Electronic technology in biomedicine

Academic Year: (2017 / 2018) **Review date: 18-01-2018**

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: PREFASI SEN, ENRIQUE JOSE

Type: Compulsory ECTS Credits : 6.0

Year : 2 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

none

OBJECTIVES

-know the purpose and operation of analog and digital electronic systems
-Operation of basic electronic instrumentation and being able to measure with them.
- Knowledge and use of main electronic parts.
- Ability to design, dimension, build and apply basic electronic functions.
- Ability to use computer aided design tools for electronic circuit design, identify the parts in an electronic circuit and know its funtion in an schematic 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.

T2: Electronic components
1. Diodes and Transistors (MOSFET).
2. MOSFET small signal model.
3. Single stage amplifier using MOSFETs.

T3: Amplification (Operational Amplifiers)
1. Inverting Amplifier.
2. Non-Inverting Amplifier.
3. Comparator.
4. Differential Amplifier.
5. Input and Output impedance.
6. Cascade Amplifiers.

T4: Digital Electronics
1. Binary system and Boole Algebra.
2. Combinational circuits: Decoders and Multiplexers.
3. Sequential circuits: Flip-Flops

T5: Electronic Circuits in Biomedicine
1. Sensors and Actuators.
2. Signal conditioning: Analog and digital signals.
3. Block diagram of a sensor readout circuit.
4. Offset cancelation and common mode rejection.
5. Instrumentation Amplifiers.
6. Passive and Active Filters.
7. Examples of Biomedicine circuits:
   a. Temperature measurement.
   b. Pressure measurement.

LEARNING ACTIVITIES AND METHODOLOGY

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

- Laboratory practices and problems resolution classes 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 continuing assessment is valued 25% of total mark. Lab exercises also are 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. For the students not following continuing evaluation, the general rules of the university apply.

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

BASIC BIBLIOGRAPHY

- Floyd, Thomas L. Principles of electric circuits, Pearson Prentice Hall, 2010
- Floyd, Thomas L. Electronic devices, Pearson/Prentice Hall, 2008
- Floyd, Thomas L. Digital fundamentals, Pearson Prentice Hall,, 2009