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220227 - Electronic Technology

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering
Academic year: 2019
Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Teaching unit Optional)
ECTS credits: 3 Teaching languages: Catalan, Spanish, English

Teaching staff

Coordinator: 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 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

Total learning time: 75h	Hours large group:	27h	36.00%
	Self study:	48h	64.00%

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Content

Module 1: Instrumentation Systems

Learning time: 4h

Theory classes: 2h
Self study : 2h

Description:
Introduction to instrumentatition Systems.

Related activities:
A1, A2 and A4.

Module 2:Sensors and Signal Conditioners.

Learning time: 30h

Theory classes: 19h
Self study : 11h

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.

Module 3: Systems Based on Microprocessors.

Learning time: 41h

Theory classes: 27h
Self study : 14h

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.

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Planning of activities

Activity 1: Theoretical Lectures

Hours: 44h
Theory classes: 19h
Self study: 25h

Support materials:
Lectures note.

Activity 2: Practical problems.

Hours: 12h
Theory classes: 2h
Self study: 10h

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

Support materials:
Lectures note.

Descriptions of the assignments due and their relation to the assessment:
The exercise solutions are delivered through digital campus ATENEA.

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

Activity 3: Real application development.

Hours: 17h
Theory classes: 4h
Self study: 13h

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.

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

Descriptions of the assignments due and their relation to the assessment:
The project is delivered by the digital campus ATENA.

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.

Activity 4: Final Examination

Hours: 2h
Theory classes: 2h

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

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Descriptions of the assignments due and their relation to the assessment:
Exam solution.

Qualification system

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

Bibliography

Basic:

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

Others resources:

Computer material

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