



## Course guides

# 230123 - PAESEL - Advanced Project in Electronic Systems Engineering

Last modified: 29/04/2020

**Unit in charge:** Barcelona School of Telecommunications Engineering  
**Teaching unit:** 710 - EEL - Department of Electronic Engineering.

**Degree:** BACHELOR'S DEGREE IN TELECOMMUNICATIONS TECHNOLOGIES AND SERVICES ENGINEERING (Syllabus 2015). (Optional subject).

**Academic year:** 2020    **ECTS Credits:** 12.0    **Languages:** Catalan, English, Spanish

### LECTURER

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**Coordinating lecturer:** Bragós Bardia, Ramon

**Others:** Oliveras Verges, Albert  
Pegueroles Valles, Josep Rafael  
Camps Carmona, Adriano  
Alarcón Cot, Eduard  
Torres Urgell, Lluís  
Vallverdú Bayés, Francesc

### PRIOR SKILLS

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You must have passed Basic Engineering Project  
You must have passed Economics and Business

### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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#### Generical:

11 CDIO N3. They will be able to apply a comprehensive view of the entire life cycle (conception, design, implementation and operation) of a product, process or service in the ICC field, and identify users' needs and develop a set of requirements for the product, process or service and a set of initial specifications. They will be able to explore possible solutions and select the best one. They will be able to carry out a design process following a standardised methodology. They will know how to evaluate and propose improvements to the design. They will take into account economic and social aspects of the project or product.

#### Transversal:

1. ENTREPRENEURSHIP AND INNOVATION - Level 3. Using knowledge and strategic skills to set up and manage projects. Applying systemic solutions to complex problems. Devising and managing innovation in organizations.
2. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 3. Taking social, economic and environmental factors into account in the application of solutions. Undertaking projects that tie in with human development and sustainability.

### TEACHING METHODOLOGY

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Directed activities  
Lectures  
Team work (autonomous learning)  
Homework (individual autonomous learning)  
oral presentation  
Short answer tests (Control)  
Long answer test (Final Exam)

## LEARNING OBJECTIVES OF THE SUBJECT

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The course aims to achieve a double impact:

1. Consolidation and extension of the content of previous or parallel courses
2. Acquisition of generic skills at an advanced level. The course deals with almost all generic skills, with emphasis on:
  - Teamwork, leadership
  - Oral and written communication
  - Communication in 3rd language (English)
  - Entrepreneurship and innovation
  - Sustainability and social commitment
  - Ability to conceive, design, implement and operate complex systems in the ICT field

Learning outcomes:

Depending on the subject and scope of the project presented in this course, the student achieves the following learning outcomes: Specification, implementation and documentation of electronic instrumentation and control equipments and systems, including both the technical considerations and the regulations that apply.

Application of electronic technology to other fields, and not only to ICT and Communications.

Design of integrated circuits and discrete analog, digital and mixed-mode electronics, analog-digital and digital-to-analog conversion, RF, optoelectronics and photonics, power supply and electric power conversion for telecommunication, computing and other applications.

Design of interface devices, data capture and storage and terminals for telecommunications systems and services.

Specification, design and use of electronic instrumentation and measurement systems.

Analysis and solution of reliability problems, including interferences and electromagnetic compatibility.

Taking initiatives that create new opportunities and solutions with vision of implementation, process and market

Using knowledge and strategic skills to create and manage projects with an innovative approach. Applying systemic solutions to complex problems.

Applying sustainability criteria and ethic codes of the profession in designing and evaluating technologic solutions. Identifying the need for legislation, regulations and standards.

Understanding the concept of life cycle of a product and applying it to the development of ICT products and services, using suitable standards and legislation.

Studying with books and articles in English and writing a report in English and participating in a technical meeting conducted in that language.

Conducting an oral presentation in English and answering questions from the audience.

Using strategies to prepare and carry out oral and written texts and documents with consistent content, structure and style, appropriate level and good spelling and grammar.

Communicating clearly and effectively in oral and written presentations on complex subjects, adapting to the situation, to the audience and to the objectives of the communication.

Planning and reaching agreements on the objectives, operating rules, responsibilities, schedule and review procedures work.

Identify the roles, skills and shortcomings of the different group members, recognizing and / or assuming the role of leader. Negotiating and managing conflicts within the group.

Identifying user needs and developing a definition of product-process-service and its initial specifications. Following the process management model based on a standard. Evaluating the application of laws and regulations that apply.

Identifying needs and market opportunities. Collecting information that would allow elaborating specifications for a new product, process or service. Elaborating a basic business plan. Performing the planning and execution of a design process.

## STUDY LOAD

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Type	Hours	Percentage
Hours large group	26,0	7.98
Hours small group	78,0	23.93
Self study	222,0	68.10

**Total learning time:** 326 h



## CONTENTS

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### Lectures

**Description:**

Specific aspects of economics and business. Business plan.  
Regulations  
Contents related to the specific project

**Full-or-part-time:** 35h 20m

Theory classes: 15h 20m

Self study : 20h

### Seminars:

**Description:**

Critical thinking  
System thinking  
Research in specialized databases of business information  
Research in specialized databases of patents  
Patent preparation strategy  
Teamwork, leadership  
Environmental impact  
Advanced project management methodology

**Full-or-part-time:** 22h 30m

Theory classes: 10h

Self study : 12h 30m

### Specific math concepts

**Description:**

Additional math content for the specific projects developed in this course: statistics, optimization, modeling, numerical calculation.

**Full-or-part-time:** 37h 30m

Theory classes: 16h 30m

Self study : 21h



## Project

### Description:

Project with high technical complexity, carried out by a large group of people (9-12) that divide the work into subgroups (3-4) and which are coordinated at different levels.

- Each degree performs a different project and there may be different projects within the same degree, with the possibility of transversal projects between tracks and between degrees
- Incorporates different parts (theoretical, HW, SW, measures economic study ...)
- Projects with different profiles, focusing on a specific aspect (Research, Technical Development, Economic study / business plan)

Examples of possible topics:

- Telemedicine - biomedical sensor - communications link - Database
- Payload for a picosatellite
- Coin Sorter
- Fleet Management (GPS, communications, databases, maps)
- Access control: card readers, LAN, DB
- Viterbi decoder chip
- RFID
- Monitoring system for endangered species
- System for remote relay
- Internet TV

**Full-or-part-time:** 234h 40m

Guided activities: 99h 10m

Self study : 135h 30m

## ACTIVITIES

(ENG) Presentació oral

(ENG) Presentació oral

(ENG) Proves de resposta curta (Control)

(ENG) Proves de resposta llarga (Examen Final)



## GRADING SYSTEM

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- Continuous assessment of the activities carried out in the case studies of training sessions and seminars
- Continuous assessment, documentation and oral presentation of the project reports.
- Cross-assessment and co-assessment of the project

60% of the score corresponds to the project mark

40% of the score is based on the individual assessment of the evidences collected at the progress meetings, seminars and the co-assessment of the team colleagues

This course will assess at least the following generic skills:

- Entrepreneurship and innovation (high)
- Sustainability and social commitment (high)
- Ability to conceive, design, implement and operate complex systems in the field of ICT (High Level)

## EXAMINATION RULES.

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A clear failure performing the tasks assigned by the team can mean the failure of the course regardless of the grade given to the group project