

## [MHD203] INSTALLATIONS

### GENERAL INFORMATION

<b>Studies</b>	UNIVERSITY MASTER IN INDUSTRIAL ENGINEERING		<b>Subject</b>	INDUSTRIAL STRUCTURAL AND CONSTRUCTION THEORY	
<b>Semester</b>	1	<b>Course</b>	2	<b>Mention / Field of specialisation</b>	
<b>Character</b>	COMPULSORY		<b>Language</b>	CASTELLANO	
<b>Plan</b>	2022	<b>Modality</b>	Face-to-face	<b>Total hours</b>	32 class hours + 43 non-class hours = <b>75 total hours</b>
<b>Credits</b>	3	<b>Hours/week</b>	1.78		

### 2030 AGENDA GOALS



### PROFESSORS

AIZPURU NAZABAL, AITZIBER  
GOMENDIO RUIZ, AMAIA  
AZPI-GARCIA SAN JOSE, RICARDO

### REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
(No specific previous subjects required)	[!] <i>Fundamentos de Mecánica de Fluidos</i> [!] <i>Fundamentos de Tecnología Eléctrica</i> [!] <i>Fundamentos de Termodinámica</i>

### LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
<b>MHRA18</b> - To demonstrate knowledge about construction, building, facilities, infrastructure and urban planning in the field of industrial engineering		x		0,44
<b>MHRA20</b> - To demonstrate knowledge and capabilities to project and design electrical and fluid installations, lighting, air conditioning and ventilation, energy savings and efficiency, acoustics, communications, home automation and smart buildings and security installations		x		1,64
<b>MHRA22</b> - To demonstrate knowledge and capabilities to carry out verification and control of facilities, processes and products		x		0,28
<b>MHRA23</b> - To demonstrate knowledge and capabilities to carry out certifications, audits, verifications, tests and reports		x		0,32
<b>MHRA27</b> - To demonstrate the ability to integrate knowledge and face the complexity of formulating judgments based on information that, being incomplete or limited, includes reflections on the social, health and safety, environmental, economic and industrial implications and responsibilities		x		0,04
<b>MHRA28</b> - To communicate your conclusions and the knowledge and ultimate reasons that support them to specialized and non-specialized audiences in a clear and unambiguous way		x		0,08
<b>MHRA30</b> - To work with people, involving and directing them in a dynamic aimed at a common objective that includes reflection on their ethical and social responsibility, with a global vision of the work to be carried out and the characteristics that it requires (quality, deadlines,...), assuming responsibility for the decisions made		x		0,12
<b>MHR126</b> - To apply the knowledge acquired and your problem-solving skills in new, little-known or changing environments within broader (or multidisciplinary) contexts related to your area of study		x		0,04
<b>MHR129</b> - To possess the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous		x		0,04

**Total:** 3

KC: Knowledge or Content / SK: Skills / AB: Abilities

### ENAE LEARNING RESULTS

ENAE LEARNING RESULTS	ECTS
<b>ENA124</b> - Knowledge and comprehension: Deep knowledge and comprehension of the engineering disciplines of their speciality, at the level necessary to acquire the rest of the competencies of the degree.	0,5
<b>ENA126</b> - Knowledge and comprehension: Critical knowledge of the broad multidisciplinary context of engineering and the interrelations existing between the knowledge of the different fields.	0,5
<b>ENA128</b> - Analysis in engineering: Ability to conceive new products, processes, and systems.	0,5
<b>ENA141</b> - Practical application of engineering: Ability to apply standards of engineering practice.	1
<b>ENA142</b> - Practical application of engineering: Knowledge and comprehension of the social, health and safety, environmental, economic and industrial implications of engineering practice.	0,5

**Total:** 3

### SECONDARY LEARNING RESULTS

**RMH145** [!] *Analiza y determina los factores que impliquen algún tipo de riesgo planteando diferentes alternativas que*

**aseguren las condiciones de salubridad, confort y seguridad de los lugares de trabajo correspondientes a actividades industriales o las que son**

#### LEARNING ACTIVITIES

	CH	NCH	TH
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams		3 h.	3 h.
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		3 h.	3 h.
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams		5 h.	5 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	5 h.		5 h.
Carrying out exercises and solving problems individually and/or in teams	2 h.	3 h.	5 h.
Seminars, debates and/or workshops to deepen and/or share experiences.	3 h.	2 h.	5 h.
Carrying out visits and/or learning trips to other university centres, laboratories, companies and/or thermal power plants	1 h.		1 h.

#### EVALUATION SYSTEM

W

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

50%

Individual written and/or oral tests or individual coding/programming tests

#### MAKE-UP MECHANISMS

(No mechanisms)

**CH - Class hours:** 11 h.

**NCH - Non-class hours:** 16 h.

**TH - Total hours:** 27 h.

**RMH144 [I] Realiza el diseño de las instalaciones necesarias para la distribución de agua, generación y distribución del calor y energía eléctrica; así como los sistemas de evacuación y recuperación tanto de aguas residuales como del calor generados en el proce**

#### LEARNING ACTIVITIES

	CH	NCH	TH
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams		2 h.	2 h.
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		2 h.	2 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.		2 h.
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams		5 h.	5 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	5 h.		5 h.
Carrying out exercises and solving problems individually and/or in teams	2 h.	3 h.	5 h.
Carrying out visits and/or learning trips to other university centres, laboratories, companies and/or thermal power plants	1 h.		1 h.
Tutoring sessions and monitoring of training activities	1 h.	2 h.	3 h.

#### EVALUATION SYSTEM

W

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

50%

Individual written and/or oral tests or individual coding/programming tests

#### MAKE-UP MECHANISMS

(No mechanisms)

**CH - Class hours:** 11 h.

**NCH - Non-class hours:** 14 h.

**TH - Total hours:** 25 h.

**RMH143** [!] *Analiza y cuantifica las necesidades de agua, calor y energía eléctrica de una actividad industrial, urbana o residencial planteando diferentes alternativas que den respuesta a las necesidades teniendo siempre en consideración la sostenibilidad y el*

#### LEARNING ACTIVITIES

	CH	NCH	TH
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		2 h.	2 h.
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams		5 h.	5 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	5 h.		5 h.
Carrying out exercises and solving problems individually and/or in teams	2 h.	3 h.	5 h.
Carrying out visits and/or learning trips to other university centres, laboratories, companies and/or thermal power plants	1 h.		1 h.
Reading and personal and/or shared analysis of relevant and current publications (books, articles, catalogues, etc.) related to the speciality	2 h.	3 h.	5 h.

#### EVALUATION SYSTEM

W

#### MAKE-UP MECHANISMS

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

50%

(No mechanisms)

Individual written and/or oral tests or individual coding/programming tests

50%

**CH - Class hours:** 10 h.

**NCH - Non-class hours:** 13 h.

**TH - Total hours:** 23 h.

## CONTENTS

1. INTRODUCTION FACILITIES-Psychrometry-General standards. Regulations-Industrial Buildings-Ecodesign-Thermal Installations2. AIR CONDITIONING INSTALLATIONS-Heating and Cooling Power Calculation-Heating, Cooling and Ventilation3. INSTALLATION OF ACS-Dimensioning and Production of DHW4. CONSUMPTION ESTIMATION-Heating-DHW5. THERMAL PRODUCTION-Heat Production-Cooling Production6. THERMAL TRANSPORT-Piping Classification-Pipe Sizing-Pumps7. FUEL INSTALLATIONS-Liquid Fuels-Gaseous Fuels8. RENEWABLE ENERGIES-EST, Solar Thermal Energy-ESF, Photovoltaic Solar Energy-Biomass-Heat Pumps-Cogeneration

## LEARNING RESOURCES AND BIBLIOGRAPHY

### Learning resources

Presentations by external Lecturers  
Slides of the subject  
Topic related web quires  
Moodle Platform  
Class presentations  
Video projections  
Computer practical training  
[!] *Visita empresas (incineradora, depuradora, refinería...)*  
[!] *Visita a las instalaciones de la universidad*

### Bibliography

CTE. Código Técnico de la Edificación. Servicio de publicaciones del Ministerio de Vivienda. 2010  
RITE. Reglamento de las Instalaciones Térmicas de los Edificios. Ministerio de Industria, Energía y Turismo. 2007  
REBT. Reglamento Electrotécnico para Baja Tensión. Ministerio de Industria, Energía y Turismo, 2012