

230648 - WLA - Wireless Communication Links and Antennas

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 TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Teaching unit Compulsory) MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Teaching unit Optional)
ECTS credits:	5
Teaching languages:	English

Teaching staff

Coordinator:	JORDI ROMEU
Others:	SEBASTIÁN BLANCH, LLUÍS JOFRE, JUAN MANUEL RIUS

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.

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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

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

1. Channel modeling. LOS, NLOS. MIMO channel.	Learning time: 16h Theory classes: 3h Laboratory classes: 1h Self study : 12h
2. Antenna modeling: time-frequency radiation parameters, impedance and matching.	Learning time: 17h Theory classes: 3h Laboratory classes: 2h Self study : 12h
3. Compact antennas: wire and slot antennas, small antennas, ground planes.	Learning time: 18h Theory classes: 4h Laboratory classes: 2h Self study : 12h
4. Broadband antennas: principles of broadbanding, fractal antennas, UWB antennas.	Learning time: 18h Theory classes: 4h Laboratory classes: 2h Self study : 12h
5. Multielement antennas: Arrays, MIMO, smart and reconfigurable antennas.	Learning time: 18h Theory classes: 4h Laboratory classes: 2h Self study : 12h
6. Antennas in systems: wireless systems, active antennas, EMC topics, technology	Learning time: 10h Theory classes: 2h Laboratory classes: 1h Self study : 7h

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7. Antenna measurements: ranges, radiation pattern and impedance measurements.	Learning time: 10h Theory classes: 2h Laboratory classes: 1h Self study : 7h
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8. Application to radar and radionavigation systems	Learning time: 18h Theory classes: 4h Laboratory classes: 2h Self study : 12h
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Planning of activities

LABORATORY
Description: Antenna design.

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.

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Qualification 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:

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.

Lee, H.F.; Chen, W. Advances in microstrip and printed antennas. New York: Wiley, 1997. ISBN 0471044210.

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.