# Home and building automation

**Academic Year: ( 2019 / 2020 )** **Review date: 27-04-2020**

**Department assigned to the subject: Systems Engineering and Automation Department**

**Coordinating teacher: BARBER CASTAÑO, RAMON IGNACIO**

**Type: Electives ECTS Credits : 6.0**

**Year : 4 Semester : 2**

## REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Although it is not required to have completed any course, it helps to have knowledge of Control Engineering, Digital Electronics and Computer Networks.

## OBJECTIVES

By the end of this subject, students will be able to have:

1. a coherent knowledge of their branch of engineering including some at the forefront of the branch in automation of buildings applications;
2. the ability to apply their knowledge and understanding of automation applications to identify, formulate and solve engineering problems using established methods in the field of building automation;
3. the ability to apply their knowledge and understanding to develop and realise designs of automation applications to meet specific communications and building control requirements;
4. workshop and laboratory skills in programming of building control systems;
5. the ability to select and use appropriate equipment, tools and methods such as protocols, sensors and actuators applied to building automation;
6. the ability to combine theory and practice to solve engineering problems of automation applications applied to buildings.

## DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to building automation
   - 1.1 Buildings and applications
   - 1.2 Evolution
   - 1.3 Actors involved

2. Basic Concepts
   - 2.1 Interoperability
   - 2.2 Devices
   - 2.3 Communications

3. Regulations
   - 3.1 REBT - Low Voltage Electrotechnical Regulations
   - 3.2 AENOR: EA0026 2006
   - 3.3 ICT- Common Telecommunications Infrastructure
   - 3.4 Energy rating of buildings

4. KNX
   - 4.1 Introduction
   - 4.2 Physical environment
   - 4.3 Network Structure
   - 4.4 Communication Protocol
   - 4.5 Facilities KNK
   - 4.6 Programming Software: ETS

5. Other protocols
   - 5.1 LonWorks
   - 5.2 Backnet

6. Transmission technologies

6.1. PLC technologies
6.2. Wireless technologies

7. Control Facilities
7.1 Scada Systems.
7.2 Residential gateways.

8. Applications
8.1 Applications to lighting control
8.2 Applications to climate control
8.3 Security Applications
8.4 Domotic care
8.5 Energy Efficiency
8.6 Multimedia and home appliances

## LEARNING ACTIVITIES AND METHODOLOGY

- Lectures, question resolution classes and personal work, oriented to the acquisition of theoretical knowledge (3 ECTS).
- Lab and problem resolution classes and personal work, oriented to the acquisition of practical skills related to the program of the course (3 ECTS).
- Assignments and student presentations.
- Visits to relevant centers of interest.

## ASSESSMENT SYSTEM

- Examan: 50%
- KNX Practices: 30%
- Work: 20%

2 partial exams are liberatory for the final exam will be performed.

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|---|---|
| **% end-of-term-examination:** | 50 |
| **% of continuous assessment (assigments, laboratory, practicals…):** | 50 |

## BASIC BIBLIOGRAPHY

- Drew Gislason Zigbee wireless networking, Newnes, 2008

- H. Merz, T. Hansemann, C. Hübner Building Automation Communication Systems with EIB/KNX, LON and BACnet, Springer, 2009
- Shengwei Wang Intelligent Buildings and Building Automation, Spon Press, 2010