SUBJECT TEACHING GUIDE

1191 - Conduction Systems

Master's Degree in Marine Engineering

Academic year 2026 - 2027

1. IDENTIFYING DATA					
Degree	Master's Degree in Marine Engineering			Type and Year	Compulsory. Year 1
Faculty	School of Maritime Engineering				
Discipline	Conduction Systems				
Course unit title and code	1191 - Conduction Systems				
Number of ECTS credits allocated	6	Term		Semester based (2)	
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Combination of face-to-face and online training

Department	DPTO. CIENCIAS Y TECNICAS DE LA NAVEGACION Y DE LA CONSTRUCCION NAVAL
Name of lecturer	SERGIO GARCIA GOMEZ
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Other lecturers	

3.1 LEARNING OUTCOMES
Optimize conducting marine cogeneration systems and their systems of generation, transmission and electricity distribution
Projecting maintenance of marine systems cogeneration and generation systems, transport and distribution of electricity.
Optimize driving machines and heat engines and hydraulic machines.
Carry out energy and environmental audits.
Management of the operation of the machinery of the Propulsion installation.
Plan and schedule operations.
Operation, monitoring, performance evaluation and maintenance of the propulsion installation safety and auxiliary machinery.

4. OBJECTIVES

The student acquires the sufficient abilities to realize studies to optimize the conduction in marine and industrial installations.

To train the student in terms of driving systems in maritime and industrial facilities at the management level, according to what is established in the table
A-III / 2 of the Code of Training, Certification and Watch for Seafarers, as amended (STCW-78/2010). The
The student will achieve knowledge, understanding and proficiency on:
- Project characteristics and operating mechanisms of the main machines and related auxiliary machinery: marine diesel engines.
- Project characteristics and operating mechanisms of the main machines and auxiliary machinery related: marine steam turbines.
- Project characteristics and operating mechanisms of the main machines and auxiliary machinery related: marine gas turbines.
- Theoretical knowledge: Propulsion characteristics of diesel engines, steam and gas turbines, including speed, power and fuel consumption.
- Theoretical knowledge: Thermal cycle, thermal efficiency and thermal balance of the following engines: marine diesel engines.
- Theoretical knowledge: Thermal cycle, thermal performance and thermal balance of steam turbines and gas turbines marine
- Theoretical knowledge: Thermal cycle, thermal performance and thermal balance of the following engines: marine steam boilers.
- Practical knowledge: Operation, monitoring, performance evaluation and effective maintenance of the propulsion system safety and auxiliary machinery.

6. COURSE ORGANIZATION

CONTENTS	
1	COGENERATION. Concept. General aspects of cogeneration.
2	TRIGENERATION. Description. Applications.
3	DESIGN CONSIDERATIONS FOR A COGENERATION SYSTEM. Energy demand profiles. Configuration of the installation.
4	EVALUATION OF COGENERATION. Advantages of cogeneration. For the whole country. For the industrial sector or user. Cogeneration technologies.
5	POWER GENERATION EQUIPMENT AND SYSTEMS. Rotary engines: Gas turbines, Microturbines and Steam turbines. Alternate Engines: Description .. Performance. Power. Maintenance. Installation. Fuel cells: Introduction. Principle of operation of a fuel cell. Type of fuel cells and applications. Advantages and disadvantages. Vessels with fuel cells. Comparison between different power plants.
6	COGENERATION SYSTEMS AND THERMICALLY ACTIVATED TECHNOLOGIES. Cogeneration by steam cycle. Cogeneration with gas turbine. Cogeneration with microturbines. Cogeneration with thermal motors. Boilers for cogeneration. Fuel cell systems for cogeneration. Comparative analysis of cogeneration systems.
7	ENERGY MANAGEMENT. Economic reasons. Optimization of production. Management of operations. Environmental Protection. Competitive advantages.
8	CALCULATION OF USEFUL HEAT, ELECTRICITY AND SAVINGS OF PRIMARY ENERGY OF HIGH EFFICIENCY COGENERATION. Useful heat produced in a cogeneration plant. Electricity from cogeneration. Primary energy savings and high efficiency cogeneration.
9	ENERGY EFFICIENCY IN SHIPS. Introduction. Design of ships for energy efficiency. Alternative fuels. Operational measures. Effects and barriers.
10	REGULATION AND POLICIES OF COGENERATION
11	ENERGETIC AND ENVIRONMENTAL AUDITS. Energy audits. Environmental Audits

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessment	%
Final exam	Written exam	Yes	Yes	50,00
Works related to the subject, which must be presented in class.	Work	Yes	No	15,00
Activities in the virtual platform	Activity evaluation with Virtual Media	Yes	Yes	25,00

Participation in virtual classroom forums (PFAV)	Activity evaluation with Virtual Media	Yes	Yes	10,00
TOTAL				100,00

Observations

EVALUATION METHODS:

- 1. (AEAV) Assessment activities carried out through the Virtual Classroom (25%):
Evaluations proposed and delivered through the Virtual Classroom during the non-face-to-face period.

- 2. (AP) Evaluation of classroom activities (15%):
Evaluations to be carried out during the face-to-face period to be delivered through the Virtual Classroom.

- 3. (PFAV) Participation in forums of the Virtual Classroom (10%):

CONTINUING EVALUATION (50%) = AEAV (25%) + PFAV (10%) + AP (15%)

- 4. (TE) Classroom theory exam (50%):
Option 1: "Partial" exam to be taken on the last day of face-to-face class.
Option 2: Official exam of the June call to be held according to the Center's exam calendar.
Option 3: Official exam of the September call to be held according to the Center's exam calendar.
- Whoever fails the option 1 exam can take the option 2 exam and option 3 as a last chance.
- To make an average with the continuous assessment mark, it is required to obtain at least 40% of the mark corresponding to the theory exam.

I. WHO PASSES THE CONTINUING EVALUATION:

FINAL NOTE ON CONTINUOUS EVALUATION = AEAV (25%) + PFAV (10%) + AP (15%) + TE (50%)

II. WHO DOES NOT PASS THE CONTINUING ASSESSMENT:

II.1. Classroom activities (AP) approved but activities of the Virtual Classroom (AEAV / PFAV) suspended:
You must answer some extraordinary questions (PE) in the final exam to make up the activities not carried out in the Virtual Classroom.

CONTINUING EVALUATION (50%) = PE (35%) + AP (15%)
FINAL NOTE = CONTINUOUS EVALUATION (50%) + TE (50%)

II.2. Activities and forums of the Virtual Classroom (AEAV / PFAV) approved but face-to-face activities (AP) suspended:
Face-to-face activities are not recoverable.
FINAL NOTE = AEAV / PFAV (35%) + TE (50%)

II.3. Activities and forums of the Virtual Classroom (AEAV / PFAV) and in-person activities (AP) suspended:
To recover the activities of the virtual classroom (AEAV / PFAV) you must answer some extraordinary questions (PE) in the final exam.
Face-to-face activities (AP) are not recoverable.
FINAL NOTE = PE (35%) + TE (50%)

NOTE: In the event that the health and educational authorities establish a mandatory remote evaluation scenario not in person, the method of evaluation in person will be as follows:
- 1. (AEAV / PFAV) Evaluation of the activities and forums held in the Virtual Classroom (35%):
Evaluations proposed and delivered through the Virtual Classroom during the periods established in the Virtual Classroom.
- 2. (A) Evaluation of activities (15%):
Evaluations of activities proposed to be carried out during the periods established in the Virtual Classroom.
CONTINUOUS ASSESSMENT (50%) = AEAV / PFAV (35%) + A (25%)
- 3. (TE) Theory exam (50%):
Option 1: "Partial" exam to take the last week of teaching using Moodle.
Option 2: Official exam of the June call to be held according to the Center's exam calendar using Moodle.
Option 3: Official exam of the September call to be held according to the Center's exam calendar using Moodle.
- Whoever fails the option 1 exam can take the option 2 exam and option 3 as a last chance.
- To make an average with the continuous assessment mark, it is required to obtain at least 40% of the mark corresponding to the theory exam.
FINAL NOTE ON CONTINUOUS EVALUATION = AEAV / PFAV (35%) + A (15%) + TE (50%)

II. WHO DOES NOT PASS THE CONTINUING ASSESSMENT: II.1. Activities (A) approved but activities and forums of the Virtual Classroom (AEAV / PFAV) suspended: You must answer some extraordinary questions (PE) in the final exam to make up the activities not carried out in the Virtual Classroom. CONTINUOUS EVALUATION (50%) = PE (25%) + A (15%) FINAL NOTE = CONTINUOUS EVALUATION (50%) + TE (50%) II.2. Activities and forums of the Virtual Classroom (AEAV / PFAV) approved but activities (A) suspended: The activities are not recoverable. FINAL NOTE = AEAV / PFAV (35%) + TE (50%) II.3. Activities and forums of the Virtual Classroom (AEAV / PFAV) and suspended activities (A): To recover the activities of the virtual classroom (AEAV / PFAV) you must answer some extraordinary questions (PE) in the final exam. Activities (A) are not recoverable. FINAL NOTE = PE (25%) + TE (50%)
Observations for part-time students
Students who are enrolled part-time may not follow the continuous assessment and take the final exam, following the criteria detailed in the observations. Partial notes are not kept for the July extraordinary call.

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
Energías renovables y eficiencia energética. Instituto Tecnológico de Canarias, S.A. ISBN: 978-84-69093-86-3. (2008).
LIBRO VERDE sobre la eficiencia energética. COMISIÓN DE LAS COMUNIDADES EUROPEAS. (2005).