

Master's degree in Management and Operation of Energy Maritime Facilities

Section A-III/2. Mandatory minimum requirements for certification of chief engineer officers and second engineer officers on ships powered by main propulsion machinery of 3,000 kW propulsion power or more

Function: Marine engineering at the management level

| Competence | Knowledge, understanding and proficiency | Asignatura |
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| 1. Manage the operation of propulsion plant machinery | 1.1 Design features, and operative mechanism of the following machinery and associated auxiliaries: .1 marine diesel engine .2 marine steam turbine .3 marine gas turbine .4 marine steam boiler | 280720 Turbomáquinas térmicas e hidráulicas 280719 Plantas y sistemas de vapor 280718 Motors tèrmics |
| 2. Plan and schedule operations | <i>Theoretical knowledge</i> 2.1 Thermodynamics and heat transmission 2.2 Mechanics and hydromechanics 2.3 Propulsive characteristics of diesel engines, steam and gas turbines, including speed, output and fuel consumption 2.4 Heat cycle, thermal efficiency and heat balance of the following: .1 marine diesel engine .2 marine steam turbine .3 marine gas turbine .4 marine steam boiler 2.5 Refrigerators and refrigeration cycle 2.6 Physical and chemical properties of fuels and lubricants 2.7 Technology of materials 2.8 Naval architecture and ship construction, including damage control | 280720 Turbomáquinas térmicas e hidráulicas (2.1, 2.2, 2.3, 2.4.2, 2.4.3) 280703 Gestión de la seguridad marítima y medioambiental (2.7, 2.8) 280704 Gestión de sistemas integrados. Seguridad, medioambiente y calidad (2.7, 2.8) 28078 Motors tèrmics (2.1, 2.2, 2.3, 2.4.1, 2.6) 280719 Plantas y sistemas de vapor (2.1, 2.2, 2.4.4, 2.5, 2.6) |

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| <p>3. Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</p> | <p><i>Practical knowledge</i></p> <p>3.1 Start up and shut down main propulsion and auxiliary machinery, including associated systems</p> <p>3.2 Operating limits of propulsion plant</p> <p>3.3 The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</p> <p>3.4 Functions and mechanism of automatic control for main engine</p> <p>3.5 Functions and mechanism of automatic control for auxiliary machinery including but not limited to:</p> <ul style="list-style-type: none"> .1 generator distribution systems .2 steam boilers .3 oil purifier .4 refrigeration system .5 pumping and piping systems .6 steering gear system .7 cargo-handling equipment and deck machinery | <p>280720 Turbomáquinas térmicas e hidráulicas (3.1, 3.2, 3.3)</p> <p>280718 Motors tèrmics (3.1, 3.2, 3.3)</p> <p>280719 Plantas y sistemas de vapor (3.1, 3.2, 3.3, 3.5.2, 3.5.4, 3.5.5)</p> <p>280725 Control avanzado de sistemas marinos (3.4, 3.5)</p> |
| <p>4. Manage fuel, lubrication and ballast operations</p> | <p>4.1 Operation and maintenance of machinery, including pumps and piping systems</p> | <p>280720 Turbomáquinas térmicas e hidráulicas</p> <p>280719 Plantas y sistemas de vapor</p> <p>280718 Motors tèrmics</p> <p>280726 Ingeniería y gestión del mantenimiento</p> |

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Function: Electrical, electronic and control engineering at the management level

| Competence | Knowledge, understanding and proficiency | Asignatura |
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| 5. Manage operation of electrical and electronic control equipment | <p><i>Theoretical knowledge</i></p> <p>5.1 Marine electrotechnology, electronics, power electronics, automatic control engineering and safety devices</p> <p>5.2 Design features and system configurations of automatic control equipment and safety devices for the following:</p> <p>.1 main engine .2 generator and distribution system .3 steam boiler</p> <p>5.3 Design features and system configurations of operational control equipment for electrical motors</p> <p>5.4 Design features of highvoltage installations</p> <p>5.5 Features of hydraulic and pneumatic control equipment</p> | <p>280725 Control avanzado de sistemas marinos (5.1, 5.3, 5.5)</p> <p>280722 Sistemas de propulsión y planta eléctrica (5.1, 5.2, 5.3, 5.4, 5.5)</p> <p>280721 Electrónica avanzada del barco</p> |
| 6. Manage troubleshooting, restoration of electrical and electronic control equipment to operating condition | <p><i>Practical knowledge</i></p> <p>6.1 Troubleshooting of electrical and electronic control equipment</p> <p>6.2 Function test of electrical, electronic control equipment and safety devices</p> <p>6.3 Troubleshooting of monitoring systems</p> <p>6.4 Software version control</p> | <p>280722 Sistemas de propulsión y planta eléctrica</p> <p>280721 Electrónica avanzada del barco</p> |

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| <p>7. Manage safe and effective maintenance and repair procedures</p> | <p><i>Theoretical knowledge</i> 7.1 Marine engineering practice</p> <p><i>Practical knowledge</i> 7.2 Manage safe and effective maintenance and repair procedures 7.3 Planning maintenance, including statutory and class verifications 7.4 Planning repairs</p> | <p>280726 Ingeniería y gestión del mantenimiento (7.1, 7.2, 7.3, 7.4)</p> |
| <p>8. Detect and identify the cause of machinery malfunctions and correct faults</p> | <p><i>Practical knowledge</i> 8.1 Detection of machinery malfunction, location of faults and action to prevent damage 8.2 Inspection and adjustment of equipment 8.3 Non-destructive examination</p> | <p>280726 Ingeniería y gestión del mantenimiento</p> |
| <p>9. Ensure safe working practices</p> | <p><i>Practical knowledge</i> Safe working practices</p> | <p>280703 Gestión de la seguridad marítima y medioambiental</p> <p>280704 Gestión de sistemas integrados. Seguridad, medioambiente y calidad</p> <p>280703 Gestión de la seguridad marítima y medioambiental</p> <p>280704 Gestión de sistemas integrados. Seguridad, medioambiente y calidad</p> |

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Function: Controlling the operation of the ship and care for persons on board at the management level

| Competence | Knowledge, understanding and proficiency | Asignatura |
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| 10. Control trim, stability and stress | <p>10.1 Understanding of fundamental principles of ship construction and the theories and factors affecting trim and stability and measures necessary to preserve trim and stability</p> <p>10.2 Knowledge of the effect on trim and stability of a ship in the event of damage to, and consequent flooding of, a compartment and countermeasures to be taken</p> <p>10.3 Knowledge of IMO recommendations concerning ship stability</p> | 280703 Gestión de la seguridad marítima y medioambiental |
| 11. Monitor and control compliance with legislative requirements and measures to ensure safety of life at sea, security and protection of the marine environment | <p>11.1 Knowledge of relevant international maritime law embodied in international agreements and conventions</p> <p>11.2 Regard shall be paid especially to the following subjects:</p> <p>.1 certificates and other documents required to be carried on board ships by international conventions, how they may be obtained and the period of their legal validity</p> <p>.2 responsibilities under the relevant requirements of the International Convention on Load Lines, 1966, as amended</p> <p>.3 responsibilities under the relevant requirements of the International Convention for the Safety of Life at Sea, 1974, as amended agreements and conventions</p> <p>.4 responsibilities under the International Convention for the Prevention of Pollution from Ships, as amended</p> <p>.5 maritime declarations of health and the requirements of the International Health Regulations</p> <p>.6 responsibilities under international instruments affecting the safety of the ships, passengers, crew or cargo</p> <p>.7 methods and aids to prevent pollution of the environment by ships</p> <p>.8 knowledge of national legislation for implementing international agreements and conventions</p> | <p>280703 Gestión de la seguridad marítima y medioambiental</p> <p>280700 Normativa técnica de inspección y documentación del barco</p> <p>280704 Gestión de sistemas integrados. Seguridad, medioambiente y calidad</p> |

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| <p>12. Maintain safety and security of the vessel, crew and passengers and the operational condition of life-saving, fire-fighting and other safety systems</p> | <p>12.1 A thorough knowledge of life-saving appliance regulations (International Convention for the Safety of Life at Sea)</p> <p>12.2 Organization of fire and abandon ship drills</p> <p>12.3 Maintenance of operational condition of life-saving, fire-fighting and other safety systems</p> <p>12.4 Actions to be taken to protect and safeguard all persons on board in emergencies</p> <p>12.5 Actions to limit damage and save the ship following fire, explosion, collision or grounding</p> | <p>280703 Gestión de la seguridad marítima y medioambiental (12.1, 12.2, 12.3, 12.4, 12.5)</p> <p>280704 Gestión de sistemas integrados. Seguridad, medioambiente y calidad (12.1, 12.2, 12.3, 12.4, 12.5)</p> |
| <p>13. Develop emergency and damage control plans and handle emergency situations</p> | <p>13.1 Ship construction, including damage control</p> <p>13.2 Methods and aids for fire prevention, detection and extinction</p> <p>13.3 Functions and use of life-saving appliances</p> | <p>280703 Gestión de la seguridad marítima y medioambiental</p> <p>280704 Gestión de sistemas integrados. Seguridad, medioambiente y calidad</p> |

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| <p>14. Use leadership and managerial skills</p> | <p>14.1 Knowledge of shipboard personnel management and training</p> <p>14.2 A knowledge of international maritime conventions and ecommendations, and related national legislation</p> <p>14.3 Ability to apply task and workload management, including:</p> <ul style="list-style-type: none"> .1 planning and coordination .2 personnel assignment .3 time and resource constraints .4 prioritization <p>14.4 Knowledge and ability to apply effective resource management:</p> <ul style="list-style-type: none"> .1 allocation, assignment, and prioritization of resources .2 effective communication on board and ashore .3 decisions reflect consideration of team experience .4 assertiveness and leadership, including motivation .5 obtaining and maintaining situation awareness <p>14.5 Knowledge and ability to apply decision making techniques:</p> <ul style="list-style-type: none"> .1 situation and risk assessment .2 identify and generate options .3 select course of action .4 evaluation of outcome effectiveness <p>14.6 Development, implementation, and oversight of standard operating procedures</p> | <p>280707 Liderazgo y gestión de empresas marítimas</p> |
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