230928 - TEL - Electronic Technology

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering
Academic year: 2019
Degree: BACHELOR'S DEGREE IN ELECTRONIC ENGINEERING AND TELECOMMUNICATION (Syllabus 2018). (Teaching unit Compulsory)
ECTS credits: 6
Teaching Languages: Catalan, Spanish

Teaching staff
Coordinator: Jimenez Serres, Vicente
Others: Garcia Gonzalez, Miquel Angel

Prior skills

Degree competences to which the subject contributes

Specific:
CE8. (ENG) GREELEC: Capacitat per utilitzar eines informàtiques de cerca de recursos bibliogràfics o d'informació relacionada amb les telecomunicacions i l'electrònica. (Mòdul comú a la branca de telecomunicació).
CE29. (ENG) GREELEC: Capacitat d'analitzar i solucionar els problemes d'interferències i compatibilitat electromagnètica. (Mòdul de tecnologia específica- Sistemes electrònics).

General:
CG2. (ENG) GEELEC: coneixement, comprensió i capacitat per explicar la legislació necessària durant el desenvolupament de la professió d'enginyer tècnic de telecomunicació i facilitat per al maneig d'especificacions, reglaments i normes d'obligat compliment.
CG6. (ENG) GREELEC: Facilitat per al maneig d'especificacions, reglaments i normes d'obligat cumpliment.

Transversal:
CT5. (ENG) GREELEC: ÚS SOLVENT DELS RECURSOS DE LA INFORMACIÓ. Gestionar l'adquisició, l'estructuració, l'anàlisi i la visualització de dades i informació en l'àmbit de l'especialitat i valorar de forma crítica els resultats d'aquesta gestió.

Teaching methodology
Lectures
Laboratory sessions
Team assignments (at home)
Individual work
Continuous assessment evaluation
Final assessment evaluation

Learning objectives of the subject
Understand the task of the engineer in the development of an electronic product from the specifications to the final
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Understand the problems associated with systems compatibility, both from the standardization and interference point of view. Understand the problems associated with the design of Printed Circuit Boards (PCBs) both at the level of its manufacturability and the problems associated with heat management or the integrity of the signals. Know the problems related to the safety of people and electronic equipment. Understand the current electronic equipment manufacturing process.

**Study load**

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

<table>
<thead>
<tr>
<th>Topic 1: Introduction to the manufacture of electronic equipments</th>
<th>Learning time: 5h</th>
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</thead>
<tbody>
<tr>
<td>Description: Typical elements within an electronic device: Analog and digital circuits, power supplies, cables, connectors, presentation elements and interaction, shielding, enclosure. Phases of the design of an electronic equipment.</td>
<td>Theory classes: 2h</td>
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<td>Self study: 3h</td>
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<table>
<thead>
<tr>
<th>Topic 2: Printed Circuit Boards (PCB)</th>
<th>Learning time: 22h</th>
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<tbody>
<tr>
<td>Description: Elements of printed circuit boards. CAD tools for the design of PCBs. Stack-Up options. Phases of the design of a PCB. Management of the current return and grounding. Differential and controlled impedance lines. Thermal considerations. Standards and regulations.</td>
<td>Theory classes: 10h</td>
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<td>Self study: 12h</td>
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<tr>
<th>Topic 3: Electronic components technology.</th>
<th>Learning time: 19h</th>
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<tbody>
<tr>
<td>Description: Technological aspects of passive components, active devices and analog and digital integrated circuits. Limitations of components and non-idealities.</td>
<td>Theory classes: 9h</td>
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<td>Self study: 10h</td>
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<tr>
<th>Topic 4: Power subsystem</th>
<th>Learning time: 7h</th>
</tr>
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<tr>
<td>Description: Power regulation options. Inductive components. Distributed power. Decoupling.</td>
<td>Theory classes: 3h</td>
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<td>Self study: 4h</td>
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### Topic 5: Cables and connectors

**Description:**
Types of cables. Electrical shielding and susceptibility to magnetic fields. Dielectric effects. Connectors. Impedance matching.

**Learning time:** 7h
- Theory classes: 3h
- Self study: 4h

### Topic 6: Integration and assembly of electronic equipment

**Description:**
Integration of components. Automatic assembly. Implications in the design.

**Learning time:** 7h
- Theory classes: 3h
- Self study: 4h

### Topic 7: Electromagnetic compatibility concepts

**Description:**
Generation and susceptibility to electromagnetic radiation. Techniques to reduce emission and susceptibility. Compatibility regulations.

**Learning time:** 14h
- Theory classes: 6h
- Self study: 8h

### Topic 8: Security in electronic equipments

**Description:**

**Learning time:** 7h
- Theory classes: 3h
- Self study: 4h

### Laboratory: Design of a PCB

**Description:**

**Learning time:** 34h
- Theory classes: 20h
- Laboratory classes: 14h
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### Laboratory: Circuit measurements

<table>
<thead>
<tr>
<th>Learning time: 28h</th>
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<tr>
<td>Theory classes: 16h</td>
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<tr>
<td>Laboratory classes: 12h</td>
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### Description:
Integrity tests for analog and digital signals. Noise, interference and crosstalk. Differential lines and single ended. Power integrity tests. Comparison with linear and commutated supplies. Effects of decoupling and PSRR.

### Qualification system
- 40% Final exam
- 35% Laboratory sessions
- 25% Continuous assessment evaluation

### Bibliography

#### Basic:

#### Complementary: