



## IDENTIFYING DATA

### Telecommunication Engineering in the Information Society

Subject	Telecommunication Engineering in the Information Society			
Code	V05M145V01101			
Study programme	Máster Universitario en Ingeniería de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	5	Mandatory	1st	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Cuiñas Gómez, Íñigo			
Lecturers	Caeiro Rodríguez, Manuel Cuiñas Gómez, Íñigo Fernández Iglesias, Manuel José			
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General description	<p>This subject aims to motivate the students to practical application of the most technical concepts of Telecommunication Engineering for solving problems and offering services to the society in which they live: it pretends that they realise that the activity of the engineer is not an isolated fact but it transforms the World (at small and at large scale). This leads to two fundamental ideas:</p> <p>1) Society, people that conform it, has problems that can be solved by the engineers: the function of the Engineering is to solve or mitigate problems of the society, not to create them. Knowing how situations have been solved in the past can help to face problems in the future (this leads to history oriented to future action, no to the contemplation of the past).</p> <p>2) Engineering activities have direct influence in the own society, in how people live or in how they relate. In fact, the large changes of the last decades have been based directly on contributions of the field of the Telecommunication Engineering. This influence has to go accompanied of being aware of the ethical responsibility.</p>			

## Training and Learning Results

Code	
A3	CB3 Students must integrate knowledge and handle complexity of formulating judgments based on information that was incomplete or limited, including reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
B7	CG7 Capacity for implementation and management of manufacturing processes of electronic and telecommunications equipment; guaranteeing safety for persons and property, the final quality of the products, and their homologation.
B9	CG9 Ability to understand the responsibility and professional ethics in the activity of the profession of Telecommunications Engineering.
B13	CG13 Knowledge, understanding and ability to implement the necessary legislation in the exercise of the profession of Telecommunication Engineering.
C15	CE15/GT1 Ability to integrate technologies and systems of Telecommunication Engineering, with general character, and at broader and multidisciplinary contexts such as bioengineering, photovoltaic conversion, nanotechnology, telemedicine.
D3	CT3 Understanding Engineering in a framework for sustainable development.
D4	CT4 Awareness of the need for training and continuous quality improvement, developing values of the dynamics of scientific thought, showing a flexible, open and ethical attitude in front of different opinions or situations, particularly on non-discrimination based on sex, race or religion, respect for fundamental rights, accessibility, etc.

## Expected results from this subject

Expected results from this subject	Training and Learning Results
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Knowledge of what the profession of Telecommunicationis Engineering is and what represents.	B7 B13 D4
Being aware of the social, ethical and environmental responsibility of Telecommunication Engineering.	A3 B9 D3 D4
Contact with other disciplines in which the technologies of Telecommunication integrate for the development of the society (i.e. bioengineering, solar energy, nanotechnologies, remote medicine, remote assistance, or remote education).	C15

## Contents

Topic	
Seminar on the Engineering in the Society	<p>1. Professional activity and ethic implications. Description of the professional activity of Engineers (preferably with the collaboration of alumni from the School), the ethic implications of their works, and other aspects of professional development. The students interact with speakers.</p> <p>2. Social implication, by means of Design Thinking. We look for getting familiar with a methodology that moves future engineers to look towards society and try to find solutions or solve problems that directly affect to actual users.</p> <p>Related competencies: C15, D4, A3 and B9</p>
Professional attributions and their history	<p>Historically, there are eight professional attributions assigned to Telecommunication Engineering within Spanish regulations. Along this item, we will focus on the historical development of systems or applications related with them, as well as on the National and European legislation that applies:</p> <ul style="list-style-type: none"> <li>* Television</li> <li>* Wire communications (including the small local history: Vigo was the base of German and British cables)</li> <li>* Radioelectric spectrum (description and management, taking into account National and International legislation)</li> <li>* Internet and its influence in Society</li> <li>* Mobile telephony (including effects on health)</li> <li>* Experts official reports.</li> </ul> <p>Related competencies: B13 and D3</p>
In a multidisciplinary society	<p>The proposal for the work in groups C is centered in the resolution of problems or situations of the society in which we live, no strictly related with the Telecommunication Engineering, so that the students comprise its implication in multiple fields of the society and how they can influence in giving solutions based on their competencies and engineering skills.</p> <p>Related competencies: B7, C15, D3 and D4</p>

## Planning

	Class hours	Hours outside the classroom	Total hours
Seminars	14	15	29
Project based learning	4	70	74
Project based learning	1	0	1
Lecturing	9	10	19
Essay questions exam	2	0	2

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

## Methodologies

Description

Seminars Teaching in seminar format, in which the student participates very actively in the evolution of the classes deepening in a specific subject, expanding it and relating it with contents oriented to the professional practice; including the participation in scientific and/or informative events, organised or not in the own School; the organisation of debates that allow sharing ideas and proposals, guided by lecturers; and the study of cases/analysis of situations (analysis of a problem or real case, with the purpose to knowing it, interpreting it, resolving it, generating hypothesis, diagnosing it and going deep in alternative procedures of solution, to see the application of the theoretical concepts in the real World). These activities can have related a load of autonomous work of the student.

Topic "Seminar on Engineering and Society", and related debates, are taught following this methodology.

Competencies worked: with this methodology we work the competencies A3, B7, B9, B13 and D4

Project based learning Realisation of works for the resolution of a case or a specific project, as well as the presentation of the results by writing and/or by means of a presentation that may follow different formats: oral, poster, multimedia. They include the integrated Methodologies: problem-based learning, resolution of design problems proposed by lecturers, and project-based learning (PBL) education.

Teams of students will be defined, according to the outcomes of a personality test that the students make in the first session. The aim is to attain heterogeneous groups selected externally, as in a real company. The projects in which groups will work are related among them and are focused in a specific field of study familiar to the students.

Students, in groups, work towards providing a solution to a clear-cut problem according to the Design Thinking methodology, identifying situations of the daily life that a priori may not relate to the Telecommunication. Design Thinking develops through the following phases: discover, interpret, ideate, experience and evolve. The solution achieved will have to consider not only technical questions, but also legal, environmental, social and related with sustainability.

By applying the Design Thinking methodology, a specific challenge will be identified within the field of study, and all the information available related to that challenge will be gathered. The students will pose imaginative solutions and will treat to build a proposal that is reasonable, although it may not be still implementable given the current technological development.

The aim is not to manufacture or program a solution, but to look for a proposal that is feasible, now or in the future when technology is more developed, and that it is acceptable socially.

Initially, groups will identify all relevant information. From that information, they will try to identify the people involved and will try of empathize with them, to identify the actual problem that they feel. From the problem identified, groups will try to produce technological or procedural solutions. They will have to look for technical and scientific information and, finally, elaborate a prototype, a report and a presentation.

The result of this activity may be documented through an online service, forum or wiki. Also it will produce a final document and a presentation and/or video that was used in the defence of the work developed in front of the class. Both results will according to the criteria collected in evaluation rubrics which will be presented to the students at the beginning of the course and will be available at the University's e-learning platform.

Interaction with lecturers will be carried out in five 1-hour sessions, and through forums during the research of information, and by email for the exchange of ideas. The groups will have to send to the lecturer in charge the "point of view" before the third session, and three ideas to resolve the challenge before the fourth session.

Topic "In a Multidisciplinary Society" corresponds with this educational methodology.

Competences worked: A3, C15, B9 and D4.

Project based learning (\*)Véase descripción de la metodología anterior

Lecturing Explanation of the contents of the subject; it includes explanation of concepts; introduction of practices and exercises; and resolution of problems and/or exercises.

Topic "Professional attributions and its history" fits with this methodology.

Competencies worked: with this methodology work the competencies B7, B9 and D3.

## Personalized assistance

Methodologies	Description
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Lecturing	Time that group-A lecturers use to meet their students and to solve his/her doubts
Seminars	Time that group-A lecturers use to meet their students and to solve his/her doubts
Project based learning	Time that group-C lecturers use to help their students during their projects development, added to the scheduled meetings
Project based learning	
<b>Tests</b>	<b>Description</b>
Essay questions exam	Time that lecturers use to help the students to understand the contents of assessment exercises and to review with them, individually, those exercises once corrected.

### Assessment

	Description	Qualification	Training and Learning Results		
Seminars	Short answer tests: In the seminars we will assess the participation in the debates (with the speakers of the seminar Engineering in the Society). It will be able to support the evaluation in proofs of short answer.	20	A3	B7 B9 B13	D4
Project based learning	Practical proofs: The realisation of the works in groups will be evaluated in two parts: the own dynamics of the works and the presentations. 25% of the mark is related to the own work; given by the lecturer that directs the work and by the group of lecturers of the matter. The mark will be the same for all the group members.	25	A3	B9	C15 D4
Project based learning	Practical proofs: The realisation of the works in groups will be evaluated in two parts: the own dynamics of the works and the presentations. Related to the presentation, the mark will represent another 25%, given by his/her mates (evaluation by pairs) according to a rubric that will be approved before the beginning of the works. The mark will be the same for all the group members.	25	A3	B9	C15 D4
Lecturing	Short answer tests: At the end or at the beginning of designated lectures, that will liberate contents of the previous topics.	30		B7 B9	D3
Essay questions exam	The single evaluation exam, in case it would be needed, will consist of questions of development, in which the student will have to show the acquired knowledge, initiative to propose solutions to problems no necessarily of telecommunication, and he/she will also have to explain his opinion on conflicts of professional ethics, showing his capacity to provide opinions on situations that involve to the society.	0	A3	B7 B9 B13	C15 D3 D4

### Other comments on the Evaluation

The students can chose any of the following assessment systems:

1.- The **continuous assessment** tests allow students to obtain a final grade based solely on their path along the course, and consist of:

- 1.1. Short-answer tests that will take place at the end or the beginning of designated lectures, totaling 30% of the final grade.
- 1.2. Short-answer tests in the seminars, which account for 20%.
- 1.3. Practical proofs for the evaluation of supervised work (25%) and the presentation of them (25%).

Continuous assessment tasks are not recoverable, and they are only valid for the current year.

A student is assumed to have opted for continuous assessment when he/she has been made one of the long-answer tests and has participated in two debate activities. A student who chooses to continuous assessment is deemed to have been presented to the subject, whether they are present or not to the final exam.

If a student, having submitted to continuous assessment, chooses the final exam, the final grade for the course will be the average of the two.

2.- **Global assessment exam.** Under the regulations of the University of Vigo, the student who wishes may choose 100% of the final grade by a single final exam. The global assessment exam is one that is done in the official dates marked on School Board in the months of December or January in ordinary call (or July in the case of extraordinary call), and it is mandatory to attend to those students who have not opted for continuous assessment and want to pass the subject.

The final exam will consist of a development test, as described in the evaluation section. All material given in the lectures, lab classes and project presentations is subject to questioning.

The extraordinary call exam will have a similar structure to the final exam.

### **Ethical code**

Final exams and quizzes must be worked out on everyone's own. Any infraction will be considered a serious breach of ethics and reported to the academic authorities.

Lecturers may decide to fail a student if he has committed a serious ethical breach.

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### **Sources of information**

#### **Basic Bibliography**

O. Pérez Sanjuán, **De las señales de humo a la Sociedad del Conocimiento**, <http://bit.ly/2Rxf9cl>, COIT-AEIT,

VV.AA., **Design Thinking. Guía de Iniciación**, 978-84-8158-846-0,

[https://www.researchgate.net/publication/341803750\\_Design\\_Thinking\\_Guia\\_de\\_iniciacion](https://www.researchgate.net/publication/341803750_Design_Thinking_Guia_de_iniciacion), Universidade de Vigo, 2020

VV.AA., **Design Thinking for Educators**, [www.designthinkingforeducators.com/toolkit/](http://www.designthinkingforeducators.com/toolkit/),

I. Cuiñas, M. J. Fernández Iglesias (editores), **Design Thinking for Engineering. A practical guide**, 9781839535024 / 10.1049/PBME024E, <https://digital-library.theiet.org/content/books/me/pbme024e>, The Institute of Engineering and Technology, 2023

#### **Complementary Bibliography**

C. Rico, **Crónicas y testimonios de las Telecomunicaciones españolas**, <http://bit.ly/31V3NnF>, COIT-AEIT,

O. Pérez Sanjuán, **Detrás de la Cámara. Historia de la televisión y de sus cincuenta años en España**,

<http://bit.ly/2X0iyBA>, COIT-AEIT,

J. Cabanelas, **Vía Vigo: el Cable Inglés y el Cable Alemán**, Instituto de Estudios Vigueses,

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### **Recommendations**

#### **Subjects that continue the syllabus**

Telecommunication Projects Management/V05M145V01201