# Experimental Project II

**Academic Year: ( 2019 / 2020 )** **Review date: 06-05-2020**

**Department assigned to the subject: Electronic Technology Department**

**Coordinating teacher: ZUMEL VAQUERO, PABLO**

**Type: Electives ECTS Credits : 3.0**

**Year : 1 Semester : 2**

## REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Analog and Digital Subsystem Design
Electronic & Photonic Devices
Fundamentals of Signals and Electronic System Modelling

## OBJECTIVES

Basic competences and skills

-Ability to apply acquired knowledge and problem solving skills in new environments within wider (or multidisciplinary) contexts related to their area of study.

- Ability to integrate knowledge and face the complexity of making judgments based on information that, incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.

- Acquisition of the learning skills that allow students to continue studying.

General competences and skills:

- Ability to prepare concise, clear and reasoned documentation and specify the work to be done for the development, integration and application of complex electronic systems with high added value.

- Acquisition of teamwork capacities integrating multidisciplinary approaches.

- Adoption of the scientific method as a fundamental work tool to apply both in the professional and research fields.

Specific competences:

- Ability to design, implement and manage a set of tests and experimental measures to evaluate the operation of an electronic system.

- Ability to participate in a multidisciplinary technical work team in the field of electronic engineering, with the ability to react to technical and operational difficulties in the framework of development of a technological project.

- Ability to verify experimentally in the laboratory the compliance of the specifications required to a new electronic system after its design

After completing this subject the student will have acquired the ability to:
- Design and develop a complete electronic system using the subsystems learnt in other courses within the master, analog and/or digital electronic circuits, interfaces, power electronic circuits, etc.
- Design and develop a test bench to measure and evaluate the performance of an electronic system.
- Apply their knowledge in the electronic field, at both system and device level, in a real and practical environment.
- Collaborate within a multidisciplinary team (different disciplines in electronic engineering field), reacting to operational and technical difficulties, in a project development scenario
- Properly report the developed project and defend it against third parties.

## DESCRIPTION OF CONTENTS: PROGRAMME

The program of Experimental Projects II is related with Experimental Projects I. A number of laboratory projects will be offered. Each project will consist of a medium complexity complete electronic system, covering a certain application. We will consider for the project offer especially the contents of the previous master topics, covering several disciplines in the electronic engineering field.

The students will collaborate in teams according to the assigned project, requiring some coordination between them. Both team and individual performance will be assessed.

The preferred project assigned to students will be long length projects and if this option is not possible, a short-length proyect will be assigned. The selection of Project length and complexity will be guided and supervised by the advisor.

In this course every student must collaborate in developing, debugging and testing a electronic systems. Students should know modeling and simulation tools, development and debugging environments and basic measurements techniques to complete the required work.

## LEARNING ACTIVITIES AND METHODOLOGY

Lectures
Laboratory project development
Tutoring
Group Work
Individual study
Docent methodology
Practical case resolution in a work gorup
Redaction of laboratory workbooks and reports.

## ASSESSMENT SYSTEM

As this is a practical design developed in a laboratory, grading will be based on achieving the different milestones of the project, this is considered SE2. There will be a final laboratory exam and redaction of a lab report that will be considered SE3. The students not following the continuing evaluation process may take a final examination graded up to 70% consisting in a laboratory exam where they have to demonstrate the assigned project. In the final exam they will provide a final report graded up to 10% of the final mark.
Extraordinary evaluation: the final grade could be obtained following the procedure of the continuos assessment with the same weights for each item, or the final grade could be obtained with a final exam with a weight of 100%.

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| **% end-of-term-examination:** | 20 |
| **% of continuous assessment (assigments, laboratory, practicals…):** | 80 |

## BASIC BIBLIOGRAPHY

- Gaonkar, Ramesh S. Fundamentals of microcontrollers and applications in embedded systems, Thomson/Delmar Learning, 2007
- M.A. Perez Garcia, J.C. Alvarez Anton, J.C. Campo Rodriguez, F.J. Ferrero Martin, G.J. Grillo Ortega Instrumentacion Electronica, Thomson - Paraninfo, 2003
- Sedra, Adel S  Circuitos microelectrónicos, McGraw-Hill Interamericana, 2006

## ADDITIONAL BIBLIOGRAPHY

- Art Kay, Tim Green Analog Engineer's, Texas Intruments (ebook available at www.ti.com), 2014
- Jonathan Valvano Embedded Systems: Introduction to Arm® Cortex(TM)-M Microcontrollers, Self-published. Available on Amazon (kindle version), 2012