Degree competences to which the subject contributes

**Generical:**
10 ECI N3. They will have acquired knowledge related to experiments and laboratory instruments and will be competent in a laboratory environment in the ICC field. They will know how to use the instruments and tools of telecommunications and electronic engineering and how to interpret manuals and specifications. They will be able to evaluate the errors and limitations associated with simulation measures and results.

Learning objectives of the subject

- Ability to perform the specification, implementation, documentation and development of equipment and instrumentation electronics and considering both the technical and related regulatory compliance.
- Ability to apply electronic and assistive technology in other fields and activities, not only in the field of Information Technologies and Communications.
- Ability to design analog electronic circuits and data capture. Ability to specify and use electronic instrumentation and measurement systems.
- Ability to analyze and solve problems of interference and electromagnetic compatibility in measurement systems.
## Study load

<table>
<thead>
<tr>
<th></th>
<th>Hours large group:</th>
<th>Hours small group:</th>
<th>Self study:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total learning time:</strong> 150h</td>
<td>39h</td>
<td>26h</td>
<td>85h</td>
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<tr>
<td></td>
<td>26.00%</td>
<td>17.33%</td>
<td>56.67%</td>
</tr>
</tbody>
</table>
## Content

### Unit 1. Measuring system characteristics

**Learning time:** 24h  
Theory classes: 12h  
Self study: 12h

**Description:**
Definition of basic terminology, types of measures. Methods of evaluation of uncertainty in the measurement. Magnitude estimation in time and frequency domains.

### Unit 2.- Sensors and signal conditioning

**Learning time:** 22h  
Theory classes: 10h  
Guided activities: 2h  
Self study: 10h

**Description:**
Types of signals. Classification of sensors and analysis of its characteristics. Analysis and circuit design of signal conditioning for sensors.

### Unit 3.- Signal Acquisition

**Learning time:** 20h  
Theory classes: 10h  
Self study: 10h

**Description:**
Structures and circuits for analog signals multiplexing. Sample and hold circuits. Analog to digital and D/A, conversion architectures.

### Unit 4.- The measuring system in its environment

**Learning time:** 14h  
Theory classes: 7h  
Self study: 7h

**Description:**
# Planning of activities

<table>
<thead>
<tr>
<th>Laboratory practices</th>
<th>Hours: 9h</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Laboratory classes: 8h</td>
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<tr>
<td></td>
<td>Self study: 12h</td>
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<table>
<thead>
<tr>
<th>Long answer tests (Control)</th>
<th>Hours: 1h</th>
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<tbody>
<tr>
<td></td>
<td>Laboratory classes: 1h</td>
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</table>

<table>
<thead>
<tr>
<th>Long answer tests (Final Exam)</th>
<th>Hours: 3h</th>
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<tbody>
<tr>
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<td>Theory classes: 3h</td>
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</table>
Qualification system

50% Final Exam  
30% Lab work  
20% Exercises and controls

Bibliography

Basic:


Complementary:

