SUBJECT TEACHING GUIDE

G988 - Thermodynamics and Thermotechnics

Degree in Industrial Electronic Engineering and Automatic Control Systems

Academic year 2019-2020

1. IDENTIFYING DATA					
Degree	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)	
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	%
MID-TERM EXAM	Written exam	Yes	Yes	40,00
PRACTICAL EXERCISE I	Others	Yes	No	10,00
PRACTICAL EXERCISE II	Others	Yes	No	10,00
FINAL EXAM	Written exam	Yes	Yes	40,00
TOTAL				100,00

Observations

TO PASS THE SUBJECT THROUGH CONTINUOUS ASSESSMENT IS NECESSARY TO OBTAIN A FINAL AVERAGE SCORE OF 50% OR MORE OF THE MAXIMUM SCORE, AS WELL AS TO ATTEND TO LABORATORY ACTIVITIES.THE FINAL AVERAGE SCORE IS OBTAINED FROM THE SCORES OBTAINED IN CONTINUOS ASSESSMENT AND THE FINAL EXAM.
THIS AVERAGE ONLY COULD BE POSSIBLE IF STUDENTS HAVE OBTAINED MORE THAN 35% OF THE MAXIMUM SCORE IN BOTH (CONTINUOUS ASSESSMENT AND FINAL EXAM).
THE CONTINUOS ASSESSMENT INCLUDES: MID-TERM EXAM, PRACTICAL EXERCISE I AND PRACTICAL EXERCISE II.

Observations for part-time students

PART-TIME STUDENTS MUST TAKE AN EXAM OF ALL THE CONTENTS OF THE SUBJECT INCLUDED LABORATORY ACTIVITIES IN THE FEBRUARY OR SEPTEMBER CALL.
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.