

Course guide

230602 - AAM - Antennas and Microwaves

Last modified: 11/04/2025

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 739 - TSC - Department of Signal Theory and Communications.

Degree: MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Optional subject).
MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Optional subject).

Academic year: 2025 **ECTS Credits:** 5.0 **Languages:** English

LECTURER

Coordinating lecturer: JUAN MANUEL O'CALLAGHAN CASTELLA

Others: Primer quadrimestre:
JUAN MANUEL O'CALLAGHAN CASTELLA - 11
JORDI ROMEU ROBERT - 11

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)

LEARNING OBJECTIVES OF THE SUBJECT

Learning objectives of the subject:

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

Type	Hours	Percentage
Self study	86,0	68.80
Hours large group	26,0	20.80
Hours small group	13,0	10.40

Total learning time: 125 h

CONTENTS

Introduction

Description:

introduction

Full-or-part-time: 0h 30m

Theory classes: 0h 30m

Electromagnetic Spectrum - Radiation of electromagnetic waves

Description:

Description of the electromagnetic spectrum - Fundamentals of radiation of electromagnetic waves

Full-or-part-time: 15h 30m

Theory classes: 1h 30m

Laboratory classes: 4h

Self study : 10h

Electromagnetic waves

Description:

Electromagnetic waves

Full-or-part-time: 9h

Theory classes: 2h

Laboratory classes: 2h

Self study : 5h

Fundamentals of noise

Description:

Fundamentals of noise

Full-or-part-time: 9h

Theory classes: 2h

Laboratory classes: 2h

Self study : 5h

Transmission lines

Description:

Transmission lines

Full-or-part-time: 9h

Theory classes: 2h

Laboratory classes: 2h

Self study : 5h

Wireless communications

Description:

Wireless communications

Full-or-part-time: 9h

Theory classes: 2h

Laboratory classes: 2h

Self study : 5h

Fundamentals of transmitters and receivers

Description:

Fundamentals of transmitters and receivers

Full-or-part-time: 9h

Theory classes: 2h

Laboratory classes: 2h

Self study : 5h

Lab practises

Description:

Lab practises

Full-or-part-time: 16h

Theory classes: 2h

Laboratory classes: 4h

Self study : 10h

Case study

Description:

Case study

Full-or-part-time: 19h

Theory classes: 4h

Self study : 15h

Midterm exam

Description:

Midterm exam

Full-or-part-time: 13h

Theory classes: 2h

Self study : 11h

Final Exam

Description:

Final exam

Full-or-part-time: 18h

Theory classes: 3h

Self study : 15h

GRADING 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.