Electronics engineering fundamentals

Academic Year: (2022 / 2023) **Review date: 20-06-2022**

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 clampling 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:
- Introduction to the laboratory instrumentation
- P1. Digital System - Counter.
- P2: RC Circuit and Diode Circuit.
- P3: MOSFET Circuit y Amplifier Circuit.

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 (assigments, 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