Course guide
230162 - PAEST - Advanced Project in Network Systems Engineering

Last modified: 16/06/2024

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 744 - ENTEL - Department of Network Engineering.

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

Academic year: 2024 **ECTS Credits:** 12.0 **Languages:** English

LECTURER

Coordinating lecturer: ANA MARIA CALVERAS AUGE

Others:

Primer quadrimestre:
ALBERTO AGUASCA SOLE - 21, 22, 23
EDUARDO JOSE ALARCON COT - 21, 22, 23
SERGIO BERMEJO SANCHEZ - 22
RAMON BRAGOS BARDIA - 21, 22, 23
ANA MARIA CALVERAS AUGE - 21
JUAN JOSÉ COSTA PRATS - 23
JOAN SARDA FERRER - 21, 22, 23
EVA MARIA VIDAL LOPEZ - 21, 22, 23

Segon quadrimestre:
ALBERTO AGUASCA SOLE - 51
EDUARDO JOSE ALARCON COT - 51
RAMON BRAGOS BARDIA - 51
JOSE PARADELLS ASPAS - 51
JOAN SARDA FERRER - 51
EVA MARIA VIDAL LOPEZ - 51

PRIOR SKILLS

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

REQUIREMENTS

BASIC ENGINEERING PROJECT - Precorequisite
ECONOMICS AND MANAGEMENT - Precorequisite

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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

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

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:
Is able to build, operate and manage the telecommunication networks, services, processes and applications, that is, systems for acquisition, transport, representation, processing, storage, management and presentation of multimedia information from the point of view of network systems.
Is able to apply the techniques in which telematic networks, services and applications are based, such as management systems, signaling and switching, routing, security (cryptographic protocols, tunnels, firewalls, payment mechanisms, authentication and content protection), traffic engineering (graph theory, queuing theory and teletraffic), pricing and service quality and reliability in both fixed and mobile environments, for personal, local or long distance communication, with different bandwidths, including telephony and datatransmission.
Is able to build, operate and manage telematics services using analytical tools for planning, sizing and analysis.
Is able to describe, program, validate and optimize communication protocols and interfaces at different levels of a network architecture.
Is able to follow the technological process of transmission, switching and process for improving networks and telematic services.
Is able to design network architectures and telematics services.
Is able to program services and telematic applications in distributed networks.
Takes initiatives that create new opportunities and solutions with vision of implementation, process and market
Uses knowledge and strategic skills to create and manage projects with an innovative approach. Applies systemic solutions to complex problems.
Has the capacity to critically reflect on sustainability in the professional field and applies sustainability criteria and the deontological codes of the profession in the design and evaluation of technological solutions. Identifies the need to apply legislation, regulations and regulations. Considers environmental criteria in projects related to the professional field and includes indicators to estimate/measure the environmental impact. Considers in the projects and actions criteria of safety, health and social justice and includes indicators to measure its social impact.
Knows the concept of life cycle of a product and applies it to the development of ICT products and services, using the suitable regulations and legislation. Knows strategies and/or technologies for the reduction, reuse and recycling of natural resources and waste related to products and services in the corresponding professional field and knows how to use the suitable metrics (or tools) to measure their environmental impact throughout the life cycle (extraction, production, use and end of life).
Studies with books and articles in English and writes a report in English and participates in a technical meeting conducted in that language.
Conducts an oral presentation in English and answers questions from the audience.
Uses 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.
Communicates 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.
Plans and reaches agreements on the objectives, operating rules, responsibilities, schedule and review procedures work.
Identifies the roles, skills and shortcomings of the different group members, recognizing and / or assuming the role of leader. Negotiates and manages conflicts within the group.
Identifies user needs and develops a definition of product-process-service and its initial specifications. Follows the process management model based on a standard. Evaluates the application of laws and regulations that apply.
Identifies needs and market opportunities. Collects information that would allow elaborating specifications for a new product, process or service. Elaborates a basic business plan.
Is able to provide new ideas and solutions in a project of his/her professional field to make it more sustainable, to propose sustainable projects, to monitor and dismantle properly and to select which indicators will be used to measure sustainability.
Knows how to collaborate with social agents and the different stakeholders involved in a project in his/her professional field, to identify their needs and expectations, and to assess the implications they may have on the sustainability of the project
Learns about the concepts of social commitment and corporate social responsibility and their possibilities and limitations.

STUDY LOAD

Type	Hours	Percentage
Self study	196,0	65.33
Hours large group	26,0	8.67
Hours small group	78,0	26.00

Total learning time: 300 h

CONTENTS

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
Sustainability: environmental, social and economic viability impact. Ethical issues
Advanced project management methodology

Full-or-part-time: 22h 30m
Theory classes: 10h
Self study : 12h 30m

Project

Description:
Project to develop a product or service with a high technical complexity, carried out by a large group of people (7-12) who divide the work into subgroups (3-4) and coordinate at different levels.
- Several different projects will be offered, most of them proposed by companies, hospitals, NGOs or other external institutions.
- Some strategic projects will be offered from the School.
- Some projects may be more suitable for one of the majors of the degree while others will be transversal or even require members of the different majors.
- The projects incorporate different parts (theoretical study, HW, SW, measurements, economic study, non-financial study of environmental, social and ethical impacts)

Examples of possible topics:

- Telemedicine: biomedical sensor + communications link + data analysis on a cloud server
- Payload of a picosatellite, mission control.
- Fleet management (GPS, communications, BBDD, cartography)
- AI-powered shopping assistant
- Monitoring system for endangered species
- Management of the network of an ICU and obtaining estimators with AI techniques.
- Optimization of trajectories of a mobile printing robot
- Participation in the Formula Student project.

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

- 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

A global mark is assigned to the project developed by the team using a rubric that takes into account the different aspects of the process and its documentation (50%), and of the final result, the presentations that have been made and the final report (50%).

This mark is modulated for each component of the group with three coefficients, with a modulation rate of 30% each. One is determined from the evidences collected by the teaching staff in the in-person sessions, the other is determined by the team leader with the points-bag procedure and the other by the co-assessment carried out by all members of the team using a rubric. In the latter case, the team leader is evaluated for his or her role as a team leader.

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.

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