Course guide
280719 - 280719 - Steam Power Plants and Systems

Last modified: 27/05/2024

Unit in charge: Barcelona School of Nautical Studies
Teaching unit: 742 - CEN - Department of Nautical Sciences and Engineering.

Degree: MASTER'S DEGREE IN THE MANAGEMENT AND OPERATION OF MARINE ENERGY FACILITIES (Syllabus 2016). (Compulsory subject).

Academic year: 2024 **ECTS Credits:** 5.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: JULIAN SANCHEZ SANCHEZ

Others: Segon quadrimestre:
JULIAN SANCHEZ SANCHEZ - MGOIE

PRIOR SKILLS

Own the degree of Marine Engineer

REQUIREMENTS

It is not necessary to have done any previous subject of the master.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE1-MGOIEM. Coneixements adequats per iniciar l'activitat investigadora. Metodologia de la investigació aplicada a l'àmbit de l'especialitat
CE3-MGOIEM. Capacitat per conèixer, entendre i utilitzar els principis de la cogeneració en instal·lacions marines
CE4-MGOIEM. Capacitat per conèixer, entendre i utilitzar els principis de les energies renovables en instal·lacions marines
CE5-MGOIEM. Capacitat per conèixer, entendre i utilitzar els principis d'inspecció i certificació d'instal·lacions marines
CE6-MGOIEM. Capacitat per conèixer, entendre i utilitzar els principis dels sistemes de generació, transport i distribució d'energia
CE8-MGOIEM. Coneixement i capacitat per optimitzar la gestió de sistemes de cogeneració marins, així com els seus sistemes de generació, transport i distribució d'energia elèctrica
CE9-MGOIEM. Coneixement i capacitat per projectar operacions de manteniment de sistemes de cogeneració marins, així com els seus sistemes de generació, transport i distribució d'energia elèctrica
CE18MGOIEM. Coneixements d'auditories energètiques i mediambientals
CE13MGOIEM. Coneixement i capacitat per projectar operacions de manteniment de sistemes de màquines i motors tèrmics i hidràulics i màquines elèctriques marines
CE7-MGOIEM. Capacitat per conèixer, entendre i utilitzar els principis de control avançat de processos d'operació, manteniment i reparació

Generical:
CG1-MGOIEM. Conocimientos suficientes en materias básicas y tecnológicas, que le capaciten para el desarrollo de nuevos métodos y procedimientos
CG2-MGOIEM. (ENG) Capacidad para resolver problemas complejos y tomar decisiones con responsabilidad sobre bases científicas y tecnológicas en el ámbito de su especialidad
CG5-MGOIEM. (ENG) Capacidad de integración de sistemas marítimos complejos y de traducción en soluciones viables
CG6-MGOIEM. (ENG) Capacidad para desarrollar los conocimientos para el análisis e interpretación de mediciones, cálculos, valoraciones, tasaciones, peritaciones, estudios, informes y documentos técnicos en el ámbito de su especialidad
CG9-MGOIEM. Capacitat per a la gestió de l'explotació i operació de vaixells i artefactes marítims, la seva seguretat, prevenció de la contaminació i riscos laborals, salvament i rescats, suport logístic i manteniment
CG10MGOIEM. Capacitat per re-disseny i modificació d'equips i instal·lacions energètiques i de seguretat marines, dins l'àmbit de la seva especialitat, és a dir, operació, manteniment i explotació
CG11MGOIEM. Capacitat per realitzar tasques d'investigació, desenvolupament i innovació en l'àmbit de la seva especialitat

Basic:
CB6. Possess knowledge and understanding that provide a basis or opportunity be original in the development and / or application of ideas, often in a research context.
CB9. That students can communicate their conclusions and the knowledge and Latest rationale underpinning to specialists and non Specialty clearly and unambiguously.

TEACHING METHODOLOGY

Classes of theory in the classroom. Exhibition class with support of audiovisual material and development of examples. Proposal of different questions so that the student participates actively in the class.
Resolution of problems and practical cases in the classroom. Practical cases related to different topics from those addressed by the subject will be considered.
Development of works, reports (individual). Current problems in the sector will be sought and students will be encouraged to propose solutions to these problems. These solutions must be recorded in a written report, well presented, written and structured, with well-defined objectives and clear and specific final conclusions.
Tutorials Individual resolution or to small groups of doubts arising during the study of the different subjects and problems of the subject

LEARNING OBJECTIVES OF THE SUBJECT

This course will evaluate the following STCW competences:
1. Manage the operation of propulsion plant machinery
1.1 Design features, and operative mechanism of the following machinery and associated auxiliaries:
.4 marine steam boiler

2. Plan and schedule operations
Theoretical knowledge
2.1 Thermodynamics and heat transmission
2.2 Mechanics and hydromechanics 2.4 Heat cycle, thermal efficiency and heat balance of the following:
.4 marine steam boiler
2.5 Refrigerators and refrigeration cycle 2.6 Physical and chemical properties of fuels and lubricants

3. Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
Practical knowledge 3.1 Start up and shut down main propulsion and auxiliary machinery, including associated systems
3.2 Operating limits of propulsion plant
3.3 The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
3.5 Functions and mechanism of automatic control for auxiliary machinery including but not limited to:
.2 steam boilers
.4 refrigeration system
.5 pumping and piping systems

4. Manage fuel, lubrication and ballast operations
4.1 Operation and maintenance of machinery, including pumps and piping systems

STUDY LOAD

Type	Hours	Percentage
Hours large group	45,0	36.00
Self study	80,0	64.00

Total learning time: 125 h

CONTENTS

Steam plants

Description:
Detailed study of the types of steam plants and systems.

Full-or-part-time: 19h
Theory classes: 2h
Guided activities: 7h
Self study : 10h

Steam pipes

Description:
Design, sizing of elements and accessories, fasteners and supports. Insulation.

Full-or-part-time: 18h
Theory classes: 1h
Guided activities: 10h
Self study : 7h

Auxiliary elements

Description:
Vents, valves, deaerators, etc.

Full-or-part-time: 18h
Theory classes: 7h
Guided activities: 1h
Self study : 10h

Operation of steam systems

Description:
Control and operation. Systems. P&ID, etc.

Full-or-part-time: 19h
Theory classes: 2h
Guided activities: 10h
Self study : 7h

Maintenance and Inspections of Steam Systems

Description:
Corrosion control, repairs, etc.

Full-or-part-time: 19h
Theory classes: 10h
Guided activities: 2h
Self study : 7h

Regulation of steam systems and plants

Description:
Applicable codes and regulations for design, maintenance and inspection

Full-or-part-time: 6h
Theory classes: 1h
Guided activities: 2h
Self study : 3h

Chemical control and degradation mechanisms associated with water-steam chemistry

Description:
Chemical control and degradation mechanisms associated with water-steam chemistry Sampling lines and process steam quality analyzers.

Full-or-part-time: 13h
Theory classes: 1h
Guided activities: 7h
Self study : 5h

Cogeneration

Description:
Power generation by energy recovery

Full-or-part-time: 6h
Theory classes: 2h
Guided activities: 1h
Self study : 3h

Marine Steam Installations

Description:
Steam installations in ship's auxiliary systems.

Full-or-part-time: 7h
Theory classes: 1h
Guided activities: 3h
Self study : 3h

GRADING SYSTEM

Practices to be delivered and final work. Valuation of 40%.
Examination. A final exam will be held which will consist of answering a series of theoretical and practical questions of the subject in writing. Valuation of 60%.

EXAMINATION RULES.

Practices will be sent by email and will have to be returned by email on the date set out in the statement.
The final exam will be a 2-hour theoretical-practical test.

BIBLIOGRAPHY

Basic:
- Woodruff, Everett B.; Lammers, Herbert B.; Lammers, Thomas F. Steam plant operation. 10th ed. New York: McGraw-Hill Education, 2017. ISBN 9781259641336.
- Rosaler, Robert C (ed.). Standard handbook of plant engineering. 2nd Edition. New York: McGraw-Hill Education, 2015. ISBN 0070521646.