Course guide
220203 - 220203 - Basic Instrumentation

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). (Compulsory subject).
Academic year: 2022  ECTS Credits: 2.5  Languages: Catalan

LECTURER

Coordinating lecturer: RAUL FERNANDEZ GARCIA
Others: RAUL FERNANDEZ GARCIA

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Ability to design electronic systems and industrial instrumentation.

TEACHING METHODOLOGY

The course is divided into three parts:

· Exposure sessions.
· Laboratory sessions.
· Self study.

In the exposure sessions, teachers will introduce the theoretical foundations of the subject, concepts, methods and illustrate them with examples and exercises to facilitate their understanding.

In laboratory sessions, teachers will guide students in applying theoretical concepts to solve experimental set-ups, based on critical thinking at all times. We propose activities that students solve in the classroom and outside the classroom, to promote contact and use the basic tools necessary to perform an instrumentation system.

Students, independently, is working on material provided by the. The teachers provide a curriculum and monitoring activities (ATENEA).

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course the student should:
· Understand and select the main types sensor
· Be able to perform signal conditioning system of sensors.
· Understand the operation and select Analog Interfaces

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>7,5</td>
<td>12.00</td>
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<tr>
<td>Hours large group</td>
<td>15,0</td>
<td>24.00</td>
</tr>
<tr>
<td>Self study</td>
<td>40,0</td>
<td>64.00</td>
</tr>
</tbody>
</table>
Total learning time: 62.5 h

CONTENTS

Module 1: Introduction to Electronic Instrumentation

Description:
1.1 Introduction
1.2 Measuring Systems
1.3 Static characteristics
1.4 Dynamic characteristics

Related activities:
- Activity 1: Exercises
- Activity 2: Pre-Laboratory task
- Activity 3: Laboratory Exam
- Activity 4: Final Exam

Full-or-part-time: 7h 30m
Theory classes: 2h
Laboratory classes: 1h 30m
Self study: 4h

Module 2: Sensors

Description:
2.1 Resistive sensors
2.2 Reactive sensors
2.3 Generator sensors

Related activities:
- Activity 1: Exercises
- Activity 2: Pre-Laboratory task
- Activity 3: Laboratory Exam
- Activity 4: Final Exam

Full-or-part-time: 16h
Theory classes: 4h
Laboratory classes: 2h
Self study: 10h
Module 3: Signal conditioning

**Description:**
3.1. Operational amplifier
3.2. Instrumentation amplifiers
3.3. Analog filters

**Related activities:**
- Activity 1: Exercises
- Activity 2: Pre-Laboratory task
- Activity 3: Laboratory Exam
- Activity 4: Final Exam

**Full-or-part-time:** 24h
Theory classes: 6h
Laboratory classes: 2h
Self study: 16h

Module 4: Acquisitions and signal distribution

**Description:**
4.1. Sample and hold
4.2. Analogue to digital conversion
4.3. Transmission

**Related activities:**
- Activity 1: Exercises
- Activity 2: Pre-Laboratory task
- Activity 3: Laboratory Exam
- Activity 4: Final Exam

**Full-or-part-time:** 15h
Theory classes: 3h
Laboratory classes: 2h
Self study: 10h

GRADING SYSTEM

The final grade depends on the following activities:

- Activity 1: Exercises, weight: 20%
- Activity 2: Pre-Laboratory exercises, weight: 10%
- Activity 3: Laboratory Exam, weight: 20%
- Activity 4: Final Exam, weight: 50%

The results with average grade of less than 5 can be recovered by special recovery exam. The maximum grade you can get in this extraordinary examination of recovery 5.

BIBLIOGRAPHY

**Basic:**

**Complementary:**
RESOURCES

Hyperlink: