Electronic, photonic and electro-optical devices

Academic Year: (2019 / 2020) **Review date: 26-04-2019**

Department assigned to the subject: Department of Electronic Technology

Coordinating teacher: GARCIA SOUTO, JOSE ANTONIO

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 1

STUDENTS ARE EXPECTED TO HAVE COMPLETED

No prerequisites.

COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.

Basic skills...

+ Knowledge and understanding that provide a basis or opportunity for originality in developing and / or applying ideas, often in a research context.

+ That the students can apply their knowledge and ability to solve problems in new or unfamiliar related to their field of study environments.

+ That students are able to integrate knowledge and handle complexity, and formulate judgments based on information that was incomplete or limited, includes reflections on social and ethical responsibilities linked to its implementation.

General skills ...

+ Acquire skills for understanding new technologies for use in electronic systems and their proper use to solve new problems or applications.

+ Take the scientific method as a fundamental working tool to apply both in the professional field and in research.

Specific Skills ...

+ Know the capabilities of new analog electronics, photonics and power (including new materials and structures), to improve the performance of existing systems or applications.

+ Ability to design a device, system or application that complies with given specifications using a systemic and multidisciplinary approach and integrating advanced tools and modules that are characteristic of the field of Electronic Engineering.

LEARNING OUTCOMES:

To overcome this subject students should be able to:

+ Know the different types of electronic components and micro-electromechanical used in the design and implementation of both analog electronic systems and digital power and instrumentation (assets and liabilities), including the latest technologies used (new materials and structures) and be able to use in the design and specification of different electronic subsystems.

+ Know the different types of photonic and electro-optical components used in the design and implementation of electronic systems, communications and instrumentation (assets and liabilities), including the latest technologies used (new materials and structures), meet their functional characteristics and use, and be able to use in the design and specification of different subsystems.

DESCRIPTION OF CONTENTS: PROGRAMME

In this course different, electro-optical and micro-electromechanical electronic components, photonic, requiring deepen technological aspects to make them part of electronic systems, thus securing added value are detailed.
They used the latest technologies, new materials and new structures, so that they can be used in the designs and specifications of complex electronic subsystems are included. Among the components addressed in this subject devices and power electronic components include specific use; for example those based on technologies Wide Bandgap as silicon carbide (SiC) and gallium nitride (GaN) high voltage, current and power. Also they described; active components such as high frequency MESFETs, HEMTs, HBTs, and application circuits. As an important part devices and passive and active photonic components are also studied; eg Bragg gratings in optical fiber and quantum cascade lasers, modulators (Mach-Zehnder, electroabsorption) and optical amplifiers, demultiplexers based on optical resonators ring. based on liquid crystal devices and micro-electromechanical devices (MEMS), their properties and application environments (e.g. capacitive sensors, bioengineering, SAW filters, modulators Luz space SLMs¿ and color filters).
This course offers students the ability to integrate the latest electronic components, micro-electro-mechanical, electro-optical and photonic available in the market and are part of electronic systems with high added value.

LEARNING ACTIVITIES AND METHODOLOGY

TRAINING ACTIVITIES:

lecture
Practical classes
theoretical and practical classes
Laboratory practices
tutorials
Team work
Individual student work

TEACHING METHODS:

Exhibitions in class with teacher support and audiovisual media, in which the main concepts of matter are developed and the literature is provided to supplement student learning.

Critical reading recommended by the teacher of the subject texts: newspaper articles, reports, manuals and / or academic papers, either for later discussion in class, either to expand and consolidate the knowledge of the subject.

Resolution of practical cases, problems, etc. posed by the teacher individually or in groups.

Preparation of papers and reports individually or in groups.

ASSESSMENT SYSTEM

Ordinary call:

Students will take on group work and lab related to a component or type of component that will involve 20% of the evaluation.
They completed up to three questionnaires (one subject block) each of which provide 10% of the evaluation.
Finally they made a theoretical and practical test as a final exam, corresponding to 60% of the evaluation.

Extraordinary call:

The assessment may be by continuous assessment procedure with the same weights than in the ordinary call or a final exam with 100% rating.

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

BASIC BIBLIOGRAPHY

- Paul Horowitz, Winfield Hill The Art of Electronics Third Edition, Cambridge University Press, 2015

ADDITIONAL BIBLIOGRAPHY

- Dr.-Ing. Arendt Wintrich Application Manual Power Semiconductors, SEMIKRON International GmbH, 2015

BASIC ELECTRONIC RESOURCES

- RP Photonics . The Encyclopedia of Laser Physics and Technology: http://www.rp-photonics.com/encyclopedia.html