

Academic Year: ( 2023 / 2024 )

Review date: 17-04-2023

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: GUTIERREZ FERNANDEZ, ERIC

Type: Compulsory ECTS Credits : 6.0

Year : Semester : 1

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

- Physics I
- Physics II
- Basic principles of electrical technology

**OBJECTIVES**

- Ability to design, analyze, select, optimize, synthesize, install and maintain analog electronic systems and digital
- Understand basic concepts related to the principles of electronics and its application to the Engineering.
- Know the purpose and the functioning of the analog and digital electronic systems.
- Management of the basic electronic instrumentation and carry out measures with them.
- Understand and use the main electronic components.

**DESCRIPTION OF CONTENTS: PROGRAMME****THEORY:****T1: Introduction to Electronics Engineering Fundamentals**

- 1.1. Course presentation, schedule, contents, sessions, evaluation, bibliography.
- 1.2. Analog and digital signals. Description.
- 1.3. Analog and digital signal parameters.

**T2: Digital Electronics**

- 2.1. Fundamentals of digital electronics. Numbering and coding in digital systems. Boolean algebra. Logic gates.
- 2.2. Basic logic functions and Boolean rules for simplification.
- 2.3. Combinational circuits. Multiplexer, decoder.
- 2.4. Synchronous sequential systems. D-type flip-flop. Counters.
- 2.5. Memories. Programmable logic. Integrated electronic circuits. Hardware description languages.

**T3: Passive electronic components.**

- 3.1. Resistors. Capacitors. Inductors. Types, characteristics.
- 3.2. Overview of electric circuit theory basics: Ohm, Kirchhoff, Thevenin, Norton, Superposition theorem.
- 3.3. Simulation of analog electronic circuits (LTSpice).

**T4: Filters and electronic instrumentation**

- 4.1. Passive electronic circuits. RC filters. Bode diagram.
- 4.2. Electronic measurement equipment. Measuring voltages and currents. Power sources, generators, multimeters, oscilloscope.

**T5: Active electronic components**

- 5.1. Introduction to semiconductors.
- 5.2. Diode: pn junction. Characteristic curve, diode models. Types.
- 5.3. Limiting and clamping circuits. Half-wave and full-wave rectifiers w/ and w/o filter.
- 5.4. Transistor types. MOSFET transistor. N- and P-channel enhancement MOSFET: structure and functional description, characteristic curves, operating zones, equations, biasing.

**T6: Analog Subsystems**

- 6.1. Amplification: concept, parameters of interest. Types of amplifiers.
- 6.2. Ideal operational amplifier: functional description and operation. Stable operational amplifier based topologies (inverting, non-inverting, buffer, instrumentation amplifier, adder)
- 6.3. Operational amplifier as a comparator.

## LABORATORY:

- S1: Digital electronics.
- S2: Instrumentation measurements foundations.
- S3: Circuits simulation with LTSpice. Transistors and diodes.
- S4: Operational amplifiers.

## LEARNING ACTIVITIES AND METHODOLOGY

The docent methodology will include:

- Theoretical and problem classes, individual tutoring (both individual and in teams, online, up to 28 h) and personal work of the student (both individual and in teams); the acquisition of theoretical knowledge-oriented.
- Practices of laboratory aimed at the acquisition of practical skills related to the program of the course, complemented with simulations.

## ASSESSMENT SYSTEM

Ordinary call:

For students who took the continuous assessment, the partial exam will have a weight of 20% of the final mark. The evaluation of the laboratory work will have a weight of 30%. The final exam will have 50% of the final mark and will cover all the contents of the subject.

The final mark of the students who followed the continuous evaluation will be calculated as:

- 30% Laboratory Mark.
- 20% Midterm Exam Mark.
- 50% Final Exam Mark.

The final mark of the students who did not follow the continuous evaluation will follow the university regulation and will be calculated as:

- 30% Laboratory Mark.
- 50% Final Exam Mark.

being 8 over 10 the maximum mark possible.

Extraordinary call:

The final mark of the students who followed the continuous evaluation will be calculated as:

- 30% Laboratory Mark.
- 20% Midterm Exam Mark.
- 50% Final Exam Mark.

The final mark of the students who did not follow the continuous evaluation will follow the university regulation and will be calculated as:

- 30% Laboratory Mark.
- 50% Final Exam Mark.

being 10 over 10 the maximum mark possible.

**% end-of-term-examination:** 60

**% of continuous assessment (assignments, laboratory, practicals...):** 40

## BASIC BIBLIOGRAPHY

- FLOYD, Thomas L. Fundamentos de sistemas digitales, Pearson Prentice Hall.
- FLOYD, Thomas L. Dispositivos Electrónicos, Pearson Prentice Hall.

## ADDITIONAL BIBLIOGRAPHY

- THOMAS L. FLOYD PRINCIPIOS DE CIRCUITOS ELÉCTRICOS (8ªED), PRENTICE HALL, 2008

