SUBJECT TEACHING GUIDE

G988 - Thermodynamics and Thermotechnics

First Degree in Industrial Electronic Engineering and Automatic Control Systems

Academic year 2026-2027

1. IDENTIFYING DATA					
Degree	First Degree in Industrial Electronic Engineering and Automatic Control Systems			Type and Year	Compulsory. Year 2
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Thermofluid Mechanics Module in Common with the Industrial Branch				
Course unit title and code	G988 - Thermodynamics and Thermotechnics				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Knowledge Field	Industrial engineering, mechanical engineering, automation engineering, industrial organization engineering and navigation engineering				
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA ELECTRICA Y ENERGETICA
Name of lecturer	INMACULADA FERNANDEZ DIEGO
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Other lecturers	MANUEL ODRIOZOLA RODRIGUEZ CARLOS LIAÑO FERNANDEZ

4. OBJECTIVES
KNOWING OF THE BASIC CONCEPTS OF THERMODYNAMICS .
APPLICATION OF THE THEORETICAL CONCEPTS OF THERMODYNAMICS TO THE DESIGN OF THERMAL FACILITIES .

6. SUBJECT PROGRAM

CONTENTS	
1	THERMODYNAMICS LAWS AND THERMODYNAMIC PROPERTIES OF FLUIDS
1.1	Fundamental concepts (Thermodynamic System, Systems' Properties, Processes and State Changes , Equations of State)
1.2	The First Law of Thermodynamics (internal energy and heat, work, expression of the First Law, work done in closed systems, the First Law in open systems, mechanical irreversibility. equivalent processes, sign convection for heat and work, Joule's Law, specific heat)
1.3	The Second Law of Thermodynamics (Second Law in cyclical processes, Second Law in non-cyclical processes, irreversibility calculation, efficiency in energetic processes)
1.4	State functions (perfect gases with variable heat capacities, steam, T-s diagram, h - s diagram)
1.5	Compressible flow (leak processes, speed of sound in gases, processes of adiabatic leak, steady one-dimensional isentropic flow in nozzles and diffusers, shock wave)
2	THERMODYNAMIC CYCLES
2.1	Power cycles (steam cycles, air cycles, combined cycle, cogeneration, introduction to heat engines)
2.2	Refrigeration cycles (compression refrigeration, absorption refrigeration, heat pumps)
3	THERMOTECHNICS
3.1	Combustion (combustion properties, fuels, thermodynamics of combustion)
3.2	Psychrometry (Psychrometric diagram, Psychrometric transformations)
3.3	Heat transfer (conduction, convection, finned heat exchangers, radiation, overall heat transfer coefficient, introduction to heat exchangers)

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Continuous assessment written exam	Written exam	Yes	Yes	35,00
Follow-up activities	Others	No	No	20,00
LABORATORY ACTIVITIES	Laboratory evaluation	Yes	Yes	10,00
FINAL EXAM	Written exam	Yes	Yes	35,00
TOTAL				100,00

Observations

TO PASS THROUGH CONTINUOUS ASSESSMENT, A GRADE OF 5 OR HIGHER IS REQUIRED, CALCULATED BY AVERAGING THE GRADES FROM THE CONTINUOUS ASSESSMENT WRITTEN EXAM, FOLLOW-UP ACTIVITIES, FINAL EXAM, AND LABORATORY ACTIVITIES.

TO CALCULATE THE AVERAGE, A GRADE OF 3.5 OR HIGHER IS REQUIRED ON BOTH THE CONTINUOUS ASSESSMENT WRITTEN EXAM AND THE FINAL EXAM.

Observations for part-time students

PART-TIME STUDENTS MUST TAKE AN EXAM OF ALL THE CONTENTS OF THE SUBJECT INCLUDED LABORATORY ACTIVITIES.
TO PASS THE COURSE IT IS NECESSARY TO OBTAIN A SCORE OF 50% OR MORE OF THE MAXIMUM SCORE.

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
Termodinámica lógica y motores térmicos, José Agüera Soriano. ED Ciencia 3, S.A.. ISBN: 84-86204-98-4.
Termodinámica lógica y motores térmicos, problemas resueltos, José Agüera Soriano. ED Ciencia 3, S.A.. ISBN: 84-86204-99-2.
Termodinámica para ingenieros, Merle Potter, Craig Somerton, ED MCGrawhill. ISBN: 84-481-4282-9.
Fundamentos de termodinámica técnica, Michael Moran, Howard Shapiro, versión española por José Turégano y Carmen Velasco, ED Reverte, S.A.. ISBN: 978-84-291-4379-9.
Termodinámica / Yunus A. Çengel, Michael A. Boles, Mehmet Kanoglu ; revisión técnica, Alejandro Rojas Tapia, Abraham Laurencio Martínez Bautista, Ignacio del Valle Granados, Victor Hugo Ayerda Barbales, Rodolfo Soto Urbina, Eligio Astorga Cordero, Leonora de Lemos Medina, Guillermo Evangelista Benitos, Mario René Santizo Calderón. Novena edición, 2019. ISBN 978-1-4562-7208-1.