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Antwerp Maritime Academy

Study guide

Master in Nautical Sciences

Academic year 2025-2026

Master in Nautical Sciences

Mandatory subjects - Core modules	Th/Pr	UC
Maritime transport		
SHIP'S EXPLOITATION (PART 2)	**30/-**	**4**
Ship's exploitation (part 2)	30/-	4
SUPPLY CHAIN MANAGEMENT	**18/6**	**3**
Supply Chain Management	18/6	3
MARITIME LAW - BASICS	**24/-**	**3**
Maritime Law - Basics	24/-	3
Maritime techniques		
NAVIGATION (PART 4)	**26/24**	**5**
Navigation: tidal analysis	12/-	2
Applied navigation: voyage planning	-/12	1
Radar (part 3): simulator + ARPA	-/12	1
Navigation in polar waters	14/-	1
REGULATIONS OF MARITIME TRAFFIC (PART 4) AND MANOEUVRES (PART 3)	**20/16**	**3**
Manoeuvres (part 3)	8/4	1
Manoeuvring (part 3): simulator	-/12	1
Regulations of maritime traffic (part 4): collision analysis	12/-	1
PROPULSION (PART 2)	**24/20**	**3**
Propulsion (part 2) - theory	24/-	2
Propulsion (part 2) - exercises	-/20	1
AUTOMATION	**24/12**	**3**
Automation - theory	24/-	2
Automation - exercises	-/12	1
INSPECTION, SURVEY AND MAINTENANCE	**24/-**	**3**
Inspection, survey and maintenance	24/-	3
Human resources and communication		
THE HUMAN ELEMENT IN A MARITIME ENVIRONMENT	**8/16**	**3**
The human element in a maritime environment	8/16	3
Master thesis		
MASTER THESIS	**-/-**	**15**
Master thesis	-/-	15

Optional subjects related to research topics

Safety and health		
STRATEGIC MANAGEMENT	**24/-**	**3**
Strategic Management	24/-	3
ADVANCED MARITIME MEDICINE	**12/18**	**3**
Advanced maritime medicine	12/18	3
Maritime transport		
ANALYSIS OF SHIPPING MARKETS	**24/-**	**3**
Analysis of shipping markets	24/-	3
PORT MANAGEMENT AND POLICY	**24/-**	**3**
Port management and policy	24/-	3

Problems of marine environment

ADVANCED MARITIME ECOLOGY & TECHNOLOGY	**24/12**	**3**
Advanced maritime ecology & technology	24/12	3

Problems of maritime energy

Maritime techniques

DYNAMIC POSITIONING	**24/12**	**3**
Dynamic positioning	24/12	3
ADVANCED TANKER TRAINING OIL	**18/18**	**3**
Advanced tanker training oil	18/18	3
ADVANCED TANKER TRAINING CHEMICALS	**18/18**	**3**
Advanced tanker training chemicals	18/18	3
ADVANCED TANKER TRAINING GAS & IGF	**18/18**	**3**
Advanced tanker training gas & IGF	18/18	3
ADVANCED STABILITY	**12/12**	**3**
Advanced stability - theory	12/-	2
Advanced stability - exercises	-/12	1
SEMINAR IN SHIP CONSTRUCTION, PROPULSION AND AUTOMATION	**24/-**	**3**
Seminar in ship construction, propulsion and automation	24/-	3

Human resources and communication

INFORMATION AND COMMUNICATION TECHNOLOGY	**24/-**	**3**
Information and communication technology	24/-	3
DATA ANALYTICS AND AI FOR THE MARITIME INDUSTRY	**24/-**	**3**
Data analytics and AI for the maritime industry	24/-	3

Maritime law

SPECIALISED PROGRAMME IN MARITIME LAW	**96/-**	**12**
Law of the sea - Advanced	36/-	5
Maritime Law - Advanced	60/-	7

Elective subjects

Maritime techniques

ICE NAVIGATION SIMULATOR	**-/6**	
Ice Navigation Simulator	-/6	-

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**SHIP'S EXPLOITATION (PART 2) (4 UC)**
Course element	**Ship's exploitation (part 2) (HZS-NW-EXP-NW412)**
Lecturer(s)	**Kathy SPEELMAN, Marieke UTEN**
Lecturer in charge	Kathy SPEELMAN
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	
Units of credit (UC)	4
Hours of formal lecture/ practical exercise	30/-
Semester + module(s)	**Semester 1, Module 1.1** **12/-** | **Semester 1, Module 1.2** **18/-** | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - develop problem solving skills in order to solve complex issues related to the topics covered; - gain profound insights of the topics covered; - individually acquire, process and interpret theoretical knowledge.
Course content	The student participates in guest lectures given by professionals from the maritime industry. Topics covered are: maritime insurance, chartering, transport under bill of lading, salvage and Maritime Labour convention. The student will solve in group an issue related to one of these subjects. The student will decide on which areas he/she, as an individual or as a group, needs to acquire more knowledge. In this way the student is expected to develop responsibility for his/her own learning process.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - Possess specialised knowledge, understanding and skill in operational domains, such as manoeuvring in difficult and/or unusual situations; in addition ship exploitation, supply chain management, law of the sea, important for a second career following seafaring. (MA-NW-4)
Examination	**Following Module 1.1** **permanent evaluation** | **Following Module 1.2** **permanent evaluation with integrated practical test** | Following Module 2.1 - | Following Module 2.2 - **Second session** **written exam**
Caesura measures	
Required study material	- No calculator allowed.
Recommended preliminary competences	
Additional information	

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Programme	Master in Nautical Sciences
Course	**SUPPLY CHAIN MANAGEMENT (3 UC)**
Course element	**Supply Chain Management (HZS-WE-HT-NW415)**
Lecturer(s)	**Birger RAA**
Lecturer in charge	Birger RAA
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	
Units of credit (UC)	3
Hours of formal lecture/ practical exercise	18/6
Semester + module(s)	**Semester 1, Module 1.1 9/3** | **Semester 1, Module 1.2 9/3** | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - interpret the strategic importance of operational and supply chain management; - distinguish supply chain decisions at strategic, tactical and operational levels; - know the different functional areas in supply chain management; - understand the impact of variability on a supply chain; - explain how variability can be addressed through buffers and flexibility; - explain the bullwhip effect and how it can be mitigated through supply chain coordination; - apply basic mathematical and statistical models in capacity, inventory, quality and project management.
Course content	In this course, the student is introduced to the different decision levels and functional domains of operational and supply chain management. He/She gains insight into the principles of the functional domains, their interrelationships and the need for coordination and collaboration across the links of the supply chain. The student also learns to estimate the impact of variability and uncertainty, and how variability can be dealt with in a supply chain. In doing so he/she applies some basic mathematical and statistical models for quantitative decision support in capacity management, inventory management, quality management, and project planning.
Learning outcomes	- Possess specialised knowledge, understanding and skill in operational domains, such as manoeuvring in difficult and/or unusual situations; in addition ship exploitation, supply chain management, law of the sea, important for a second career following seafaring. (MA-NW-4) - Possess advanced knowledge and understanding in one or more topics from the nautical research field such as health and safety (strategic management, maritime medical emergencies), maritime transport (analysis of shipping markets, supply chain management, port management and policy, business economics), marine environmental technology (advanced maritime ecology), maritime energy issues, maritime techniques (introduction to hydrography, dynamic positioning, unusual ships - olie-, gas- (LPG/ LNG) and chemical tankers, advanced maritime technology and safety, advanced stability, shipbuilding, propulsion and automation), human resources and communication (data analysis). (MA-NW-8) - Independently analyse complex problems in often unpredictable professional situations and develop and implement appropriate solution strategies in an international environment. (MA-NW-12)
Examination	Following Module 1.1 - | **Following Module 1.2 written exam** | Following Module 2.1 - | Following Module 2.2 - **Second session written exam**
Caesura measures	
Required study material	- Lecturer's course text available. - Only scientific calculator allowed.

Recommended preliminary competences	Integral calculus (part 2) and statistical methods for scientific research
Additional information	- Bozarth, C., Handfield, R. (latest ed.). *Introduction to Operations and Supply Chain Management.* Essex, UK: Pearson.

ECTS Information Package

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Programme	Master in Nautical Sciences
Course	**MARITIME LAW - BASICS (3 UC)**
Course element	**Maritime Law - Basics (HZS-WE-HT-NW471)**
Lecturer(s)	**Ralph DE WIT**
Lecturer in charge	Ralph DE WIT
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	
Units of credit (UC)	3
Hours of formal lecture/ practical exercise	24/-
Semester + module(s)	**Semester 1, Module 1.1 12/-** | **Semester 1, Module 1.2 12/-** | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - understand the legal background of the private law aspects of the maritime sector (admiralty law in the common law jurisdictions) - understand the specific nature of the maritime legal regime and the important influence of international conventions that have been incorporated into Belgian law or coexist along with it; - understand the relevant legal sources, and to locate and apply them; - follow up on legal claims under maritime legal rules.
Course content	About 90% of global trade is carried by sea. Carriage by sea is by far the most cost-efficient method for carrying raw materials and finished products throughout the world. Carriage by sea has a very long-standing legal tradition, which has caused maritime law to develop into a branch of the law which is characterised by a large degree of autonomy and specificity. The course provides students with a basic review of classic topics of maritime law and related subjects, inter alia: legal standing of sea-going vessels, rights in rem and registry; shipowners, liability, limitation of liability; charterparties and carriage of goods by sea; marine insurance (P&I Clubs); arrest of ships. Due to time constraints, not every topic is reviewed every year; usually there is a selection.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - Possess specialised knowledge, understanding and skill in operational domains, such as manoeuvring in difficult and/or unusual situations; in addition ship exploitation, supply chain management, law of the sea, important for a second career following seafaring. (MA-NW-4) - Possess advanced knowledge and understanding in one or more topics from the nautical research field such as health and safety (strategic management, maritime medical emergencies), maritime transport (analysis of shipping markets, supply chain management, port management and policy, business economics), marine environmental technology (advanced maritime ecology), maritime energy issues, maritime techniques (introduction to hydrography, dynamic positioning, unusual ships - olie-, gas- (LPG/ LNG) and chemical tankers, advanced maritime technology and safety, advanced stability, shipbuilding, propulsion and automation), human resources and communication (data analysis). (MA-NW-8) - Source, critically interpret, evaluate, process and correctly cite scientific information in relation to the nautical sciences. (MA-NW-9)
Examination	**Following Module 1.1** | **Following Module 1.2 oral exam** | **Following Module 2.1** | **Following Module 2.2** **Second session oral exam**
Caesura measures	

Required study material	- Lecturer's course text available. - No calculator allowed.
Recommended preliminary competences	
Additional information	

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Programme	Master in Nautical Sciences
Course	**NAVIGATION (PART 4) (5 UC)**
Course element	**Navigation: tidal analysis (HZS-NW-NAV-NW410)**
Lecturer(s)	**Patricia VAN LANGENHOVEN**
Lecturer in charge	Ynse JANSSENS
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Maritime English - part 3 Meteorology (Part 2) and oceanography **Strict succession (must have followed and passed)** Regulations of maritime traffic (Part 3) and manoeuvres (Part 2) Navigation (part 3)
Units of credit (UC)	2
Hours of formal lecture/ practical exercise	12/-
Semester + module(s)	**Semester 1, Module 1.1 12/-** | Semester 1, Module 1.2 -/- | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - scientifically analyse the origin and influence of tides on Earth; - determine the different harmonic constants using the Doodson coefficients; - predict tidal heights using harmonic constants; - have an understanding of the meteorological influences on tides; - have an understanding of the measurement of tides and tidal currents.
Course content	The student acquires further knowledge of and insight into the formation of tides on earth. More specifically, this course covers the following topics: - the Equilibrium Tide of Newton; - the determination of harmonic constants and Doodson coefficients; - the dynamic model: the different types of tides and tidal currents; - the meteorological influences on the tide; - the harmonic analysis: calculating the height of a tide using harmonic constants; - the measurement of tides and tidal currents.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - Master advanced aspects of navigation, including advanced tide analysis (including critical approaches to navigation software), voyage planning, navigation in congested waters and port areas (radar/ARPA), ice navigation. (MA-NW-3) - Possess advanced knowledge and understanding in one or more topics from the nautical research field such as health and safety (strategic management, maritime medical emergencies), maritime transport (analysis of shipping markets, supply chain management, port management and policy, business economics), marine environmental technology (advanced maritime ecology), maritime energy issues, maritime techniques (introduction to hydrography, dynamic positioning, unusual ships - olie-, gas- (LPG/ LNG) and chemical tankers, advanced maritime technology and safety, advanced stability, shipbuilding, propulsion and automation), human resources and communication (data analysis). (MA-NW-8)
Examination	Following Module 1.1 - | **Following Module 1.2 written exam** | Following Module 2.1 - | Following Module 2.2 - **Second session written exam**

Caesura measures	
Required study material	- Lecturer's course text available. - Only scientific calculator allowed.
Recommended preliminary competences	
Additional information	- Bowditch, LL.D. (2002). *The American Practical Navigator, volume 1 & 2.* US: Defense Mapping Agency Hydrographic Center. - International Maritime Organization. (1978). *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) 1978, as amended.* London, UK: IMO. - UKHO. (1941). *NP 120, Admiralty Manual of Tides.* London, UK: Hydrographer of the Navy. - UKHO. (1975). *NP 159, Admiralty Method of Tidal Prediction*. London, UK: Hydrographer of the Navy.

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Programme	Master in Nautical Sciences
Course	**NAVIGATION (PART 4) (5 UC)**
Course element	**Applied navigation: voyage planning (HZS-NW-NAV-NW411)**
Lecturer(s)	**Patricia VAN LANGENHOVEN**
Lecturer in charge	Ynse JANSSENS
Educational programme	**Master in Nautical Sciences**

Method of teaching	Practical exercises
Other teaching methods	Portfolio Group work
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Maritime English - part 3 Meteorology (Part 2) and oceanography **Strict succession (must have followed and passed)** Regulations of maritime traffic (Part 3) and manoeuvres (Part 2) Navigation (part 3)
Units of credit (UC)	1
Hours of formal lecture/ practical exercise	-/12
Semester + module(s)	**Semester 1, Module 1.1 -/8** | **Semester 1, Module 1.2 -/4** | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - draw up a complete voyage plan independently, using all available nautical publications and charts, both on paper and digitally; - he/she is able to consider the correct choice of routes according to the prevailing conditions.
Course content	The student is given the opportunity to build up a complete itinerary based on: - all necessary paper and/or digital publications; - specific voyage planning software with integrated electronic charts, up-to-date weather forecasts and navigational warnings.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - Master advanced aspects of navigation, including advanced tide analysis (including critical approaches to navigation software), voyage planning, navigation in congested waters and port areas (radar/ARPA), ice navigation. (MA-NW-3) - Work on further personal development in the nautical field by critically reflecting on one's own performance, by detecting new developments in the nautical sciences and by undergoing academic or professional training. (MA-NW-13)
Examination	**Following Module 1.1 permanent evaluation** | **Following Module 1.2 permanent evaluation** | Following Module 2.1 - | Following Module 2.2 - **Second session written exam**
Caesura measures	- 100% presence in practical sessions mandatory to be evaluated in the first and second exam session.
Required study material	- Lecturer's course text available. - Parallel ruler and compass. - Only scientific calculator allowed.
Recommended preliminary competences	Telecommunication Maritime ecology and environmental legislation Chart work (part 3) & Voyage planning Regulations for maritime traffic (part 3)

Additional information	- Anwar, N. (2006). *Passage Planning Principles.* London, UK: Seamanship International. - Becker-Heins, R. (2016). *Voyage Planning with ECDIS, Practical Guide for Navigators.* Overijssel, The Netherlands: Lemmer. ISBN 978-90-825818-0-5. - International Chamber of Shipping. (2016). *Bridge Procedures Guide,* (5th ed).London, UK: ICS. - International Maritime Organization (1995). *IMO-Resolution A.893 (21), Guidelines for Voyage Planning*. London, UK: IMO. - International Maritime Organization. (1978). *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) 1978, as amended.* London, UK: IMO.

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Programme	Master in Nautical Sciences
Course	**NAVIGATION (PART 4) (5 UC)**
Course element	**Radar (part 3): simulator + ARPA (HZS-NW-NAV-NW430)**
Lecturer(s)	**Peter DOTSELAERE, Veerle VAN DRIESSCHE**
Lecturer in charge	Ynse JANSSENS
Educational programme	**Master in Nautical Sciences**

Method of teaching	Practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Maritime English - part 3 Meteorology (Part 2) and oceanography **Strict succession (must have followed and passed)** Regulations of maritime traffic (Part 3) and manoeuvres (Part 2) Navigation (part 3)
Units of credit (UC)	1
Hours of formal lecture/ practical exercise	-/12
Semester + module(s)	**Semester 1, Module 1.1 -/8** | **Semester 1, Module 1.2 -/4** | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - act (under supervision) independently on a navigational bridge, including the correct set-up and use of all available instruments; - evaluate different situations, including emergencies, and think in a problem-solving way; - demonstrate leadership in emergency and/or challenging situations; - navigate in traffic dense areas, continuously building up a correct situation assessment and taking into account evolving environmental conditions; - deal with stressful situations on board; - recognise and deal correctly with emergency situations of other vessels; - communicate correctly with crew members and third parties; - create a safe environment for all persons on board.
Course content	In the third part of the Radar (part 3): simulator + ARPA course the student will learn how to deal with unexpected events on board. The level of difficulty of the navigation exercises is also increased in order to advance the acquired competencies from the 3rd Bachelor. In addition to the daily operation of waiting on a navigation bridge, the student also learns to deal with emergency situations in an appropriate and correct way. In doing so, the management level qualities of the student are taken into account. Leadership, communication, appropriate action under great pressure and resistance to stress are dealt with extensively in addition to the "normal" work. The sailing areas, the type of ship and the environmental conditions are adapted in the exercises.

Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - Possess advanced knowledge and understanding of technical aspects of merchant ships, including propulsion (gas turbines, drag resistance, propeller characteristics, etc.), inspection, survey and maintenance of ships. (MA-NW-2) - Master advanced aspects of navigation, including advanced tide analysis (including critical approaches to navigation software), voyage planning, navigation in congested waters and port areas (radar/ARPA), ice navigation. (MA-NW-3) - Possess specialised knowledge, understanding and skill in operational domains, such as manoeuvring in difficult and/or unusual situations; in addition ship exploitation, supply chain management, law of the sea, important for a second career following seafaring. (MA-NW-4) - Undertake the advanced tasks of a deck officer on board a ship and in relation to other maritime stakeholders. This encompasses, amongst others, multicultural communication skills, awareness of the complexity of the role of the 'responsible leader', conflict management, understanding the diversity of leadership styles, and techniques to control emergency situations and abandon ship procedures as OOW or Captain (Crisis and Crowd Management). (MA-NW-7) - Independently analyse complex problems in often unpredictable professional situations and develop and implement appropriate solution strategies in an international environment. (MA-NW-12) - Work on further personal development in the nautical field by critically reflecting on one's own performance, by detecting new developments in the nautical sciences and by undergoing academic or professional training. (MA-NW-13)
Examination	**Following Module 1.1 permanent evaluation** | **Following Module 1.2 permanent evaluation** | Following Module 2.1 - | Following Module 2.2 - **Second session oral exam**
Caesura measures	- 100% presence in practical sessions mandatory to be evaluated in the first and second exam session; - To be able to communicate effectively, fluently and purposefully.
Required study material	- Parallel ruler and compass. - No calculator allowed.
Recommended preliminary competences	
Additional information	- Bole, A., Wall, A., Norris, A. (latest ed.). *Radar and ARPA Manual.* Amsterdam, The Netherlands: Elsevier. - British Admiralty. (latest ed.). *Admiralty list of Radio Signals.* London, UK: United Kingdom Hydrographic Office. - British Admiralty. (latest ed.). *Captains guide to port entry.* London, UK: United Kingdom Hydrographic Office. - British Admiralty. (latest ed.). *NP Tide tables.* London, UK: United Kingdom Hydrographic Office. - British Admiralty. (latest ed.). *Pilot books.* London, UK: United Kingdom Hydrographic Office. - International Chamber of Shipping. (2016). *Bridge Procedures Guide,* (5th ed).London, UK: ICS. - International Maritime Organization. (1978). *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) including 2010 Manila Amendments.* London, UK: IMO. - International Maritime Organization. (2003). *Colreg: Convention on the International Regulations for Preventing Collisions at Sea, as amended.* London, UK: IMO. - Lownsborough, R., Calcutt, D. (1993). *Electronic Aids to Navigation: Radar and ARPA*. London, UK: Edward Arnold. - Subramaniam, H. (latest ed.). *Shipborne Radar*. Mumbai, India: Vijaya Publications. - Swift, A.J., Bailey, T.J. (2004). *Bridge Team Management.* London, UK: IMO.

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Programme	Master in Nautical Sciences
Course	**NAVIGATION (PART 4) (5 UC)**
Course element	**Navigation in polar waters (HZS-NW-NAV-NW480)**
Lecturer(s)	**Ynse JANSSENS**
Lecturer in charge	Ynse JANSSENS
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Maritime English - part 3 Meteorology (Part 2) and oceanography **Strict succession (must have followed and passed)** Regulations of maritime traffic (Part 3) and manoeuvres (Part 2) Navigation (part 3)
Units of credit (UC)	1
Hours of formal lecture/ practical exercise	14/-
Semester + module(s)	**Semester 1, Module 1.1** 14/- | **Semester 1, Module 1.2** 14/- | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - recognise and name the different types of ice; - recognise and name the different ice limits; - analyse ice maps, radar and satellite images to create a safe route; - calculate an EGG code independently; - predict ice movements; - make decisions about choosing the right route; - apply the Polar Code; - know the danger of ice on ships and people; - justify why certain manoeuvres in the ice are necessary.
Course content	The student is introduced to sailing in ice areas. Firstly he/she gets to know the origin, the geographical distribution and the limits of the different types of ice. After that, attention is paid to detecting ice and reading ice charts and satellite images. By applying the EGG code and Polaris the student learns to draw up a part of the voyage plan. The student is also guided through the Polar Code. Ice accumulation, navigating in ice, encounters with other ships, freeing a vessel stuck in the ice, help from icebreakers and mooring in a port complete the course.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - Master advanced aspects of navigation, including advanced tide analysis (including critical approaches to navigation software), voyage planning, navigation in congested waters and port areas (radar/ARPA), ice navigation. (MA-NW-3)
Examination	Following Module 1.1 - | **Following Module 1.2 written exam** | Following Module 2.1 - | Following Module 2.2 - **Second session written exam**
Caesura measures	
Required study material	- Lecturer's course text available. - No calculator allowed.
Recommended preliminary competences	Manoeuvres (part 2) Manoeuvring simulator (part 2): simulator

Additional information	- Admiralty. (2004). *Ocean Passages for the World.* Somerset, UK: United Kingdom Hydrographic Office. ISBN: 9780707718873 - Bowditch, LL.D. (2002). *The American Practical Navigator, volume 1 & 2.* US: Defense Mapping Agency Hydrographic Center. - British Admiralty. (2016). *NP 100, The Mariner's Handbook, (11th ed.).* London, UK: United Kingdom Hydrographic Office. - Buysse, J. (2007). *Handling ships in ice, a practical guide to handling class 1A and 1AS ships.* London, UK: The Nautical Institute. ISBN: 1870077849 - House, D.J. (2016). *The ice navigation manual.* Edinburgh, UK: Witherby. ISBN: 9789053315989 - International Maritime Organization. (1978). *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) 1978, as amended.* London, UK: IMO. - Meteorological Office. (latest ed.). *Marine Observer's handbook.* London, HMSO. - Snider, D. (2018). *Polar Ship Operations - A Practical Guide*. (latest ed.). London, UK: The Nautical Institute. ISBN: 9781906915568

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Programme	Master in Nautical Sciences
Course	**REGULATIONS OF MARITIME TRAFFIC (PART 4) AND MANOEUVRES (PART 3) (3 UC)**
Course element	**Manoeuvres (part 3)** **(HZS-NW-NAV-NW401)**
Lecturer(s)	**Frederik BOUMANS**
Lecturer in charge	Christophe SENSEN
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Strict succession (must have followed and passed)** Regulations of maritime traffic (Part 3) and manoeuvres (Part 2)
Units of credit (UC)	1
Hours of formal lecture/ practical exercise	8/4
Semester + module(s)	Semester 1, Module 1.1 -/- | **Semester 1, Module 1.2 8/4** | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: -demonstrate thorough theoretical knowledge and understanding regarding: -the safe manoeuvring of ships in severe storm conditions; -the manoeuvring of ships with the assistance of tugboats; -adequate response in emergency situations, including intentional and unintentional grounding, collisions, emergency towing, and emergency steering; -be familiar with the concept of azimuth propulsion.
Course content	The student acquires extensive knowledge and understanding of the various factors that influence the manoeuvring of a ship. In addition, the student examines procedures during emergency situations. In doing so, he/she delves into the following situations: manoeuvring during severe storms, the use of tugboats, acting in emergencies, and the application of azimuth propulsion. The student studies the principles of azimuth propulsion not only theoretically, but also practices them on the simulator.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - Possess specialised knowledge, understanding and skill in operational domains, such as manoeuvring in difficult and/or unusual situations; in addition ship exploitation, supply chain management, law of the sea, important for a second career following seafaring. (MA-NW-4) - Independently analyse complex problems in often unpredictable professional situations and develop and implement appropriate solution strategies in an international environment. (MA-NW-12)
Examination	Following Module 1.1 - **Following Module 1.2 written and permanent evaluation** Following Module 2.1 - Following Module 2.2 - **Second session written exam**
Caesura measures	- 100% presence in practical sessions mandatory to be evaluated in the first and second exam session; - Obtain a minimum of 10/20 for each part of the exam to pass for this element.
Required study material	- Lecturer's course text available. - No calculator allowed.
Recommended preliminary competences	

Additional information	- Baudu, H. (2014). *Ship Handling*. Enkhuisen, The Netherlands: Dokmar Maritime Publishers. - Hooyer, H. H. (2010). *Behavior and handling of ships*. Centerville, US: Cornell Maritime Press. - Paffett, J. A. (1990). *Ships and Water.* Niwot, US: Seaways. - Rowe, R. W. (1996). *The Shiphandler's Guide for Masters and Navigating Officers*. London, UK: The Nautical Institute.

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**REGULATIONS OF MARITIME TRAFFIC (PART 4) AND MANOEUVRES (PART 3) (3 UC)**
Course element	**Manoeuvring (part 3): simulator (HZS-NW-NAV-NW402)**
Lecturer(s)	**Klaas DE HERT, Christophe SENSEN**
Lecturer in charge	Christophe SENSEN
Educational programme	**Master in Nautical Sciences**

Method of teaching	Practical exercises
Other teaching methods	Group work
Instruction language	Dutch/French
Required preliminary credit(s)	**Strict succession (must have followed and passed)** Regulations of maritime traffic (Part 3) and manoeuvres (Part 2)
Units of credit (UC)	1
Hours of formal lecture/ practical exercise	-/12
Semester + module(s)	**Semester 1, Module 1.1 -/8** | **Semester 1, Module 1.2 -/4** | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - have an overview of the forces acting on the vessel (with wind and current) and therefore be able to predict the future course; - be able to detect a deviation from the course in time (even in fog) and apply the necessary corrective measures; - clearly give orders in a correct manner and at the right time; - apply MCRM.
Course content	The student applies the acquired theoretical manoeuvering knowledge in practice. On a realistic ship manoeuvring simulator the student gets a difficult situation with wind, current and fog in front of him. He/She receives a briefing in advance and learns to apply the advice, give the right orders at the right time and act appropriately to bring the exercise to a successful conclusion. The knowledge, teamwork and appropriate action are important.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - Possess specialised knowledge, understanding and skill in operational domains, such as manoeuvring in difficult and/or unusual situations; in addition ship exploitation, supply chain management, law of the sea, important for a second career following seafaring. (MA-NW-4)
Examination	**Following Module 1.1 permanent evaluation** | **Following Module 1.2 permanent evaluation** | Following Module 2.1 - | Following Module 2.2 - **Second session second session impossible**
Caesura measures	- 100% presence in practical sessions mandatory to be evaluated in the first and second exam session.
Required study material	- Lecturer's course text available. - No calculator allowed.
Recommended preliminary competences	
Additional information	- Baudu, H. (2014). *Ship Handling*. Enkhuisen, The Netherlands: Dokmar Maritime Publishers. - Hooyer, H. H. (2010). *Behavior and handling of ships*. Centerville, US: Cornell Maritime Press. - Paffett, J. A. (1990). *Ships and Water.* Niwot. US: Seaways. - Rowe, R. W. (1996). *The Shiphandler's Guide for Masters and Navigating Officers*. London, UK: The Nautical Institute.

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**REGULATIONS OF MARITIME TRAFFIC (PART 4) AND MANOEUVRES (PART 3) (3 UC)**
Course element	**Regulations of maritime traffic (part 4): collision analysis (HZS-NW-NAV-NW450)**
Lecturer(s)	**Christophe SENSEN**
Lecturer in charge	Christophe SENSEN
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Strict succession (must have followed and passed)** Regulations of maritime traffic (Part 3) and manoeuvres (Part 2)
Units of credit (UC)	1
Hours of formal lecture/ practical exercise	12/-
Semester + module(s)	Semester 1, Module 1.1 -/- | **Semester 1, Module 1.2 12/-** | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - present a realistic view of the regulations in a complex situation and justify these, using good seamanship; - follow buoys/beacons correctly without endangering the vessel.
Course content	The student learns to apply the 'International Regulations for Preventing Collisions at Sea' (London, 1972), updated with the recent amendments, in a complex situation by using good seamanship.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - Independently analyse complex problems in often unpredictable professional situations and develop and implement appropriate solution strategies in an international environment. (MA-NW-12)
Examination	Following Module 1.1 - | **Following Module 1.2 oral exam** | Following Module 2.1 - | Following Module 2.2 - **Second session oral exam**
Caesura measures	
Required study material	- Lecturer's course text available. - International Maritime Organization. (2003). *Colreg: Convention on the International Regulations for Preventing Collisions at Sea, as amended.* London, UK: IMO. - The United Kingdom Hydrographic Office. (2012). *NP735 IALA Maritime buoyage System, Combined Cardinal and Lateral System, as amended.* Somerset, UK: UKHO. - No calculator allowed.
Recommended preliminary competences	
Additional information	- Nautical Institute. (2007). *Managing Collision Avoidance at Sea.* London, UK: IMO. - Nautical Institute. (2015). *Navigation Accidents and their causes.* London, UK: IMO.

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**PROPULSION (PART 2) (3 UC)**
Course element	**Propulsion (part 2) - theory (HZS-WE-TE-NW411T)**
Lecturer(s)	**Evert LATAIRE**
Lecturer in charge	Evert LATAIRE, Kris VERBEECK
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	**Standard succession (must have followed)** Propulsion (Part 1)
Units of credit (UC)	2
Hours of formal lecture/ practical exercise	24/-
Semester + module(s)	**Semester 1, Module 1.1** **12/-** | **Semester 1, Module 1.2** **12/-** | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - compare different types of main engines and decide on the most appropriate type; - understand the operation of a propeller; - explain and compare the different types of ship resistance; - combine the influence and cooperation of main engine, propeller and resistance.
Course content	The student is introduced to the operation of a gas turbine. The student learns how different types of main engines can be critically compared with each other. He/She studies different forms of ship resistance and the operation of the propeller. The student learns how the characteristics of the main engine, ship resistance and propeller are connected to each other
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - Possess advanced knowledge and understanding of technical aspects of merchant ships, including propulsion (gas turbines, drag resistance, propeller characteristics, etc.), inspection, survey and maintenance of ships. (MA-NW-2) - As a result of thorough knowledge and understanding of exact and applied sciences (automation), deal responsibly with complex technical systems and problems on board. (MA-NW-6) - Possess advanced knowledge and understanding in one or more topics from the nautical research field such as health and safety (strategic management, maritime medical emergencies), maritime transport (analysis of shipping markets, supply chain management, port management and policy, business economics), marine environmental technology (advanced maritime ecology), maritime energy issues, maritime techniques (introduction to hydrography, dynamic positioning, unusual ships - olie-, gas- (LPG/ LNG) and chemical tankers, advanced maritime technology and safety, advanced stability, shipbuilding, propulsion and automation), human resources and communication (data analysis). (MA-NW-8)
Examination	Following Module 1.1 - | **Following Module 1.2** **written exam** | Following Module 2.1 - | Following Module 2.2 - **Second session** **written exam**
Caesura measures	
Required study material	- Lecturer's course text available. - Only scientific calculator allowed.
Recommended preliminary competences	

Additional information	- International Maritime Organization. (2014). *Model Course 7.01: Master and chief mate*. London, UK: IMO. - Muckle, W., & Taylor, D. A. (1987). *Muckle's naval architecture*. Marine engineering series (2nd ed.). London, UK: Butterworth-Heinemann. - Schneekluth, H., & Bertram, V. (1998). *Ship design for efficiency and economy* (2nd ed.). Oxford, UK: Butterworth-Heinemann.

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Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**PROPULSION (PART 2) (3 UC)**
Course element	**Propulsion (part 2) - exercises (HZS-WE-TE-NW423T)**
Lecturer(s)	**Kris VERBEECK**
Lecturer in charge	Evert LATAIRE, Kris VERBEECK
Educational programme	**Master in Nautical Sciences**

Method of teaching	Practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Propulsion (Part 1)
Units of credit (UC)	1
Hours of formal lecture/ practical exercise	-/20
Semester + module(s)	**Semester 1, Module 1.1 -/12** | **Semester 1, Module 1.2 -/8** | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - have an understanding of the operation of the generators; - understand the impact of his/her actions on the on-board machinery; - analyse emergency situations; - report findings correctly.
Course content	The student explores the boundaries of the main engine and learns how his/her actions influence them. The operating principles and use of the on-board generators are explored. The student examines a number of emergency scenarios and uses these to perform analyses using his/her knowledge of the on-board engines. He/She correctly presents his/her findings in a report.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - Possess advanced knowledge and understanding of technical aspects of merchant ships, including propulsion (gas turbines, drag resistance, propeller characteristics, etc.), inspection, survey and maintenance of ships. (MA-NW-2) - Independently analyse complex problems in often unpredictable professional situations and develop and implement appropriate solution strategies in an international environment. (MA-NW-12)
Examination	**Following Module 1.1 permanent evaluation** | **Following Module 1.2 permanent evaluation** | Following Module 2.1 - | Following Module 2.2 - **Second session practical test**
Caesura measures	- 100% presence in practical sessions mandatory to be evaluated in the first exam session; - 100% presence in practical sessions mandatory to be evaluated in the first and second exam session.
Required study material	- Lecturer's course text available. - No calculator allowed.
Recommended preliminary competences	
Additional information	- Kuiken, K. (2017). *Diesel Engines.* Onnen, The Netherlands: Target Global Energy Training. ISBN 9789079104055.

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Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**AUTOMATION (3 UC)**
Course element	**Automation - theory (HZS-WE-TE-NW412T)**
Lecturer(s)	**Tim GEERTS**
Lecturer in charge	Tim GEERTS
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Electronics 2 and Informatics Propulsion (Part 1)
Units of credit (UC)	2
Hours of formal lecture/ practical exercise	24/-
Semester + module(s)	**Semester 1, Module 1.1** **12/-** | **Semester 1, Module 1.2** **12/-** | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - read and draw up a block diagram of a controlled process for a simple control; - understand and apply the concept of transfer function; - recognise and describe the different components of a measurement and control circuit by means of a characteristic; - understand the different setting parameters of a P&ID controller.
Course content	The student familiarises himself/herself with the theoretical foundations of the control systems used to automate processes. The student learns to express processes mathematically by means of block diagrams and transfer functions by thinking analytically. The student will be familiarised with the different types of controllers, their adjustment possibilities and their realisation. Afterwards the student receives an introduction about the more modern techniques such as PLCs and microcontroller controlled systems.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - As a result of thorough knowledge and understanding of exact and applied sciences (automation), deal responsibly with complex technical systems and problems on board. (MA-NW-6) - Source, critically interpret, evaluate, process and correctly cite scientific information in relation to the nautical sciences. (MA-NW-9) - Independently design, plan and execute an individual research project in the nautical sciences as a research beginner; independently select relevant research methods and techniques and apply them correctly; scientifically process and apply the results from this scientific research. (MA-NW-10) - Independently analyse complex problems in often unpredictable professional situations and develop and implement appropriate solution strategies in an international environment. (MA-NW-12) - Work on further personal development in the nautical field by critically reflecting on one's own performance, by detecting new developments in the nautical sciences and by undergoing academic or professional training. (MA-NW-13)
Examination	Following Module 1.1 - | **Following Module 1.2** **oral exam with written preparation** | Following Module 2.1 - | Following Module 2.2 - **Second session** **oral exam with written preparation**
Caesura measures	
Required study material	- Lecturer's course text available. - Scientific and graphic calculators allowed.

Recommended preliminary competences	
Additional information	- Breimer, I.J., (1990). *Procesautomatisering.* Groningen, Nederland: Wolters-Noordhoff. ISBN 9001160514. - Murrill, P. W., (2011). *Fundamentals of Process Control Theory.* (3rd ed.). Research Triangle Park, US: ISA. ISBN: 155617683X.

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**AUTOMATION (3 UC)**
Course element	**Automation - exercises (HZS-WE-TE-NW424T)**
Lecturer(s)	**Tim GEERTS**
Lecturer in charge	Tim GEERTS
Educational programme	**Master in Nautical Sciences**

Method of teaching	Practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Electronics 2 and Informatics Propulsion (Part 1)
Units of credit (UC)	1
Hours of formal lecture/ practical exercise	-/12
Semester + module(s)	**Semester 1, Module 1.1 -/4** | **Semester 1, Module 1.2 -/8** | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - read a P&ID diagram and find the different control circuits in it; - set up a P&ID controller using the described techniques.
Course content	The student learns how to work with a Piping & Instrumentation Diagram (P&ID). The student learns how to work with a P&ID controller in the engine room simulator. By means of described methods he/she learns how this controller can be set. The student will also investigate the setting parameters of the controller in the autopilot on board a ship.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - As a result of thorough knowledge and understanding of exact and applied sciences (automation), deal responsibly with complex technical systems and problems on board. (MA-NW-6) - Source, critically interpret, evaluate, process and correctly cite scientific information in relation to the nautical sciences. (MA-NW-9) - Independently design, plan and execute an individual research project in the nautical sciences as a research beginner; independently select relevant research methods and techniques and apply them correctly; scientifically process and apply the results from this scientific research. (MA-NW-10) - Independently analyse complex problems in often unpredictable professional situations and develop and implement appropriate solution strategies in an international environment. (MA-NW-12) - Work on further personal development in the nautical field by critically reflecting on one's own performance, by detecting new developments in the nautical sciences and by undergoing academic or professional training. (MA-NW-13)
Examination	**Following Module 1.1 permanent evaluation** | **Following Module 1.2 permanent evaluation** | Following Module 2.1 - | Following Module 2.2 - **Second session oral exam with written preparation**
Caesura measures	- 100% presence in practical sessions mandatory to be evaluated in the first exam session.
Required study material	- Lecturer's course text available. - Scientific and graphic calculators allowed.
Recommended preliminary competences	Automation - theory

Additional information	- Breimer, I.J. (1990). *Procesautomatisering.* Groningen. Nederland : Wolters-Noordhoff. ISBN 9001160514. - Murrill, P. W. (2011). *Fundamentals of Process Control Theory.* (3rd ed.). Research Triangle Park, US: ISA. ISBN: 155617683X.

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Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**INSPECTION, SURVEY AND MAINTENANCE (3 UC)**
Course element	**Inspection, survey and maintenance (HZS-WE-TE-NW425T)**
Lecturer(s)	**Bart HEYLBROECK**
Lecturer in charge	Bart HEYLBROECK
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	
Units of credit (UC)	3
Hours of formal lecture/ practical exercise	24/-
Semester + module(s)	**Semester 1, Module 1.1** **12/-** | **Semester 1, Module 1.2** **12/-** | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - have an understanding of the distinction between 'damage and failure' and the approach to prevention; - know the different inspections according to frequency, usefulness and content; - name the possible consequences of any defects found; - analyse damage, according to cause and effect, with insight into possible conceptual improvements; - recognise weak points in a ship's structure; - identify and understand the importance of maintenance and related measures; - have an understanding of the evaluation of corrosion in, for example, ballast tanks and the importance of this; - understand the importance of thickness measurements and thus the concept of corrosion wastage; - recognise the risks to the ship's structure associated with navigating in areas where icing occurs; - analyse an incident and identify measures to be taken to limit further damage; - identify the importance of the EU Ship Recycling Regulation and its related measures.
Course content	The student is familiarised with the technical aspects of the ship that are directly related to maintenance and damage investigation, including the identification of weak spots in the ship's structure. In the first part a distinction is made between damage and failure, and then the different types of inspections are addressed. The different levels of damage are discussed and various causes of damage are explained, including cracking with the identification of locations where increased stresses and weakened structures are present. Corrosion as a source of damage is also discussed as well as the corrosion protection of the hull. This is followed by discussing measures to prevent damage. Finally, we study the weak spots for failure and collapse of structures on board bulk carriers and tankers. This part concludes with the actions to be taken in case of damage due to collision or stranding. In the second part, the student learns about maintenance and the recycling of ships.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - Possess advanced knowledge and understanding of technical aspects of merchant ships, including propulsion (gas turbines, drag resistance, propeller characteristics, etc.), inspection, survey and maintenance of ships. (MA-NW-2) - Possess advanced knowledge and understanding in one or more topics from the nautical research field such as health and safety (strategic management, maritime medical emergencies), maritime transport (analysis of shipping markets, supply chain management, port management and policy, business economics), marine environmental technology (advanced maritime ecology), maritime energy issues, maritime techniques (introduction to hydrography, dynamic positioning, unusual ships - olie-, gas- (LPG/ LNG) and chemical tankers, advanced maritime technology and safety, advanced stability, shipbuilding, propulsion and automation), human resources and communication (data analysis). (MA-NW-8)

Examination	Following Module 1.1 -	**Following Module 1.2** **written exam**	Following Module 2.1 -	Following Module 2.2 -
	Second session **written exam**			
Caesura measures				
Required study material	- Lecturer's course text available. - No calculator allowed.			
Recommended preliminary competences				
Additional information	- AMACORT. (2014). A field study of the effectiveness of sacrificial anodes in ballast tanks of merchant ships. *Journal of Marine Science and Technology.* DOI: 10.1007/s00773-013-0232-3. - AMACORT. (2017). The Economics of a Long Term Coating. *International Journal of Maritime Engineering (IJME)*, Transactions RINA, Vol 159, Part A3. DOI No: 10.3940/rina.ijme.2017.a3.416. - Contraros, P.D. (2003). *The Domino Effect" Coating Breakdown - Corrosion - Structural Failures Leading to Possible Design Ramifications*. MRINA ABS Europe. - European Union. (2009). *Regulation (EU) No 1257/2013 of the European parliament and of the council of 20 November 2013 on ship recycling and amending Regulation (EC) No 1013/2006 and Directive 2009/16/EC, as amended.* Brussels, Belgium: European Parliament and Council. - International Association of Classification Societies. (1997). *BULK CARRIERS - Guidance and Information on Bulk Cargo Loading and Discharging to Reduce the Likelihood of Over-stressing the Hull Structure.* London, UK: IACS. - International Association of Classification Societies. (2002). *BULK CARRIERS - guidelines for Surveys, Assessment and Repair of Hull Structures*. London, UK: Witherby & Co. ISBN: 1856092232. - International Association of Classification Societies. (2005). *Guidelines for coating maintenance and repairs*. London, UK: Witherby & Co. ISBN: 1856093085. - International Association of Classification Societies. (2011). *Classification Societies - What, Why and How?.* London, UK: IACS. - International Association of Classification Societies. (2016). *IACS Objectives, Strategy and Action Plan (2016-2017)*. London, UK: IACS. - International Association of Classification Societies. (Rev. 2 May 2015). *Recommendation 87, Guidelines for coating maintenance & repairs for ballast tanks and combined cargo/ballast tanks on oil tankers*. London, UK: IACS. - International Labour Organization. (2004). *Safety and health in shipbreaking: Guidelines for Asian countries and Turkey*. Geneva, Switzerland: ILO. ISBN: 9221152898. - International Maritime Organization. (2006). *Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers RESOLUTION MSC.215(82), as amended.* London, UK: IMO. - International Maritime Organization. (2010). *International Goal-based Ship Construction Standards for Bulk Carriers and Oil Tankers (GBS Standards) (resolution MSC.287(87)).* London, UK: IMO. - International Maritime Organization. (as amended). *Polar Code (A.1024(26) Ships operating in polar waters).* London, UK: IMO. - Lloyd's Register. (2002). *A Master's Guide to Hatch Cover Maintenance.* London, UK: The Standard. ISBN: 1856092321. - Lloyd's Register. (2014). *ESP Guidance booklet for all ship types in preparation for a special survey.* London, UK: LR. - Melchers, R.E. (1999). Corrosion uncertainty modelling for steel structures. *Journal of Constructional Steel Research*, 52, 3-19. Amsterdam, The Netherlands: Elsevier. - Oil Companies International Marine Forum. (1997). *Factors influencing accelerated corrosion of cargo oil tanks.* London, UK: OCIMF. - Tanker Structure Co-operative Forum. (2010). *Guidelines for the inspection and maintenance of double hull tanker structures*. Edinburgh, UK: Witherby Seamanship International. ISBN: 9781856090803.			

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**THE HUMAN ELEMENT IN A MARITIME ENVIRONMENT (3 UC)**
Course element	**The human element in a maritime environment (HZS-WE-HT-NW414H)**
Lecturer(s)	**Camille DEBANDT, Sophie LIMBOS, Kathy SPEELMAN**
Lecturer in charge	Sophie LIMBOS
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	Portfolio Group work
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Navigation (part 3)
Units of credit (UC)	3
Hours of formal lecture/ practical exercise	8/16
Semester + module(s)	**Semester 1, Module 1.1 4/8** | **Semester 1, Module 1.2 4/8** | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - to master the principles of situational leadership and apply them to a (multicultural) team; - critically reflect on the function of a leading officier on board; - activate resources in order to promote wellbeing; - critically reflect on communicative situations and actions in order to anticipate and, if possible, avoid communicative misunderstandings; - use techniques to adjust non desirable or non functional behaviour of team members.
Course content	The master student in Nautical Sciences is made aware of the complexity of his/her position as a (social) leader on board and is offered the knowledge and competences to perform this role optimally. In order to accomplish these course objectives, the collaboration with the maritime industry is put forward. The master student in Nautical Sciences gets a deeper insight into the psychosocial aspects specific to working and living on board and which have an impact on the performance of an officer of the watch. Multiculturalism and hierarchy, team work and group dynamics, leadership and wellbeing are the major themes. In addition, communicative situations and types of communication the future officer will face, are also dealt with. The main goal of this course is to strengthen the soft skills needed to perform a responsible leadership.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - Undertake the advanced tasks of a deck officer on board a ship and in relation to other maritime stakeholders. This encompasses, amongst others, multicultural communication skills, awareness of the complexity of the role of the 'responsible leader', conflict management, understanding the diversity of leadership styles, and techniques to control emergency situations and abandon ship procedures as OOW or Captain (Crisis and Crowd Management). (MA-NW-7) - Independently analyse complex problems in often unpredictable professional situations and develop and implement appropriate solution strategies in an international environment. (MA-NW-12) - Work on further personal development in the nautical field by critically reflecting on one's own performance, by detecting new developments in the nautical sciences and by undergoing academic or professional training. (MA-NW-13)
Examination	**Following Module 1.1 permanent evaluation** | **Following Module 1.2 permanent evaluation** | Following Module 2.1 - | Following Module 2.2 - **Second session oral exam**
Caesura measures	- 100% presence in practical sessions mandatory to be evaluated in the first exam session.

Required study material	- Lecturer's course text available. - No calculator allowed.
Recommended preliminary competences	
Additional information	

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**MASTER THESIS (15 UC)**
Course element	**Master thesis (HZS-DOC-NW499)**
Lecturer(s)	**Promotor**
Lecturer in charge	Klaas DE HERT, Deirdre LUYCKX
Educational programme	**Master in Nautical Sciences**

Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Bachelor term paper and scientific research methodology
Units of credit (UC)	15
Hours of formal lecture/ practical exercise	-/-
Semester + module(s)	Semester 1, Module 1.1 -/- | Semester 1, Module 1.2 -/- | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - critically assess scientific sources for accuracy and relevance; - independently set up and carry out his/her own maritime scientific research at the level of a junior researcher; - work out a problem-solving strategy on the basis of theoretical arguments, calculations and experiments and to carry these out; select and correctly apply the relevant research methods and techniques; - clearly document and substantiate the scientific research methodology used; - critically reflect on the information gathered, the conducted research and the obtained results, and justify the choices made; - present and defend the conducted research in a clear and concise manner, and answer questions about the research project.
Course content	Working out his/her own research project on a self-chosen theme from the nautical sciences, and reporting on it, is the crowning achievement for the student. This theme is in line with the student's programme and/or the professional field. Essentially, the master thesis consists of a further deepening of the bachelor thesis, and thus relies on the previous preparation in the bachelor thesis. In doing so, the student combines skills that have been developed throughout the programme.
Learning outcomes	- Source, critically interpret, evaluate, process and correctly cite scientific information in relation to the nautical sciences. (MA-NW-9) - Independently design, plan and execute an individual research project in the nautical sciences as a research beginner; independently select relevant research methods and techniques and apply them correctly; scientifically process and apply the results from this scientific research. (MA-NW-10) - Produce a well-documented written report in the form of a thesis about the research project which meets all the formal requirements of an academic publication and which is correct in terms of language and style. (MA-NW-11)
Examination	**Following Module 1.1 oral exam** | **Following Module 1.2 oral exam** | **Following Module 2.1 oral exam** | **Following Module 2.2 oral exam** **Second session oral exam**
Caesura measures	
Required study material	- No calculator allowed.
Recommended preliminary competences	
Additional information	

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**STRATEGIC MANAGEMENT (3 UC)**
Course element	**Strategic Management (HZS-WE-HT-NW420)**
Lecturer(s)	**Theo NOTTEBOOM**
Lecturer in charge	Theo NOTTEBOOM
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture
Other teaching methods	Group work
Instruction language	English
Required preliminary credit(s)	
Units of credit (UC)	3
Hours of formal lecture/ practical exercise	24/-
Semester + module(s)	Semester 1, Module 1.1 -/- | Semester 1, Module 1.2 -/- | Semester 2, Module 2.1 -/- | **Semester 2, Module 2.2 24/-**
Learning objectives	At the end of the course, the student is expected to be able to: -Understand the main theoretical and conceptual approaches to strategic management in organizations, as presented by leading scholars (Drucker, Porter, Mintzberg, etc.); -Gain insight into the role of strategic management approaches in key corporate domains such as marketing, accounting, finance, production/ operations management and information management; -Develop analytical and decision making skills for dealing with complex strategic problems faced by organizations; -Apply strategic management approaches and concepts to case studies in the maritime industry.
Course content	Strategic Management focuses on the organization as a whole and its transactions with its environment. This course discusses the main theoretical and conceptual approaches to strategic challenges in organizations. It develops a framework of analysis to enable students to identify strategic issues and problems in complex organizations. The course also presents tools and instruments to analyze and evaluate, both qualitatively and quantitatively, the performance of strategic decisions. In doing so, the student develops conceptual skills so that he/she is able to integrate strategic aspects of corporations. To bridge the gap between theory and practice, students will be asked to prepare a group assignment aimed at applying strategic management tools and concepts to evaluate the strategy of a chosen shipping company. The case study should also include a scan of the external environment of the organization and identify the key environmental factors (the key success factors, opportunities, threats, etc.) having an impact on the performance of the overall industry and the company being analyzed.
Learning outcomes	- Possess advanced knowledge and understanding in one or more topics from the nautical research field such as health and safety (strategic management, maritime medical emergencies), maritime transport (analysis of shipping markets, supply chain management, port management and policy, business economics), marine environmental technology (advanced maritime ecology), maritime energy issues, maritime techniques (introduction to hydrography, dynamic positioning, unusual ships - olie-, gas- (LPG/ LNG) and chemical tankers, advanced maritime technology and safety, advanced stability, shipbuilding, propulsion and automation), human resources and communication (data analysis). (MA-NW-8)
Examination	Following Module 1.1 - | Following Module 1.2 - | Following Module 2.1 - | **Following Module 2.2 written exam** **Second session written exam**
Caesura measures	
Required study material	- Lecturer's course text available. - No calculator allowed.
Recommended preliminary competences	Proficiency in General English is recommended

Additional information	

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**ADVANCED MARITIME MEDICINE (3 UC)**
Course element	**Advanced maritime medicine (HZS-WE-HT-NW442)**
Lecturer(s)	**Thomas VAN LOOY**
Lecturer in charge	Deirdre LUYCKX
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	**Strict succession (must have followed and passed)** Maritime medicine (Part 2) and training in a hospital
Units of credit (UC)	3
Hours of formal lecture/ practical exercise	12/18
Semester + module(s)	Semester 1, Module 1.1 -/- | Semester 1, Module 1.2 -/- | **Semester 2, Module 2.1 12/-** | **Semester 2, Module 2.2 -/18**
Learning objectives	At the end of the course, the student is expected to be able to: - demonstrate detailed understanding of specific medical problems that may arise on board; - apply medical-technical skills, such as resuscitation (BLS-AED and ALS), general and specific clinical examination of the heart, lungs, abdomen, peripheral blood vessels, nervous system, eye, urinary examination, locomotor system, mouth and teeth; - pay attention to communicative aspects, such as dealing with depression, aggression, and psychosis; - acquire specific knowledge that may be required to provide medical assistance on board in addition to the criteria set out in the STCW Code as amended.
Course content	The student receives theoretical, detailed insight into a number of specific medical problems, applied to the situation on board. The student builds up medical-technical skills, i.e. resuscitation (BLS-AED and ALS), general and targeted clinical examination of heart, lungs, abdomen, peripheral blood vessels, nervous system, eye, urinary examination, locomotor system, mouth and teeth. In terms of communication the students learns how to deal with depression, aggression, and psychosis. Through lectures, practice and demonstrations, the student acquires specific knowledge that may be required to provide medical assistance on board in addition to the criteria set out in the STCW Code as amended.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1)
- Offer expert advice on safety issues, specifically accident analysis (understanding of the content, application and intentions of the International Regulations for Preventing Collisions at Sea). (MA-NW-5)
- Possess advanced knowledge and understanding in one or more topics from the nautical research field such as health and safety (strategic management, maritime medical emergencies), maritime transport (analysis of shipping markets, supply chain management, port management and policy, business economics), marine environmental technology (advanced maritime ecology), maritime energy issues, maritime techniques (introduction to hydrography, dynamic positioning, unusual ships - olie-, gas- (LPG/ LNG) and chemical tankers, advanced maritime technology and safety, advanced stability, shipbuilding, propulsion and automation), human resources and communication (data analysis). (MA-NW-8)
- Source, critically interpret, evaluate, process and correctly cite scientific information in relation to the nautical sciences. (MA-NW-9)
- Independently design, plan and execute an individual research project in the nautical sciences as a research beginner; independently select relevant research methods and techniques and apply them correctly; scientifically process and apply the results from this scientific research. (MA-NW-10)
- Produce a well-documented written report in the form of a thesis about the research project which meets all the formal requirements of an academic publication and which is correct in terms of language and style. (MA-NW-11)
- Independently analyse complex problems in often unpredictable professional situations and develop and implement appropriate solution strategies in an international environment. (MA-NW-12)
- Work on further personal development in the nautical field by critically reflecting on one’s own performance, by detecting new developments in the nautical sciences and by undergoing academic or professional training. (MA-NW-13)</td></tr>
<tr><td>Examination</td><td>
<table>
<tr><td>Following Module 1.1
-</td><td>Following Module 1.2
-</td><td>Following Module 2.1
-</td><td>Following Module 2.2
oral exam and permanent evaluation</td></tr>
<tr><td colspan="4">Second session
oral exam</td></tr>
</table>
</td></tr>
<tr><td>Caesura measures</td><td>- 100% presence in practical sessions mandatory to be evaluated in the first exam session.</td></tr>
<tr><td>Required study material</td><td>- No calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td>Maritime medicine (part 1)
Maritime medicine (part 2) and training in a hospital</td></tr>
<tr><td>Additional information</td><td></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**ANALYSIS OF SHIPPING MARKETS (3 UC)**
Course element	**Analysis of shipping markets (HZS-WE-HT-NW413)**
Lecturer(s)	**Theo NOTTEBOOM**
Lecturer in charge	Theo NOTTEBOOM
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	
Units of credit (UC)	3
Hours of formal lecture/ practical exercise	24/-
Semester + module(s)	Semester 1, Module 1.1 -/- | Semester 1, Module 1.2 -/- | Semester 2, Module 2.1 -/- | **Semester 2, Module 2.2 24/-**
Learning objectives	At the end of the course, the student is expected to be able to: - analyse and integrate business and economic issues related to the four markets in shipping in a scientifically sound manner; - understand and put complex and current problems in the four markets in the right context; - reflect on the functioning of the four markets and, on the basis of their own reflection, suggest adequate solutions in an uncertain context; - use the specific concepts and terminology associated with the shipping markets; - search for and interpret relevant data related to the market forces.
Course content	Ship owners operate in four different markets: the newbuilding market, the freight market, the sales and purchase market and the demolition market. In this course the student acquires in-depth insight into the operation of these four markets from a practical point of view. The course consists of four parts. Each of these parts focuses on one of the four markets. In addition to a numerical insight into the four markets, the student gets acquainted with the market forces (supply, demand, pricing) and the possible strategies of the market players.
Learning outcomes	- Possess advanced knowledge and understanding in one or more topics from the nautical research field such as health and safety (strategic management, maritime medical emergencies), maritime transport (analysis of shipping markets, supply chain management, port management and policy, business economics), marine environmental technology (advanced maritime ecology), maritime energy issues, maritime techniques (introduction to hydrography, dynamic positioning, unusual ships - olie-, gas- (LPG/ LNG) and chemical tankers, advanced maritime technology and safety, advanced stability, shipbuilding, propulsion and automation), human resources and communication (data analysis). (MA-NW-8)
Examination	Following Module 1.1 - | Following Module 1.2 - | Following Module 2.1 - | **Following Module 2.2 written exam** **Second session written exam**
Caesura measures	
Required study material	- Lecturer's course text available. - No calculator allowed.
Recommended preliminary competences	Proficiency in General English is recommended
Additional information	

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**PORT MANAGEMENT AND POLICY (3 UC)**
Course element	**Port management and policy (HZS-WE-HT-NW414)**
Lecturer(s)	**Theo NOTTEBOOM**
Lecturer in charge	Theo NOTTEBOOM
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	
Units of credit (UC)	3
Hours of formal lecture/ practical exercise	24/-
Semester + module(s)	Semester 1, Module 1.1 -/- | Semester 1, Module 1.2 -/- | **Semester 2, Module 2.1 24/-** | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - analyse and integrate business and economic issues related to port management and policy in a scientifically sound manner; - understand complex and current problems in ports and place them in the right framework; - reflect on the operation of ports and to propose adequate solutions in an uncertain context on the basis of own reflection; - use specific concepts and terminology related to port operations, policy and management; - look up and interpret relevant data concerning the operation of ports.
Course content	This course aims to provide a good insight into the various aspects related to port activities. The student will see how a number of port management principles and practices can be incorporated into the broader framework of global transportation systems. Furthermore, the student is introduced to the key elements of port policy at a European level and at the level of individual states (both in Europe and beyond). The course consists of three parts: (1) the market environment of seaports, (2) port management and (3) port policy.
Learning outcomes	- Possess advanced knowledge and understanding in one or more topics from the nautical research field such as health and safety (strategic management, maritime medical emergencies), maritime transport (analysis of shipping markets, supply chain management, port management and policy, business economics), marine environmental technology (advanced maritime ecology), maritime energy issues, maritime techniques (introduction to hydrography, dynamic positioning, unusual ships - olie-, gas- (LPG/ LNG) and chemical tankers, advanced maritime technology and safety, advanced stability, shipbuilding, propulsion and automation), human resources and communication (data analysis). (MA-NW-8)
Examination	**Following Module 1.1** | **Following Module 1.2** | **Following Module 2.1** | **Following Module 2.2 written exam** **Second session written exam**
Caesura measures	
Required study material	- Lecturer's course text available. - No calculator allowed.
Recommended preliminary competences	Proficiency in General English is recommended
Additional information	- Notteboom, T., A. Pallis and J-P Rodrigue (2021) Port Economics, Management and Policy, New York: Routledge.

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**ADVANCED MARITIME ECOLOGY & TECHNOLOGY (3 UC)**
Course element	**Advanced maritime ecology & technology (HZS-NW-EXP-NW421)**
Lecturer(s)	**Raf MESKENS, Geert POTTERS**
Lecturer in charge	Geert POTTERS
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	Group work Demonstration
Instruction language	English
Required preliminary credit(s)	
Units of credit (UC)	3
Hours of formal lecture/ practical exercise	24/12
Semester + module(s)	Semester 1, Module 1.1 -/- | Semester 1, Module 1.2 -/- | **Semester 2, Module 2.1 12/6** | **Semester 2, Module 2.2 12/6**
Learning objectives	At the end of the course, the student is expected to be able to: - make connections between environmental problems in contemporary society and various economic, social and cultural drivers; - identify different ecosystem services and analyse their role in a given process or ecosystem; - develop a critical attitude in discussions about technological developments, making the necessary reflections about their impact on the environment and nature; - visualise scientific information in a useful way for communication in a subject-specific, research-driven context.
Course content	This course begins with a thorough discussion of sustainable development as a core concept in general environmental theory and philosophy. Using recent environmental reports and publications, the student learns to make connections between economy, ecology and the social fabric of 21st century society and to critically examine the processes and drivers that control these processes. The student elaborates on this using the concept of ecosystem services and applies it in three themes: - Biodiversity, linked to a discussion of the phenomenon of overfishing. Through this theme, the student learns to identify different ecosystem services and explain their importance; - The climate crisis, and related global energy challenges. The student also analyses the possible energy transitions in shipping and identifies arguments for and against the different options available (LNG, hydrogen, biofuel, etc); - The impact of pollution on life on this planet, from individual organisms (humans) to entire ecosystems. The student thus deepens his/her knowledge of environmental legislation from the bachelor courses. Subsequently, the student integrates these ecological insights with the needs and characteristics of recent maritime technological developments, by means of guest lectures and/or company visits. After this, the student makes his/her own critical analysis of a given theme, in a small group, deepens an ecological and/or technological subject, and designs a scientific poster about it.

Learning outcomes	- Possess advanced knowledge and understanding in one or more topics from the nautical research field such as health and safety (strategic management, maritime medical emergencies), maritime transport (analysis of shipping markets, supply chain management, port management and policy, business economics), marine environmental technology (advanced maritime ecology), maritime energy issues, maritime techniques (introduction to hydrography, dynamic positioning, unusual ships - olie-, gas- (LPG/ LNG) and chemical tankers, advanced maritime technology and safety, advanced stability, shipbuilding, propulsion and automation), human resources and communication (data analysis). (MA-NW-8) - Source, critically interpret, evaluate, process and correctly cite scientific information in relation to the nautical sciences. (MA-NW-9) - Work on further personal development in the nautical field by critically reflecting on one's own performance, by detecting new developments in the nautical sciences and by undergoing academic or professional training. (MA-NW-13)
Examination	Following Module 1.1 - Following Module 1.2 - Following Module 2.1 - **Following Module 2.2** **oral exam with written preparation** **Second session** **oral exam with written preparation**
Caesura measures	
Required study material	- Lecturer's course text available. - No calculator allowed.
Recommended preliminary competences	Maritime ecology and environmental legislation Maritime English - part 3
Additional information	- International Maritime Organization. (1973-1978). *International Convention for the Prevention of Pollution from Ships (MARPOL) 1973-1978, as amended*. London, UK: IMO. - Potters, G. (2013). *Marine Pollution*. bookboon.com - Wilson, L. (2012). *The Paint Inspector's Field Guide.* Capelle aan den Ijssel, The Netherlands: TQC.

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**DYNAMIC POSITIONING (3 UC)**
Course element	**Dynamic positioning (HZS-NW-NAV-NW491)**
Lecturer(s)	**Peter DOTSELAERE**
Lecturer in charge	Peter DOTSELAERE
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	**Standard succession (must have followed)** Navigation (part 3)
Units of credit (UC)	3
Hours of formal lecture/ practical exercise	24/12
Semester + module(s)	Semester 1, Module 1.1 -/- | Semester 1, Module 1.2 -/- | **Semester 2, Module 2.1 24/-** | **Semester 2, Module 2.2 -/12**
Learning objectives	At the end of the course, the student is expected to be able to: - understand the different DP systems/elements/components; - apply the different DP modes; - understand and implement the different DP system failure modes; - understand the sensors; - understand the reference systems; - set the DP computers in a correct way for a given DP operation; - understand and apply relevant DP procedures; - keep and hand over a DP watch; - make a DP risk assessment; - report a DP incident; - have knowledge of power management and distribution; - understand the importance of operational planning, how to evaluate and implement
Course content	The student becomes acquainted with the different DP systems on board and the different tasks of a DPO during the different DP operations are explained. The student is also familiarised with the operation of the DP control system in potentially very difficult environmental circumstances such as changing weather conditions, and learns to make an assessment of how and when DP operations can or cannot be started or interrupted. The student also learns to deal with the different performance standards: which tasks need to be performed how, what are the international and national regulations and guidelines, reporting to the different authorities, follow-up of the total DP operation to ensure maximum safety of the ship, the crew and the environment.
Learning outcomes	- Possess advanced knowledge and understanding in one or more topics from the nautical research field such as health and safety (strategic management, maritime medical emergencies), maritime transport (analysis of shipping markets, supply chain management, port management and policy, business economics), marine environmental technology (advanced maritime ecology), maritime energy issues, maritime techniques (introduction to hydrography, dynamic positioning, unusual ships - olie-, gas- (LPG/ LNG) and chemical tankers, advanced maritime technology and safety, advanced stability, shipbuilding, propulsion and automation), human resources and communication (data analysis). (MA-NW-8)
Examination	Following Module 1.1 - | Following Module 1.2 - | **Following Module 2.1 written exam** | **Following Module 2.2 permanent evaluation** **Second session written exam**
Caesura measures	- 100% presence in practical sessions mandatory to be evaluated in the first and second exam session; - Obtain a minimum of 10/20 for each part of the exam to pass for this element.
Required study material	- Lecturer's course text available. - No calculator allowed.

Recommended preliminary competences	
Additional information	- *Guidelines for the Training and Experience of Key DP Personnel* (latest ed.), IMCA, IMCA M117 - *Guidelines for Vessels and Units with Dynamic Positioning (DP) Systems* (16 June 2017), IMO, MSC.1/Circ.1580 - International Maritime Organization. (1978). *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) 2010, as amended.* London, UK: IMO.

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**ADVANCED TANKER TRAINING OIL (3 UC)**
Course element	**Advanced tanker training oil (HZS-NW-EXP-NW430)**
Lecturer(s)	**Ynse JANSSENS, Denis STEVENS**
Lecturer in charge	Ynse JANSSENS
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	**Strict succession (must have followed and passed)** Basic tanker training (oil, gas, chem) & IGF
Units of credit (UC)	3
Hours of formal lecture/ practical exercise	18/18
Semester + module(s)	**Semester 1, Module 1.1 6/-** | **Semester 1, Module 1.2 12/-** | **Semester 2, Module 2.1 -/18** | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - correctly interpret physical and chemical properties of liquid oil cargoes; - safely plan, carry out and monitor loading, discharging and tank cleaning operations on board oil tankers; - take measures to prevent pollution of the environment by the release of oil or oily products; - take measures to prevent hazards; - check and follow the agreement with the prevailing legislation with emphasis on SOLAS, MARPOL Annex 1, OPA90 and the relevant technical codes and regulations concerning IG & COW; - operate the simulator; - name the different parts of the loading and unloading process; - outline the piping used to load and/or unload a tanker; - completely unload a tanker; - manage tank cleaning; - identify problems/errors and work out solutions/alternatives; - use and interpret the ODME; - act independently in case of alarms.
Course content	The courses Advanced Tanker training Oil, Advanced Tanker training Gas and IGF en Advanced Tanker training Chemicals are an advanced continuation of the Basic Tanker training for Oil, Chemicals, Gas, and IGF. They start with a common theoretical part in which the student first elaborates on the study of cargo calculations on board oil, chemical and gas tankers within more advanced issues. In addition, the student gets acquainted with the phenomenon of hammering and studies the possibilities of static electricity on board liquid cargo ships. The course Advanced Tanker training - Oil deals minimum with the issues of storage, handling and transport of crude oil in accordance with the STCW2010 Specialized Training For Oil Tankers". - Model Course 1.02. The topics to be explored are Inert gas, crude oil washing, ullaging and sampling, STS, bunkering and bunker fraud. On the simulator, the student works on the basis of knowledge acquired in the 3rd Bachelor. In the Master the emphasis is on the oil tanker. In the labs, the student gets to know the activities in depth from the moment of arrival into port until the ship is fully unloaded. The following items will be covered: debottoming, ballasting, tank stripping, crude oil washing, internal stripping, ODME, heavy weather ballast, tank cleaning, and oil record book.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1)
- Possess advanced knowledge and understanding of technical aspects of merchant ships, including propulsion (gas turbines, drag resistance, propeller characteristics, etc.), inspection, survey and maintenance of ships. (MA-NW-2)</td></tr>
<tr><td>Examination</td><td>
<table>
<tr><td>Following Module 1.1
-</td><td>Following Module 1.2
-</td><td>Following Module 2.1
permanent evaluation</td><td>Following Module 2.2
oral exam with written preparation</td></tr>
<tr><td colspan="4">Second session
oral exam with written preparation</td></tr>
</table>
</td></tr>
<tr><td>Caesura measures</td><td>- 100% presence in practical sessions mandatory to be evaluated in the first and second exam session;
- Obtain a minimum of 10/20 for each part of the exam to pass for this element.</td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- No calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td>Maritime English - part 3</td></tr>
<tr><td>Additional information</td><td>- Baptist, C. (2000). Tanker Handbook for Deck Officers. Glasgow, UK: Brown, Son & Ferguson Ltd.
- Bruhn, C. (latest ed.). Dr. Verwey's Tank Cleaning Guide. Dassendorf, Germany: ChemServe.
- Huber, M. (latest ed.). Tanker operations: A handbook for the person-in-charge. Pensylvania, US: Schiffer Pub Ltd.
- International Chamber of Shipping /OCIMF. (latest ed.). Clean Seas Guide for Oil Tankers, Edingburgh, UK: Witherby Seamanship International.
- International Chamber of Shipping /OCIMF. (latest ed.). International Safety Guide for Oil Tankers and Terminals (ISGOTT). Edingburgh, UK: Witherbys Publishing.
- International Chamber of Shipping. (latest ed.). Clean seas guide for oil tankers. London, UK: ISC.
- International Chamber of Shipping. (latest ed.). Ship to ship transfer guide. London, UK: ISC.
- International Chamber of Shipping. (latest ed.). Tanker Safety Guide Chemicals. London, UK: Marisec Publications.
- International Chamber of Shipping. (latest ed.). Tanker Safety Guide Liquified Gas. London, UK: Marisec Publications.
- International Maritime Organization. (1973-1978). International Convention for the Prevention of Pollution from Ships (MARPOL) 1973-1978, as amended. London, UK: IMO.
- International Maritime Organization. (1974). International Convention for the Safety of Life at Sea (SOLAS) 1974, as amended. London, UK: IMO.
- International Maritime Organization. (1990). Inert Gas Systems (IMO-860E). London, UK: IMO.
- International Maritime Organization. (latest ed.). International Code of Safety for Ships using gases or other low-flashpoint fuels (IGF). London, UK: IMO.
- Intertanko. (latest ed.). Effective crude oil washing. Oslo, Norway: Intertanko.
- Marton, G. (1992). Tanker Operations: A Handbook for the Ship's Officer. California , US: Cornell Maritime Press.
- Solly, R. (2011). Manual for oil tanker operations. Edingburgh, UK: Witherby Seamanship International.</td></tr>
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ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**ADVANCED TANKER TRAINING CHEMICALS (3 UC)**
Course element	**Advanced tanker training chemicals (HZS-NW-EXP-NW434)**
Lecturer(s)	**Inez HOUBEN, Kathy SPEELMAN, Denis STEVENS**
Lecturer in charge	Kathy SPEELMAN
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	Group work
Instruction language	English
Required preliminary credit(s)	**Strict succession (must have followed and passed)** Basic tanker training (oil, gas, chem) & IGF
Units of credit (UC)	3
Hours of formal lecture/ practical exercise	18/18
Semester + module(s)	**Semester 1, Module 1.1 6/-** | Semester 1, Module 1.2 -/- | **Semester 2, Module 2.1 12/-** | **Semester 2, Module 2.2 -/18**
Learning objectives	At the end of the course, the student is expected to be able to: - recognise physical and chemical properties of hazardous liquid substances on board ships subject to the IBC Code; - select and apply correct, safe procedures in carrying out the various parts of cargo handling on chemical tankers in accordance with the IBC Code and Marpol; - identify and work out a solution to operational problems in accordance with relevant IMO legislation; - prepare a loading plan, execute it on a simulator and monitor and report the executed operations in a correct manner in accordance with the Marpol legislation; - take measures to prevent contamination of the environment by chemicals on board ships subject to the IBC Code.
Course content	The courses Advanced Tanker training Oil, Advanced Tanker training Gas and IGF, and Advanced Tanker training Chemicals are an advanced continuation of course module Basic Tanker training for Oil, Chemicals, Gas and IGF. They start with a common theoretical part in which the student first elaborates on the study of cargo calculations on board oil, chemical and gas tankers within more advanced issues. In addition, the student gets acquainted with the phenomenon of hammering and studies the possibilities of static electricity on board liquid cargo ships. The Advanced Tanker training Chemicals also includes an advanced training programme that enables the student to create a safety culture on board chemical tankers. In this course, the student learns how to perform and control cargo operations, be familiar with the properties of chemical cargoes, take precautions to prevent hazards, apply health and safety measures, respond to emergencies, take fire safety measures, take precautions to prevent environmental pollution and monitor and verify compliance with legal requirements. The first part aims at students becoming familiar with the equipment, instruments and equipment used to handle the cargo of a chemical tanker. The relevant laws and regulations from the IBC Code and Marpol are discussed in detail. The course then addresses the need for proper planning, the use of safe procedures and checklists for various cargo handling operations. This enables the student to identify, solve and prevent operational problems. Finally, specific cargo handling challenges on chemical tankers are discussed. In the labs the student uses the cargo handling simulator for chemical tankers and can practise the different cargo operations, as discussed in the theory. The student can gain experience in a controlled environment and improve himself/herself in cargo handling on the simulator. The course is in accordance with A-V/1-1-3 of the STCW code.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1)
- Possess advanced knowledge and understanding in one or more topics from the nautical research field such as health and safety (strategic management, maritime medical emergencies), maritime transport (analysis of shipping markets, supply chain management, port management and policy, business economics), marine environmental technology (advanced maritime ecology), maritime energy issues, maritime techniques (introduction to hydrography, dynamic positioning, unusual ships - olie-, gas- (LPG/LNG) and chemical tankers, advanced maritime technology and safety, advanced stability, shipbuilding, propulsion and automation), human resources and communication (data analysis). (MA-NW-8)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following
Module 1.1
-</td><td>Following
Module 1.2
-</td><td>Following
Module 2.1
-</td><td>Following Module 2.2
oral exam with written preparation and permanent evaluation</td></tr><tr><td colspan="4">Second session
oral exam with written preparation</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td>- 100% presence in practical sessions mandatory to be evaluated in the first and second exam session;
- Obtain a minimum of 10/20 for each part of the exam to pass for this element;
- To be able to communicate effectively, fluently and purposefully.</td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- No calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td>- International Chamber of Shipping /OCIMF. (latest ed.). International Safety Guide for Oil Tankers and Terminals (ISGOTT). Edingburgh, UK: Witherbys Publishing.
- International Chamber of Shipping /OCIMF. (latest ed.). Ship to Ship Transfer Guide for Petroleum, Chemicals and Liquefied Gases. Edingburgh, UK: Witherbys Publishing.
- International Chamber of Shipping. (latest ed.). Tanker Safety Guide Chemicals. London, UK: Marisec Publications.
- International Maritime Organization. (1973-1978). International Convention for the Prevention of Pollution from Ships (MARPOL) 1973-1978, as amended. London, UK: IMO.
- International Maritime Organization. (1974). International Convention for the Safety of Life at Sea (SOLAS) 1974, as amended. London, UK: IMO.
- International Maritime Organization. (1978). International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) 1978, as amended. London, UK: IMO.
- International Maritime Organization. (latest ed.). International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk (IBC Code). London, UK: IMO.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**ADVANCED TANKER TRAINING GAS & IGF (3 UC)**
Course element	**Advanced tanker training gas & IGF (HZS-NW-EXP-NW432)**
Lecturer(s)	**Werner JACOBS, Anne-Pascale MORNARD, Denis STEVENS**
Lecturer in charge	Werner JACOBS
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	**Strict succession (must have followed and passed)** Basic tanker training (oil, gas, chem) & IGF
Units of credit (UC)	3
Hours of formal lecture/ practical exercise	18/18
Semester + module(s)	**Semester 1, Module 1.1 6/-** | **Semester 1, Module 1.2 12/-** | **Semester 2, Module 2.1 -/18** | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - recognise physical and chemical properties of liquid gas cargo/fuel on board ships subject to the IGF Code; - plan, conduct and follow up gas and fuel operations on board ships subject to the IGF Code in a safe manner; - take measures to prevent pollution of the environment by a release of gas/fuel on board ships subject to the IGF Code; - take measures to prevent hazards; - verify and follow up on agreement with the prevailing legislation.
Course content	The courses Advanced Tanker training Oil, Advanced Tanker training Gas and IGF, and Advanced Tanker training Chemicals are a continuation and deepening of the module Basic Tanker training for Oil, Chemicals, Gas and IGF. They start with a common theoretical part in which the student first elaborates on the study of cargo calculations on board oil, chemical and gas tankers within more advanced issues. In addition, the student gets acquainted with the phenomenon of hammering and studies the possibilities of static electricity on board liquid cargo ships. In the course Advanced Tanker training Gas and IGF, the physical and chemical properties of liquefied gas are further discussed. Also the possible health effects after contact with the cargo or cargo vapours are explained. In the second chapter the student learns in detail how liquefied gases can be transported on a seagoing vessel, with an emphasis on the different tank designs. The third chapter is a selection of the existing legislation, with the importance for the operator of gas tankers as a leitmotif. The different types of ships are considered as well as the requirements regarding ventilation. In the next chapter the student gets acquainted with the different instruments and equipment specific to a gas tanker or IGF vessel and how to use them. After acquiring this subject matter, the different operations are discussed in detail, both on board an LNG, LPG and IGF ship. Finally, the student learns more about emergency procedures and communication with the shore terminal. The labs take place on the gas simulator. The emphasis is on practising the various operations as discussed in the theory. The student gets the opportunity to carry out the different operations on the simulator of LNG, LPG as well as IGF vessels. The student performs 2 bunker operations on a simulator during the propulsion course.
Learning outcomes	

Examination	Following Module 1.1 -	Following Module 1.2 -	**Following Module 2.1 permanent evaluation**	**Following Module 2.2 oral exam with written preparation and permanent evaluation**
	Second session oral exam with written preparation			
Caesura measures				
Required study material	- Lecturer's course text available. - Only scientific calculator allowed.			
Recommended preliminary competences				
Additional information	- Clucas, C. *(latest ed.). Tanker Safety Training (Liquefied Gas), Specialised Level.* London, UK: Witherbys Publishing. - International Maritime Organization. *(latest ed.). International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code).* London, UK: IMO. - Society of International Gas Tanker and Terminal Operators. *(latest ed.). Liquefied Gas Handling Principles on Ships and in Terminals*. London, UK: SIGTTO.			

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**ADVANCED STABILITY (3 UC)**
Course element	**Advanced stability - theory (HZS-NW-EXP-NW419)**
Lecturer(s)	**Werner JACOBS**
Lecturer in charge	Werner JACOBS
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	**Standard succession (must have followed)** Stability (Part 3)
Units of credit (UC)	2
Hours of formal lecture/ practical exercise	12/-
Semester + module(s)	Semester 1, Module 1.1 -/- | Semester 1, Module 1.2 -/- | Semester 2, Module 2.1 -/- | **Semester 2, Module 2.2 12/-**
Learning objectives	At the end of the course, the student is expected to be able to: - determine and analyse the specific stability problems when loading a pontoon; - analyse and assess a case study involving the capsising of a vessel; - understand the specific stability problems in loading a heavy lift vessel and handle them on a simulator; - assess the consequences of accidental damage on different ship types; - understand the phenomenon of liquefaction and dynamic separation on board bulk carriers; - understand the specific stability problems in the transport of steel coils; - explain the cause of parametric rolling through stability.
Course content	The course is structured as follows: a theoretical approach, complemented with a number of case studies, calculation via loading simulator and practical exercises. The following topics will certainly be covered, but can be complemented with recent events in the maritime world with regard to stability: - specific stability problems when loading a pontoon; - a case study in which a ship capsised; - specific stability problems when loading a heavy elevator ship; - the consequences of accidental damage on different types of ships; - the phenomenon of liquefaction and dynamic separation on board bulk carriers; - specific stability problems when transporting steel coils; - cause of parametric rolling and an explanation via the stability.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1)
Examination	**Following Module 1.1** | **Following Module 1.2** | **Following Module 2.1** | **Following Module 2.2 oral exam with written preparation** **Second session oral exam with written preparation**
Caesura measures	
Required study material	- Lecturer's course text available. - No calculator allowed.
Recommended preliminary competences	

Additional information	- Barrass, B., Derrett, D.R. (latest ed.) *Ship Stability for Masters and Mates.* London, UK: Butterworth-Heinemann. - Clark, C. (2008). *Stability*, *Trim and Strength for Merchant Ships and Fishing Vessels*. London, UK: The Nautical Institute. ISBN: 9781870077873. - International Maritime Organization. (1966). *International Load Lines Convention (ILL) 1966, as amended.* London, UK: IMO. - International Maritime Organization. (latest ed.). *International Code on Intact Stability*. London, UK: IMO. - Rhodes, M. (2009). *Ship Stability OOW*. Edingburgh, UK: Witherby Seamanship International. - van Dokkum, K. (latest ed.). *Ship Stability.* Enkhuizen, The Netherlands: Dokmar.

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**ADVANCED STABILITY (3 UC)**
Course element	**Advanced stability - exercises (HZS-NW-EXP-NW411)**
Lecturer(s)	**Werner JACOBS**
Lecturer in charge	Werner JACOBS
Educational programme	**Master in Nautical Sciences**

Method of teaching	Practical exercises
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	**Standard succession (must have followed)** Stability (Part 3)
Units of credit (UC)	1
Hours of formal lecture/ practical exercise	-/12
Semester + module(s)	**Semester 1, Module 1.1** **-/6** | **Semester 1, Module 1.2** **-/6** | Semester 2, Module 2.1 -/- | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - carry out a full stability calculation on board a bulk carrier for a full voyage (arrival - loading - sea voyage - transit channel - bunkering - sea voyage - unloading).
Course content	The student participates in a multidisciplinary exercise that will take place cross-curricularly, together with voyage planning and ship exploitation. For the part Stability, the student independently builds a loading simulator in calculation software (e.g. Excel, Scilab or Matlab) based on the knowledge gained in previous years. The student understands how all stability data for the virtual voyage to be undertaken can be calculated via this simulator, including shear forces and deflection moments. The voyage deals with the different stages such as arrival at port of loading - loading - sea voyage - transit channel - bunkering - sea voyage - arrival at port of discharge - unloading.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1)
Examination	**Following Module 1.1 permanent evaluation** | **Following Module 1.2 permanent evaluation with integrated practical test** | Following Module 2.1 - | **Following Module 2.2 practical test** **Second session practical test**
Caesura measures	
Required study material	- Lecturer's course text available. - Only scientific calculator allowed.
Recommended preliminary competences	
Additional information	- Barrass, B., Derrett, D.R. (latest ed.) *Ship Stability for Masters and Mates.* London, UK: Butterworth-Heinemann. - Clark, C. (2008). *Stability*, *Trim and Strength for Merchant Ships and Fishing Vessels*. London, UK: The Nautical Institute. ISBN: 9781870077873. - International Maritime Organization. (1966). *International Load Lines Convention (ILL) 1966, as amended.* London, UK: IMO. - International Maritime Organization. (latest ed.). *International Code on Intact Stability*. London, UK: IMO. - Rhodes, M. (2009). *Ship Stability OOW*. Edingburgh, UK: Witherby Seamanship International. - van Dokkum, K. (latest ed.). *Ship Stability.* Enkhuizen, The Netherlands: Dokmar.

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**SEMINAR IN SHIP CONSTRUCTION, PROPULSION AND AUTOMATION (3 UC)**
Course element	**Seminar in ship construction, propulsion and automation (HZS-WE-TE-NW426T)**
Lecturer(s)	**Tim GEERTS**
Lecturer in charge	Tim GEERTS
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	Dutch/French + English
Required preliminary credit(s)	
Units of credit (UC)	3
Hours of formal lecture/ practical exercise	24/-
Semester + module(s)	Semester 1, Module 1.1 -/- | Semester 1, Module 1.2 -/- | **Semester 2, Module 2.1 12/-** | **Semester 2, Module 2.2 12/-**
Learning objectives	At the end of the course, the student is expected to be able to: - use an arduino as a controller in a control loop; - use measurable phenomena to predict a possible failure in one of the cylinders in the main engine of a simulated engine room; - recognise and solve problems when manoeuvring in ports and canals; - have an understanding of how to carry out a towing test; - discuss various new materials used in the construction of ships; - discuss different modern welding techniques.
Course content	The student acquires a deeper understanding of how modern techniques are used in practice during various seminars. In the seminar Automation the student will learn to use and programme an Arduino to serve as a P&ID controller. In the seminar Propulsion, the student will learn to detect errors in the on-board propulsion system, more specifically in the cylinders of the main engine. In four seminars on Shipbuilding, the student will focus on the problem of manoeuvring in harbours and canals, examining hull shapes in a towing tank, the use of new (plastic) materials in ship constructions and various modern welding techniques.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1)
- Possess advanced knowledge and understanding of technical aspects of merchant ships, including propulsion (gas turbines, drag resistance, propeller characteristics, etc.), inspection, survey and maintenance of ships. (MA-NW-2)
- Possess specialised knowledge, understanding and skill in operational domains, such as manoeuvring in difficult and/or unusual situations; in addition ship exploitation, supply chain management, law of the sea, important for a second career following seafaring. (MA-NW-4)
- As a result of thorough knowledge and understanding of exact and applied sciences (automation), deal responsibly with complex technical systems and problems on board. (MA-NW-6)
- Source, critically interpret, evaluate, process and correctly cite scientific information in relation to the nautical sciences. (MA-NW-9)
- Independently design, plan and execute an individual research project in the nautical sciences as a research beginner; independently select relevant research methods and techniques and apply them correctly; scientifically process and apply the results from this scientific research. (MA-NW-10)
- Independently analyse complex problems in often unpredictable professional situations and develop and implement appropriate solution strategies in an international environment. (MA-NW-12)
- Work on further personal development in the nautical field by critically reflecting on one’s own performance, by detecting new developments in the nautical sciences and by undergoing academic or professional training. (MA-NW-13)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
-</td><td>Following Module 1.2
-</td><td>Following Module 2.1
permanent evaluation</td><td>Following Module 2.2
permanent evaluation</td></tr><tr><td colspan="4">Second session
second session impossible</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Scientific and graphic calculators allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**INFORMATION AND COMMUNICATION TECHNOLOGY (3 UC)**
Course element	**Information and communication technology (HZS-WE-TE-NW420)**
Lecturer(s)	**Jonas JOOS**
Lecturer in charge	Deirdre LUYCKX
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture			
Other teaching methods				
Instruction language	English			
Required preliminary credit(s)				
Units of credit (UC)	3			
Hours of formal lecture/ practical exercise	24/-			
Semester + module(s)	Semester 1, Module 1.1 -/-	Semester 1, Module 1.2 -/-	**Semester 2, Module 2.1** **12/-**	**Semester 2, Module 2.2** **12/-**

<table>
<tr><td>Learning objectives</td><td>At the end of the course, the student is expected to be able to:
-
understand the performance of computer systems based on the architecture and hardware used (microprocessor, I/O devices, graphics cards, hard drives);
-
build a working computer from individual components or replace parts of an existing computer;
-
deduce the functioning of small programs written in assembly language;
-
use the Bash shell to efficiently and professionally execute (repetitive) computing tasks;
-
program the Linux operating system, master UNIX system calls, and transfer this knowledge to other operating systems;
-
understand the structure of the internet and the layering of computer networks;
-
build, configure, and maintain a local network, as well as analyze and solve problems in existing networks;
-
assess the issues and dangers associated with certain types of software, such as viruses, and propose techniques to protect against these threats;</td></tr>
<tr><td>Course content</td><td>The student will learn to interact with (modern) computer systems in a professional manner and gain insight into their operation. The first part builds on prior knowledge of digital electronics, so that the students learns to understand the components of a computer system (hardware) and their interconnections within the context of system architecture. He/she explores various technologies in depth, with a comparative analysis of their advantages and disadvantages. The student gives special focus to the operating system's structure and functionality, as well as effective use of the command-line interface for file management, data logging, and system monitoring. The second part covers computer networks and data communication, using the protocol stack hierarchy. Students will be introduced to the hardware required for building a network, network topologies, cabling, modems, and other communication devices, as well as higher-layer protocols. In particular, he/she focuses on the TCP/IP protocol that forms the backbone of Internet communication, as well as user-level protocols such as HTTP, FTP, and email. Finally, the student focuses on security at the computer, operating system, and network levels.</td></tr>
<tr><td>Learning outcomes</td><td>- As a result of thorough knowledge and understanding of exact and applied sciences (automation), deal responsibly with complex technical systems and problems on board. (MA-NW-6)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
-</td><td>Following Module 1.2
-</td><td>Following Module 2.1
-</td><td>Following Module 2.2
oral and written exam</td></tr><tr><td colspan="4">Second session
oral and written exam</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
</table>

Required study material	- Lecturer's course text available. - Scientific and graphic calculators allowed.
Recommended preliminary competences	
Additional information	- Kurose J. F. & Ross, K. W., *Computer Networking: A Top-Down Approach*, 6th edition, ISBN 978-0-13-285620-1 (2013). - Null, L. & Lobur J., *The Essentials of Computer Organization and Architecture*, 5th edition, ISBN 978-1284123036 (2018). - Silberschatz, A., Galvin, P. B. & Gagne, G., *Operating System Concepts*, 10th edition, ISBN 978-1-119-32091-3 (2018). - Tanenbaum, A. S. & Austin, T., *Structured Computer Organization*, 6th edition, Pearson Education, ISBN 978-0-13-291652-3 (2013). - Tanenbaum, A. S. & Wetherall, D. J., *Computer Networks*, 5th edition, ISBN 978-0-13-212695-3 (2011).

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**DATA ANALYTICS AND AI FOR THE MARITIME INDUSTRY (3 UC)**
Course element	**Data analytics and AI for the maritime industry (HZS-WE-TE-NW421)**
Lecturer(s)	**Birger RAA**
Lecturer in charge	Birger RAA
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	
Units of credit (UC)	3
Hours of formal lecture/ practical exercise	24/-
Semester + module(s)	Semester 1, Module 1.1 -/- | Semester 1, Module 1.2 -/- | **Semester 2, Module 2.1 16/-** | **Semester 2, Module 2.2 8/-**
Learning objectives	At the end of the course, the student is expected to be able to: - understand the fundamentals and concepts underlying commonly used data analytics and AI techniques; - distinguish between training, testing and validating a data analytics model - identify possible applications of AI techniques and their improvement potential in a maritime context; - solve specific problems using the basic methods taught in this course; - assess the limitations and ethical consequences of AI techniques.
Course content	In this course, the student discovers what artificial intelligence (AI) is, including relevant terminology and an overview of various AI techniques and applications. The student examines the societal context of AI, discussing the impact of AI on society, regulations, and ethical aspects. The student delves into data analytics and learns to understand and apply descriptive, predictive, and prescriptive models. Within the domain of machine learning, the student distinguishes the difference between supervised and unsupervised learning, and explores neural networks, Markov Decision Processes, and Reinforcement Learning. The student tests various AI applications. In the first part of the applications, the student focuses on classification, clustering, and computer vision. In the second part, the student examines AI applications such as forecasting, navigation, and planning.
Learning outcomes	- As a result of thorough knowledge and understanding of exact and applied sciences (automation), deal responsibly with complex technical systems and problems on board. (MA-NW-6) - Independently design, plan and execute an individual research project in the nautical sciences as a research beginner; independently select relevant research methods and techniques and apply them correctly; scientifically process and apply the results from this scientific research. (MA-NW-10)
Examination	Following Module 1.1 - | Following Module 1.2 - | Following Module 2.1 - | **Following Module 2.2 oral exam with written preparation and written exam and permanent evaluation** **Second session oral exam with written preparation and written exam and permanent evaluation**
Caesura measures	
Required study material	- Lecturer's course text available. - Scientific and graphic calculators allowed.
Recommended preliminary competences	Differential and integral calculus (part 1) Integral calculus (part 2) and statistical methods for scientific research

Additional information	- Joshi, A.V. (2023). *Machine Learning and Artificial Intelligence*. Cham, Switzerland: Springer. - Lindholm, A., Wahlström, N., Lindsten, F., & Schön, T. B. (2022). *Machine Learning: A First Course for Engineers and Scientists*. Cambridge: Cambridge University Press. - Russell, S., Norvig, P. (2021). *Artificial Intelligence, Global Edition*. (4th ed.). Pearson Education. https://elibrary.pearson.de/book/99.150005/9781292401171

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**SPECIALISED PROGRAMME IN MARITIME LAW (12 UC)**
Course element	**Law of the sea - Advanced (HZS-WE-HT-NW417)**
Lecturer(s)	**Ralph DE WIT**
Lecturer in charge	Ralph DE WIT
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	
Organisational conditions	The course is organised from 6 enrolments.
Units of credit (UC)	5
Hours of formal lecture/ practical exercise	36/-
Semester + module(s)	Semester 1, Module 1.1 -/- | Semester 1, Module 1.2 -/- | Semester 2, Module 2.1 -/- | **Semester 2, Module 2.2 36/-**
Learning objectives	At the end of the course, the student is expected to be able to: - understand and apply the international law of the sea, as a body of rules, with a view to solving specific legal problems; - identify and critically discuss the content of the law of the sea, with sufficient command of treaty law, national law, case law (jurisprudence) and legal writings; - understand the dynamics and functions of intergovernmental organisations within the system of public international law; - recognise and critically evaluate the strengths and weaknesses of the law of the sea as a body of public policy rules, with regard to contemporary problems such as marine pollution and handling of stowaways; - conduct self-directed legal research.
Course content	This course offers an in-depth analysis and further development of concepts that were dealt with in the introductory course 'Law of the Sea – Basics'. It contains, inter alia, the following elements (which may differ each academic year, as topics may be specifically selected or highlighted with a view to current affairs): - International law of the sea in general (delimitation of maritime zones, specific legal regimes for port state control and flag states, dispute settlement in international law); - Incidents at sea (collision law, assistance and salvage, marine pollution); - Maritime surveillance (aspects of security, safety and pollution, focusing on legal constraints based on privacy and commercial necessity, ISPS, cybersecurity, maritime crime such as piracy, barratry, cargo pilfering); - Renewable energy (including impact of dredging industry – important for Belgium – and legal status of submarine cables and pipelines).
Learning outcomes	- Possess specialised knowledge, understanding and skill in operational domains, such as manoeuvring in difficult and/or unusual situations; in addition ship exploitation, supply chain management, law of the sea, important for a second career following seafaring. (MA-NW-4) - Undertake the advanced tasks of a deck officer on board a ship and in relation to other maritime stakeholders. This encompasses, amongst others, multicultural communication skills, awareness of the complexity of the role of the 'responsible leader', conflict management, understanding the diversity of leadership styles, and techniques to control emergency situations and abandon ship procedures as OOW or Captain (Crisis and Crowd Management). (MA-NW-7) - Independently analyse complex problems in often unpredictable professional situations and develop and implement appropriate solution strategies in an international environment. (MA-NW-12) - Work on further personal development in the nautical field by critically reflecting on one's own performance, by detecting new developments in the nautical sciences and by undergoing academic or professional training. (MA-NW-13)

Examination	Following Module 1.1 -	Following Module 1.2 -	Following Module 2.1 -	**Following Module 2.2** **oral exam**
	Second session **oral exam**			
Caesura measures				
Required study material	- Lecturer's course text available. - No calculator allowed.			
Recommended preliminary competences	Law of the sea - basics			
Additional information	- United Nations. (1982). *United Nations Convention on the Law of the Sea, as amended*. New-York, US: UN.			

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**SPECIALISED PROGRAMME IN MARITIME LAW (12 UC)**
Course element	**Maritime Law - Advanced (HZS-WE-HT-NW418)**
Lecturer(s)	**Ralph DE WIT**
Lecturer in charge	Ralph DE WIT
Educational programme	**Master in Nautical Sciences**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	
Organisational conditions	The course is organised from 6 enrolments.
Units of credit (UC)	7
Hours of formal lecture/ practical exercise	60/-
Semester + module(s)	Semester 1, Module 1.1 -/- | Semester 1, Module 1.2 -/- | Semester 2, Module 2.1 -/- | **Semester 2, Module 2.2 60/-**
Learning objectives	At the end of the course, the student is expected to be able to: - understand and apply international and Belgian legal rules governing admiralty law, specifically the Belgian Shipping Code; - understand and apply the rules of specific maritime legal regimes, such as carriage of goods (limitation of and exemption from liability, time bars, etc.), carriage of passengers, legal status of a ship…; - understand and apply the legal rules of related activities, such as multimodal carriage, land-based activities (freight forwarders, terminal operators) and related operations (international sale, letters of credit, insurance), and dispute resolution; - apply general rules to complex cases, by identifying, evaluating and solving legal problems (including researching and analysing legal sources, and performing independent legal research).
Course content	The course 'Maritime Law – Advanced' further elaborates on the basic competencies which were acquired in the mandatory course 'Maritime Law – Basics.' Some topics that were concisely treated in the basic course are looked at in more detail, such as (but not limited to) carriage of goods by sea (under bill of lading or sea waybill, and multimodal), maritime trade (sale of goods, trade finance), and charterparties. Attention is also devoted to land-based activities (terminal operations, transport intermediaries), risk management and dispute resolution (following up on legal disputes, including specific proceedings such as arrest of vessels), and some principles of competition law.
Learning outcomes	- Possess specialised knowledge, understanding and skill in operational domains, such as manoeuvring in difficult and/or unusual situations; in addition ship exploitation, supply chain management, law of the sea, important for a second career following seafaring. (MA-NW-4) - Possess advanced knowledge and understanding in one or more topics from the nautical research field such as health and safety (strategic management, maritime medical emergencies), maritime transport (analysis of shipping markets, supply chain management, port management and policy, business economics), marine environmental technology (advanced maritime ecology), maritime energy issues, maritime techniques (introduction to hydrography, dynamic positioning, unusual ships - olie-, gas- (LPG/ LNG) and chemical tankers, advanced maritime technology and safety, advanced stability, shipbuilding, propulsion and automation), human resources and communication (data analysis). (MA-NW-8) - Source, critically interpret, evaluate, process and correctly cite scientific information in relation to the nautical sciences. (MA-NW-9) - Independently analyse complex problems in often unpredictable professional situations and develop and implement appropriate solution strategies in an international environment. (MA-NW-12) - Work on further personal development in the nautical field by critically reflecting on one's own performance, by detecting new developments in the nautical sciences and by undergoing academic or professional training. (MA-NW-13)

Examination	Following Module 1.1 -	Following Module 1.2 -	Following Module 2.1 -	**Following Module 2.2** **oral exam**
	Second session **oral exam**			
Caesura measures				
Required study material	- Lecturer's course text available. - No calculator allowed.			
Recommended preliminary competences				
Additional information				

ECTS Information Package

Antwerp Maritime Academy

Programme	Master in Nautical Sciences
Course	**ICE NAVIGATION SIMULATOR (UC)**
Course element	**Ice Navigation Simulator (HZS-NW-NAV-NW492)**
Lecturer(s)	**Ynse JANSSENS, Veerle VAN DRIESSCHE**
Lecturer in charge	Ynse JANSSENS
Educational programme	**Master in Nautical Sciences**

Method of teaching	Practical exercises
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	
Units of credit (UC)	-
Hours of formal lecture/ practical exercise	-/6
Semester + module(s)	Semester 1, Module 1.1 -/- | Semester 1, Module 1.2 -/- | Semester 2, Module 2.1 -/- | **Semester 2, Module 2.2 -/6**
Learning objectives	At the end of the course, the student is expected to be able to: - act independently when sailing through ice; - make correct decisions in different situations; - weigh up and consider the best manoeuvre; - give guidance to other ships (convoy, freeing a vessel beset in ice); - think in a problem-solving way; - communicate correctly with other ships.
Course content	The student learns to translate the acquired knowledge from theory into practice. Firstly, the student sails through different types of ice to get to know the simulator and the reaction of the ship. In the following exercises the students learn to: - free a beset ship in ice with an icebreaker; - overtake a ship; - make way for other ships; - sail behind an icebreaker by day and night; - assemble and guide a convoy.
Learning outcomes	- Act in accordance with the minimum standards of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the corresponding Code, as amended, for deck officers on seagoing vessels; and hereby comply with STCW standards at management level. (MA-NW-1) - Master advanced aspects of navigation, including advanced tide analysis (including critical approaches to navigation software), voyage planning, navigation in congested waters and port areas (radar/ARPA), ice navigation. (MA-NW-3) - Possess specialised knowledge, understanding and skill in operational domains, such as manoeuvring in difficult and/or unusual situations; in addition ship exploitation, supply chain management, law of the sea, important for a second career following seafaring. (MA-NW-4)
Examination	Following Module 1.1 - | Following Module 1.2 - | Following Module 2.1 - | **Following Module 2.2 permanent evaluation** **Second session** **second session impossible**
Caesura measures	
Required study material	- Lecturer's course text available. - No calculator allowed.

Recommended preliminary competences	Manoeuvres (part 3) Manoeuvring (part 3): simulator Applied navigation: voyage planning Radar (part 3): simulator + ARPA Navigation in polar waters
Additional information	- Buysse, J. (2007). *Handling ships in ice, a practical guide to handling class 1A and 1AS ships.* London, UK: The Nautical Institute. ISBN 1870077849. - House, D.J. (2016). *The ice navigation manual.* Edinburgh, UK: Witherby. ISBN 9789053315989. - Snider, D. (2018). *Polar Ship Operations - A Practical Guide*. (latest ed.). London, UK: The Nautical Institute. ISBN: 9781906915568

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Antwerp Maritime Academy

Required preliminary credits - summary

Master in Nautical Sciences

Academic year 2025-2026

Master in Nautical Sciences

Maritime techniques	
NAVIGATION (PART 4)	**Standard succession (must have followed)** MARITIME ENGLISH - PART 3 METEOROLOGY (PART 2) AND OCEANOGRAPHY **Strict succession (must have followed and passed)** REGULATIONS OF MARITIME TRAFFIC (PART 3) AND MANOEUVRES (PART 2) NAVIGATION (PART 3)
REGULATIONS OF MARITIME TRAFFIC (PART 4) AND MANOEUVRES (PART 3)	**Strict succession (must have followed and passed)** REGULATIONS OF MARITIME TRAFFIC (PART 3) AND MANOEUVRES (PART 2)
PROPULSION (PART 2)	**Standard succession (must have followed)** PROPULSION (PART 1)
AUTOMATION	**Standard succession (must have followed)** ELECTRONICS 2 AND INFORMATICS PROPULSION (PART 1)
Human resources and communication	
THE HUMAN ELEMENT IN A MARITIME ENVIRONMENT	**Standard succession (must have followed)** NAVIGATION (PART 3)
Master thesis	
MASTER THESIS	**Standard succession (must have followed)** BACHELOR TERM PAPER AND SCIENTIFIC RESEARCH METHODOLOGY
Safety and health	
ADVANCED MARITIME MEDICINE	**Strict succession (must have followed and passed)** MARITIME MEDICINE (PART 2) AND TRAINING IN A HOSPITAL
Maritime techniques	
DYNAMIC POSITIONING	**Standard succession (must have followed)** NAVIGATION (PART 3)
ADVANCED TANKER TRAINING OIL	**Strict succession (must have followed and passed)** BASIC TANKER TRAINING (OIL, GAS, CHEM) & IGF
ADVANCED TANKER TRAINING CHEMICALS	**Strict succession (must have followed and passed)** BASIC TANKER TRAINING (OIL, GAS, CHEM) & IGF
ADVANCED TANKER TRAINING GAS & IGF	**Strict succession (must have followed and passed)** BASIC TANKER TRAINING (OIL, GAS, CHEM) & IGF
ADVANCED STABILITY	**Standard succession (must have followed)** STABILITY (PART 3)