SUBJECT TEACHING GUIDE

G859 - Thermodynamics and Thermotechnics

Degree in Electrical Engineering

Academic year 2023-2024

1. IDENTIFYING DATA				
Degree	Degree in Electrical Engineering		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	G859 - Thermodynamics and Thermotechnics			
Number of ECTS credits allocated	6	Term	Semester based (1)	
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

3.1 LEARNING OUTCOMES
- Students will be able to apply the thermodynamics' concepts to engineering practice .   Students will be able to apply the thermodynamic's concepts to engineering practice
- Students will know the cycles of the main thermal engines in power generation .

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

6. COURSE ORGANIZATION

	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	%
EXAM 1	Written exam	No	Yes	35,00
EXAM 2	Others	No	Yes	10,00
EXAM 3	Others	No	Yes	10,00
EXAM 4	Written exam	Yes	Yes	35,00
LABORATORY ACTIVITIES	Laboratory evaluation	No	Yes	10,00
TOTAL				100,00
Observations				
TO PASS THE SUBJECT IS NECESSARY TO OBTAIN A FINAL AVERAGE SCORE OF 50% OR MORE OF THE MAXIMUM SCORE (FINAL AVERAGE SCORE TAKES INTO ACCOUNT ALL THE EXAMS AND LABORATORY ACTIVITIES).				
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; AGÜERA SORIANO, J.; ED CIENCIA 3, S.A.
PROBLEMAS RESUELTOS. TERMODINÁMICA LÓGICA Y MOTORES TÉRMICOS; AGÜERA SORIANO, J; ED
TERMODINÁMICA PARA INGENIEROS; POTTER, M., SOMERTON, C.; ED MCGRAWHILL
FUNDAMENTOS DE TERMODINÁMICA TÉCNICA; MORAN, M., SHAPIRO, H.; ED REVERTE, S.A.