Course guide
230648 - WLA - Wireless Communication Links and Antennas

Last modified: 25/05/2023

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). (Compulsory subject). MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Optional subject).

Academic year: 2023   **ECTS Credits:** 5.0   **Languages:** English

LECTURER

Coordinating lecturer:	Consultar aquí / See here: https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/responsables-assignatura
Others:	Consultar aquí / See here: https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/professorat-assignat-idioma

PRIOR SKILLS

Tools and concepts used in radiofrequency such as impedance matching, antenna parameters, transmission equation. Use of dB, and power units such as dB. Knowledge of electromanetic field theory.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Ability to develop radio-communication systems: antennas design, equipment and subsystems, channel modeling, link dimensioning and planning.
2. Ability to implement wired/wireless systems, in both fix and mobile communication environments.
3. Ability to design radio-navigation and location systems, as well as radar systems.

Transversal:
4. 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.

5. 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.

6. 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
- Application classes
- Laboratory classes
- Exercises
- Short answer test (Control)
- Short answer test (Test)
- Extended answer test (Final Exam)

LEARNING OBJECTIVES OF THE SUBJECT

Learning objectives of the subject:

To present advanced antenna concepts based on a modern time-space formulation, system oriented CAD design techniques and wireless antenna optimization and measurements. In addition, the course develops appreciation for research issues of antennas for mobile wireless and advanced communications systems.

Learning results of the subject:

- Ability to specify, design antennas of telecommunications in both a fixed, mobile, personal, local or long distance, with different bandwidths.

STUDY LOAD

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

Total learning time: 125 h

CONTENTS

Antennas in a System

Description:
About antennas in a system

Full-or-part-time: 16h
Theory classes: 3h
Laboratory classes: 1h
Self study : 12h

Radiation

Description:
Radiation

Full-or-part-time: 17h
Theory classes: 3h
Laboratory classes: 2h
Self study : 12h

Numerical techniques. MoM

Description:
About numerical methods.

Full-or-part-time: 18h
Theory classes: 4h
Laboratory classes: 2h
Self study : 12h

Input Parameters. Fundamental Limits.

Description:
Fundamental límits.

Full-or-part-time: 18h
Theory classes: 4h
Laboratory classes: 2h
Self study : 12h

Miniaturization techniques.

Description:
Antenna miniaturization.

Full-or-part-time: 18h
Theory classes: 4h
Laboratory classes: 2h
Self study : 12h

Printed antennas.

Description:
Printed antenans.

Full-or-part-time: 10h
Theory classes: 2h
Laboratory classes: 1h
Self study : 7h

Antennas in dielectric media.

Description:
Antennas in media.

Full-or-part-time: 10h
Theory classes: 2h
Laboratory classes: 1h
Self study : 7h

Broadband and UWB antennas

Description:
Broadband antennas.

Full-or-part-time: 18h
Theory classes: 4h
Laboratory classes: 2h
Self study : 12h

Multielement (Array and MIMO)

Description:
content english

Full-or-part-time: 1h
Theory classes: 1h

Smart and reconfigurable antennas.

Description:
content english

Full-or-part-time: 1h
Theory classes: 1h

Integrated and plasmonic antennas

Description:
content english

Full-or-part-time: 1h
Theory classes: 1h

ACTIVITIES

LABORATORY

Description:
Antenna design

Full-or-part-time: 12h
Laboratory classes: 12h

EXERCISES

Description:
Exercises to strengthen the theoretical knowledge.

ORAL PRESENTATION

Description:
Presentation of a work group.

SHORT ANSWER TEST (CONTROL):

Description:
Mid term control.

EXTENDED ANSWER TEST (FINAL EXAMINATION):

Description:
Final examination.

GRADING SYSTEM

Final examination: from 20% to 70%
Partial examinations and controls: from 0% to 50%
Individual assessments: from 0% to 40%
Laboratory assessments: from 0% to 70%

BIBLIOGRAPHY

Basic:

- Lee, H.F.; Chen, W. Advances in microstrip and printed antennas. New York: Wiley, 1997. ISBN 0471044210.
- Flaviis, F. de; Jofre, L.; Romeu, J.; Grau, A. Multiantenna systems for MIMO communications. San Rafael, Calif: Morgan & Claypool Publishers, 2008. ISBN 9781598290882.
- Martone, M. Multiantenna digital radio transmission. Boston: Artech House, 2002. ISBN 1580533183.
- 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.