Course guide
310409 - 310409 - Added-Value Facilities in Smart Cities and Smart Buildings

Last modified: 09/05/2025

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

Degree: MASTER'S DEGREE IN ADVANCED BUILDING CONSTRUCTION (Syllabus 2014). (Optional subject).

Academic year: 2025 **ECTS Credits:** 5.0 **Languages:** Catalan, Spanish, English

LECTURER

Coordinating lecturer: Bordonau Farrerons, Jose

Others: Bordonau Farrerons, Jose

PRIOR SKILLS

Basic knowledge on Physics of electricity.

TEACHING METHODOLOGY

Methodology oriented to the application of knowledge to real projects.
Combination of:
- Lectures using top-down approach.
- Lectures using bottom-up approach, analyzing a real project in home automation, smart buildings, facilities management or smart cities and extracting general conclusions.
- Visit of a real installation in Nexus I building, UPC North Campus
- Short project mentored in teams of 3-4 students, using project-based learning.

LEARNING OBJECTIVES OF THE SUBJECT

Introduce in a practical and application-oriented way the basic concepts of Electronics in order to understand home automation, building automation, facilities management and smart cities technologies at the building professional level. Therefore, the aspect of applicability to project and work control is focused. The design of electronic systems for such applications falls outside the scope of the subject.
The applications of value-added installations are oriented to:
- Residential level: home automation technology.
- Level of service buildings: building automation technology. A distinction will be made between applications for building users (smart buildings) and applications in which the user is the building itself (infrastructure management or facilities management).
- At the urban level: smart cities.

STUDY LOAD

Type	Hours	Percentage
Hours medium group	5,0	4.00
Hours large group	15,0	12.00
Hours small group	5,0	4.00
Guided activities	10,0	8.00
Self study	90,0	72.00

Total learning time: 125 h

CONTENTS

Basic concepts in electronic technology

Description:
- Magnitudes: current, voltage, power
- Digital/analog
- Ohm's law, Kirchoff's laws
- Circuits: voltage divider, application in a thermostat
- Controllers, sensors and actuators
- Wired networks and wireless networks
- Systems for home automation and intelligent buildings. Extension to smart cities.

Specific objectives:
Aprender los conceptos básicos, el vocabulario y comprender los retos de futuro de la tecnología.

Related activities:
Lectures with exercises to introduce the applications

Full-or-part-time: 4h
Theory classes: 4h

Projects of added-value installations

Description:
Review of actual projects:
- Home automation
- Smart buildings and facilities management
- Smart cities

Specific objectives:
Analysis of real projects, applying the knowledge

Related activities:
Presentation and debate in a lecture

Full-or-part-time: 7h
Theory classes: 7h

Review of innovative added-value installations

Description:
Presentations by the students about innovative added value facilities, mentored by the teacher
A debate is done after each presentation

Specific objectives:
Present and debate the most recent innovations

Related activities:
Presentations and debates during the lectures

Full-or-part-time: 2h
Theory classes: 2h

Presentations of the short projects

Description:
The students teams present their proposals of added-value installation

Full-or-part-time: 2h
Theory classes: 2h

GRADING SYSTEM

10 % for the presentation in teams during 10 minutes at the end of a lecture time for a topic of application of the course.

10 % for the report of the visit to the Nexus I building.

20 % for the team work developed for the short project
30 % for the report of the mini-project
30 % for the presentation of the mini-project

EXAMINATION RULES.

Information and deadlines about the activities to be graded will be published in Atenea along the course.

BIBLIOGRAPHY

Complementary:
- Millman, Jacob. Microelectrónica. 6a ed. Barcelona: Hispano Europea, 1991. ISBN 9788425508851.
- Romero, C. ; Vázquez, F.; Castro, C. Domótica e inmótica : viviendas y edificios inteligentes. 2ª ed. Madrid: Ra-Ma, 2010. ISBN 9788499640174.
- Quinteiro González, J. M. ; Lamas Graziani, J. ; Sandoval González, J. D.. Sistemas de control para viviendas y edificios: domótica. Madrid: Paraninfo, 1999.
- Moreno Gil, J. ; Rodríguez Diéguez, E. ; Lasso Tárraga, D. Instalaciones automatizadas en viviendas y edificios : equipos e instalaciones electrotécnicas. Madrid: Thomson-Paraninfo, 1998. ISBN 8428324913.
- Laserna Larburu, Santos F. Edificios inteligentes y domótica. [Bilbao]: Logical Design, 1999. ISBN 8493043109.

RESOURCES

Other resources:
Josep Bordonau, Added-Value Facilities, Campus digital Atenea