a special attention to the physical mechanisms and to the whole system vision.

Learning results of the subject:

- Ability to analyze communication systems operating from microwave up to optical frequencies.

### Study load

Total learning time: 125h	Hours large group:	26h	20.80%
	Hours medium group:	0h	0.00%
	Hours small group:	13h	10.40%
	Guided activities:	0h	0.00%
	Self study:	86h	68.80%

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### Content

Introduction	Learning time: 0h 30m Theory classes: 0h 30m
Description: introduction	
Electromagnetic Spectrum - Radiation of electromagnetic waves	Learning time: 15h 30m Theory classes: 1h 30m Laboratory classes: 4h Self study : 10h
Description: Description of the electromagnetic spectrum - Fundamentals of radiation of electromagnetic waves	
Electromagnetic waves	Learning time: 9h Theory classes: 2h Laboratory classes: 2h Self study : 5h
Description: Electromagnetic waves	
Fundamentals of noise	Learning time: 9h Theory classes: 2h Laboratory classes: 2h Self study : 5h
Description: Fundamentals of noise	
Transmission lines	Learning time: 9h Theory classes: 2h Laboratory classes: 2h Self study : 5h
Description: Transmission lines	

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Wireless communications	Learning time: 9h Theory classes: 2h Laboratory classes: 2h Self study : 5h
Description: Wireless communications	
Fundamentals of transmitters and receivers	Learning time: 9h Theory classes: 2h Laboratory classes: 2h Self study : 5h
Description: Fundamentals of transmitters and receivers	
Lab practises	Learning time: 16h Theory classes: 2h Laboratory classes: 4h Self study : 10h
Description: Lab practises	
Case study	Learning time: 19h Theory classes: 4h Self study : 15h
Description: Case study	
Midterm exam	Learning time: 13h Theory classes: 2h Self study : 11h
Description: Midterm exam	

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Final Exam	Learning time: 18h Theory classes: 3h Self study : 15h
Description: Final exam	

### Qualification system

Final exam : 20%  
 Homework, case studies and lab work: 80%

### Bibliography

#### Basic:

Saunders, S.R.; Aragón-Zavala, A. Antennas and propagation for wireless communication systems. 2nd ed. Chichester (UK): John Wiley & Sons, 2007. ISBN 9780470848791.

Olver, A.D. Microwave and optical transmission. Chichester: John Wiley, 1992. ISBN 047193416X.

Cardama, Á. [et al.]. Antenas [on line]. 2a ed. Barcelona: Edicions UPC, 2002 [Consultation: 09/02/2015]. Available on: <<http://hdl.handle.net/2099.3/36797>>. ISBN 8483016257.