390215 - CSE - Electronic Circuits and Systems

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
- Project based learning
- 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 a system 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 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>Total learning time: 150h</th>
<th>Hours large group: 40h</th>
<th>26.67%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td>Hours small group:</td>
<td>20h</td>
<td>13.33%</td>
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<tr>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td>Self study:</td>
<td>90h</td>
<td>60.00%</td>
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</tbody>
</table>
# Content

## Unit 1: Introduction to electronic systems
- **Learning time:** 10h  
  - Theory classes: 3h  
  - Laboratory classes: 1h  
  - Self study: 6h

**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

## Unit 2: Power supplies for electronic systems
- **Learning time:** 22h  
  - Theory classes: 6h  
  - Laboratory classes: 3h  
  - Self study: 13h

**Description:**
2. Power supplies for electronic systems  
   2.1 Energy and power  
   2.2 Characteristics of power supplies for electronic systems  
   2.3 Electric power sources  
      2.3.1 Batteries  
      2.3.2 Power grid  
   2.4 Devices and circuits for power systems

## Unit 3: Input and output devices
- **Learning time:** 45h  
  - Theory classes: 11h  
  - Laboratory classes: 7h  
  - Self study: 27h

**Description:**
3. Input and output devices  
   3.1 Input devices  
      3.1.1 Description and modelling  
      3.1.2 Basic circuit for input devices  
   3.2 Output devices  
      3.2.1 Description and modelling  
      3.2.2 Basic circuits for output devices
### Unit 4: Digital electronics

**Learning time:** 37h  
Theory classes: 10h  
Laboratory classes: 5h  
Self study: 22h  

**Description:**  
4. Digital electronics  
4.1 Fundamentals of digital electronics  
4.2 A/D conversion and D/A conversion

### Unit 5: Analog electronics

**Learning time:** 36h  
Theory classes: 10h  
Laboratory classes: 4h  
Self study: 22h  

**Description:**  
5. Analog electronics  
5.1 Common analog functions  
5.2 Frequency response of analog circuits
### Planning of activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>ACTIVITY 1: Theory classes</td>
<td>76h</td>
</tr>
<tr>
<td></td>
<td>Self study: 38h</td>
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<tr>
<td></td>
<td>Theory classes: 38h</td>
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<tr>
<td>Activity 2: Guided excercises classes</td>
<td>20h</td>
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<tr>
<td></td>
<td>Laboratory classes: 10h</td>
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<tr>
<td></td>
<td>Self study: 10h</td>
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<tr>
<td>Activity 3: Non-presential exercise resolution</td>
<td>26h</td>
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<td>Self study: 26h</td>
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<tr>
<td>ACTIVITY 4: Individual test</td>
<td>2h</td>
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<tr>
<td></td>
<td>Theory classes: 2h</td>
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<tr>
<td>Activity 5: Laboratory classes</td>
<td>16h</td>
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<td></td>
<td>Self study: 8h</td>
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<td>Laboratory classes: 8h</td>
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<tr>
<td>Activity 6: Oral and written communication</td>
<td>10h</td>
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<td></td>
<td>Laboratory classes: 2h</td>
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<tr>
<td></td>
<td>Self study: 8h</td>
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### Qualification system

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

- **N1**: mark of the first individual test, with a 25% contribution.
- **N2**: mark of the second individual test, with a 35% contribution.
- **N3**: mark of the exercises from activities 2 and 3, with a 15% contribution.
- **N4**: mark of the laboratory classes, with a 15% contribution.
- **CG**: mark of the generic skill, with a 10% contribution.

\[
N_{\text{final}} = 0.25 \times N1 + 0.35 \times N2 + 0.15 \times N3 + 0.15 \times N4 + 0.1 \times CG
\]
Regulations for carrying out activities

Dates for the realization of presential activities, as well as dead-lines for reports and exercises delivery will be published at the beginning of the quarter. Late deliveries will be given a mark of zero. The laboratory activities will take place at the Laboratory of Physics L204. Good practices and security rules are to be followed.

Attendance to presential sessions mandatory. Absence for unexcused reasons or failure to deliver the respective deliverable to any of the small group sessions will lead to a failing grade for N3 and / or N4. The lack of punctuality will be taken into account when evaluating any scheduled activity. For this purpose, a maximum delay of 10 minutes will be tolerated. The use of telephones or other mobile devices in the classroom or the laboratory is not allowed.

Bibliography

Basic:

Complementary: