



20037 - TRANSMISSION MEDIA (2018-19)

General

Code: 20037

Lecturer responsible:

SANCHEZ SORIANO, MIGUEL ANGEL

Credits ECTS:	6
Theoretical credits:	1,5
Practical credits:	0,9
Distance-base hours:	3,6

Departments involved

- **Dept:** PHYSICS, ENGINEERING SYSTEMS AND SIGNAL THEORY
Area: SIGNAL THEORY AND COMMUNICATIONS
Theoretical credits: 1,5
Practical credits: 0,9
 This Dept. is responsible for the course.
 This Dept. is responsible for the final mark record.

Study programmes where this course is taught

- DEGREE IN SOUND AND IMAGE IN TELECOMMUNICATION ENGINEERING
 Course type: COMPULSORY (Year: 4)
- UNIVERSITY MASTER'S DEGREE IN TELECOMMUNICATION ENGINEERING
 Course type: COMPLEMENTARY TRAINING (Year: 1)
 Course type: COMPLEMENTARY TRAINING (Year: 9)

Competencies and objectives

Course context for academic year 2018-19

Preliminary recommended subjects: Signals and Systems, Communication Theory, Fundamentals of engineering optics.

Transmission media are a fundamental part of telecommunication systems since they ensure the correct transmission of information between two faraway points. The knowledge of the existing transmission media, their characteristics and working mode are a discipline of interest for the future graduate student in Telecommunication Engineering.

Course content (verified by ANECA in official undergraduate and Master's degrees)

UA Basic Transversal Competences

- **CT10** : Capacity to confront, plan and solve real problems demanded by society in the field of engineering.
- **CT11** : Capacity to learn and apply new concepts and methods in an autonomous and interdisciplinary fashion.
- **CT12** : Capacity to assimilate and adapt to the permanent evolution of technology when developing one's professional career.
- **CT13** : Capacity to adopt the scientific method when planning and carrying out different academic and professional tasks.

Basic Transversal Competences

- **CT1** : Students should show they possess and understand knowledge in a field of study that continues from general secondary education and is usually found at a level which, although supported by advanced textbooks, also includes certain aspects that involve knowledge arising from the cutting edge of their field of study.
- **CT2** : Students should know how to apply their knowledge to their job or vocation in a professional manner and should possess those skills that are usually reflected when preparing and defending arguments and solving problems in their field of study.
- **CT3** : Students should have the ability to gather and interpret relevant data (normally within their field of study) to give opinions that include a reflection on important, social, scientific, ethical matters, etc.
- **CT4** : Students should be able to transmit information, ideas, problems and solutions to both specialist and non-specialist audiences.

Specific Competences: >> Competences Common to the Telecommunications Branch

- **C1** : Capacity for self-learning of new knowledge and techniques appropriate for the conception, development and exploitation of telecommunications systems and services.
- **C4** : Capacity to analyse and specify the fundamental parameters of communication systems.
- **C8** : Capacity to understand the mechanisms for propagating and transmitting electromagnetic and acoustic waves, and their corresponding transmitting and receiving devices.

Exclusive skill taught in this course

No data

Learning outcomes (Training objectives)

No data

Specific objectives stated by the academic staff for academic year 2018-19

- To understand the existing transmission media, the advantages and disadvantages which are presented by each one of them.
- To study the problematic of the noise in radio communication systems as bounding factor.
- To understand and to analyze the signal propagation in ideal transmission lines both in time and frequency domain.
- To know the different degradations that appear in real transmission lines, to understand and characterize them in specific lines.
- To know the most used guiding transmission systems, the advantages and disadvantages that are presented by each of them, and their behavior inside a communication system.
- To analyze antennas as a radio communication system element, to know and understand his parameters as transmitting and receiver antenna.
- To know the most used types of antennas and to understand their more significant features.

Content and bibliography

Content for academic year 2018-19

Unit 1: **Introduction to transmission media** (Related specific competences: C1, C4). Transmission media, radio communication services and systems, radio-electric spectrum and bands.

Unit 2: **Noise in communication systems** (Related specific competences: C1, C4). Introduction to noise, noise equivalent bandwidth, quadripole noise, noise in quadripole network.

Unit 3: **Ideal transmission lines** (Related specific competences: C1, C4, C8). Basic concepts of transmission lines, circuit model of transmission line, voltage and current waves, characteristic impedance, transmitted power, propagation and reflection coefficient in a transmission line.

Unit 4: **Ideal transmission lines in permanent regime with sinusoidal excitation** (Related specific competences: C1, C4, C8). Voltage and current phasor representation, wavelength, impedance and admittance, transmission line terminated in load, power balance, impedance matching and synthesis, the Smith Chart.

Unit 5: **Real transmission lines: cables, waveguides and optical fiber** (Related specific competences: C1, C4, C8). Lossy transmission line, propagation characteristics and dispersion in lossy lines, energy balance, homogeneous transmission lines: two wire line, coaxial cable, stripline, inhomogeneous transmission lines: microstrip and coplanar waveguide, rectangular and circular waveguides, optical fiber.

Unit 6: **Antennas** (Related specific competences: C1, C4, C8). Antenna transmitting parameters: radiation power density, radiation pattern, directivity, gain, half-power beam width; Antennas receiving parameters: polarization, impedance matching, antenna noise temperature; transmission equation: Friis formulas; Antennas: dipole, monopole, linear array, aperture, horn, microstrip and reflector antennas.

Field work practical 1: **Noise computation in radio communication devices** (Related specific competences: C1, C4)

Field work practical 2: **Characterization of transmission lines** (Related specific competences: C1, C4, C8)

Field work practical 3: **Attenuation measurement in transmission lines** (Related specific competences: C1, C4, C8)

Field work practical 4: **Antenna radiation patterns** (Related specific competences: C1, C4, C8)

Transversal competences CT1-CT5, CT10-CT13 are developed throughout all teaching units.

Assessment

Assessment procedures and criteria 2018-19

Two tests along the course (weeks 8 and 15) will be performed representing 40% of the final grade; the technical reports of the field work practical provide 10% of the final grade. The problem exam, whose contribution to the final grade is 50%, will be performed at the end of the course.

Final Grade= field work practical reports (10%)+ tests (40%)+ problem exam (50%)

The course passes if the final average grade obtained is equal to or greater than 5, being a necessary condition to obtain a minimum of 4 in the problem exam.

A test examination along with the problem exam (in July or December) will be carried out by students, who have not done the continuous assessment during the course.

Description	Criteria	Type	Weighting system
Field work practical	Field work practical reports	ACTIVITIES OF EVALUATION DURING THE SEMESTER	10
Tests	Tests (15 questions). For each question there is one and only one correct answer from four. Each correct answer adds 2 points and each wrong answer subtracts 2/3 points. First test is scheduled at week 8 (Units 1-5.1), and second test at week 15 (Units 5-6).	ACTIVITIES OF EVALUATION DURING THE SEMESTER	40
Problem exam	Overall exam (3 problems) covering the whole course (units 1-6). It will be carried out the day of the final exam.	FINAL TEST	50

Official exam dates for academic year 2018-19

Exam session	Date	Time	Group - Classroom(s) allocated	Comments
(C1) Pruebas extraordinarias de finalización de estudios	10/05/2018			Teoría
(C1) Pruebas extraordinarias de finalización de estudios	10/05/2018			Teoría
	10/05/2018			Teoría

	10/05/2018	Teoría
(C3) Periodo ordinario para asignaturas de segundo semestre y anuales	14/06/2019	Teoría
(C3) Periodo ordinario para asignaturas de segundo semestre y anuales	14/06/2019	Teoría
	14/06/2019	Teoría
(C4) Pruebas extraordinarias para asignaturas de grado y máster	11/07/2019	Teoría
(C4) Pruebas extraordinarias para asignaturas de grado y máster	11/07/2019	Teoría
	11/07/2019	Teoría

