SUBJECT TEACHING GUIDE

G1117 - Steam and Gas Turbines I

Degree in Maritime Engineering

Academic year 2016-2017

1. IDENTIFYING DATA					
Degree	Degree in Maritime Engineering			Type and Year	Compulsory. Year 3
Faculty	School of Maritime Engineering				
Discipline	Third Year Subjects Topic Module: Specific Technology Propulsion and Ship Services				
Course unit title and code	G1117 - Steam and Gas Turbines I				
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. CIENCIAS Y TECNICAS DE LA NAVEGACION Y DE LA CONSTRUCCION NAVAL
Name of lecturer	SERGIO GARCIA GOMEZ
E-mail	sergio.garcia@unican.es
Office	Escuela Técnica Superior de Náutica. Planta: + 2. DESPACHO (210)
Other lecturers	ANTONIO VEGA OMAÑA

3.1 LEARNING OUTCOMES
- Knowing solve the main, auxiliary and propulsion systems and ship refrigeration and air conditioning Legislation
- Knowing solve problems fluidomecánicas systems and machines. in internal combustion engines, in steam turbines. in gas turbines. in steam generators, heat transfer, regulation and control machinery and marine systems. in electric propulsion systems. power electronics. in the calculation, selection, installation and maintenance of marine propellers and knowledge of classification societies and know how to solve problems inspection

4. OBJECTIVES

Knowing the Rankine cycle changes to improve thermal performance. Knowing and applying the equations fundamental movement of the compressed fluid and thermal turbomachinery (steam turbines and gas). Know and identify the various parts, uses more employees and types of motor thermal turbomachinery (axial and radial) both thermal, conventional and nuclear, land and sea plants. mechanical and thermodynamic study the constituent parts of a steam turbine, energy transformations in fixed and mobile elements. powers and yields. Gas turbines. Study the ideal and real cycles of gas turbines, Brayton cycle, yields and modifications.

6. COURSE ORGANIZATION	
CONTENTS	
1	1. Steam Turbine: Machine fluido.Turbomáquinas. Definition of steam turbine. Historical evolution of the steam turbine. Description of vapor.Clasificación Turbine Steam Turbines.
2	2. cycles of steam turbines. Rankine cycle. Trends and changes Rankine cycle: performance improvements. Rankine cycle intermediate reheating. Increase performance internal turbine to reduce the humidity. Regenerative cycle. Regenerative cycle intermediate reheating. Real Rankine cycle. Performances.
3	3. Steam flow in the crowns of nozzles. nozzles Steam Turbines. Main equations compressed fluid motion: Equation of State, Continuity Equation, Equation Number of Movement equation Energy Conservation. subsonic, sonic and supersonic flow in a duct anyone. Output speed of the steam nozzle. average velocity in any section of the nozzle. Critical parameters of a nozzle. Spending and speed steam through a nozzle. Curvilinear nozzle axis.
4	4. Crowns moving blades. Introduction. triangles speeds. fundamental equation of turbomachines: Euler equation. application turbines steam and gas. Second Embodiment Equation Euler. Third form of the Euler equation. study action blades. Study of reaction blades. Practice 1: Introduction, recognition and Outlining a conventional steam plant a vessel. Practice 2: fixed bodies turbines steam. Nozzles.
5	5. turbines action. Introduction. Simple turbine pressure single speed. Simple pressure turbine and Multiple speed. Multiple turbine pressure single speed for each pressure jump. multiple turbine Multiple pressure and speed. Characteristics Turbines action. Powers and yields. Practice 3: moving parts of steam turbines. Palettes. Practice 4: Design of a moving blade section
6	6.Turbinas radial flow reaction. Reaction turbine simple and compound. Turbines action-reaction or axial flow reaction. Responsiveness. Limit. Rotation speed corresponding condition degree single reaction. Operation responsiveness 1/2. Action-reaction turbine composed. Comparison reaction between the turbines and action. Powers and performances. Practice 5: Presentation and analysis of steam turbine simulator.

7	7. Gas turbines: General Ideas. Cycles gas turbines. The combustion turbine pressure constant. simple open cycle. Brayton cycle ideal. Brayton modifications ciclo.Ciclo Real. TG internal performance regardless of losses in ducts. internal performance depending TG Rc and the maximum and minimum temperatures. TG internal performance depending on Rc, Rtoic and Rtoit. TG internal performance considering ducts losses before and after the turbine. Heat recovery. Real.Recuperación ideal cycle heat. ideal and actual cycle

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Description Theory exam	Written exam	Yes	Yes	50,00
Description Laboratory practices	Work	Yes	No	20,00
Description Classroom Practices	Work	No	No	20,00
Description continuous assessment	Others	No	No	10,00
TOTAL				100,00

Observations

A / a student who chooses not to follow in the process of continuous assessment and go exclusively to the examination end, only you can get a '7.5' as the highest rating. On second call not saved the partial grades obtained during the course.

Observations for part-time students

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

- Kostyuk A. &Frolov V. Steam and Gas Turbines. MIR, Moscú. 1988.

- Mataix C. Turbomáquinas Térmicas: Turbinas de Vapor, Turbinas de Gas y Turbocompresores. Editorial Dossat 2000. 3ª Edición. Madrid. 2000.

- Schegliaev A.V. Turbinas de Vapor. Editorial Mir. Moscú. 1985.

- Troyanovsky B.M., Filippov G.A., Bulkin A.E. Turbinas de Vapor y de Gas de las Centrales Nucleoeléctricas . MIR, Moscú.
1987.

- Muñoz Torralbo M. et al. Turbomáquinas Térmicas. Editorial Sección de Publicaciones de la E.T.S. de Ingenieros Industriales. Madrid. 2001.