COURSE DATA

Data Subject	
Code	34910
Name	Linear Signals and Systems
Cycle	Grade
ECTS Credits	6.0
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
1403 - Degree in Telematics Engineering	School of Engineering	2	First term

Subject-matter

Degree	Subject-matter	Character
1403 - Degree in Telematics Engineering	8 - Signals and systems	Obligatory

Coordination

Name	Department
VEGARA MESEGUER, FRANCISCO	240 - Computer Science

SUMMARY

It is a subject of second course and first semester, common to the branch of Telecommunications in the Degree of Telematics Engineering.

The subject aims to present the fundamental general concepts related to signals and systems both continuous and discrete, with special emphasis on the first, as a fundamental basis to later address in another subject the analysis and implementation of discrete systems.

The general contents of the subject are:

1 / Basic properties of signals and systems.

2 / LTI Systems

3 / Fourier Developments (Series and Continuous and Discrete Transforms)

4 / Laplace Transforms.

5 / Implementation of continuous systems in block diagrams

6 / Sampling and signal reconstruction.

7 / Filter design.

The general objectives for this subject are:

- Know the description, basic properties and types of signals and linear systems.
- know the most important tools for the analysis, design and implementation of continuous systems.
- Provide a knowledge base and sufficient skills to facilitate subsequent learning of other related subjects.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

Have studied the subject of Mathematics, which includes the subjects of Mathematics I, II and III.

OUTCOMES

1403 - Degree in Telematics 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.

LEARNING OUTCOMES

The main results that are intended to be achieved as a consequence of the learning of this subject are:

1 Ability to learn new knowledge and techniques appropriate for the design, development or operation of telecommunication systems and services (R-1 competence).

2 Ability to analyze and specify the fundamental parameters of a communications System (R-4 competence).

3 Ability to assess the advantages and disadvantages of different technological alternatives for deploying or implementing communications systems, from the point of view of signal space, disturbances and noise, and analogue and digital modulation Systems (R-5 competence).

4 Acquire sufficient training to approach further knowledge in related subjects with a high degree of autonomy (CB-5 competence).

5 Ability to solve problems with initiative, decision making, creativity, etc. (G-4 competence).

DESCRIPTION OF CONTENTS

1. Signals and Systems

1 / Continuous and discrete signals.
2 / Transformation of the dependent variable.
3 / Energy and power of a signal.
4 / Typical signals.
5 / Continuous and discrete systems.
6 / Basic properties of systems

2. Continuous LTI Systems

1 / The convolution continues.
2 / Fundamental properties of continuous LTI systems.
3 / Time domain representation of LTI continuous systems.

3. Series and Fourier Transform continuous.

1 / Representation of continuous periodic signals in Series.
2 / Representation of continuous aperiodic signals .
3 / Correlation and Spectrum.
4 / Basic analysis of continuous systems.
5 / Convolution theorem and modulation in the continuous domain.
6 / Frequency domain representation of LTI continuous systems.

4. The Laplace Transform

1 / Definition and basic properties.
2 / The Laplace transform of basic signals.
3 / Other properties of the Laplace Transform
4 / Representation of signals and continuous system with Laplace transform.
5 / The inverse Laplace transform.
6 / Solving linear differential equations using Laplace Transform

5. Implementation of continuous systems in block diagrams.

1 / Representation of systems in block diagrams
2 / Transfer Function
3 / Simplifying Block Diagrams
4 / Temporal response of systems

6. Sampling and reconstruction of signals

1 / Temporal and frequency analysis of sampled signals: the sampling theorem.
2 / Aliasing.
3 / Reconstruction of sampled signals and types of interpolation.
4 / Conversion A/D and D/A.
5 / Introduction to the digital processing of analog signals.

7. Filter Design

1 / Continuous filters: Basic specifications.
2 / Types and order.
3 / FIR and IIR Filters.
4 / Butterworth Filters.
5 / Basic design based on specifications.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Laboratory practices	20,00	100
Classroom practices	10,00	100
Study and independent work	40,00	0
Preparation of evaluation activities	9,00	0
Preparing lectures	8,00	0
Preparation of practical classes and problem	25,00	0
Resolution of case studies	8,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

1/ Presential work consisting of:

1.1/ Classes of theory, which will consist of the presentation and basic explanation of the corresponding subject. Periodic short-term activities will be proposed, which will encourage the intervention of the students with the objective of confirming the understanding of the theory exposed (CB2, G-3).

1.2/ classes of exercises, designed to solve larger problems either conceptual or temporary (B-1, G-4, R-1).

1.3/ laboratory classes designed to test experimentally some of the most relevant issues seen in theory classes (R-2, R-4)..

2/ Non-presential work consisting of:

2.1/ resolution and presentation of exercises. It is about solving the exercises proposed by the teacher and/or public exposure of the resolution of some of them (B-4, R-1).

2.2 / preparation and submission of papers. It is intended to give relevant importance to teamwork, not only for this section, but for some others. Groups of several people will be formed in order to be able to share and try to resolve any doubts that may arise individually (CB-2, CB-5).

3/ Individual and/or collective tutorials. It establishes certain hours of individual tutorials per week that students can attend to clarify their doubts, as well as a few hours of collective tutorials to clarify the doubts arising during the classes of physical exercises.

EVALUATION

Key results intended to be achieved as a result of the learning of this matter are essentially practical, and are measured by the degree in which the student has acquired the relevant knowledge. For this purpose, the assessment will be based primarily in the resolution of practical problems, simplified ones in the case of the review or the exercises, and real ones for the proposed main work.

According to the new model, we intend to give the final exam a not excessive prominence, but without arriving to a continuous assessment model. Selected teaching evaluation mechanism consists of the following items and assessments:

Assessment of participation (up to 5% of the final mark)

Assistance, implementation and if appropriate, evaluacion through an exam of the practical work (up to 15% of the final mark)

Resolution of exercises (up to 20% of the final mark)

Final exam (at least 60% of the final mark)

For students unable to attend regular class, an alternative model is offered in which the evaluation of attendance to practical classes and participation are replaced by some additional work and special tutoring assistance, with an equivalent total percentage.

The final alternative for this alternative Assessment is:

Final note (Alternative Assessment) = Note Theory Examination (60%) + Note Laboratory Examination (15%) + Note alternative works (25%)

In the second examination call the final mark will be obtained by averaging the exam with a weight of 80% and an exam on the submitted practical exercises with a weight of 20% in all cases.Furthermore, in the case of having failed the practicals in the first call the alumni will have to submit them again, individually.

The minimum required to overcome the subject will be the equivalent to a 4 out of 10 in the final examination as in the resolution of exercises. Other assessable items are not subject to minimum.

In any case, this subject requires the personal assistance to the laboratory and the execution of exercises in a progressive manner, according to the basic paradigm of the Bolonia's model. Therefore, an alumni cannot be admitted to examination without having performed such tasks because he/she has not been enroled during at least one term. This excludes the possibility of an advanced examination call for these alumni.

The evaluation will be conducted in accordance Qualifications University of Valencia. At the time of writing this guide, the current legislation was the one approved by the Governing Council of the UVEG of January 27, 2004, adjusted as provided for that purpose by the Royal Decrees 1044/2003 and 1125 / 2003. It states basically that the marks will be numbered from 0 to 10 with a decimal expression with the following rating scale :

From 0 to 4,9: “Fail”(D,E, F)

From 5 to 6,9: “Pass” (C)

From 7 to 8,9: “Notable”(B)

From 9 to 10: “Excellent” (A, A+)

Any copy among students detected in the continuous assessment (C), in the final test (E) or in the laboratory assessment (P) involves loosing the matriculation of first and second call in the current course.

Regarding fraudulent activities:

-The lecturer may expel students form the classroom while they are doing an exam if: 1) They don’t guarantee the authencity and privacy of the exercise. 2) They borrow the identity of another student 3) They have the mobile phone or any other unauthorized electronic device or documen

-The lecturer can stay with the evidence involved in incidents occurred as they are doing an exam and notify by a written stament to the head of studies of the center

The lecturer can qualify with a “zero” mark an exam when: 1) There are indications of fraudulent performance in the exam or part of it. 2) They have the mobile phone or any other unauthorized electronic device or document.

In addition to all these measures, the lecturer may initiate disciplinary proceedings against the student.

In any case, the evaluation system will be managed by what is written in the "Reglament d'Avaluació i Qualificació de la Universitat de València per a Graus i Màsters"

(https://webges.uv.es/uvTaeWeb/MuestraInformacionEdictoPublicoFrontAction.do?accion=inicio&idEdictoSeleccionado=5639)

REFERENCES

Basic

- Señales y Sistemas
  Alan V. Oppenheim & Alan S. Willky
  Ed. Prentice Hall
- Señales y Sistemas.
  Haykin & Van Veen
  Ed. Limusa Wiley
- Signal Processing for Communications
  P. Prandoni, M. Vetterli
  EPFL Press

Additional

- Señales y Sistemas: Análisis mediante métodos de Transformada y Matlab.
  M.J. Roberts
  Ed. Mc Graw Hill
- A course in Digital Signal Processing
  B. Porat
  Ed. Wiley
- Discrete-Time Signal Processing (3rd Edition)
  Alan V. Oppenheim, Ronald W. Schafer
  Ed. Prentice Hall

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

English version is not available