Course guide
240381 - 240EI036 - Installations Projects

Last modified: 13/03/2025

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 758 - EPC - Department of Project and Construction Engineering.

Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Compulsory subject).
MASTER'S DEGREE IN MANAGEMENT ENGINEERING (Syllabus 2021). (Optional subject).

Academic year: 2025 **ECTS Credits:** 3.0 **Languages:** Catalan, Spanish

LECTURER

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DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CEECONS4. Apply the adequate knowledge for the design, execution, verification and control of facilities, infrastructures and urban design in the field of industrial engineering.
CEMEI18. Knowledge about manufacturing, construction, facilities, infrastructures, and urban design in the field of industrial engineering.
CEMEI20. Knowledge and abilities to project and design electrical and flow facilities, lighting, air conditioning and ventilation, save and energetic efficiency, acoustics, communications, domotics, and intelligent buildings and security facilities.
CEMEI22. Knowledge and abilities to verify and control the facilities, processes and products.

TEACHING METHODOLOGY

- In-person sessions for presenting content (theoretical classes).
- Independent study and completion of exercises and activities (completion of group course work).

The course work will consist of carrying out a building air conditioning project based on a practical case that will be proposed in class. The focus of the work is to conduct the conceptual design (without calculations) of the installation, expanding on the knowledge acquired in class. It will be done in groups of 3-4 people.

LEARNING OBJECTIVES OF THE SUBJECT

The objective is to give students skills to understand the components and operation of the main systems required in buildings: generating and electrical distribution systems, thermal and mechanical systems; and to give them skills to select the most suitable systems depending on the needs and conditions of each type of building. It also aims to provide basic knowledge about the management and maintenance of installations, as well as strategies to promote their energy efficiency.

STUDY LOAD

Type	Hours	Percentage
Hours large group	27,0	36.00
Self study	48,0	64.00

Total learning time: 75 h

CONTENTS

Module 1: HVAC Installations

Description:
- Objectives and description of ventilation systems. Regulatory standards.
- Types of ventilation systems.
- Components of a ventilation installation.
- Description and operation of thermal energy generation equipment: Condensing boilers, Biomass boilers, Heat pumps, Geothermal systems, Cooling plants, etc.
- Optimization and energy management in thermal energy generation.
- Objectives of building air conditioning. Regulatory standards.
- Description and characteristics of air conditioning system typologies: Hydronic systems, Air-based systems, Refrigerant fluid systems.
- Description of air conditioning installation components.
- Description of air conditioning system regulation and control.

Related activities:
Course work
First midterm exam

Full-or-part-time: 45h
Theory classes: 13h
Self study : 32h

Module 2: Mechanical Installations

Description:
- Description and operation of domestic hot water generation equipment. Regulatory standards.
- Description of elements and distribution of the Cold Water Supply network.
- Description of elements and distribution of the Domestic Hot Water network.
- Description of water treatment systems.
- Description of elements of the sanitation network.

Related activities:
Course work (only domestic hot water generation)
Second midterm exam

Full-or-part-time: 16h
Theory classes: 6h
Self study : 10h

Module 3: Electrical Installations

Description:
- Electrical installations in buildings: applicable general regulations.
- Service connection and link installations.
- Interior installations: installation systems, conduits and channels, circuits, and special requirements.
- Electrical supply type: normal and supplementary supply.
- Lighting installations: basic concepts of lighting technology, regulatory standards, types, and elements of a lighting installation.

Related activities:
Second midterm exam

Full-or-part-time: 8h
Theory classes: 4h
Self study : 4h

Module 4: Installation Management and Control Systems. Energy Efficiency and Facility Management

Description:
- Improvement of energy efficiency in installations. Reduction of consumption vs. indoor comfort.
- Comprehensive management of installations. Building and BMS (Building Management Systems) monitoring.
- The importance of maintenance management in building installations. Role, functions and characteristics of Facility Management.

Related activities:
Second midterm exam

Full-or-part-time: 6h
Theory classes: 4h
Self study : 2h

GRADING SYSTEM

Nfinal= 0,35 Nep1 + 0,35 Nep2 + 0,3 Nt
Nfinal: Final mark
Nep1: First midterm exam mark
Nep2: Second midterm exam mark
Nt: Course work mark

In case of re-evaluation, the final grade will correspond to the grade obtained in the re-evaluation exam (which will be scored up to a maximum of 7.0 and will cover the entire theoretical syllabus of the course).

EXAMINATION RULES.

- In the exams, calculators, mobile phones, and any support materials are not allowed.
- The re-evaluation is only for the exam portion (first and second midterm exams) and will be scored up to a maximum of 7.0.
- If the student taking the re-evaluation does not pass the course, the highest grade between the regular evaluation and the re-evaluation will be retained.

BIBLIOGRAPHY

Basic:
- Ministerio de Vivienda y Agenda Urbana. CTE-DB-HE Codi Tècnic de l'Edificació. Document Bàsic : Estalvi d'Energia [on line]. Madrid: BOE, 2019 [Consultation: 08/04/2025]. Available on: https://www.codigotecnico.org/DocumentosCTE/AhorroEnergia.html.
- Ministerio de Vivienda y Agenda Urbana. CTE-DB-HS : Codi Tècnic de l'Edificació. Document Bàsic : Salubritat [on line]. Madrid: BOE, 2019 [Consultation: 09/04/2025]. Available on: https://www.codigotecnico.org/DocumentosCTE/Salubridad.html.
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- Ministerio de Industria y Energía. Gobierno de España. RIPCI Reglament d'instal·lacions de protecció contra incendis [on line]. Madrid: Ministerio de Industria y Energía. Gobierno de España, 2017 [Consultation: 15/06/2021]. Available on: https://www.boe.es/boe_catalan/dias/2017/06/12/pdfs/BOE-A-2017-6606-C.pdf.
- Ministerio de Ciencia y Tecnología. Gobierno de España. REBT Reglament electrotècnic de Baixa Tensió i les seves instruccions tècniques [on line]. Madrid: Ministerio de Ciencia y Tecnología. Gobierno de España, 2002 [Consultation: 15/06/2021]. Available on: https://www.boe.es/boe_catalan/dias/2002/10/01/pdfs/A02526-02720.pdf.
- Ministerio de Fomento. Gobierno de España. RITE Reglament d'instal·lacions tèrmiques en edifici i les seves instruccions tècniques [on line]. Madrid: Ministerio de Fomento. Gobierno de España, 2007 [Consultation: 15/06/2021]. Available on: https://www.boe.es/boe_catalan/dias/2007/09/01/pdfs/A03775-03826.pdf.