

Course guide

220243 - 220243 - Smart Buildings

Last modified: 29/04/2024

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 758 - EPC - Department of Project and Construction Engineering.

Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Optional subject).

Academic year: 2024 **ECTS Credits:** 5.0 **Languages:** English

LECTURER

Coordinating lecturer: Tejedor Herran, Blanca

Others:

PRIOR SKILLS

Basic knowledge of building facilities is recommended

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

2. Proper knowledge for the design, construction and management of buildings and their surroundings, especially in the field of industrial engineering.
4. Acquire the knowledge necessary for the design, implementation, verification and control of facilities, infrastructure and urban development in the field of industrial engineering.

TEACHING METHODOLOGY

The course is structured in three parts: theoretical lessons, practical lessons and project. In the theoretical lessons, the lecturer introduces concepts and methods. To facilitate their understanding, the subject contains several exercises and examples. In the practical lessons, the lecturer guides students in the application of theoretical concepts to solve problems, always using critical reasoning. Students' project is divided into three deliverables according to theoretical lessons.

LEARNING OBJECTIVES OF THE SUBJECT

Introduce the student to the concepts of design, construction and management of smart buildings and related systems.

STUDY LOAD

Type	Hours	Percentage
Hours small group	15,0	12.00
Self study	80,0	64.00
Hours large group	30,0	24.00

Total learning time: 125 h

CONTENTS

(ENG) Introducció als conceptes d'edificis intel·ligents

Description:

- Introduction to the theoretical framework of intelligent buildings.
- Comparative analysis between smart building and green building
 - Case studies and real examples
 - How to evaluate needs of building systems (i.e. types of facilities, legislation, tools etc.).

Specific objectives:

Provide the basis for assimilating the fundamental concepts of the course

Related activities:

Short-exercises
2nd delivery of the project

Full-or-part-time: 35h

Theory classes: 10h
Laboratory classes: 5h
Self study : 20h

title english

Description:

- The second module includes:
- Conceptualization of the "Volere Method"
 - Creation of possible scenarios
 - Identification and definition of user's requirements
 - Resolution of case studies

Specific objectives:

The student should determine the requirements of design, construction and management of the building. The goal is to achieve the interaction between facilities and users in order to reduce the impact in terms of economy - energy - environment

Related activities:

Short-exercises
2nd delivery of the project

Full-or-part-time: 45h

Theory classes: 10h
Laboratory classes: 5h
Self study : 30h



The framework for integrated building systems

Description:

Proposal of strategies for integrated building systems

- Physical and functional dimensions
- Integrated systems and interfaced systems
- Network architecture
- Communication protocols (KNX, BACNET, MODBUS etc.)
- Type of cabling between devices
- Data management at urban scale
- Monitoring and control of building systems
- Economy

Specific objectives:

The student should design and integrate smart systems to reduce: operational costs, environmental impacts, energy demands. This module pretends to propose a buuilding management system with its respective sensors and actuators to satisfy user's requeriments that were defined in Module II

Related activities:

Short-exercices
3rd delivery of the project

Full-or-part-time: 45h

Theory classes: 10h
Laboratory classes: 5h
Self study : 30h

GRADING SYSTEM

The qualification system is focused on short activities and a final project. The activities are performed during the session or developed at home (25%). The project is often based on a real case study (75%) and it can be performed individually or in group (depending on the scope of the project or number of students). To ensure a good execution, the project is divided in three deliverables over the course (NP1 = 25%; NP2 = 25%; NP3 = 25%).

EXAMINATION RULES.

Attendance is mandatory (>80% of classes)

BIBLIOGRAPHY

Basic:

- Sinopoli, Jim. Smart buildings systems for architects, owners and builders [on line]. Oxford: Butterworth-Heinemann, 2010 [Consultation : 03/10/2022]. Available on : <https://www.sciencedirect-com.recursos.biblioteca.upc.edu/book/9781856176538/smart-building-systems-for-architects-owners-and-builders>. ISBN 9781856176538.