COURSE DATA

DATA SUBJECT

Code: 34910
Name: Linear signals and systems
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1403 - Degree in Telematics Engineering	Escola Tècnica Superior d'Enginyeria	2	First quarter
1935 - Double Degree Program in Mathematics-Telematics Engineering	Facultat de Ciències Matemàtiques	3	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1403 - Degree in Telematics Engineering	Signals and systems	COMPULSORY
1935 - Double Degree Program in Mathematics-Telematics Engineering	Tercer curso	COMPULSORY

COORDINATION

ROGER VAREA SANDRA

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.

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

It is recommended to have studied the subject of Mathematics, which includes the subjects of Mathematics I, II and III.

COMPETENCES / LEARNING OUTCOMES

1403 - Degree in Telematics Engineering

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.

R1 - Ability for self-learning of new knowledge and techniques appropriate for the conception, development and exploitation of telecommunications systems and services.

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.

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.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	30,00
Laboratory	20,00
Classroom practices	10,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	40,00
Preparation of lessons	33,00
Preparation for assessment activities	9,00
Resolution of case studies	8,00
Total hours	**90,00**

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

The fundamental learning outcomes expected from this course are essentially practical in nature and are measured by the degree to which the student has acquired the relevant skills. To this end, assessment will be based primarily on the resolution of practical problems¿simplified in the case of exams or proposed exercises.

The selected assessment system consists of the following components and weightings:

- Assessment of attendance and participation (up to 5% of the final grade)
- Attendance, completion, and evaluation of labs (up to 20% of the final grade). This 20% corresponds to 5% for the development and submission of lab reports, and the remaining 15% for a test related to the topics covered during the practical sessions.
- Individual resolution of proposed exercises (up to 15% of the final grade)
- Final exam (60% of the final grade)

For students who are unable to attend classes regularly, an alternative model is offered in which the evaluation of attendance and participation will be replaced by additional work with an equivalent total weighting.

In the second exam sitting, students may choose to be assessed under one of two options, which must be communicated to the course instructor before the final exam date:

Option A) Same weightings as in the first sitting, repeating only the final exam and/or lab test.

Option B) Final exam (80% of the final grade) + Practical work (20% of the final grade).

The minimum requirement to pass the course is the equivalent of 4 out of 10 in the final exam. The remaining assessable items are not subject to a minimum passing score.

This course requires, in all cases, attendance at lab sessions and the progressive completion of exercises in line with the fundamental principles of the Bologna model.

Any clear case of copying or plagiarism in an activity that is part of the evaluation will result in a failure of the course, and the student will be subject to the appropriate disciplinary procedures outlined in the PROTOCOL FOR ACTION AGAINST FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA (ACGUV 123/2020).

In any case, the evaluation system will comply with the provisions of 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

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- Señales y Sistemas. Haykin & Van Veen Ed. Limusa Wiley
- Signal Processing for Communications P. Prandoni, M. Vetterli EPFL Press
- 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