VNIVERSITAT DE VALÈNCIA

Course Guide
34799 Telecommunication Systems and Services

COURSE DATA

Data Subject	
Code	34799
Name	Telecommunication Systems and Services
Cycle	Grade
ECTS Credits	6.0
Academic year	2018 - 2019

Study (s)

Degree	Center	Acad. year	Period
1402 - Degree in Telecommunications Electronic Engineering	School of Engineering	3	First term

Subject-matter

Degree	Subject-matter	Character
1402 - Degree in Telecommunications Electronic Engineering	10 - Telecommunication signals, systems and services	Obligatory

Coordination

Name	Department
TORRES PAIS, JOSE GABRIEL	242 - Electronic Engineering

SUMMARY

The subject Telecommunication Systems and Services is a compulsory quarterly basis to be taught in the fifth semester of the Degree in Electronic Engineering degree in Telecommunications consisting of a total of 4 credits of classroom (theory and problems) and 2 laboratory credits .

The subject of Telecommunications Systems and Services develops content necessary for students to learn the fundamentals of a communications system. Also presented are examples of communications systems and services with their main characteristics and comparison between them based on their fundamentals.

The purpose of this course is to describe the basic concepts of telecommunications systems and services so that students can be free to choose the best option in terms of technology, design and functionality in their deployment. To strengthen this objective it is intended that the student knows how some of the telecommunications systems and services today.

The course contents are:

• **Introduction to telecommunications systems and services**

Concept. Telecommunication systems. Telecommunication services. Spanish regulatory framework. Standardization bodies. Representation of information. Networks in a telecommunications system. Hierarchy of transport.

• **Interconnection and telecommunication network management**

Principles. Interconnection in Spain. Management and administration of networks. Current system of management and administration.

• **Wired access systems**

Characterization of the loop. ADSL access systems. Triple-Play Architecture. Access Systems HDSL and VDSL. XDSL systems in Spain.

• **Optical access systems**

Introduction. GPON and EPON systems.

• **Hybrid Access Systems**

Genesis of the HFC networks. HFC network architecture. TV distribution services. Data services. Telephony Services. HFC networks in Spain.

• **DVB-S Satellite Systems**

Introduction. Reference model. Network architecture. Technical regulations. Audiovisual sector in Spain.

• **Mobile systems**

Introduction. System architecture. Mobile system generations. 4th generation 4G-LTE

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

It is recommended to have studied the subjects of:

Mathematics
Physics
Circuits and electronic and photonic components

OUTCOMES

1402 - Degree in Telecommunications Electronic Engineering

- R4 - Ability to analyze and specify the fundamental parameters of communication systems.
- R5 - Ability to assess the advantages and drawbacks of different technological alternatives for the deployment and implementation of communications systems, from the point of view of signal space, perturbations and noise and analogue and digital modulation systems.
- R1 - Ability for self-learning of new knowledge and techniques appropriate for the conception, development and exploitation of telecommunications systems and services.
- G3 - Acquisition of the knowledge of the basic and technological subjects that allows students to learn new methods and theories and endows them with the versatility to adapt to new situations.
- G4 - Ability to solve problems with initiative, decision-making and creativity, and to communicate and transmit knowledge, abilities and skills, understanding the ethical and professional responsibility of the activity of a telecommunications technical engineer.
- G5 - Knowledge to carry out measurements, calculations, assessments, evaluations, loss adjustments, studies, reports, task planning, and other analogous work in the specific field of telecommunications.
- G6 - Ability in the handling of specifications, regulations and norms of compulsory compliance.
- R2 - Ability to use communication and computer applications (offimatics, databases, advanced calculation, project management, visualization, etc.) to support the development and exploitation of telecommunications and electronics networks, services and applications.
- R3 - Ability to use computer tools to find bibliographic resources and information related to telecommunications and electronics.
- R8 - Ability to understand the mechanisms of propagation and transmission of electromagnetic and acoustic waves, and their corresponding transmitting and receiving devices.
- R15 - Understand the standards and regulations of telecommunications in Spain, Europe and Internationally.

LEARNING OUTCOMES

Learning Outcomes

This course allows for the following learning outcomes:

• Be able to analyze and specify the key parameters of a communications system. (G3, G5, R4)

• Evaluate the advantages and disadvantages of different technological alternatives for deployment or implementation of communications systems, from the standpoint of signal space, disturbance and noise modulation systems and analog and digital. (G3, G4, G5, G6, R5)

• Autonomy in the apprehension of new knowledge and techniques for the design, development or operation of telecommunications systems and services. (G4, R1, R15)

• Analysis / design elements of communications from a systemic point of view. (G4, G5, G6)

To acquire skills

To complement the above results, this subject also to acquire the following skills and social skills:

• Ability to analyze and specify the key parameters of a communications system. It should also be able to evaluate the advantages and disadvantages of different technological alternatives for deployment or implementation of communications systems, from the standpoint of signal space, disturbances and Rudi and systems, analog and digital modulation.

• Increase your self in the apprehension of new knowledge and téncicas suitable for design, development or operation of telecommunications systems and services.

• Encouraging research, developing the students' ability to analyze new problems with the tools learned.

• In the laboratory, foster teamwork. Teamwork requires cooperation, consensus, conflict resolution and respect for other team members, while requiring an ability to argue and defend one's opinions, from rational criteria and without discrimination of any kind.

• Ability to build a comprehensive and organized written document, as well as the ability to present these results in public. Our students, in their professional future, they must present analysis, studies, reports, etc.. to customers, suppliers, managers, etc.., the drafting and presentation must be clear and concise. This type of social skill is therefore of great importance.

• Ability to obtain adequate information (literature search and online) with which to tackle the analysis, design and verification of a measuring system.

DESCRIPTION OF CONTENTS

1. Introduction to telecommunication systems and services

1.1 Concept
1.2 Systems of telecommunication.
1.3 Services of telecommunication.
1.4 Spanish Regulatory Framework
1.5 Standardisation bodies.
1.6 Depiction of the information.
1.7 Networks in a telecommunications system.
1.8 Hierarchies transport

2. Wired access systems

2.1 Characterization of the loop.
2.2 ADSL access systems.
2.3Triple-Play Architecture.
2.4 Access Systems HDSL and VDSL.
2.5 xDSL systems in Spain.
2.6 Bulletin of problems.

3. Optical access systems

3.1 Introduction.
3.2 GPON and EPON systems.
3.3 Bulletin of problems.

4. Hybrid access systems

4.1 Genesis of the HFC networks.
4.2 HFC Network Architecture.
4.3 Services TV distribution.
4.4 Services Data
4.5 Telephony Services.
4.6 HFC networks in Spain.
4.7 Bulletin of problems.

5. DVB-S Satellite systems

5.1 Introduction.
5.2 Models of reference.
5.3 Network Architecture.
5.4 Technical standards.
5.5 Audiovisual Spain.
5.6 Bulletin of problems.

6. Sistemas móviles

6.1 Introduction.
6.2 Architecture.
6.3 Mobile generations.
6.4 4th generation 4G-LTE
6.5 Bulletin of problems.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Laboratory practices	20,00	100
Classroom practices	10,00	100
Development of group work	10,00	0
Development of individual work	5,00	0
Study and independent work	5,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	12,00	0
Preparing lectures	30,00	0
Preparation of practical classes and problem	15,00	0
Resolution of case studies	8,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The development of the course is structured around four themes: the theory and problem solving sessions, tutorials, presentation of evidence of continuous assessment and presentation of technical documentation testing practices.

Group learning with the teacher (G3, G4, G5, G6, R4, R5, R15)

The sessions of theory and problems using the model of lecture. In the theoretical sessions the teacher will present the fundamental contents of this subject using the media at their disposal, (presentations, transparencies, blackboard). In the problem sessions, the professor will explain a number of problems-type, through which the student will learn to identify the essential elements of posing and solving problems. They also use the participatory approach to the problem sessions, which is to prioritize the communication between students and student / teacher. To this end, the teacher will advance which day will be devoted to solving problems and what problems could be solved, so that the student can attend these classes with the approach of the problems, but its resolution will be completed in class forming groups of four or five students who then have to go to the blackboard to explain the problem and resolve the doubts that have the other fellow.

Tutorials (G3, G4, G5, G6, R1, R4, R5, R15)

The students will have a schedule of tutoring whose purpose is to solve problems, questions, guidance on jobs, etc.. The schedule of these tutorials will be indicated at the beginning of the academic year. They will also have the opportunity to clarify some questions via email or discussion forums by using the tool "Virtual Classroom" which provides the University of Valencia.

Individual study (G4, G6, R1)

A voluntary student may submit the resolution of a series of quizzes in total have 7 continuous assessment tests (PEC, one per lesson). These tests are voluntary self-assessment and should be resolved exclusively by students without any help from the teacher.

Group work with colleagues (G3, G4, G5, R1, R5)

The practice groups will consist of a maximum of two people, which should be organized for the design, installation and experimental evidence. Each practice will consist of two distinct parts each with an estimated duration of 2 hours. The first part is theoretical and its resolution is required to perform the second part of a purely experimental.

Teaching materials available (G3, G4, G5, G6, R1, R4, R5, R15)

To make a success of the teaching methodology described the student has the Virtual Classroom, from the beginning of the academic year, the following documents:

• **Teaching Guide** provides the information elements sufficient to determine what it is intended that the student learns, how it will do, under what conditions and how it will be evaluated.

• **Guidelines for the Study** of the different lessons, structured in the following sections:

- Presentation.
- Objectives and skills acquired.
- Content and timing.
- Comments to the material.
- Fundamentals.
- Further Reading.
- Comments or additional.

• **Transparencies** of each course topic.

• **Newsletter problems** in each lesson.

• **Continuous Assessment Tests (PECs**) from each of the lessons.

• **The practice outlines** the following structure:

- Objectives.
- Material.
- Prior knowledge.
- Theoretical basis.
- Activities and experimental procedure.

EVALUATION

For the first round, it will be applied the continuous evaluation method. This means that, in addition to the final examination, class and laboratory work will also be evaluated according to the following rules:

1. Student work, up to 2 points, broken down as follows:

1.1. Participation in class, answers questions and solving exercises/tests in class (G3, G4, G5, G6, R4, R15)

1.2. Resolution of tasks deliverables that the professor calls for and other non-classroom-based volunteer work (G3, G4, G5, G6, R1, R5)

2. Continuous assessment of laboratory, up to 3 points. Obtained by:

2.1. The students will answer a test after each laboratory project, to determine the mark for each laboratory project.

2.2. The final mark will be the average of all the laboratory project marks. The unattendance to any of the laboratory sessions will provide a 0 mark for the corresponding laboratory project (G4, G5, R4)

3. Final exam, up to 5 points.

3.1 Exam regarding theoretical and practical issues of the subject (G3, G4, G5, G6, R4, R5)

It will be necessary to obtain at least a mark of 4 on 10 in laboratory and a final exam sections to be evaluated the course in first round.

The final mark will be the sum of the three sections, it must obtain a minimum mark of 5 points on a total of 10 points to pass the course.

For the second round, a final examination will be held regarding the theoretical and practical content taught in the classroom and an additiona exam regarding the work done in in the laboratory.

Both of these exams will have the same percentage as in the first round and it must obtain a mark of 4 on 10 in both of these exams to be evaluated.

The final grade will be given, as in the first round, by the sum of the three sections. It must obtain a minimum mark of 5 points on a total of 10 points to pass the course.

In case of not taking the final exam, the qualification in the corresponding competition will be "not presented".

In any case, the evaluation system will be governed by what is established in the Evaluation and Qualification Regulations of the University of Valencia for Degrees and Masters (https://webges.uv.es/uvTaeWeb/MuestraInformacionEdictoPublicoFrontAction.do?accion=inicio&idEdictoSeleccionado= 5639)

REFERENCES

Basic

- Referencia b1: Sistemas de Comunicaciones Electrónicas. W. Tomasi. Prentice-Hall.
  Referencia b2: R. Blake. Sistemas electrónicos de comunicaciones. Ed. Thomson Paraninfo.
  Referencia b3: J. M. Huidobro. Redes y servicios de telecomunicaciones. Paraninfo.

Additional

- Referencia c1: F. Dungan. Sistemas electrónicos de telecomunicación II : sistemas telefónicos : fijos y móviles. Thomson Paraninfo.
  Referencia c2: L. Rubio, J. Reig y N. Cardona. Problemas de sistemas de telecomunicación. Servicio de publicaciones UPV.
  Referencia c3: Texto referencia