Nanoelectronic devices

Academic Year: (2023 / 2024) **Review date: 11/04/2023 12:18:30**

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: GARCIA CAMARA, BRAULIO

Type: Electives ECTS Credits : 3.0

Year : 2 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

The student must have completed the compulsory subjects of the master's degree, especially Quantum Technologies and Engineering

OBJECTIVES

The evolution of electronics goes through the miniaturization of devices down to nanometric levels. This reduction in size allows for an increase in packing density, an increase in the capacities of electronic devices and a reduction in consumption. But this also implies the appearance of new non-classical phenomena, the need for new materials and the development of new designs.

In this sense, the objective of the subject is to have knowledge of the new nanoelectronic technologies, components and materials that are emerging and being incorporated into electronic systems with high added value in fields such as nanotechnology and bioengineering.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Nanoelectronic devices and quantum mechanics
2. Fabrication techniques.
3. Nanoelectronic devices based on carbon nanotubes.
4. Graphene electronics.
5. Nanoelectronic logic and information processing.
6. Nanoelectronic sensors and sensor arrays.
7. Molecular electronics.

LEARNING ACTIVITIES AND METHODOLOGY

MD1
Presentations in class by the teacher with the support of computer and audiovisual media, in which the main concepts of
the subject and the bibliography is provided to complement the learning of the students.
MD2
Critical reading of texts recommended by the professor of the subject: articles, reports, manuals and/or academic articles, either for later discussion in class, or to broaden and consolidate knowledge of the subject.
MD3
Resolution of practical cases, problems, etc. raised by the teacher individually or in groups
MD4
Presentation and discussion in class, under the moderation of the teacher, of topics related to the content of the subject, as well as practical cases
MD5
Preparation of work and reports individually or in groups

ASSESSMENT SYSTEM

% end-of-term-examination/test:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

- Individual or group work will be carried out during the course.
- They will consist of information searches and sharing, contributions in course forums, class discussions, and eventually simulations of nanoelectronic devices.
- There will be a final exam of the knowledge acquired and its application in practical cases.

BASIC BIBLIOGRAPHY

- ELKE SCHEER, JUAN CARLOS CUEVAS Molecular Electronics: An Introduction to Theory and Experiment, World Scientific, 2017

- Edward L. Wolf Quantum Nanoelectronics: An Introduction to Electronic Nanotechnology and Quantum Computing, Wiley-VCH, 2009

- George W. Hanson Fundamentals of Nanoelectronics, Pearson, 2009

- Michel Houssa, Athanasios Dimoulas, Alessandro Molle 2D Materials for Nanoelectronics, CRC Press, 2016

- Rainer Waser Nanoelectronics and Information Technology, Wiley-VCH, 2013