Electronic technology in biomedicine

Academic Year: (2023 / 2024) **Review date: 21-04-2023**

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: HERNANDEZ CORPORALES, LUIS

Type: Compulsory ECTS Credits : 6.0

Year : 2 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Systems and Signals (First Semester, Second year)

OBJECTIVES

- Knowing the purpose and operation of analog and digital electronic systems.
- Operation of basic electronic instrumentation.
- Knowledge and use of main electronic devices.
- Ability to design, size, build and make use of basic electronic functions.
- Ability to use computer aided design tools for electronic circuit design, identify the parts in an electronic circuit and knowing its funtion in a diagram.

DESCRIPTION OF CONTENTS: PROGRAMME

T1: Circuit Theory

1. Ohm law.
2. Kirchhoff laws
3. Current and voltage sources.
4. Superposition theorem.
5. Thevenin and Norton theorem.
6. Real voltage and current sources.
7. Capacitors and Inductors (C and L).
8. Time response of C and L.
9. Universal equation for C and L.
10. DC and AC circuit analysis.
11. Frequency response of R, C and L circuits.
12. First order passive Filters and Bode Diagram.
13. Computer circuit simulation of AC and DC circuits.

T2: Electronic components

1. Applications and electronics systems. Biomedicine applications.
2. Diodes and Transistors (MOSFET).
3. Single stage amplifier using MOSFETs.
4. Computer circuit simulation of diodes and transistors.

T3: Amplification (Operational Amplifiers)

1. Inverting Amplifier.
2. Non-Inverting Amplifier.
3. Comparator.
4. Differential Amplifier.
5. Input and Output impedance.
6. Cascade Amplifiers.
7. Computer simulation of amplifier and power supply circuits.

T4: Digital Electronics

1. Binary system and Boole Algebra.
2. Combinational circuits: Decoders and Multiplexers.
3. Sequential circuits: Flip-Flops
4. Acquisition systems and data conversion. Transducers and sensors.

T5: Electronics Laboratory

1. Basic electronics instrumentation and measurement.

2. Electronics applications design.
3. Electronics applications implementation.

LEARNING ACTIVITIES AND METHODOLOGY

- Theory lectures (large group), problem resolutions lectures (small groups), individual and group tutoring sessions and student personal homework; oriented to theoretical knowledge acquisition.

- Laboratory practices and problems resolution lectures in small groups, individual tutorials and student personal homework; oriented to practical knowledge related with the fields of the course.

- Computer sessions in small groups using CAD tools for electronics circuits simulations. The goal of these sessions is to encourage the use of the CAD tools to complement the theoretical-practical learning during the course.

ASSESSMENT SYSTEM

The partial exam in the continuous assessment is valued 25% of total mark. Lab exercises are also valued 25%. The final examination has a value of the remaining 50%. The last course block is evaluated together with the final examination. The minimum mark in the final exam is 4 points to keep on the continuous assessment. For students not following continuous evaluation, the general rules of the university apply. Requirements to keep the continuous assessment are attending all the laboratory sessions, sitting all the midterm exams and sitting the final exam.

Ordinary call with continuous assessment:
- 25% Laboratory.
- 25% Midterm Exams (15% first, 10% second).
- 50% Final Exam (minimum mark of 4).

Ordinary call without continuous assessment:
- 25% Laboratory.
- 55% Final Exam.
Maximum mark of 8/10.

Extraordinary call with continuous assessment:
- 25% Laboratory.
- 25% Midterm Exams (15% first, 10% second).
- 50% Final Exam (minimum mark of 4).

Extraordinary call without continuous assessment:
- 100% Final Exam.
Maximum mark of 10/10.

% end-of-term-examination:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

BASIC BIBLIOGRAPHY

- A. Bruce Carlson Circuits: Engineering Concepts and Analysis of Linear Electric, TBS , 1999
- Debashis De; Kamakhya Prasad Ghatak, Basic Electronics, Pearson India, 2010
- Floyd, Thomas L. Digital Fundamentals, Pearson International Edition, 2015
- Tildon H. Glisson Introduction to Circuit Analysis and Design, Springer Nature Switzerland AG. , 2018