



IDENTIFYING DATA

(*)Antenas

Subject	(*)Antenas			
Code	V05M145V01222			
Study programme	(*)Máster Universitario en Enxeñaría de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	5	Mandatory	1st	2nd
Teaching language	English			
Department				
Coordinator	Díaz Otero, Francisco Javier			
Lecturers	Díaz Otero, Francisco Javier García Pino, Antonio			
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General description	(*)La asignatura se dedica al estudio de antenas y abarca desde las bases electromagnéticas hasta el diseño práctico de las mismas, pasando por los modelos de análisis y simulación del comportamiento de las antenas.			

Competencies

Code	
A2	CB2 Students must apply their knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
A4	CB4 Students must communicate their conclusions, and the knowledge and reasons stating them-, to specialists and non-specialists in a clear and unambiguous way.
A9	CG4 The capacity for mathematical modeling, calculation and simulation in technological centers and engineering companies, particularly in research, development and innovation tasks in all areas related to Telecommunication Engineering and associated multidisciplinary fields.
A20	CE2 The ability to develop radio communication systems: antenna, equipment and subsystems design; channel modeling; link budgeting; and planning.
A21	CE3 The ability to implement systems by cable, line, satellite, in fixed and mobile communication environments.
A23	CE5 The ability to design systems of radio navigation and positioning, as well as radar systems.

Learning aims

Expected results from this subject	Typology	Training and Learning Results
(*) To understand the phenomena of electromagnetic radiation and receiving signals	know	A4 A9
(*) To know the main parameters that characterize the behavior of the transmitting and receiving antennas	know	A4 A9 A20 A21 A23
(*) Know the different types of antennas according to their applications and operating frequencies	know	A4 A9 A20 A21 A23
(*) To be able to understand and develop models to simulate the behavior of the antennas and predict their characteristic parameters	Know How	A4 A9 A20 A21 A23

(*) To be able to cope antenna design exercises for certain specifications

Know How

A2
A4
A9
A20
A21
A23

Contents

Topic

1. Electromagnetic antennas Basics

Related Skills: A20, A21, A23

1.1 General

1.2 Phenomenon of electromagnetic radiation

1.3 Properties of the radiation field

1.4 transmission antenna

1.5 The receiving antenna

1.6 The antenna communication systems and radar

2. Modeling antennas

Related Skills: A4, A9

2.1 Linear Antennas

2.3 Arrays

Antenna Types

A4, A9, A20, A21, A23

3.1 Wire Antennas

3.2 slot and printed antennas

3.3 Speakers, lenses and reflectors

Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	15	15	30
Troubleshooting and / or exercises	3	6	9
Case studies / analysis of situations	8	24	32
Autonomous practices through ICT	0	26	26
Short answer tests	1	6	7
Reports / memories of practice	1	6	7
Long answer tests and development	2	12	14

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Master Session	Presentation of the contents on the subject under study, instructions and exercises or projects to be developed by the student. Covers skills A2, A20, A21 and A23.
Troubleshooting and / or exercises	Problems and / or exercises related to the subject are formulated. The student should develop appropriate or correct solutions through the exercise routines, applying formulas or algorithms, applying transformation methods available and interpretate the results. Complement of the Master session Covers A2, A9 skills, and A20.
Case studies / analysis of situations	Analysis of an event, issue, or event in order to know, interpret it, solve it, generate hypotheses, comparing data, reflect, complete knowledge, diagnose and training in alternative dispute resolution procedures. Covers skills A2, A9, A20, A21 and A23.
Autonomous practices through ICT	Activities application of knowledge to specific situations and acquisition of basic skills and procedural matters related to the subject matter. Covers skills A2, A4, A9 and A20.

Personalized attention

Methodologies	Description
Master Session	Students will have the opportunity to attend to personalized attention in the teacher's office at the time that teachers establish for this purposes. They may also pose questions electronically.
Troubleshooting and / or exercises	Students will have the opportunity to attend to personalized attention in the teacher's office at the time that teachers establish for this purposes. They may also pose questions electronically.
Case studies / analysis of situations	Students will have the opportunity to attend to personalized attention in the teacher's office at the time that teachers establish for this purposes. They may also pose questions electronically.

Autonomous practices through ICT	Students will have the opportunity to attend to personalized attention in the teacher's office at the time that teachers establish for this purposes. They may also pose questions electronically.
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Assessment		
	Description	Qualification
Short answer tests	Conceptual questions on the course syllabus. In this proof will be evaluated the skills To2, To9 and To20.	10
Reports / memories of practice	The quality of the reports submitted, and participation in classroom practices demonstrated attitude as well as the oral presentation of the work will be assessed. In this test the skills A2, A4, A9 and A20 are evaluated.	60
Long answer tests and development	Final exam: Test for skills assessment that includes open-ended questions on a topic. Students should develop, relate, organize and present knowledge on the issue in a long answer to a practical situation presented. In this test the skills A2, A20, A21 and A23 are evaluated.	30

Other comments on the Evaluation

It will be offered to the students enrolled in this class two systems of evaluation: continuous evaluation and evaluation at the end of the semester.

1. CONTINUOUS EVALUATION

- The system of continuous evaluation will consist in:
 - A short answer test to be held in class about half of the teaching period. 10% rating. Rating EC1, with a maximum of 1 point.
 - An exercise antenna design for a particular application. It will be held autonomously through simulation tools. The student will prepare and deliver a report to be presented in class at the end of the semester. Rating EC2, with a maximum of 6 points. The 6 points of this exercise will be distributed as follows: 2 points for active participation in the sessions (in C groups) dedicated to the design and presentation and discussion; 2 points for the quality of the proposed solution; 1 point for the quality of the report submitted; and 1 point for the quality of the oral presentation.
 - An extended-response exercise in which problems of analysis and design of antennas for specific applications will be resolved. It will be held the same day fixed for the regular final exam for the course. 30% rating. Rating EC3, with a maximum of 3 points.
- The continuous assessment tests are not recoverable, ie, if a student can not fulfill them within the stipulated period the teacher is not required to repeat them.
- The final mark for continuous assessment (EC) was calculated as the sum of the scores on the three planned tests:

$$EC = EC1 + EC2 + EC3.$$
- The score on the assessable tasks (EC) will be valid only for the academic year in which they are made.

It is understood that a student receives this rating system when he has made the first test, given the memory of the second and made the corresponding oral presentation. At this time the student will be considered as well as presented to the exam.

2. FINAL EVALUATION OF SEMESTER

- It involves:

A final exam will assess competencies A2, A9, A20, A21 and A23. 40% rating. EF1 score, with a maximum of 4 points.

The day of the examination the student will deliver a memory antenna design previously assigned. The student will give an oral presentation at a public meeting in the shortest possible time respecting the compatibility with other tests of the same course and certification. Rated EF2 with a maximum of 6 points.

The EF1 and EF2 partial qualifications may be held only until the call of July and within the ongoing course

3. RECOVERY IN THE CALL OF JULY

It will follow the same procedure as the evaluation at the end of the semester. Students, communicating it previously to the start of the exam, may retain their previous note EF1 part (or alternatively EC1 EC3 +) or the EF2 (or EC2) part.

COMMENTS:

- Before the completion or delivery date of each test, the procedure review of scores will be published within a reasonable period of time.
- Every student that comes to the final test is considered as presented. It will also be considered as presented to the test every student who qualifies for the continuous assessment system in the terms described above.
- It is considered that the matter is approved if the final grade is equal to or greater than 5.

Sources of information

C.A.Balanis. "Antenna Theory. Analysis and Design", 2nd ed. Wiley, 1997.
 W.L.Stutzman, G.A.Thiele. Antenna Theory and Design. Wiley, 1981.
 R.S.Elliot. "Antenna Theory and Design". Prentice Hall, 1981.
 R.E.Collin. "Antennas and Radiowave Propagation". Mc Graw Hill, 1985.
 P.S.Kildal. □Foundations of Antenas. A Unified Approach□. Studentlitteratur. Sweeden,
 T.A. Milligan, "Modern Antenna Design", 2nd Ed. Wiley, 2005.

Recommendations

Subjects that continue the syllabus

(*)Comunicacións Móviles e Inalámbricas/V05M145V01323
 (*)Satélites/V05M145V01321
 (*)Sistemas Radio en Banda Ancha/V05M145V01322

Subjects that are recommended to be taken simultaneously

(*)Laboratorio de Radio/V05M145V01223

Subjects that it is recommended to have taken before

(*)Radio/V05M145V01103