

Course guide

220227 - 220227 - Electronic Technology

Last modified: 19/04/2023

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering.

Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Optional subject).

Academic year: 2023 **ECTS Credits:** 3.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: Juan Mon González

Others: Javier Gago Barrio

PRIOR SKILLS

Basic knowledge of Circuits Theory

TEACHING METHODOLOGY

The course is divided into three parts:

- Lectures sharing theoretical subjects and exercises.
- Hands on sessions at lab.
- Self study , exercises and other personal activities.

In the lecture sessions, teachers will introduce the theoretical foundations of the subject: concepts, methods and results, illustrating them with suitable examples. The lecturer can propose certain exercises for facilitating the subject understanding.

In laboratory work sessions, teachers will guide students in applying theoretical concepts to solve experimental assemblies. Personal analysis and criticism will be promoted. The teacher will propose some cases to be solved in the lab and will propose some cases to be solved as homework, in order to encourage the use the basic tools needed to carry out an instrumentation system.

Students, independently, should work the material provided by the teacher and the result of the work sessions-problems to fix and assimilate concepts. The teachers will provide an Activity Tracking in ATENEA.

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course the student should be able to analyse and design analog electronic circuits for signal conditioning, as well as learn to use microcontrollers in order to implement measurement applications in the industrial environment.

STUDY LOAD

Type	Hours	Percentage
Self study	48,0	64.00
Hours large group	27,0	36.00

Total learning time: 75 h

CONTENTS

Module 1: Instrumentation Systems

Description:

Introduction to instrumentation Systems.

Related activities:

A1, A2 and A4.

Full-or-part-time: 4h

Theory classes: 2h

Self study : 2h

Module 2: Sensors and Signal Conditioners.

Description:

- 1- Amplifiers and Filters.
- 2- Operational Amplifier:
 - 2.1- Buffer Amplifier.
 - 2.2- Noninverting Amplifier.
 - 2.3- Inverting Amplifier.
 - 2.4- Differential Amplifier.
 - 2.5- Instrumentation Amplifier.
- 3- Signal Conditioners.

Related activities:

A1, A2 and A4.

Full-or-part-time: 30h

Theory classes: 19h

Self study : 11h

Module 3: Systems Based on Microprocessors.

Description:

- 1- Introduction.
- 2- Microprocessor system architecture.
- 3- Block diagram.
- 4- Programming language.
- 5- Microprocessor Operation.
- 6- ARDUINO DUE development platform.
- 7- analog to Digital conversion.
- 8- Communication with a peripheral: Polling or Interrupts.

Related activities:

A3 and A4.

Full-or-part-time: 41h

Theory classes: 27h

Self study : 14h

ACTIVITIES

Activity 1: Theoretical Lectures

Material:

Lectures note.

Full-or-part-time: 44h

Theory classes: 19h

Self study: 25h

Activity 2: Practical problems.

Description:

Students outside the classroom prepare different exercises proposed in ATENEA, where they have to apply specific learning objectives with the related topics.

Specific objectives:

At the end of these activities, the student should be able analyse and design analog electronic circuits for signal conditioning.

Material:

Lectures note.

Delivery:

The exercise solutions are delivered through digital campus ATENEA.

Full-or-part-time: 12h

Theory classes: 2h

Self study: 10h

Activity 3: Real application development.

Description:

Students out and in side the classroom have to design a real application that meets the requirements given. In order to achieve the design, the students have tutorial sessions where the teacher can answer any student questions.

Specific objectives:

At the end of this activity, the student should be able to use microcontrollers in order to implement measurement applications in the industrial environment.

Material:

Project documentation that is required and the theoretical materials are available on ATENA.

Delivery:

The project is delivered by the digital campus ATENA.

Full-or-part-time: 17h

Theory classes: 4h

Self study: 13h



Activity 4: Final Examination

Description:

Single Test and exercises in classroom solving different problems related to learning objectives of the subject contents.

Delivery:

Exam solution.

Full-or-part-time: 2h

Theory classes: 2h

GRADING SYSTEM

- Resolution of exercises 10%.
- Development of a real application 60%.
- Final examination, resolution a single test and problem exercises 30%.

All those students that have suspended the final examination, will the option of redirect the result by means of an additional proof that will make the day scheduled at the calendar of final examinations. The qualification of this proof will be among 0 and 5, and will substitute the of the final examination always and when was superior.

BIBLIOGRAPHY

Basic:

- Ron Mancini, Bruce Carter. Op Amps For Everyone. 5. Elsevier, 2018. ISBN 978-0128116487.

RESOURCES

Computer material:

- Apunts ATENEA. Apunts ATENEA