

60806 - Factories and industrial facilities

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	532 - Master's in Industrial Engineering
ECTS	4.5
Course	1
Period	Half-yearly
Subject Type	Compulsory
Module	---

1. Basic info

1.1. Recommendations to take this course

This subject has no prerequisites.

1.2. Activities and key dates for the course

The student must check the dates for conducting the practices. It shall be informed of these dates at the beginning of the course and by the *Anillo Digital Docente* application.

The exams will be held on the dates established by the EINA.

2. Initiation

2.1. Learning outcomes that define the subject

1. Knowledge of urban parameters and its planning characteristics and development.
2. Knowledge of different types of industrial zones and ability to integrate the industrial plant in them.
3. Ability to design and manage industrial plants adapted to different factory processes.
4. Knowledge and ability to design and integrate into the industrial plant and into the urban infrastructure, the services and facilities required for the industrial activity.
5. Knowledge and ability to perform the verification and control of facilities and infrastructures of an industrial plant.
6. Knowledge and ability to perform certifications, audits, verifications, tests and reports in the above subjects.

2.2. Introduction

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" *Plantas y Servicios Industriales* " presents the competencies and responsibilities of the industrial engineer for the design, organization and construction of industrial zones and buildings, as well as for the developing of documents and certifications associated with the project management and construction of industrial plants.

The basic principles of urban industrial planning are analyzed, and the most representative types of industrial zones (detailing its main characteristics and design criteria). Similarly, it is described the procedure to develop a plant layout that meets functional and productive objectives, and the tools for its scientific analysis and heuristic design are also provided. In turn, it will be presented the urban planning parameters that must be considered for the industrial plot and normative requirements for the layout and inner design of the industrial building.

It is presented the historical evolution of manufacturing processes as well as the main types of industrial buildings, according to their disposition in the industrial plot, operating schemes and basic elements (focusing on the spatial implications and integrated layout that must be considered for a suitable operation). Finally, the related services required for its operation will be presented.

3.Context and competences

3.1.Goals

The aim of the course is learning general aspects relating to the design and management of industrial zones, focusing on the plant layout and organization of its related services, considering its spatial arrangement and functional operation. All this should meet the activity requirements, as well as current normative regulations.

For this, the competencies and responsibilities of the industrial engineer in this subject are defined, as well as the certifications, verifications and project management documents required for the industrial plants. The urban planning parameters that influence the layout of industrial plants are described, and the most representative types of industrial zones (detailing its main characteristics and design criteria).

It delves into the parameters to consider for the plant layout, providing the necessary tools for its heuristic and scientific design based on functional and productive criteria. In addition, the normative regulations to be considered for the plant construction are presented. The course ends with the study of supplementary facilities for the industrial activity, by analysing its integration into industrial zones.

3.2.Context and meaning of the subject in the degree

The obligatory module of the " *Máster en Ingeniería Industrial* " consists on several courses with a total of 60 ECTS, which aim to provide the skills associated with the industrial engineer practice. Within this obligatory module, the course " *Plantas y Servicios Industriales* ", has 4.5 ECTS and represents one of the twelve courses to be taken.

This course, with the course " *Construcciones Industriales y Teoría de Estructuras* " also obligatory and imparted in the next four months, is the only possibility within the module to learn the design and arrangement of industrial zones, the implementation of industrial activities, and the integration of its normative requirements.

The course is designed as a complement to the skills associated with the course " *Construcciones Industriales y Teoría de Estructuras* ", focusing its content to the field of design, planning and implementation of industrial plants and related services. The course approach is eminently practical and oriented to the professional practice.

3.3.Competences

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- Design, construction and management of industrial plants.
- Use of specific and integrated knowledge for the construction of industrial buildings and application of planning and construction regulations.
- Design and integration of these installations in industrial plants.
- Check and control the construction works and the facilities operation.
- Perform certifications, tests and reports related to the industrial construction activity.

3.4.Importance of learning outcomes

The professional who has completed the " *Máster de Ingeniería Industrial* " must have a versatile and general training to resolve the challenges of the professional practice. Within this professional practice, the building sector has a significant weight. Therefore, it is necessary to provide a general knowledge related to industrial buildings, enabling the proper performance of their duties.

This course presents contents that analyze the plant layout and arrangement of industrial zones (including its complementary services), with emphasis on the plant construction within the plot. It delves into the Spanish normative regulations and knowledge are provided for certifications, audits, verifications testing and management reports related to the project and construction of industrial plants.

4.Evaluation

The student will be assessed by a single test at the end of the course, consisting of a theoretical and practical exam to be performed on the date established by the academic calendar of the EINA. 50% of this exam corresponds to theoretical subjects, while the remaining 50% will refer to practical exercises.

5.Activities and resources

5.1.General methodological presentation

The course methodology tries to strengthen the continuous work of the student and focuses on the most fundamental design aspects of industrial plants. For this purpose various teaching methodologies were developed:

- Theoretical knowledge through participatory lecture, given to the entire group in the weekly teaching hours allocated.
- Knowledge application by means of practical classes coordinated with the theoretical advance of the course and supervised by teachers of the subject. These sessions take place in smaller groups to enhance student learning, and develop various technical case studies.
- The tutorials will serve to review both the acquisition of theoretical knowledge by the student and his practical work.

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To follow the theoretical and practical sessions, the students will have the teaching materials developed by the teachers of the subject.

5.2.Learning activities

1. Industrial architecture.
2. Competencies and responsibilities of the industrial engineer.
3. Endorsements, licenses and normative requirements applicable to the design and construction of industrial plants.
4. Planning regulations and urban management in industrial zones.
5. Arrangement of industrial zones.
6. Plant layout.
7. Integration of services and facilities in industrial zones and buildings.

5.3.Program

Competencies and responsibilities of the industrial engineer

Urban planning

Arrangement of industrial zones

Construction of industrial plants

Processing of projects and constructions

Industrial infrastructures

Plant layout

5.4.Planning and scheduling

The theoretical teaching of the subject will be developed through lectures. The theoretical teaching will be complemented by laboratory classroom practices (distributed along the course according to schedule established by the EINA). All these activities will be supported through the Moodle application, by using the *Anillo Digital Docente* of the University of Zaragoza.

The dates set for the practice classes will be communicated to students at the beginning of the course, and by the Moodle

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application of the subject, considering the academic calendar for each course center. The exam will be held on the date indicated in the academic calendar of the EINA.

5.5. Bibliography and recommended resources

- Decreto del 18 de septiembre de 1935, publicado en la gaceta de Madrid, nº 263.
- Ley 38/1999 de 5 de noviembre, de Ordenación de la edificación.
- Real Decreto 314/2006, de 17 de marzo, por el que se aprueba el Código Técnico de la Edificación.
- Ley 3/2009, de 17 de junio, de Urbanismo de Aragón.
- Decreto 52/2002, de 19 de febrero, del Gobierno de Aragón, por el que se aprueba el reglamento de desarrollo parcial de la ley 5/1999, de 25 de marzo, urbanística, en material de organización, planeamiento urbanístico y régimen especial de pequeños municipios.
- - *Building: 3000 Years of Design Engineering and Construction* . ADDIS, HILL. Ed. Phaidon, New York 2007.
 - *La ordenación urbanística: conceptos, herramientas y prácticas* . Esteban J. Ed. Electra, 2003
 - *Ordenación de áreas industriales* . Gago J., García J.M. Junta de Castilla y León, 1993.
 - *Guía de diseño para la realización de zonas de actividades industriales* . Pérez J.M., Cano E., Domínguez J., Rodríguez B. Área de Ingeniería de la construcción, 2005.
 - *Recomendaciones para el proyecto y diseño del viario urbano* . VV.AA., Ministerio de Fomento, Centro de Publicaciones Secretaría General Técnica Ministerio de Fomento, Madrid, 2000
 - *Diseño de plantas industriales* . Morales, S.C. Ed. UNED.
 - *Complejos industriales* . Casals, M. y otros. Ed. UPC, 2001.
 - *Cuadernos de ingeniería de proyectos I: diseño básico de plantas industriales* . Ed. UPV, 1997.
 - *Arquitectura y urbanismo industrial: diseño y construcción de plantas, edificios y polígonos industriales* . Heredia, R. Ed. UPM, 1981.
 - *El arte de construir en arquitectura* . Neufert, E. Ed. Gustavo Gili, 1995.
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Instalaciones urbanas. Infraestructura y planeamiento . Arizmendi L.J. Ed. Bellisco, 1993.

- o *Instalaciones Urbanas. Infraestructuras y planeamiento Tomo II infraestructura hidráulica y de evacuación de residuos* . ARIZMENDI BARNES, LUIS JESÚS. Librería Editorial Bellisco, 1ª Edición, Madrid 1991.

- o *Manual de conducciones Uralita. Sistemas de conducciones en infraestructuras, riego y edificación*. SUÁREZ LÓPEZ, JOAQUÍN; MARTÍNEZ ABELLA, FERNANDO; PUERTAS AGUDO, JERÓNIMO. . Thomson Editores Spain Paraninfo, Madrid, 2005.

- o *Manual de edificación. Evacuación de aguas de los edificios* . GARCÍA VALCARCE, A. DIOS VIÉITEZ, M^a JOSÉ Y VARIOS. Departamento de Edificación. E.T.S. de Arquitectura. Universidad de Navarra. Pamplona 1997.

- o *Catálogo Técnico URALITA SOLUCIONES PARA LA EDIFICACIÓN. Uralita. Sistemas de Tuberías. Dpto. Técnico División Sistemas de Tuberías del Grupo Uralita, 2004.*

- o *Tipología estructural en arquitectura industrial* : Martín Rodríguez,Ángel; Suárez Domínguez,Francisco; Coz Díaz,Juan José Del;2005, 6, 146, Bellisco, Madrid

- o *Arquitectura industrial* : Phillips, Alan;1993, 224, Gustavo Gili, Barcelona