SUBJECT TEACHING GUIDE

G1112 - Steam Generators and Heat Transfer

Degree in Maritime Engineering

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Maritime Engineering			Type and Year	Compulsory. Year 3
Faculty	School of Maritime Engineering				
Discipline	Topic Module: Specific Technology Propulsion and Ship Services				
Course unit title and code	G1112 - Steam Generators and Heat Transfer				
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	ALFREDO TRUEBA RUIZ
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Other lecturers	JAVIER GARCIA GUTIERREZ

3.1 LEARNING OUTCOMES

- Bachelor in Marine Engineering:
  - Know how to solve problems in steam and heat transmission generators.
  - Operate the main and auxiliary machinery and the corresponding control systems.
  - Management of the operation of the machinery of the propulsion installation.
  - Plan and schedule the operations.
  - Operation, monitoring, evaluation of the performance and maintenance of the safety of the propulsion installation and auxiliary machinery.

- Bachelor in Maritime Engineering:
  · Ability at operational, control and design level of a steam generator in the development of the professional activity of Maritime Engineering.
  · Ability to apply the fundamental principles of the different mechanisms of heat transfer to different heat exchange systems of the ship.

4. OBJECTIVES

Bachelor in Marine Engineering:
- Train the trainee in the operational level of steam generators in accordance with Table A-III/1 of the Seafarers' Training, Certification and Watchkeeping Code, as amended (STCW-78):
- Basic construction and operating principles of marine boilers.
- Preparation, operation, fault detection and measures necessary to prevent steam boiler breakdowns.
- Train the trainee in the management of steam generators in accordance with Table A-III/2 of the Seafarers' Training, Certification and Watchkeeping Code, as amended (STCW-78):
- Theoretical knowledge: thermodynamics and thermotransmission.
- Theoretical knowledge: thermal cycle, thermal performance and thermal balance of marine steam boilers.
- Apply the fundamental laws of the different heat transmission mechanisms to the different heat exchange systems of the ship .

Bachelor in Maritime Engineering:
- Train the student in the generation of steam at the operational, management and project levels.
- Apply the fundamental laws of the different heat transmission mechanisms to the different heat exchange systems of the ship .

6. COURSE ORGANIZATION

CONTENTS	
1	Introduction to steam generators.
2	Construction layouts of gas tube boilers.
3	Construction layouts of water tube boilers.
4	Specials boilers.
5	Accessories and additional elements for boilers.
6	Natural and forced water and steam circulation.
7	Air intake in boilers.
8	Analysis and treatment of boiler water.
9	Fuels employed in boilers.
10	Combustion in boilers.
11	Burner systems for boilers.
12	Heat transfer.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
First partial exam	Written exam	Yes	Yes	30,00
Second partial exam	Written exam	Yes	Yes	30,00
Classroom practice	Others	Yes	Yes	20,00
Group work	Work	Yes	No	10,00
Laboratory practice	Laboratory evaluation	Yes	Yes	10,00
TOTAL				100,00

Observations

- JANUARY CONVOCATION:
1. (TE) Theory (60%)
Continuous evaluation: two partial exams which can be taken by students who attend at least 70% of the theory classes.
1st partial exam (30%): topics 1 to 6 on a date to be agreed upon.
2nd partial exam (30%): topics 7 to 12 on a date to be agreed upon.
Recoverable in the final exam.
Final exam in January: of the subject not passed in the continuous evaluation, to be held on the date set in the exam calendar approved by the School Board.
A pass in TE is a condition to compute the rest of the parts of the subject in the final grade .
2. (PA) Classroom practicals (20%)
Continuous evaluation:
Weekly resolution and delivery (in the classroom at the beginning of the class) of at least 70% of the problems proposed one week in advance: 10%.
Partial exam of problems to which the students who at least deliver 70% of the problems proposed weekly will be able to present themselves: 10%.
Recoverable in the final exam.
Final exam in January: for those students who do not pass it by continuous evaluation, to be held on the date set in the exam calendar approved by the School Board.
Passing the PA is a condition to compute the rest of the parts of the course in the final grade .
3. (TG) Group work (10%)
3.1. Elaborate the assigned work.
The work in its final form will be delivered through the Virtual Classroom 48 h before the date set in the schedule of exhibitions.
The contents of the work will be considered part of the course, and may be questioned in the theory exam.
3.2. Exhibition and defense according to the schedule of exhibitions.
Exhibition (30 min) of the work in its final form and evaluation and questions by the teacher and classmates (15 min).
To be graded it is a condition to participate in the exposition and defense of the work .
Not recoverable in the final exam.
4. (PL) Laboratory practicals (10%)
Continuous evaluation:
Compulsory minimum attendance to 80% of the practical hours.
Positive evaluation of the memory of the practices carried out.
Recoverable in the final exam.
Final exam in January: for those students who do not pass it by continuous evaluation, to be held on the date set in the exam calendar approved by the School Board.
Passing the PL is a condition to compute the rest of the parts of the course in the final grade .

- EXTRAORDINARY EXAM IN FEBRUARY:
Examination of the entire syllabus of the subject (TE, PA and PL) on the date set in the examination calendar approved by the School Board.
The grade obtained in TG and PL in the January exam will be kept.

Observations for part-time students
Non-mandatory class attendance

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
Morán, M. J.; Shapiro, H. N. Fundamentos de termodinámica técnica. Editorial Reverté. 2004.
Torregrosa, A.; Galindo, J.; Climent, H. Ingeniería térmica. Universidad Politécnica de Valencia. 2001.
Mesny, M. Calderas de vapor. Ediciones Marymar. 1977.
Gaffert, G. A. Centrales de vapor. Editorial Reverté. 1981.
Márquez, M. Combustión y quemadores. Ediciones Marcombo. 2005.
Salvi, G. La combustión: teoría y aplicaciones. Editorial Dossat. 1975.
Kemmer, F.N.; Mccallion, J.; Manual del agua: su naturaleza, tratamiento y aplicaciones. Editorial Mcgraw-hill. 1993.
Levenspiel, O. Flujo de fluidos e intercambio de calor. Editorial Reverté. 1996.
Holman, J.P. Transferencia de calor. Editorial Mcgraw-hill. 1998.