Course guides
280017 - 280017 - Internal Combustion Engines

Last modified: 05/07/2021

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

Degree: **Academic year:** 2021 **ECTS Credits:** 6.0
Languages: Spanish

LECTURER

Coordinating lecturer:

Others:

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE11MEM. Manage the operations of fuel, lubrication and ballast

Generical:
CG8MEM. Acquire a critical independence. Defender of oral and written form their own ideas.

Transversal:
CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

Basic:
CB10. Students must possess the learning skills that enable them continue studying in a way that will be largely self-directed or autonomous.

TEACHING METHODOLOGY

Acquire, understand and synthesize knowledge.
And solve problems.
Prepare technical reports.
Adopt solutions in practical cases.
Making memory work.

LEARNING OBJECTIVES OF THE SUBJECT

Explain the construction and functional characteristics of marine engines. Analyze the internal behavior of the motors. Provide the knowledge necessary for analysis and diagnosis. Study of performance and power.
This course will evaluate the following STCW competences:
Manage the operation of propulsion plant machinery
Plan and schedule operations
Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
Manage fuel, lubrication and ballast operations

STUDY LOAD

Type	Hours	Percentage
Hours large group	54,0	100.00

Total learning time: 54 h

CONTENTS

Analysis of power and performance

Description:
Description of the design features and working mechanisms of the main engines and auxiliary machinery.

Full-or-part-time: 16h
Theory classes: 6h
Self study : 10h

Energy load

Description:
Description of the systems and the propulsion characteristics of diesel engines, including the speed, power and fuel consumption. Analysis of the operating limits of the propulsion installation.

Specific objectives:
Manage the operation of propulsion plant machinery
Design features, and operative mechanism of marine diesel engines and associated auxiliaries.

Full-or-part-time: 16h
Theory classes: 6h
Self study : 10h

Optimization and control

Description:
Functions and mechanisms of automatic control of the main motor. Operation and operation of main propulsion and auxiliary machinery, including associated systems.

Specific objectives:
Plan and schedule operations
Thermodynamics and heat transfer Mechanics and hydromechanics
Propulsive characteristics of diesel engines, including speed, power and fuel consumption
Thermal cycle, thermal efficiency and thermal balance of marine diesel engine
Physical and chemical properties of fuels and lubricants

Full-or-part-time: 16h
Theory classes: 6h
Self study : 10h

Electronic injection

Description:
Functions and requirements of the injection devices. Functions and mechanisms of automatic control of the main motor.

Full-or-part-time: 17h
Theory classes: 6h
Self study : 11h

Supercharger

Description:
Utility and boost modes. Supercharger of large two-stroke engines. Two-stage supercharging engines and low compression ratio.

Full-or-part-time: 17h
Theory classes: 6h
Self study : 11h

Rotary engines

Description:
Rotary engines, types and alternative fuels. Operating Principles: Wankel, Radmax, Quasiturbine, Round Engine, etc.

Full-or-part-time: 17h
Theory classes: 6h
Self study : 11h

Diagram Interpretation

Description:
Obtaining, interpreting and analyzing diagrams. Analysis of the heat cycle, thermal efficiency and thermal balance of the motor.

Full-or-part-time: 17h
Theory classes: 6h
Self study : 11h

Polluting emissions

Description:
Emission sources. Gaseous pollutants. Factors affecting emissions. Reducing emissions.

Full-or-part-time: 17h
Theory classes: 6h
Self study : 11h

Operatión, faults and repairs

Description:
Inspection, diagnosis and failure analysis of diesel engines.

Specific objectives:
Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
Start up and shut down main propulsion and auxiliary machinery, including associated systems
Operating limits of propulsion plant
The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
Manage fuel, lubrication and ballast operations
Operation and maintenance of machinery, including pumps and piping systems

Full-or-part-time: 17h
Theory classes: 6h
Self study : 11h

GRADING SYSTEM

The final score is the sum of the following partial grades:
Nfinal = 0.6*Npf + 0.4*Nec

Nfinal: Final Rating
Npf: Rated final test
Nec: Course exercises

The final test consists of a part with issues related to the learning objectives of the course in terms of knowledge or understanding concepts, and a set of application exercises. Continuous assessment consists of various tests and formative activities, both individual and group, made during the course.

EXAMINATION RULES.

If you have not done laboratory activities, work or evaluation, is considered as punctuated.
It is considered not submitted when not perform any of the tests.

BIBLIOGRAPHY

Basic:
- Pérez del Río, José. Tratado general de máquinas marinas. 8 vol [on line]. Barcelona: Planeta, 1959-1970 [Consultation: 24/02/2020]. Available on: http://hdl.handle.net/2117/130277.
- Heywood, John B. Internal combustion engine fundamentals. New York: McGraw-Hill, 1988. ISBN 007028637X.
- Kates, Edgar J. Motores diesel y de gas de alta compresión. 2a ed. Barcelona: Reverté, 1982. ISBN 842914837X.
- Carreras, R. Motores de combustión interna: fundamentos. 2a ed. Barcelona: Edicions UPC, 1994. ISBN 8476534019.
- Lichty, Lester C. Procesos de los motores de combustión. Madrid: Ediciones del Castillo, 1970.

Complementary:
- Obert, Edward F. Motores de combustión interna : análisis y aplicaciones. México: CECSA, 1966.
- Taylor, Charles Fayette. Internal combustion engine in theory and practice. 2a ed. rev. Massachusetts: MIT Press, 1985. ISBN 0262700271.
- Giacosa, Dante. Motores endotérmicos : motores de encendido por chispa. Barcelona: Omega, 1988. ISBN 8428208484.
- Payri González, Francisco; Desantes Fernández, José María. Motores de combustión interna alternativos. Valencia: Editorial UPV, 2011. ISBN 9788483637050.
- Cabronero Mesas, Daniel. Motores de combustión interna. 3a ed corr. Barcelona: el autor, 2003. ISBN 8460449114.