Course guides
390215 - CSE - Electronic Circuits and Systems

Unit in charge: Barcelona School of Agri-Food and Biosystems Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering.
Degree: BACHELOR’S DEGREE IN BIOSYSTEMS ENGINEERING (Syllabus 2009). (Compulsory subject).
Academic year: 2021 ECTS Credits: 6.0 Languages: Catalan

LECTURER
Coordinating lecturer: Marcos Quilez Figuerola
Others: ROBERTO ERNESTO SERRANO FINETTI MARCOS QUILEZ FIGUEROLA

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Fundamental and application of analogical and digital electronics.

Transversal:
2. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 2. Using strategies for preparing and giving oral presentations. Writing texts and documents whose content is coherent, well structured and free of spelling and grammatical errors.

TEACHING METHODOLOGY

The following methodologies are used:
- Participative master class.
- Cooperative learning and team-work
- Guided self-learning
- Autoevaluation and coevaluation

LEARNING OBJECTIVES OF THE SUBJECT

By the end of the course the student will be able to:

- Explain the relation between information, signal and electronic circuit.
- Explain the concept of continuous magnitude, discreet magnitude and his representation by means of analog electrical signals and digital.
- Identify the main blocks that form an electronic system.
- Build simple circuital models to describe systems containing sources of signal, sensors, actuators and blocks of processing of the signal.
- Analyze the circuits mentioned in the previous point.
- Explain the differences between analog and digital signals as well as between analog and digital circuits.
- Enumerate and explain the most usual functions of analog and digital circuits in an electronic measurement system.
- Explain the power supply requirements for electronic systems and make basic calculations power consumption.
- Enumerate different power supplies for systems and describe their main characteristics.
- Implement and use a simple measuring system using a data acquisition unit connected to a personal computer to read analog inputs, digital inputs and activate relays connected to digital outputs.
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>40.0</td>
<td>26.67</td>
</tr>
<tr>
<td>Hours small group</td>
<td>20.0</td>
<td>13.33</td>
</tr>
<tr>
<td>Self study</td>
<td>90.0</td>
<td>60.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

Unit 1: Introduction to electronic systems

Description:
1. Introduction to electronic systems
   1.1 Electronic systems, information and signals
   1.2 Elements in an electronic system
   1.3 Electronic systems modelling
   1.3.1 Basic electronic components
   1.3.2 Ideal circuit elements

Related competencies:
CE-SB-21.3. Fundamental and application of analogical and digital electronics.

Full-or-part-time: 10h
Theory classes: 3h
Laboratory classes: 1h
Self study: 6h

Unit 2: Input and output devices

Description:
2. Input and output devices
   2.1 Input devices
   2.1.1 Description and modelling
   2.1.2 Basic circuits for input devices
   2.2 Output devices
   2.2.1 Description and modelling
   2.2.2 Basic circuits for output devices

Related competencies:
CE-SB-21.3. Fundamental and application of analogical and digital electronics.

Full-or-part-time: 46h
Theory classes: 12h
Laboratory classes: 7h
Self study: 27h
Unit 3: Digital electronics

Description:
3. Digital electronics
3.1 Basics of digital electronics
3.2 A/D conversion and D/A conversion

Related competencies:
CE-SB-21.3. Fundamental and application of analogical and digital electronics.

Full-or-part-time: 37h
Theory classes: 10h
Laboratory classes: 5h
Self study: 22h

Unit 4: Analog electronics

Description:
5. Analog electronics
5.1 Analog signal conditioning
5.2 Frequency response of analog circuits

Related competencies:
CE-SB-21.3. Fundamental and application of analogical and digital electronics.

Full-or-part-time: 36h
Theory classes: 10h
Laboratory classes: 4h
Self study: 22h

Unit 5: Power supplies for electronic systems

Description:
5. Power supply for electronic systems
5.1 Energy and power
5.2 Characteristics of power supplies for electronic systems
5.3 Electric power sources
5.3.1 Batteries
5.3.2 Power grid
5.4 Devices and circuits for power systems

Related competencies:
CE-SB-21.3. Fundamental and application of analogical and digital electronics.

Full-or-part-time: 21h
Theory classes: 5h
Laboratory classes: 3h
Self study: 13h
# ACTIVITIES

## ACTIVITY 1: Theory classes

**Related competencies:**
CE-SB-21.3. Fundamental and application of analogical and digital electronics.

**Full-or-part-time:** 72h
- Theory classes: 36h
- Self study: 36h

## Activity 2: Guided exercises classes

**Related competencies:**
CE-SB-21.3. Fundamental and application of analogical and digital electronics.

**Full-or-part-time:** 24h
- Laboratory classes: 12h
- Self study: 12h

## Activity 3: Non-presential exercise resolution

**Related competencies:**
CE-SB-21.3. Fundamental and application of analogical and digital electronics.

**Full-or-part-time:** 34h
- Self study: 34h

## Activity 4: Individual test

**Related competencies:**
CE-SB-21.3. Fundamental and application of analogical and digital electronics.

**Full-or-part-time:** 4h
- Theory classes: 4h

## Activity 5: Laboratory classes

**Related competencies:**
CE-SB-21.3. Fundamental and application of analogical and digital electronics.
04 COE N2. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 2. Using strategies for preparing and giving oral presentations. Writing texts and documents whose content is coherent, well structured and free of spelling and grammatical errors.

**Full-or-part-time:** 16h
- Laboratory classes: 8h
- Self study: 8h
GRADING SYSTEM

The final mark is calculated as weighed summation of the following marks:

N1: mark of the first individual test, with a 35 % contribution.
N2: mark of the second individual test, with a 35 % contribution
N3: mark of the exercises from activities 2 and 3, with a 20 % contribution.
N4: mark of the laboratori classes, with a 10 % contribution.

N_{final} = 0,35 \, N_1 + 0,35 \, N_2 + 0,20 \, N_3 + 0,10 \, N_4

BIBLIOGRAPHY

Basic:

Complementary: