INTERNATIONAL STANDARD

ISO 24438

First edition
2023-12

Ships and marine technology — Maritime education and training — Maritime career guidance

Navires et technologie maritime — Éducation et formation maritime — Recommandations pour l'orientation dans les métiers de la mer

Reference number
ISO 24438:2023(E)

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Published in Switzerland

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*.

This first edition of ISO 24438 cancels and replaces the first edition (ISO/PAS 24438:2020) which has been technically revised.

The main changes are as follows:

— editorial changes throughout the document;

— in Clause 5, added a provision of general information for Tables 1 to 11;

— in Table 9, added a provision of “7. Maritime system and equipment expert”.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The International Maritime Organization (IMO) has identified a strong need to recruit and retain seafarers globally. This document has been developed to help recruit new maritime professionals and to assist them, as well as existing maritime professionals, to enter and build their career paths for their professional achievement within the international maritime industry. Additionally, it aims to provide professional alternatives and information pertaining to existing maritime industry stakeholders who are faced with career path decisions due to industry evolution, personal circumstances or changes in professional goals in order to adapt to these changes.

The rationale of having a functional career guidance document is to provide a reference for possible occupations in the maritime industry, including minimum education and training requirements for a given occupation so that candidates can take the necessary steps to meet their goals.

Ships and marine technology — Maritime education and training — Maritime career guidance

1 Scope

This document provides a powerful decision-making tool for persons that either have clear professional development goals or uncertainties related to the progression of their career paths, including minimum education and training requirements for many of the maritime-related occupations. It aims to assist candidates to take the necessary steps to meet their goals. This document seeks to assist professionals in (or those who would like to enter) the maritime sector, on board or ashore, in determining their professional goals, establishing how to achieve them through this proactive tool, taking into consideration:

— personal circumstances and academic background;

— previous work experience, knowledge and skills;

— short, medium and long-term ambitions;

— changing education and training requirements resulting from continual industry evolution;

— current and future job opportunities,

— impact of technology, and

— shifting personal interests, attitudes, abilities, and goals.

This document helps identify many of the potential jobs within the maritime industry, on board and ashore, in order to provide alternative career paths.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Basic concept of maritime career guidance

4.1 General

The basic concept of this document is shown in Figures 1 to 3, which provide the general categories of many of the careers available in the maritime industry.

4.2 Major fields of employment in the international maritime industry

Figure 1 provides a diagram of many of the major fields of employment in the international maritime industry described in this document.

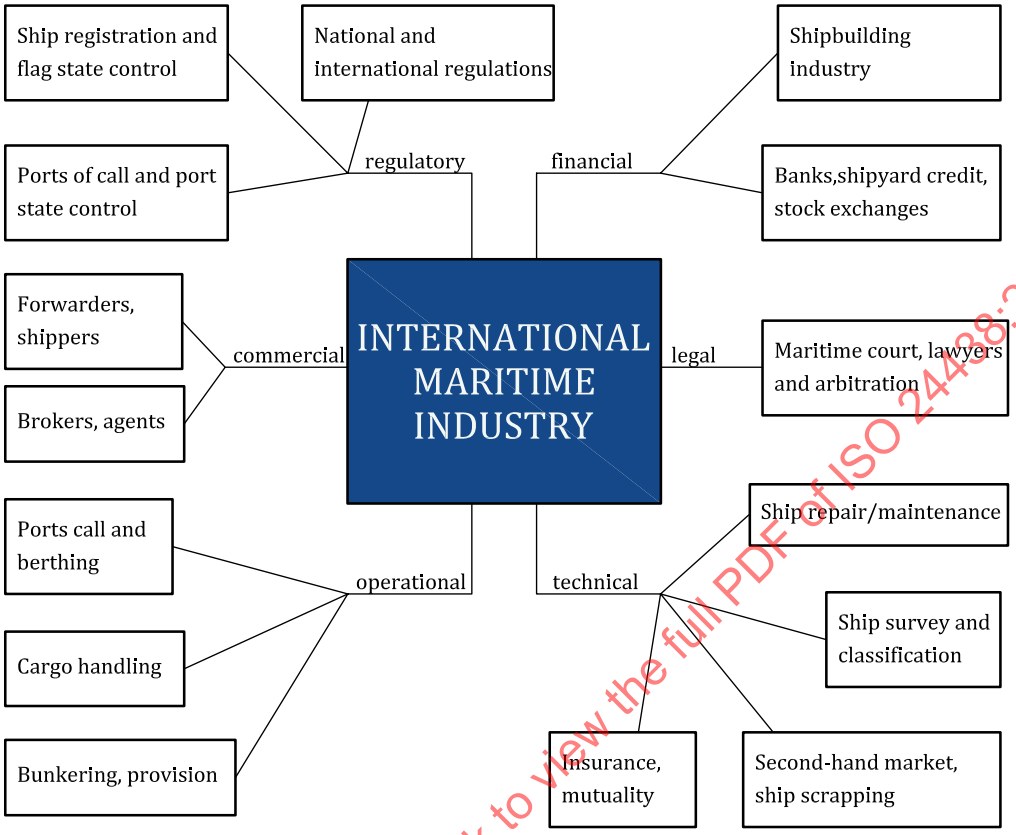

Figure 1 — Major fields of employment in the international maritime industry

4.3 Non-traditional field career paths in the maritime industry

4.3.1 General

This document focuses on many of the traditional employment fields in the maritime industry. It should be noted that there are other paths for employment in the sector. Examples of non-traditional paths for employment include, but are not limited to, those described in 4.3.2 to 4.3.5.

4.3.2 Emerging technologies in support of operations

The evolution of the industry with regard to the operation of ships, the mitigation of ship-generated pollutants/wastes, the increase of efficiency, and other maritime-related technologies has resulted in the need for professionals who are capable of installing and maintaining this type of equipment.

4.3.3 “Hawse pipe” progression

A sea-going career can include starting at a hands-on, entry level position, with a systematic progression of jobs leading to the highest level of employment on a ship. The “hawse pipe” career path allows an individual to learn all of the aspects of the operation of a vessel, from either the deck or engine department standpoint, according to the parameters set forth by national legislation for compliance with the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW)[1], as amended. This path also applies to the catering and hospitality departments according to industry practice.

4.3.4 Application of computer technologies in all aspects of the maritime industry

Many shipboard elements can now be managed with computers or computer-based applications. There is a need for professionals who are capable of supporting this type of equipment and systems. This trend includes computer-based applications, both on board and ashore, including remote monitoring of on-board equipment.

4.3.5 Military to maritime industry

Military experience and training are also transferable to maritime industry paths, both seagoing and ashore.

4.4 Personal career course charting

A recommended action plan for individual career development is illustrated in Figure 2.

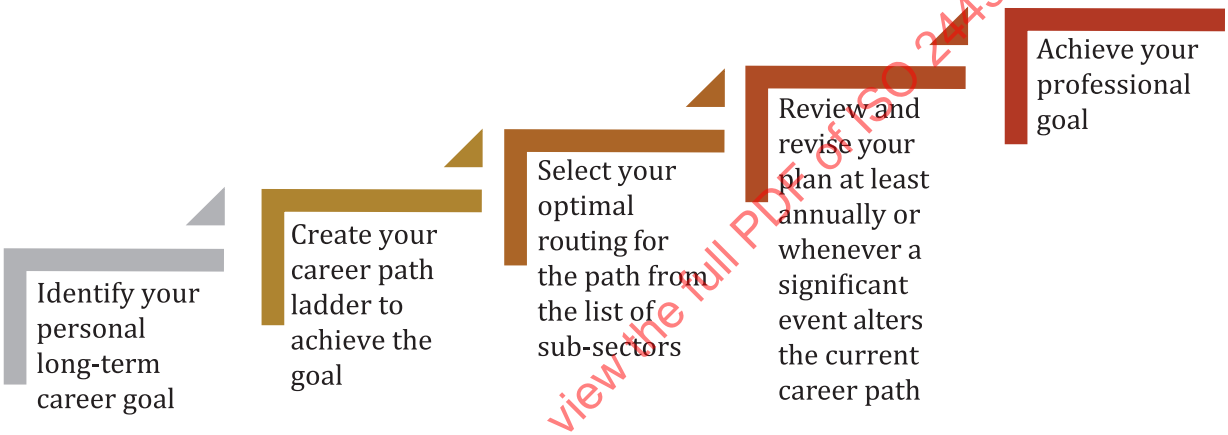

Figure 2 — Personal career course charting

4.5 Areas of potential employment in the maritime industry

Figure 3 provides a diagram of many areas of potential employment in the maritime industry, some of which are currently addressed in the career guidance described in this document. Information to assist in the selection of alternate employment paths is described in Clause 5.

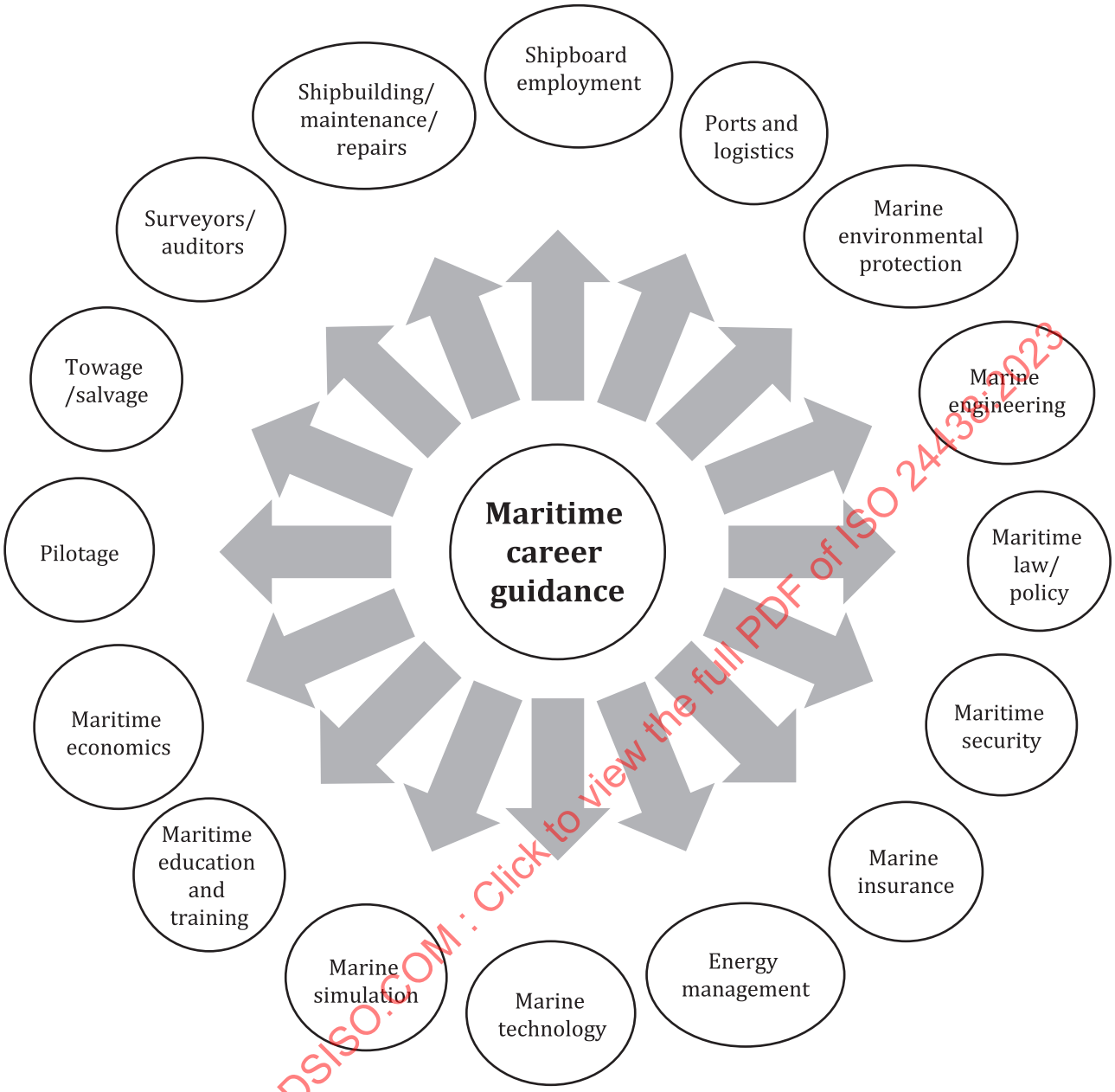

Figure 3 — Examples of areas of potential employment

5 Information on selected occupations in the maritime industry

Information related to career paths and training for attaining many of the potential occupations in the maritime industry is provided in Tables 1 to 11.

NOTE The training paths in the maritime industry vary from country to country. This is due to the different training systems in the different countries.

Table 1 — Shipboard employment and marine transportation

Occupations	Careers or related courses
1. Port security officer	— Training in port security matters that can be supplemented with a degree in port logistics, port management, or similar — Competency or certification in International Ships and Ports Security (ISPS) code compliance
2. Deck officer (officer in charge of a navigational watch - deck)	— Requirements as per the IMO International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW)[1], as amended — Undergraduate degree in nautical science, or equivalent
3. Cargo surveyor	— Specialized training in cargo surveying supplemented by an undergraduate or equivalent degree in shipping and logistics, nautical science, maritime and port management, or similar
4. Port safety officer	— Specialized training in port safety supplemented by an undergraduate or equivalent degree in nautical science, maritime and port management, or equivalent
5. Vessel traffic control officer	— Specialized training in vessel traffic control that may include radar, radio communications, chart plotting, chart plotting and interpretation, electronic chart display — Entry level requirements may require an undergraduate or equivalent degree in nautical science, or certificates of competency as officer in charge of a navigational watch - deck, or higher as per STCW
6. Deck and engine ratings	— Training according to IMO STCW requirements
Description of this sub-sector The study of marine transportation involves ships and the movement of cargo in different modes of transportation. Programs of study in this field prepare students for careers on board ships as Officers in Charge of a Navigational Watch in compliance with IMO STCW requirements.	

Table 2 — Ports and logistics

Occupations	Careers or related courses
1. Port crane operator	— Technical port operator courses
2. Yard planner for container terminal	— Undergraduate degree in maritime and port management, or equivalent
3. Stevedore/longshoreman	— Undergraduate degree in maritime and port management, or equivalent — Technical port-related studies/courses
4. Crane technician/port service technician	— Undergraduate degree in mechanical or electrical engineering, or equivalent
5. Market and freight analyst	— Undergraduate degree in maritime and port management, shipping and logistics, or equivalent
6. Logistics assistant	— Undergraduate degree in shipping and logistics, or equivalent
7. Operations manager	— Undergraduate degree in shipping and logistics, or equivalent — Graduate degree in shipping and logistics — Knowledge of quality standards (ISO 9001 and ISO 22000)
Description of this sub-sector Shipping and ports are clearly concerned with the transportation of goods and/or passengers between two or more seaports by sea; on the other hand, logistics is the function responsible for the flow of materials from suppliers into an organization, through operations within the organization and then out to customers.	

Table 3 — Marine environmental protection

Occupations	Careers or related courses
1. Oil pollution control officer	— Undergraduate degree in environmental science — Certificate in marine pollution prevention and management — Technical environmental-related studies/courses — IMO courses on the environment and control of pollution
2. Marine biologist	— Undergraduate degree in biological sciences — IMO courses on the environment and control of pollution
3. Maritime environmental engineer	— Engineering degree in maritime environmental engineering, environmental engineering, or equivalent — Certificate in industrial wastewater — Certificate in environmental impact assessment and auditing — Research in environmental issues — IMO courses on the environment and control of pollution
4. Marine chemist	— Marine chemist certification — Courses on dangerous goods — IMO courses on the environment and control of pollution
5. Environmental management technician	— Courses in environmental impact evaluation — Certificate in environmental impact assessments and auditing
Description of this sub-sector Marine Environmental Protection aims to promote, develop and enforce regulations to avert the introduction of invasive species into the marine environment, stop unauthorized ocean dumping, and prevent oil and chemical spills.	

Table 4 — Marine engineering

Occupations	Careers or related courses
1. Naval architect	— Undergraduate degree in naval architecture — Undergraduate degree in marine engineering with additional studies in naval architecture
2. Marine surveyor	— Undergraduate degree in naval architecture or marine engineering — Certification in marine surveying — Hands-on experience in the field
3. Vessel construction or repair professional	— Undergraduate degree in naval architecture or marine engineering — Trade school certificate/Associate degree in mechanical, electrical, chemical engineering (this type of degree can and often lead to a bachelor's degree and then a professional engineering license) — Apprentice program sponsored by shipyards — Hands-on experience in the field
4. Vessel design consultant	— Undergraduate degree in naval architecture — Undergraduate degree in marine engineering with additional studies in naval architecture
5. Research and development professional	— Undergraduate degree in naval architecture, marine engineering, or equivalent
Description of this sub-sector Marine engineering careers are focused on developing specialists and professionals who design, develop, build, install, inspect and maintain the propulsion systems, engines, pumps and other pieces of technical equipment that make ships and other maritime vessels function effectively, from ferries, cargo ships and hovercraft to cruise liners and military vessels, such as frigates, warships and submarines. Most marine engineers choose to specialize in one area. For instance, it is possible to focus on the maintenance of engines and propulsion systems when ships are in dry dock. Alternatively, it is possible to become an expert marine design engineer, where majority of time is spent designing complex machinery using computer-aided design software.	

Table 5 — Maritime law and arbitration

Occupations	Careers or related courses
1. Maritime/admiralty lawyer	— LL.M. in International Maritime Law, or Maritime Commercial Law, or Admiralty Law With additional courses is some or all of the following, as needed:
Description of this sub-sector The maritime law and policy specialization is designed for people working in policy formulation or an advisory capacity at an executive level, whether in the public or private sector. It provides the essential knowledge and understanding of maritime administration issues required by such senior maritime personnel and gives in-depth appreciation and advanced knowledge of the law and policy related to international maritime transport.	

Table 5 *(continued)*

Occupations	Careers or related courses
	— M Sc. in shipping and logistics — Course(s) in maritime policy development and implementation — Course(s) in maritime transport policy — Course(s) in maritime labour law and policy — Course(s) in roles and obligations of maritime administrations — Course(s) in law and policy related to maritime safety and security — Course(s) in law and policy related to the marine environment — Certificate in maritime law and shipping contracts — Certificate in shipping business — Certificate in International Maritime Codes and Conventions
2. Judge	— LL.M. in International Law — LL.M. in The Law of the Sea — LL.M. in maritime commercial law — LL.M. in maritime law and admiralty — Certificate in marine salvage law — Certificate in maritime disputes and arbitration
3. Arbitrator/mediator/conciliator	— LL.M. in The Law of the Sea — LL.M. in maritime commercial law — LL.M. in maritime law and admiralty — Certificate in marine salvage law — Diploma in marine accident investigation — Certificate in maritime disputes and arbitration
Description of this sub-sector The maritime law and policy specialization is designed for people working in policy formulation or an advisory capacity at an executive level, whether in the public or private sector. It provides the essential knowledge and understanding of maritime administration issues required by such senior maritime personnel and gives in-depth appreciation and advanced knowledge of the law and policy related to international maritime transport.	

Table 5 *(continued)*

Occupations	Careers or related courses
4.Ship owner/ship manager/ship broker	— Diploma in ship and port agency — Diploma in ship management — Diploma in ship superintendence — Certificate in ship sale and purchase — Diploma in ship finance and vessel ownership — Certificate in ship operations — Advanced Certificate in Designated Person Ashore (DPA) — Certificate in container terminal operations and management — Course of maritime labour law and policy — Experience in the maritime industry
5. Maritime administrator	— LL.M. in International Maritime Law or Maritime Commercial Law — MBA in shipping and logistics — Diploma in crew management — Diploma in maritime business management — Diploma in port management — Advanced certificate in internal auditor in shipping — Certificate in marine pollution prevention and management — Diploma in terminal management — Diploma in maritime management and leadership — Diploma in logistics management — Course in roles and obligations of maritime administrations — Course in law and policy related to maritime safety and security — Course of law and policy related to the marine environment
Description of this sub-sector The maritime law and policy specialization is designed for people working in policy formulation or an advisory capacity at an executive level, whether in the public or private sector. It provides the essential knowledge and understanding of maritime administration issues required by such senior maritime personnel and gives in-depth appreciation and advanced knowledge of the law and policy related to international maritime transport.	

Table 5 *(continued)*

Occupations	Careers or related courses
6. Trading broker	— LL.M. in Maritime Commercial Law — Certificate in trade and transport regulation — Certificate in marine warranty surveying — Certificate in energy pricing and trading — Postgraduate diploma in marine insurance — Certificate in tanker chartering
7. Insurance broker	— Certificate in commercial risks in shipping — Certificate in marine salvage law — Certificate in marine insurance — Certificate in marine warranty surveying — Certificate in marine claims — Certificate in maritime cybersecurity — Postgraduate diploma in marine insurance
Description of this sub-sector The maritime law and policy specialization is designed for people working in policy formulation or an advisory capacity at an executive level, whether in the public or private sector. It provides the essential knowledge and understanding of maritime administration issues required by such senior maritime personnel and gives in-depth appreciation and advanced knowledge of the law and policy related to international maritime transport.	

Table 6 — Maritime security

Occupations	Careers or related courses
1. Attorney/consulting agent	— Degree in maritime law/maritime port management — Background in maritime intelligence — Courses on pre-embarkation hardening assessments, citadel placement and preparing advice — Experience in vessel security assessments
2. Nautical engineer/inspector	— Undergraduate degree in nautical science, or equivalent — Technical course in team leader duties — Technical course in rules for the use of force — Technical best management practices, ISPS Code, UNCLOS — Technical vessel vulnerability and risk assessment — Technical crisis response concept
3. Security guard	— Military background — Proficiency in Security Awareness (PSA) — Proficiency in Designated Security Duties (PDSD) — Ship Security Officer – SSO (ISPS CODE) — Anti-piracy module
Description of this sub-sector Maritime security is one of the most challenging topics in the maritime domain, especially cyber security. Maritime security can first be understood in a matrix of its relation to other concepts, such as marine safety, sea power, blue economy and resilience. Second, the securitization framework allows the study of how maritime threats are made and which divergent political claims these entail to uncover political interests and divergent ideologies. Third, security practice theory enables the study of what actors do when they claim to enhance maritime security. Together these frameworks allow for the mapping of maritime security and provide an overview of all potential job opportunities in this sector.	

Table 7 — Marine insurance

Occupations	Careers or related courses
1. Ship broker and ship agent	— Undergraduate degree in nautical science, maritime and port management, or equivalent — Technical courses in ship agent or ship broker requirements — Technical courses in brokering of Truckload(TL) and Less than Truckload (LTL) transportation services
2. Marine underwriting associate	— Undergraduate or equivalent degree in maritime and port management — Related insurance experience
Description of this sub-sector Marine insurance covers the loss or damage of ships, cargo, terminals, and any transport by which the property is transferred, acquired, or held between the points of origin and the destination. Cargo insurance is the sub-branch of marine insurance, though marine insurance also includes onshore and offshore exposed property (i.e. container terminals, ports, oil platforms, pipelines), hull, marine casualty, and marine liability. When goods are transported by mail or courier, shipping insurance is used instead.	

Table 8 — Maritime energy management

Occupations	Careers or related courses
1. Energy efficiency ship operations trainer	— Graduate degree in maritime energy management — Completion of IMO course on train the trainer on energy efficiency ship operations — Completion of IMO model course 4.05
2. Maritime environmental manager	— Graduate degree in maritime energy management, maritime safety and environmental administration, or equivalent — Completion of IMO model course 4.05 — Experience as environmental management technician
3. Maritime environmental consultant	— Graduate degree in maritime energy management, maritime safety and environmental administration, or equivalent — Completion of IMO model course 4.05
4. Pollution control officer	— Graduate degree in maritime energy management, maritime safety and environmental administration, or equivalent — Completion of IMO model course 4.05 — Certificate in marine pollution prevention and management
Description of this sub-sector This is suitable for people with a technical background (e.g. naval architects, deck officers and engineers, designers, superintendents, etc.), as well as from other maritime career paths, such as ship operators, administrators, and professionals from the energy and environmental sectors. It provides a comprehensive understanding of different aspects of maritime energy management across the field, from ships to maritime onshore facilities with a view towards achieving a sustainable and energy efficient maritime industry.	