info@hzs.be
www.amacademy.be
Noordkasteel Oost 6
B-2030 Antwerpen

Antwerp Maritime Academy

Study guide

Academic Bachelor in Marine Engineering

Academic year 2026-2027

First year Bachelor in Marine Engineering

Mandatory subjects	Th/Pr	UC
Faculty of Marine Engineering		
THEORY OF ELECTRICITY & SHIP'S ELECTROTECHNICS - PART 1	**36/12**	**5**
Theory of electricity - part 1	12/-	2
Theory of electricity - part 2	12/-	1
Ship's electrotechnics - part 1	12/12	2
MARINE PROPULSION - PART 1	**24/-**	**3**
Marine propulsion - part 1	24/-	3
THERMODYNAMIC PROCESSES - PART 1	**48/-**	**6**
Thermodynamics - part 1	24/-	3
Thermal recovery techniques - part 1	24/-	3
MARINE ENGINEERING SKILLS TRAINING - PART 1	**-/48**	**3**
Marine engineering skills training - part 1	-/48	3
TECHNICAL DRAWING AND CAD	**-/12**	**3**
Technical drawing and CAD	-/12	3
ON BOARD TRAINING	**-/224**	**5**
On board training	-/224	5
Nautical Faculty		
SAFETY TECHNOLOGY - PART 1	**36/24**	**5**
Safety technology - theory	24/-	2
Safety technology - exercises	-/12	1
Fire safety - theory & Fire safety - excercises	12/12	2
STABILITY AND SHIP CONSTRUCTION - PART 1	**36/-**	**4**
Stability - part 1	12/-	1
Schip's construction - part 1	24/-	3
Faculty of Sciences		
INTRODUCTION TO SCIENTIFIC RESEARCH	**12/12**	**3**
Introduction to scientific research	12/12	3
MATHEMATICS AND PHYSICS - PART 1	**60/33**	**9**
Differential and integral calculus - part 1	36/21	5
Vector calculus - part 1 and statiques	12/6	2
Waves	12/6	2
MATTER AND MATERIALS PART 1	**24/-**	**3**
Matter and materials part 1	24/-	3
PSYCHOLOGY: HUMAN ASPECTS OF NAVIGATION	**24/-**	**3**
Psychology: human aspects of navigation	24/-	3

MARITIME ENGLISH - PART 1	**36/24**	**5**
Maritime English - part 1	36/24	5
MARITIME MEDICINE	**18/6**	**3**
Maritime medicine	18/6	3

Elective subjects

Faculty of Sciences

MARITIME ENGLISH (REFRESHER COURSE)	**-/24**	
Maritime English (refresher course)	-/24	-

Second year Bachelor in Marine Engineering

Mandatory subjects	Th/Pr	UC
Faculty of Marine Engineering		
THERMODYNAMIC PROCESSES - PART 2	**48/12**	**6**
Thermodynamics - part 2	24/-	3
Thermal recovery techniques - part 2	24/12	3
SHIP'S AUXILIARY MACHINES - PART 1	**18/8**	**3**
Ship's auxiliary machines - part 1	18/8	3
STRENGTH OF MATERIALS AND STRUCTURAL MECHANICS	**24/-**	**4**
Strength of materials and structural mechanics	24/-	4
SHIP'S AUTOMATION - PART 1	**24/8**	**4**
Ships automation - part 1	24/8	4
NAVAL ELECTRONICS AND ICT - PART 1	**24/32**	**5**
Ship electroniques and ICT - part 1	24/32	5
SHIP'S ELECTROTECHNICS - PART 2	**36/40**	**7**
Ship's electrotechnics - part 2	36/32	6
Pneumatics	-/8	1
MARINE PROPULSION - PART 2	**24/-**	**4**
Marine propulsion - part 2	24/-	4
MARINE ENGINEERING SKILLS TRAINING - PART2	**-/48**	**3**
Marine engineering skills training - part 2	-/48	3
MULTIDISCIPLINARY SIMULATOR EXERCISES - PART 1	**-/48**	**3**
Multidisciplinary simulator exercises - part 1	-/48	3
Nautical Faculty		
SAFETY TECHNIQUE - PART 2: ISPS AND ISM	**30/-**	**3**
ISM	18/-	2
ISPS	12/-	1
STABILITY AND SHIP'S CONSTRUCTION - PART 2	**22/-**	**3**
Stability - part 2	12/-	2
Ship's construction - part 2	10/-	1
Faculty of Sciences		
MATHEMATICS AND PHYSICS - PART 2	**60/30**	**7**
Integral calculus - part 2 and statistical methods for scientific research	18/6	2
Vector calculus - part 2 and dynamics	24/12	3
Hydromechanics	18/12	2
MATTER AND MATERIALS - PART 2	**36/12**	**5**
Matter and materials - part 2	24/9	3

Third year Bachelor in Marine Engineering

Mandatory subjects	Th/Pr	UC
Faculty of Marine Engineering		
SHIP'S ELECTROTECHNICS - PART 3 AND HIGH VOLTAGE	**36/48**	**4**
Ship's electrotechnics - part 3	24/28	4
High Voltage	12/20	2
MARINE PROPULSION - PART 3	**24/18**	**4**
Marine propulsion - part 3	24/18	4
MARINE ENGINEER SKILLS TRAINING - PART 3, SEMINARS - PART 1 AND MULTIDISCIPLINARY SIMULATOR EXERCISES - PART 2	**-/84**	**5**
Marine engineer skills training - part 3 and seminars - part 1	-/36	3
Multidisciplinary simulator exercises - part 2	-/48	2
SHIP AUXILIARIES - PART 2	**24/24**	**4**
Ship auxiliaries - part 2	24/24	4
SHIP ELECTRONICS AND ICT - PART 2	**32/32**	**5**
Ship electronics and ITC - part 2	32/32	5
SHIP AUTOMATION - PART 2	**24/44**	**4**
Ship automation - part 2	24/44	4
INNOVATIVE AND SUSTAINABLE MARITIME TECHNOLOGIES	**24/-**	**4**
Innovative and sustainable maritime technologies	24/-	4
Nautical Faculty		
SAFETY TECHNIQUES - PART 3 AND SHIPS EXPLOITATION	**36/12**	**6**
Ship safety	12/12	2
Maritime ecology and environmental regulations	12/-	2
Ship administration and maritime law	12/-	2
BASIC TANKER TRAINING (OIL, GAS, CHEM AND IGF)	**24/12**	**3**
Basic tanker training (oil, gas, chem and IGF)	24/12	3
Faculty of Sciences		
BACHELOR TERM PAPER AND SCIENTIFIC RESEARCH METHODS	**12/-**	**5**
Bachelor term paper	-/-	4
Methods of scientific research	12/-	1
MATHEMATICS PART 3 AND DATA ANALYSIS	**12/12**	**3**
Mathematics (part 3) and data analysis	12/12	3
MARITIME ENGLISH - PART 3	**24/-**	**3**
Maritime English - part 3	24/-	3
GENERAL AND INTERCULTURAL COMMUNICATION AND MCRM	**8/44**	**4**
General and Intercultural Communication	8/12	2
Maritime Crew Resource Management	-/32	2

ECONOMICS FOR THE MARITIME SECTOR	**24/-**	**3**
Economics for the maritime sector	24/-	3

Elective subjects

Nautical Faculty

ADVANCED FIRE FIGHTING AND TANKER FIRE FIGHTING	**6/24**	
Advanced fire fighting and tanker fire fighting	6/24	-

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**THEORY OF ELECTRICITY & SHIP'S ELECTROTECHNICS - PART 1 (5 UC)**
Course element	**Theory of electricity - part 1 (HZS-WE-TE-SWM101)**
Lecturer(s)	**Jonas JOOS**
Lecturer in charge	Rik FLOREN
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	Tutoring
Instruction language	Dutch/French
Required preliminary credit(s)	
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: - have theoretical knowledge of the magnitudes and laws of electrostatics; - apply the laws of electrostatics to basic problems; - have theoretical knowledge of the variables and laws of electrodynamics; - have an understanding of the application of the basic laws of electrodynamics to the analysis of DC voltage networks; - possess theoretical insight into the behaviour of capacitors, and on the basis thereof be able to explain transient situations in RC circuits; - solve DC voltage networks by means of these methods of analysis and, in particular, fluently determine serial and parallel equivalent resistors and applying the principles of current and voltage division.
Course content	The student is introduced to electrostatics and direct current theory. He/she learns techniques for predicting the behaviour of resistors and calculating the variables of direct current networks. He/she is introduced to capacitors and the transient phenomena in capacitors. The student continuously concretizes the subject matter by means of examples and exercises. The student acquires knowledge, insights, and skills related to electricity to support other courses and/or writing of a bachelor/master thesis.
Learning outcomes	- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)

Examination	**Following Module 1.1 written exam**	Following Module 1.2 -	Following Module 2.1 -	Following Module 2.2 -
	Second session written exam			
Caesura measures				
Required study material	- Lecturer's course text available. - Ordinary scientific and graphic scientific calculators allowed.			
Recommended preliminary competences	Mathematics			
Additional information				

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**THEORY OF ELECTRICITY & SHIP'S ELECTROTECHNICS - PART 1 (5 UC)**
Course element	**Theory of electricity - part 2 (HZS-WE-TE-SWM102)**
Lecturer(s)	**Peter BUEKEN**
Lecturer in charge	Rik FLOREN
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	Tutoring Demonstration
Instruction language	Dutch/French
Required preliminary credit(s)	
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: - possess basic theoretical insight into the phenomenon of magnetic induction, and on the basis thereof be able to explain the behaviour of coils and transient phenomena in RL circuits; - understand the analogy and distinction between resistor, capacitor, and coil; - possess a theoretical understanding of how to generate alternating current, as of its characteristics; - analyse simple AC voltage networks by means of active and reactive power; - understand the behaviour of resistors, coils, and capacitors in AC voltage networks.
Course content	The student is introduced to electromagnetism and alternating current theory. He/she acquires insight into transient situations with inductors. He/she learns techniques for predicting the behaviour of components and calculating the variables of circuits in alternating current networks. The student continuously concretises the subject matter by means of examples and exercises. The student acquires knowledge, insights, and skills related to electricity to support other courses and/or writing of a bachelor/master thesis.
Learning outcomes	- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)

<table>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1
-</td><td>Following Module 1.2
written exam</td><td>Following Module 2.1
-</td><td>Following Module 2.2
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<tr><td colspan="4">Second session
written exam</td></tr>
</table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Ordinary scientific and graphic scientific calculators allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td>Mathematics</td></tr>
<tr><td>Additional information</td><td></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**THEORY OF ELECTRICITY & SHIP'S ELECTROTECHNICS - PART 1 (5 UC)**
Course element	**Ship's electrotechnics - part 1 (HZS-SW-SWM101)**
Lecturer(s)	**Rik FLOREN**
Lecturer in charge	Rik FLOREN
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	
Units of credit (UC)	2
Hours of formal lecture/practical exercise	12/12
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: - derive the properties of electrical machines and installations mathematically, making use of the principal laws of physics; - understand and explain the operation of electrical machines under different loads; - understand the meaning of active, reactive and apparent power; - understand the transformation of energy in electrical engines; - explain the construction and operation of electrical engines on board ship; - demonstrate the differences between a marine electrical installation and a land-based installation - describe the complete electrical power circuit of a ship by means of a one-line circuit; - convert calculations into a report in a scientifically correct way using a word processor and a spreadsheet.
Course content	This course gives an introduction in marine electrical engineering. The student gets insights in the working of different electrical machines, such as: direct current generators, direct current motors, transformers, asynchronous motor, synchronous generator, synchronous motor. The student learns about the operation of aforementioned engines on a magnetic, electrical and mechanical level, by first studying/analysing their construction. With the knowledge gained in the course Electrical Engineering, the student analyses the operation of this diversity of engines. After analysis, the student can show how the power factor and the efficiency of these engines change with varying load.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)</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</td></tr><tr><td colspan="4">Second session
oral exam with written preparation</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Only ordinary scientific calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td>Theory of electricity - part 1
Theory of electricity - part 2</td></tr>
<tr><td>Additional information</td><td></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**MARINE PROPULSION - PART 1 (3 UC)**
Course element	**Marine propulsion - part 1 (HZS-SW-SWM111)**
Lecturer(s)	**Tim COOLS**
Lecturer in charge	Tim COOLS
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	Dutch/French
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 12/-** | **Semester 2, Module 2.1 12/-** | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - have a thorough knowledge of the functioning and components of the Otto engine, the diesel engine and the gas turbine; - explain the names, functioning and operation of various types of internal combustion engines, based on a number of criteria and by first classifying internal combustion engines; - have the technological knowledge of the construction methods and the components common to all internal combustion engines; - identify and name all parts of a ship's engine; - explain the functioning of a ship's engine (2-stroke, 4-stroke and gas turbine); - demonstrate understanding of the different cooling systems and scavenging air systems of ship's engines; - calculate efficiency and air factors of ship's engines; - calculate power using the PV diagram; - write a report based on his/her calculations in a scientifically correct way and using a spreadsheet.

<table>
<tr><td>Course content</td><td>In this course, the student is introduced to various types of ship’s engines, including their components, characteristics, construction methods and applications. The student gains thorough knowledge of the operation of the various ship's engines thoroughly; he/she analyses their operation, efficiency and their function on board of a ship. The student also learns why certain types of engines are used on specific ships. The student should make use of acquired knowledge in the course on thermodynamics, mathematics and physics, to learn how to calculate power and efficiency.
The course covers the following topics in succession:
- classification and overview of internal combustion engines;
- overview of common engine components;
- main dimensions of piston engines;
- combustion process in Otto and diesel engines;
- combustion process in gas turbines;
- piston engine kinematics;
- discussion and calculation of gas and mass forces;
- power distribution in main driving mechanism and valve mechanisms;
- charge exchange in 4-stroke and 2-stroke engines;
- construction methods of piston engines and gas turbines;
- engine cooling and cooling circuits;
- engine lubrification.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
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written exam</td><td>Following Module 2.2
-</td></tr><tr><td colspan="4">Second session
written exam</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Ordinary scientific and graphic scientific calculators allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td>- Briand, J. (2008). Diesels marins. Rennes, France: Infomer.
- Kuiken, K. (2008). Diesel Engines I & II. Onnen, The Netherlands: Target Global Energy Training.
- Van Maanen, P. (1992). Scheepsdieselmotoren 1. Harfsen, Nederland: Nautech.
- Van Maanen, P. (1994). Scheepsdieselmotoren 2. Harfsen, Nederland: Nautech.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**THERMODYNAMIC PROCESSES - PART 1 (6 UC)**
Course element	**Thermodynamics - part 1 (HZS-SW-SWM121)**
Lecturer(s)	**Tim COOLS**
Lecturer in charge	Tim COOLS
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture			
Other teaching methods	Portfolio			
Instruction language	Dutch/French			
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: - describe states of fluids and calculate heat or work transfers in changes of state and thermodynamic cycles, considering a number of simplifying hypotheses; - create and use formulae in practical situations and interpret the results; - use tables and diagrams specific to this module; - assess the heat and energy balance of a maritime installation; - estimate heat transfer in other parts of the course, apply it and design a practical system.			

<table>
<tr><td>Course content</td><td>In the course thermodynamics 1, the student learns to understand, apply and analyze the general basic laws of physics and thermodynamics. Furthermore, the student is also taught some basic concepts of heat transport. In exercises and examples, emphasis is placed on marine engineering aspects. Special attention is paid to the analysis of day-to-day systems such as the engines (Otto and Diesel cycle), compressors and their thermodynamic properties.
The course starts with understanding the properties of a (pure) substance in phase changes and within one phase such as specific heat, evaporation heat, critical and triple point, ... After understanding this basis, the laws are analyzed and applied in heat transfer exercises.
The main laws of thermodynamics are explained in detail, with special attention being paid to the first law of thermodynamics: The Law of Conservation of Energy. The second law is already getting an introduction. The zeroth law and the third law are also discussed.
The student should understand the gas law and learn to apply it and in exercises the student learns to analyze and apply the gas law for ideal gases. Furthermore, the concept of enthalpy is synthesized, checked and evaluated together with the first law for closed systems.
Then the student learns to calculate thermodynamic transformations of ideal gasses, in which the isochor, the isobar, the isotherm, the adiabate and the polytropes are synthesized using differential equations (pdV) into applicable equations that are tested in complex exercises.
With this foundation, the student then learns to construct thermodynamic cycles or to analyze them themselves.
In the following part, the student will learn with which principles heat transfer can take place. Conduction (conduction), convection and radiation are analyzed here. Properties of emissivity in a black body, gray body and a perfect mirror are compared and applied in different exercises. These are then applied to the thermal shield, the super insulator and the heat transfer via microwaves is also compared with thermal radiation.
Finally, the student is taught how to analyze and solve problems for heat conduction in a complex wall and for a general configuration.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
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written exam</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Ordinary scientific and graphic scientific calculators allowed.</td></tr>
</table>

Recommended preliminary competences	
Additional information	- Andre Houberechts. (1996). *La thermodynamique technique*. Bruxelles, Belgique: Vander. - Cengel, Y. (2009). *Introduction to thermodynamics and heat transfer.* New York, US: McGraw-Hill. - Cengel, Y., Boles M. *Thermodynamics - An Engineering Approach - SI Version (8th ed.)* - Kimmenaede. (2010). *Warmteleer voor technici*. Groningen, Nederland Noordhoff Uitgevers. - Moran, M., Shapiro, H., Boettner, D., Bailey, M. (2012). *Principles of Engineering Thermodynamics – SI Version (7th ed.).* Hoboken, N.J., US: Wiley.

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**THERMODYNAMIC PROCESSES - PART 1 (6 UC)**
Course element	**Thermal recovery techniques - part 1 (HZS-SW-SWM141)**
Lecturer(s)	**Stefaan BUEKEN**
Lecturer in charge	Tim COOLS
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture			
Other teaching methods				
Instruction language	Dutch/French			
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 how energy moves in a thermal installation; - easily calculate energy flows, heat quantity, fuel consumption and generated power; - distinguish and describe different types of steam and their uses; - clarify the construction of types of boilers and thus to recognise the cause of errors in boiler operation; - know and explain the limitations of each kind of boiler and by this to justify the most suitable boiler for each application; - know and understand the operation of the different devices related to the boiler and plan their maintenance; - explain the full operation of the different types of turbines (action and reaction); - synthesise the advantages and disadvantages of each type of turbine and use this to analyse an application in order to choose the appropriate turbine; - identify the main steps for starting up and shutting down a turbine; - formulate the use of turbines on board for driving generators, pumps or propulsion.			

<table>
<tr><td>Course content</td><td>Heat recovery is used in various processes on board. This course introduces the student to the operation of steam and thermal oil installations in order to evaluate and improve the thermal efficiency of the ship.
The student determines the different types of heat exchangers and steam boilers (flame tube, water tube and once-through boiler) according to their construction and functioning. He/she argues how to ensure safety on the work floor, related to these devices and researches the functioning and usefulness of economisers, air heaters and superheaters.The student discovers different types of steam turbines and argues different working principles, advantages and disadvantages. He/she then compares these systems in a substantiated manner by relating them to concepts such as entropy and enthalpy. He/she makes energy calculations for both parts and complete installations. The difficulty of the problems increases during the course.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
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written exam</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></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></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**MARINE ENGINEERING SKILLS TRAINING - PART 1 (3 UC)**
Course element	**Marine engineering skills training - part 1 (HZS-SW-SWM132)**
Lecturer(s)	**Stefaan BUEKEN, Tim JANSSENS, Marc STERKENS**
Lecturer in charge	Tim JANSSENS
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	
Units of credit (UC)	3
Hours of formal lecture/practical exercise	-/48
Semester + module(s)	**Semester 1, Module 1.1 -/12** | **Semester 1, Module 1.2 -/12** | **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: At the end of the course, the student will be expected to be able to - master basic engineering skills; - handle, use and apply the correct safety regulations in the workshop; - recognise and describe the different basic parts of a diesel engine; - explain the operation of a 4-stroke diesel engine and a 2-stroke diesel engine; - describe the application of different materials in a combustion engine; - explain the purpose and operation of different tools and where to use them; - organise the dismantling/assembly of an engine under supervision, in a group and as individuals, and be able to bring this to a successful conclusion; - turn a basic stepped shaft on the lathe based on a technical drawing, using the correct processing techniques; and organise this assignment as an individual too; - apply drilling and milling techniques; - cut threads using a thread-cutting die and a tap; - know different assembly techniques; - know the use of different joining techniques; - apply basic welding techniques on a horizontal plane by using covered-electrode arc welding; - recognise different welding processes; - be able to use MIG (Metal Inert Gas) welding; - interpret his/her measurement data correctly and write a scientifically correct report using a word processor and spreadsheet.

<table>
<tr><td>Course content</td><td>The student learns to use tools, measuring tools and machines (grinding disc, drilling machine, sanding belt, etc) in a safe and correct way.
He/she learns the basics of welding and working on the lathe in a safe and correct way.
The student learns how he/she can dismantle machines in a technically responsible manner, assess their condition and bring them back into working order.
The student learns to make a report in which the condition of these machines is shown on the basis of correct measurement data.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
- Function in an international, multicultural environment, adopt a flexible attitude and act with respect when dealing with others (bachSW-f)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
permanent evaluation</td><td>Following Module 1.2
permanent evaluation</td><td>Following Module 2.1
permanent evaluation</td><td>Following Module 2.2
written and permanent evaluation</td></tr><tr><td colspan="4">Second session
practical test</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.</td></tr>
<tr><td>Required study material</td><td>- Safety clothing.
- Analog Vernier Caliper
- Ordinary scientific and graphic scientific 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	**Academic Bachelor in Marine Engineering**
Course	**TECHNICAL DRAWING AND CAD (3 UC)**
Course element	**Technical drawing and CAD (HZS-SW-SWM131)**
Lecturer(s)	**Rik FLOREN**
Lecturer in charge	Rik FLOREN
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises			
Other teaching methods				
Instruction language	Dutch/French			
Required preliminary credit(s)				
Units of credit (UC)	3			
Hours of formal lecture/practical exercise	-/12			
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: - correctly read and interpret technical drawings; - make correct technical drawings of parts to be produced, with correct indication of dimensions of surface roughness and tolerances; - read isometric drawings of pipes and make an isometric drawing of a pipe; - read electrical, hydraulic, electronic, pneumatic and automation diagrams; - draw electrical, hydraulic, electronic, pneumatic and automation diagrams; - create all these diagrams and drawings, both on paper and in a CAD programme; - communicate about adjustments made to drawings and schematics in a clear manner and in an international context.			

<table>
<tr><td>Course content</td><td>This course introduces the student to technical drawing and CAD. The following themes and topics are covered:
- reading and creating 2D drawings of machine parts;
- spatial insight in the 3 dimensions;
- consistent and correct use of dimensions of tolerances, the fitting system and surface roughness;
- screw thread systems;
- isometric sketching of pipes.
The student should make use of all of the above using a CAD programme, with extension to 3D.

Sketching and drawing according to international and deviating standards of:
- piping & Instrumentation Diagram P&ID;
- electrical and electronic diagrams.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
permanent evaluation</td><td>Following Module 1.2
permanent evaluation</td><td>Following Module 2.1
permanent evaluation</td><td>Following Module 2.2
-</td></tr><tr><td colspan="4">Second session
practical test</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.</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>- Giesecke, F.E. (latest ed.). Engineering graphics. US: Pearson Education Inc.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**ON BOARD TRAINING (5 UC)**
Course element	**On board training (HZS-SW-SWM151)**
Lecturer(s)	**Rik FLOREN**
Lecturer in charge	Rik FLOREN
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Practical exercises
Other teaching methods	Excursion Demonstration
Instruction language	Dutch/French + English
Required preliminary credit(s)	
Units of credit (UC)	5
Hours of formal lecture/practical exercise	-/224
Semester + module(s)	Semester 1, Module 1.1 -/- | Semester 1, Module 1.2 -/- | **Semester 2, Module 2.1 -/224** | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - envisage his/her future working environment; - not only have a clear understanding of the necessary safety culture on board a ship but also put safety first in every event; - appreciate the hierarchical structure on board; - stand watch and hand over watch on board; - react quickly and safely to the various alarm signals on board.
Course content	The student undertakes a fantastic sea voyage on board the school ship. During the trip, he/she will become accustomed to life on board accompanied by his/her foreign-language colleagues. Immediately, the student is put into a watch system to work as a team in the engine room and to do safety drills. In the engine room, the student discovers the different systems necessary to operate a ship. During his/her watch, the student does a series of inspections, fills in the logbook and makes projects for his/her cadet training record book.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Function in an international, multicultural environment, adopt a flexible attitude and act with respect when dealing with others (bachSW-f)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</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
permanent evaluation or oral presentation of individual training on board</td></tr><tr><td colspan="4">Second session
oral presentation of individual training on board</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.</td></tr>
<tr><td>Required study material</td><td>- Safety clothing.

- No calculator 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	Academic Bachelor in Marine Engineering
Course	**SAFETY TECHNOLOGY - PART 1 (5 UC)**
Course element	**Safety technology - theory (HZS-NW-EXP-SWM101)**
Lecturer(s)	**Inez HOUBEN**
Lecturer in charge	Inez HOUBEN
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	
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: - understand the functioning of the IMO, situate the various international conventions, codes, and other legislative instruments in terms of safety, understand the purpose and content and provide an overview of the links between the various components; - know the content of Chapter III of the SOLAS Convention and the LSA Code; - comply with the theoretical requirements set out in STCW code A-VI 1-3 'Specification of minimum standard competence in personal survival techniques', A-VI 1-3 'Specification of minimum standard of competence in elementary first aid', A-VI 1-4 'Specification of minimum standard of competence in personal safety and social responsibilities', and A-VI 2-1 'Proficiency in survival craft and rescue boats, other than fast rescue boats'; - comply with the theoretical requirements set out in A-VI 6-1 of the STCW code with regard to 'security awareness' as stipulated in the ISPS code - apply the theoretical knowledge and skills related to the aforementioned parts of the STCW code in a professional environment; - Act accurately and effectively in professional emergency situations.

<table>
<tr><td>Course content</td><td>The student acquires basic knowledge of maritime safety and becomes familiar with the role of the IMO and the main international safety regulations, including SOLAS and MARPOL. Particular attention is given to lifesaving appliances, personal survival techniques, elementary first aid, security awareness, and safe working practices on board. The course also addresses topics such as fatigue, bullying and harassment, and responsible behaviour in a maritime environment. Through this course, the student develops the knowledge and skills required to operate safely and responsibly at sea. The student acquires the STCW competencies related to these topics.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module
1.1
-</td><td>Following Module
1.2
written exam</td><td>Following Module
2.1
-</td><td>Following Module
2.2
-</td></tr><tr><td colspan="4">Second session
written exam</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></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 Maritime Organization. (1974). International Convention for the Safety of Life at Sea (SOLAS) 1974, as amended. London, UK: IMO.
- International Maritime Organization. (latest ed.). International Ship and Port Facility Security Code (ISPS). London, UK: IMO.
- International Maritime Organization. (latest ed.). Life Saving Appliances Code (LSA Code). London, UK: IMO.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**SAFETY TECHNOLOGY - PART 1 (5 UC)**
Course element	**Safety technology - exercises (HZS-NW-EXP-SWM102)**
Lecturer(s)	**Laura DE WEL, Wikke WITTEVEEN**
Lecturer in charge	Inez HOUBEN
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Practical exercises			
Other teaching methods	Group work Demonstration			
Instruction language	Dutch/French			
Required preliminary credit(s)				
Units of credit (UC)	1			
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: - reproduce in an accurate and insightful manner the knowledge and skills offered in the study material and during the lectures; - create a cohesive overview of the various components of the course content; - use the knowledge and skills acquired in other programme modules; - apply the acquired knowledge and skills with regard to the module in a professional environment; - act accurately and effectively in professional emergency situations.			

<table>
<tr><td>Course content</td><td>During practical sessions the student practises the following items, in accordance with STCW code A-VI 1-1 ‘Specification of minimum standard competence in personal survival techniques’, A-VI 1-3 ‘Specification of minimum standard of competence in elementary first aid’, A-VI 1-4 ‘Specification of minimum standard of competence in personal safety and social responsibilities’, and A-VI 2-1 ‘Proficiency in survival craft and rescue boats, other than fast rescue boats’.

The student uses a lifeboat and life raft: He/she:
- takes the lead during and after the launching of a lifeboat;
- operates and starts the engine of a lifeboat;
- launches a lifeboat, practises procedures while on board life rafts or lifeboats;
- Rights a capsised raft;
- learns rescue and survival techniques without a life raft.
The student practises with and discusses location devices:
- signalling equipment;
- pyrotechnic devices such as manual hoist lights, parachute signals, and other emergency beacons.
The student practises with and discusses all the different personal life-saving appliances:
- wearing and using life jackets, survival suits;
- working safely with PPE;
- communicating with others in relation to on-board tasks.
The student practises with and discusses following first aid equipment:
- Actions in emergency situations;
- basic life support and resuscitation;
- treatment for wounds, bleeding, burns, scalds, shocks, fractures, dislocations, and soft tissue injuries;
- hypothermia.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1
permanent evaluation</td><td>Following Module 1.2
-</td><td>Following Module 2.1
-</td><td>Following Module 2.2
-</td></tr>
<tr><td colspan="4">Second session
second session impossible</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.</td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.
- Safety clothing.

- No calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
</table>

Additional information	- 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.). *Pocket guide to cold water survival.* Londen, UK: IMO.

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**SAFETY TECHNOLOGY - PART 1 (5 UC)**
Course element	**Fire safety - theory &** **Fire safety - excercises** **(HZS-NW-EXP-SWM103 HZS-NW-EXP-SWM104)**
Lecturer(s)	**Raf MESKENS** **Frederik BOUMANS, Dries VAN ZUNDERT**
Lecturer in charge	Inez HOUBEN
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture Practical exercises			
Other teaching methods	Excursion Group work Demonstration			
Instruction language	Dutch/French Dutch/French + English			
Required preliminary credit(s)				
Units of credit (UC)	2			
Hours of formal lecture/practical exercise	12/12			
Semester + module(s)	Semester 1, Module 1.1 -/-	**Semester 1, Module 1.2** **12/-**	**Semester 2, Module 2.1** **-/6**	**Semester 2, Module 2.2** **-/6**

Learning objectives	At the end of the course, the student is expected to be able to: - understand and apply the principles of fire and explosion; - reduce the human risk factor as much as possible; - consult and understand the various laws and regulations in force; - in the event of fire, limit the risks to the ship, its cargo, and the surrounding area; - know and understand the principles of containment, control and firefighting in their place of origin; - understand the need for different ways and means of evacuating passengers and crew; - define various firefighting strategies; - recognise and understand the link between good preparation/organisation and a structural firefighting method; - develop practical exercises for training crews; - implement the practical requirements set out in A-VI 1-2 'Fire prevention and fire fighting' of the STCW-code; - demonstrate the practical knowledge and skills such as, for example, spraying techniques with fire hoses and progressing techniques with firefighting equipment and respiratory protection with regard to A-VI 1-2 'Fire prevention and firefighting' of the STCW code during simulated examples; - respond correctly to fire situations during controlled exercises in a specialised training centre; - possess the skills to help accurately and effectively in professional fire emergencies.

Course content	The student learns how to fight fires on board ships, in accordance with STCW A-VI 1-2 'Fire prevention and firefighting'. Both prevention, development, detection and fighting of a fire are covered. The basis of the course is the SOLAS convention chapter II-2 and the accompanying FSS code. The theoretical course consists of chapters structured around the 4 main areas of fire theory, namely prevention, development, detection and firefighting. In the first chapters, the student receives a theoretical explanation of fire and corresponding terms and definitions, different basic principles such as the fire triangle and the different fire classes. Subsequently, the student is introduced to the different causes of fire, according to their specific causes and special, high-risk areas on board the ship. Via the theoretical treatment of risk management, detection and control, contained in the construction of the ship, the student becomes acquainted with the various available detection systems on board. The theory of firefighting is applied in full detail, ranging from the organisation on board, different systems and equipment on board, to the development of different strategies depending on the type of ship. **Before the student may start the fire safety - exercises course, he/she must have passed the fire safety - theory course. In addition, to ensure safety, the student will receive instructional videos and other crucial information in advance and will have to pass a test before the start of practical classes in order to participate in the fire safety - exercises course.** To ensure safety, the student will receive instructional videos and other crucial information beforehand, and will have to pass a test before the start of practical lessons in order to participate. Afterwards, the student receives practical basic training in firefighting. The following elements are practised: - breathing apparatus: the student learns to perform the correct procedure and checks, name the various components, quickly connect and disconnect the air supply, set up and use the equipment fluently; - progressing in group: understanding why and how to carry this out, necessity for good communication between team members, performing a correct stairs procedure; - fire hoses: correctly unrolling, emptying, and rolling up fire hoses; - fire hose management: correctly align and connect fire hoses, place manifolds correctly and know how to connect them; - fire nozzle techniques and 'water management': importance of water management and the correct operation of fire nozzles; - Victim evacuation: carrying out a search and rescue and performing correct carrying techniques (with BA set) to evacuate victims; - apply door procedures correctly; - making an efficient foam arrangement; - small extinguishing means: distinguish different fire extinguishers, limitations, and characteristics, correct operation of extinguishers; - use of a fire blanket on a deep fryer and a person; - EEBD (different types); - taking immediate appropriate action in the event of a fire (fire classes); - organisation in firefighting team: group collaboration, assertiveness, communication, and allocation of tasks.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1
-</td><td>Following Module 1.2
written exam</td><td>Following Module 2.1
permanent evaluation</td><td>Following Module 2.2
permanent evaluation</td></tr>
<tr><td colspan="4">Second session
written exam
second session impossible</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.
- Safety clothing.

- No calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td>- International Maritime Organization. (1974). International Convention for the Safety of Life at Sea (SOLAS) 1974, as amended. London, UK: IMO.
- International Maritime Organization. (2000). International Code for Fire and Safety Systems, 2000, as amended. London, UK: IMO.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**STABILITY AND SHIP CONSTRUCTION - PART 1 (4 UC)**
Course element	**Stability - part 1** **(HZS-NW-EXP-SWM111)**
Lecturer(s)	**Ynse JANSSENS**
Lecturer in charge	Remke WILLEMEN
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	
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 -/- 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: - have theoretical knowledge of the stability of ships; - be able to identify markings on the hull of ships; - illustrate how centre of gravity and centre of pressure change with shifting weights; - interpret loading scales; - Critically assess a GZ curve and compile it independently; - find and calculate solutions to simple stability issues.
Course content	The student receives an introduction to the study of the stability of ships. The course covers, among other things, the following items: displacement, deadweight, draughts, buoyancy, type A and type B vessels, FWA (Fresh Water Allowance), TPC (Tonnes per Centimetre Immersion), initial stability, statical stability, centre of gravity, curve of statical stability, angle of loll, movement of the centre of gravity, list, and the effect of slack tanks (free liquid surface).

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</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
written exam</td></tr><tr><td colspan="4">Second session
written exam</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Only ordinary scientific calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td>- Barrass, B., Derrett, D.R. (latest ed.) Ship Stability for Masters and Mates. London, UK: Butterworth-Heinemann.
- International Maritime Organization. (1966). International Load Lines Convention (ILL) 1966, 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.). Recommendation on Intact Stability for Passenger and Cargo Ships. London, UK: IMO.
- International Maritime Organization. (latest ed.). Ships' Routeing. London, UK: IMO.
- Rhodes, M. (2009). Ship Stability OOW. Edingburgh, UK: Witherby Seamanship International.
- Rhodes, M. (2020). Ship Stability Strength and Loading Principles. Edingburgh, UK: Witherby Seamanship International.
- van Dokkum, K. (latest ed.). Ship Stability. Enkhuizen, The Netherlands: Dokmar.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**STABILITY AND SHIP CONSTRUCTION - PART 1 (4 UC)**
Course element	**Schip's construction - part 1 (HZS-NW-EXP-SWM112)**
Lecturer(s)	**Remke WILLEMEN**
Lecturer in charge	Remke WILLEMEN
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture			
Other teaching methods	Demonstration			
Instruction language	Dutch/French			
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: - possess theoretical knowledge of shipbuilding materials: production process and mechanical properties; - be able to recognise and correctly name different parts of a ship; - know and understand the entire building process from concept to finished ship; - read ship plans, understand the purpose, content, and different applications; - possess insight into the structure of a ship; - possess insight into material stresses and loads; - possess insight into damage.			

<table>
<tr><td>Course content</td><td>In the first part the student becomes acquainted with important concepts regarding the metals used in shipbuilding, and this in relation to the production process of the metals, their microstructure, and the different types of destructive and non-destructive tests. This information will then be linked to the rules laid down by the Classification Societies. Subsequently, the basic concepts of the strength of materials are discussed, so that the student can become acquainted with the concept of internal stress in a material and the different types of stresses. Finally, a link is established between these stresses and loads applied to the structure of a ship.

The second part describes the building process of the ship with an emphasis on ship design, the production process and relevant ship plans.

In the third part, the student becomes acquainted with the assembling of a ship's hull by a detailed presentation of the ship's structure. The various structural elements are discussed and their contribution to the strength of the ship. This part is followed by a presentation of the typical building characteristics of different types of ships. Finally, some important mechanisms are introduced: the steering gear, the propeller shaft seal, and the propeller.

The fourth and final part brings together knowledge of shipbuilding materials, stresses, the building process as well as the construction of a ship by delving into the subject of damage.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)</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
written exam</td></tr><tr><td colspan="4">Second session
written exam</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Only ordinary scientific calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td>- Eyres, D.J. & Bruce, G.J. (2012). Ship Construction (7th ed.). London, UK: Butterworth-Heinemann. ISBN: 9780080972398
- Taylor, D.A. (1998). Merchant Ship Construction (4th ed.). London, UK: IMarEST. ISBN: 97819025636002
- van Dokkum, K. (latest ed.). Ship Knowledge. Enkhuizen, The Netherlands: Dokmar.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**INTRODUCTION TO SCIENTIFIC RESEARCH (3 UC)**
Course element	**Introduction to scientific research (HZS-WE-TE-SWM114)**
Lecturer(s)	**Tim COOLS, Han JACOBS, Jonas JOOS, Deirdre LUYCKX**
Lecturer in charge	Deirdre LUYCKX
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	Portfolio Group work
Instruction language	Dutch/French
Required preliminary credit(s)	
Units of credit (UC)	3
Hours of formal lecture/practical exercise	12/12
Semester + module(s)	**Semester 1, Module 1.1** **9/9** **Semester 1, Module 1.2** **3/3** 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: - construct a scientific research question; - identify scientific sources, use these to look up information, integrate them in a scientific study; - organise and visualise data in graphs; - produce a scientific report in text and in poster format according to the applicable scientific and academic standards, using a classic word processor.
Course content	In this course, students are introduced to scientific research, whereby they become acquainted with various basic techniques and methods of academic thinking and behaviour. The central theme here concerns the construction of a research question with attention to the SMART-principle (Specific - Measurable - Acceptable - Realistic – Time bound) within the framework of a project cycle. As a second important theme, the student learns to correctly identify and use scientific sources in a scientific study. Subsequently, he/she learns to edit a scientific report, thereby paying attention to adequate writing style, text structure and layout, and to draw up an appropriate list of references using a software package. In addition, the student acquires knowledge on how to use a spreadsheet package (such as Microsoft Excel) to process calculations and simulations, to manage and analyse numerical information, and to create scientific graphs and visualise the result of his/her work. The student also learns to perform error analysis as a basis for later courses in which data analysis is further elaborated. Finally, the student learns how to produce a scientific poster and is taught how to present his/her research to an audience.

<table>
<tr><td>Learning outcomes</td><td>- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1
permanent evaluation
with integrated practical test</td><td>Following Module 1.2
permanent evaluation
with integrated practical test</td><td>Following Module 2.1
-</td><td>Following Module 2.2
-</td></tr>
<tr><td colspan="4">Second session
practical test en integrated practical test</td></tr>
</table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Ordinary scientific and graphic scientific 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	Academic Bachelor in Marine Engineering
Course	**MATHEMATICS AND PHYSICS - PART 1 (9 UC)**
Course element	**Differential and integral calculus - part 1 (HZS-WE-TE-SWM111)**
Lecturer(s)	**Peter BUEKEN, Jonas JOOS, Deirdre LUYCKX, Katrijn VERHASSELT**
Lecturer in charge	Peter BUEKEN
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	Portfolio Tutoring
Instruction language	Dutch/French
Required preliminary credit(s)	
Units of credit (UC)	5
Hours of formal lecture/practical exercise	36/21
Semester + module(s)	**Semester 1, Module 1.1 6/-** | **Semester 1, Module 1.2 12/9** | **Semester 2, Module 2.1 12/6** | **Semester 2, Module 2.2 6/6**
Learning objectives	At the end of the course, the student is expected to be able to: - apply elementary techniques from the differential and integral calculus correctly to concrete examples (e.g. calculating the derivative, indefinite, and definite integral of a given function, calculating an approximate value for a definite integral, calculating the trigonometric and exponential representation of a complex number); - apply these calculation techniques to solve simple mathematical problems, such as calculating extreme values of a function and the tangent to a curve, calculating limits with l'Hôpital's rule, determining areas, volumes, centres of gravity, and moments of inertia of figures, calculating powers and roots of complex numbers with de Moivre's formula; - solve simple composite problems by dividing them into a series of successive sub-problems, determining or collecting the necessary data, and carrying out the required operations in the required sequence while using the appropriate calculation technique.
Course content	The student becomes acquainted with the most important techniques from the differential and integral calculus, in particular the calculation of the derivative and differential of a function of one variable, as well as the indefinite and definite integrals of such functions. Furthermore, he/she also learns the geometric and physical meaning of these elements and learns to use these techniques for solving simple and composite mathematical problems. He/she also gets to know complex numbers and learns to calculate with these numbers in an efficient way and to use these numbers to solve mathematical problems.

<table>
<tr><td>Learning outcomes</td><td colspan="4">- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)</td></tr>
<tr><td>Examination</td><td>Following Module
1.1
-</td><td>Following Module
1.2
written exam</td><td>Following Module
2.1
-</td><td>Following Module
2.2
written exam</td></tr>
<tr><td></td><td colspan="4">Second session
written exam</td></tr>
<tr><td>Caesura measures</td><td colspan="4"></td></tr>
<tr><td>Required study material</td><td colspan="4">- Lecturer's course text available.

- Ordinary scientific and graphic scientific calculators allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td colspan="4">Mathematics</td></tr>
<tr><td>Additional information</td><td colspan="4">- Ayres, F., & Mendelson, E. (2013). Schaum’s outlines calculus. Schaum’s outline series (6th ed.). New York, NY: McGraw-Hill.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**MATHEMATICS AND PHYSICS - PART 1 (9 UC)**
Course element	**Vector calculus - part 1 and statiques (HZS-WE-TE-SWM112)**
Lecturer(s)	**Peter BUEKEN, Katrijn VERHASSELT**
Lecturer in charge	Peter BUEKEN
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	Portfolio Tutoring Demonstration
Instruction language	Dutch/French
Required preliminary credit(s)	
Units of credit (UC)	2
Hours of formal lecture/practical exercise	12/6
Semester + module(s)	**Semester 1, Module 1.1** **6/3** **Semester 1, Module 1.2** **6/3** 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: - present vectors in a two- and three-dimensional space in different ways, and use these representations for arithmetic with vectors; - draw up equations of planes and lines in a three-dimensional space; - apply the calculation of a vector sum, a scalar and cross product to determine resulting forces, torques, and their components; - understanding the basic laws of statics and applying them in a structured way to the equilibrium analysis of mechanical systems; - taking into account material properties, to determine axial deformation and transverse contraction under the influence of normal stress.

<table>
<tr><td>Course content</td><td>The student becomes acquainted with the following important concepts from vector caculus:
- vectors in the plane and in the three-dimensional space (the term vector, free and bound vectors, modulus of a vector; components of a vector, sum and difference of vectors, scalar multiple, scalar product,cross product, triple product, scalar and vector projections);
- concepts from geometry (equation of a plane and a line in three-dimensional space).
The student learns to apply these concepts to problems from statics. To this end, he/she first acquires an introductory basic knowledge of Newtonian mechanics of a point particle, of a system of point particles, and of a rigid body. He/she becomes familiar with basic concepts of statics: force and torque; equilibrium conditions.
The student is introduced to strength of materials, more specifically the student learns to determine axial deformation and transverse contraction under the influence of normal stress while taking into account material properties.</td></tr>
<tr><td>Learning outcomes</td><td>- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1
written exam</td><td>Following Module 1.2
written exam</td><td>Following Module 2.1
-</td><td>Following Module 2.2
-</td></tr>
<tr><td colspan="4">Second session
written exam</td></tr>
</table></td></tr>
<tr><td>Caesura measures</td><td>- Obtain a minimum of 8/20 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.

- Ordinary scientific and graphic scientific calculators allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td>Mathematics</td></tr>
<tr><td>Additional information</td><td>- Spiegel, M. R. (1987). Theoretical mechanics: Schaum's outline of theory and problems. New York, NY: McGraw-Hill.
- Spiegel, M. R. (2002). Theory and problems of advanced calculus. New York, NY: McGraw-Hill.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**MATHEMATICS AND PHYSICS - PART 1 (9 UC)**
Course element	**Waves** **(HZS-WE-TE-SWM113)**
Lecturer(s)	**Katrijn VERHASSELT**
Lecturer in charge	Peter BUEKEN
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises			
Other teaching methods	Tutoring Demonstration			
Instruction language	Dutch/French			
Required preliminary credit(s)				
Units of credit (UC)	2			
Hours of formal lecture/practical exercise	12/6			
Semester + module(s)	Semester 1, Module 1.1 -/-	Semester 1, Module 1.2 -/-	**Semester 2, Module 2.1** **6/3**	**Semester 2, Module 2.2** **6/3**
Learning objectives	At the end of the course, the student is expected to be able to: - possess a theoretical understanding of what the phenomenon 'wave' implies, as of the classification of waves; - describe the general characteristics of wave phenomena using the harmonic wave; - understand how a suitable combination of (harmonic) waves creates beats and standing waves, and to carry out basic calculations in relation to this; - understand and apply the principles of interference in a general and specific sense; - understand the importance of the decibel scale and to calculate sound levels and intensities correctly.			

<table>
<tr><td>Course content</td><td>The student learns to work in a theoretical and applied manner with wave phenomena and their characteristics:
- longitudinal and transversal waves;
- mechanical and electromagnetic waves;
- wave function and speed of propagation of a wave (celerity;
- power and intensity;
- beats;
- standing waves;
- Huygens’ principle;
- refraction and reflection;
- interference and diffraction;
- the Doppler effect for mechanical waves;
- the Decibel scale;
- total internal reflection;
- the Doppler effect for electromagnetic waves;
- the vector of Poynting.</td></tr>
<tr><td>Learning outcomes</td><td>- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)</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
written exam</td></tr><tr><td colspan="4">Second session
written exam</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Ordinary scientific and graphic scientific calculators allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td>Mathematics</td></tr>
<tr><td>Additional information</td><td></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**MATTER AND MATERIALS PART 1 (3 UC)**
Course element	**Matter and materials part 1 (HZS-WE-TE-SWM121)**
Lecturer(s)	**Joeri HORVATH**
Lecturer in charge	Joeri HORVATH
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture			
Other teaching methods				
Instruction language	Dutch/French			
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: - describe and classify different aggregate states of matter and explain their properties; - describe the general structure of atoms and molecules; - use Mendeleev's Table to find data about atoms and thereby explain the properties of elements; - use the language of chemical reaction equations and solve simple stoichiometric problems, including those in the gas phase; - interpret phase diagrams, explaining the behaviour of steel; - describe methods of calculating hardness and yield strength, as well as perform simple calculations.			

<table>
<tr><td>Course content</td><td>In ‘Matter and Materials,’ the student studies the physicochemical properties of a variety of materials and learns to predict, from the properties of atomic and molecular particles, how substances behave at the macroscopic level.

At the beginning of this course, the student learns to name and use the fundamental concepts of general chemistry, together with basic concepts of physics, to understand the behaviour of more complex materials. The student practises correct use of the language of chemical reaction equations correctly and solves simple stoichiometric problems, including in the gas phase and for ionic reactions.

The course then discusses the properties of atoms, bonds between atoms to form molecules, crystal lattices of metals and ionic compounds. Gradually, the student gains insight into Mendeleev's Table as a basic tool for classifying the properties of elements. This is further explored using the general gas law to describe the behaviour of gases, and the iron-carbon diagram as an example of crystalline solids such as steel. Finally, material properties of metals such as hardness and strength are also explained in terms of the aforementioned microscopic organisation.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)</td></tr>
<tr><td>Examination</td><td>
<table>
<tr><td>Following Module 1.1
-</td><td>Following Module 1.2
oral exam with written preparation</td><td>Following Module 2.1
-</td><td>Following Module 2.2
-</td></tr>
<tr><td colspan="4">Second session
oral exam with written preparation</td></tr>
</table>
</td></tr>
<tr><td>Caesura measures</td><td></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></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**PSYCHOLOGY: HUMAN ASPECTS OF NAVIGATION (3 UC)**
Course element	**Psychology: human aspects of navigation (HZS-WE-HT-SWM121)**
Lecturer(s)	**Camille DEBANDT**
Lecturer in charge	Camille DEBANDT
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	Dutch/French
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 12/-** | **Semester 2, Module 2.1 12/-** | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - understand simple psychological processes, such as observation and attention, and evaluate their effect on the life on board; - understand the influence of social situations on human behaviour in order to demonstrate appropriate social skills during interpersonal contact; - understand and remember the qualities and pitfalls of different styles of conflict in order to be able to use the most appropriate style during a conflict and thus promote teamwork; - understand, with knowledge of the sleeping process, the principle of circadian rhythm and the disruptive effects of standing watch on sleep rhythm, as well as the causes and prevention of fatigue; - identify symptoms of excessive personal stress and those of others.
Course content	The course introduces the basic principles of psychology and its research methods while examining, together with the student, the following themes: perception, attention and sleep/fatigue. The student furthermore becomes acquainted with topics from social psychology that are relevant to maritime navigation via group discussions and exercises regarding social influence, attribution, conformity, obedience, group decision-making, helping others (diffusing of responsibility), aggression, stereotypes, and stress.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Function in an international, multicultural environment, adopt a flexible attitude and act with respect when dealing with others (bachSW-f)</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
written exam</td><td>Following Module
2.2
-</td></tr><tr><td colspan="4">Second session
written exam</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></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></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**MARITIME ENGLISH - PART 1 (5 UC)**
Course element	**Maritime English - part 1 (HZS-WE-HT-SWM131)**
Lecturer(s)	**Pieter DECANCQ, Felix HERMANS**
Lecturer in charge	Pieter DECANCQ
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises			
Other teaching methods	Portfolio			
Instruction language	English			
Required preliminary credit(s)				
Units of credit (UC)	5			
Hours of formal lecture/practical exercise	36/24			
Semester + module(s)	Semester 1, Module 1.1 -/-	**Semester 1, Module 1.2** **12/12**	**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: - recognise, understand, remember, and use specific maritime vocabulary at the introductory level to communicate about a range of maritime topics; - understand, remember, and use English grammar at the repetitive level (secondary education) in general-maritime communication situations; - understand, analyse, and process specific maritime (both nautical and engineering) texts, listening and video files at the introductory level through reflective exercises, both oral and written; - use specific maritime reporting methods by writing a report relevant to either Nautical Sciences or Marine Engineering; - Recognise, understand, remember, and apply the maritime specific communication method known as *IMO Standard Marine Communication Phrases* at the introductory level.			

<table>
<tr><td>Course content</td><td>During the course Maritime English 1 the student learns to:

- use English to communicate about a range of maritime subjects relevant to both Nautical Sciences and Marine Engineering;
- competently use specific maritime vocabulary at an introductory level through the study in English of maritime texts;
- competently apply English grammar at the repetitive level (secondary education) in general grammar exercises, including at the spoken and written level;
- process original maritime documents by means of reflection, analysis, (spoken) commentary, and creative writing skills;
- understand and apply the specific maritime communication method IMO Standard Marine Communication Phrases at an introductory level through various gapfill, speaking and writing exercises.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
- Function in an international, multicultural environment, adopt a flexible attitude and act with respect when dealing with others (bachSW-f)
- Communicate effectively and professionally in English under all kinds of maritime circumstances (nautical-technical situations) (bachSW-g)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
-</td><td>Following Module 1.2 permanent evaluation</td><td>Following Module 2.1 written and permanent evaluation</td><td>Following Module 2.2 oral exam and permanent evaluation</td></tr><tr><td colspan="4">Second session
oral and written exam en portfolio</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.
- International Maritime Organization. (2002). Standard Marine Communication Phrases. London, UK: IMO. ISBN: 9789280142112.
- Logie, C., Vivers, E. & Nisbet, A. (1998). Marlins English for Seafarers, Study Pack 2. Edinburgh, UK: Marlins. ISBN 0953174816.
- No calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
</table>

Additional information	- Buckowska, W. (2014). *MarEngine English Underway.* Dokmar, the Netherlands. ISBN: 9789071500268. - 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. (2002). *Standard Marine Communication Phrases*. London, UK: IMO. ISBN: 9789280142112. - Logie, C., Vivers, E. & Nisbet, A. (1998). *Marlins English for Seafarers, Study Pack 2*. Edinburgh, UK: Marlins. ISBN 0953174816. - Murphy, R. (2004). *English Grammar in Use.* (4th ed.). Cambridge, UK: Cambridge University Press. ISBN: 97811075339334. - Murphy, R. (2004). *Essential Grammar in Use* (3rd ed.). Cambridge, UK: Cambridge University Press. ISBN 9781107480551. - Nisbet, A., Witcher Kutz, A. & Logie, C. (1997). *Marlins English for Seafarers, Study Pack 1*. Edinburgh, UK: Marlins. ISBN: 0 9531748 08. - Petkova, V. & Toncheva, S. (2016). *Correspondence and Communications in Shipping.* Varna, Bulgaria: Steno Publishing House. ISBN: 978-954-449-853-5. - Van Kluijven, P.C. (2007). *The International Maritime Language Programme*. Sint Pancras, the Netherlands: Alk & Heijnen Publishers ISBN: 9789059610064.

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**MARITIME MEDICINE (3 UC)**
Course element	**Maritime medicine (HZS-WE-HT-SWM141)**
Lecturer(s)	**Thomas VAN LOOY**
Lecturer in charge	Deirdre LUYCKX
Educational programme	**First year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises			
Other teaching methods				
Instruction language	Dutch/French			
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 -/-	Semester 1, Module 1.2 -/-	**Semester 2, Module 2.1** **12/-**	**Semester 2, Module 2.2** **6/6**
Learning objectives	At the end of the course, the student is expected to be able to: - reproduce in an accurate and insightful way the knowledge and skills presented in the study material and during the lessons, practice, and demonstrations; - demonstrate and apply the acquired knowledge and skills regarding general pathology in a professional environment; - demonstrate and apply the knowledge and skills of occupational pathology and prevention in a professional environment; - provide medical assistance in emergency situations on board in accordance with the criteria laid down in the STCW95 Code as amended.			

<table>
<tr><td>Course content</td><td>The student will study the following topics:

First Aid for accidents, at helper level. Special focus on wound care, fractures, bleeding, burns, drowning, CPR, and shock.

General pathology: introduction to the human body, respiratory diseases, cardiovascular diseases, abdominal diseases, sexually transmitted diseases, back problems, seasickness, malaria and quarantine diseases, psychological problems.

Occupational pathology and prevention: physical and chemical risks on board, drugs and alcohol, vaccinations, nutrition, and hygiene.

Use of the ship's pharmacy and radio medical advice.

Through lectures, practice, and demonstrations, the student acquires the knowledge necessary to provide medical assistance on board according to the criteria laid down in the STCW95 as amended.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Function in an international, multicultural environment, adopt a flexible attitude and act with respect when dealing with others (bachSW-f)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</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 en oral exam and permanent evaluation</td></tr><tr><td colspan="4">Second session
oral exam with written preparation en 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 and second exam session.</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>- Marine and Coastguard Agency. (latest ed.). The ship captain’s medical guide. London, UK: The Stationery Office.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**MARITIME ENGLISH (REFRESHER COURSE) (UC)**
Course element	**Maritime English (refresher course) (HZS-WE-HT-SWM171)**
Lecturer(s)	**Pieter DECANCQ**
Lecturer in charge	Pieter DECANCQ
Educational programme	**First year Bachelor in Marine Engineering**

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	-/24
Semester + module(s)	**Semester 1, Module 1.1 -/24** | 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: - recognise, memorise, and use a starter pack of general maritime vocabulary in accordance with the General Maritime English (GME) section of the IMO Model Course 3.17 Maritime English 2015 edition; - remember, understand, and apply English grammar in general maritime English communication situations; - have a sufficient command of the reading, listening, writing, and speaking skills in the English language to serve as an introduction to the maritime English part of the course (part 1).
Course content	In the Refresher Course (optional refresher course with compulsory test at the end of the module) the student becomes acquainted with: - a starter pack of general maritime vocabulary using texts, audio and video files in accordance with the General Maritime English (GME) section of the IMO Model Course 3.17 Maritime English 2015 edition; - repetitive English grammar in general maritime reading, writing, listening and speaking exercises. The student follows this course to refresh his/her general knowledge of the English language and become acquainted with the English-speaking maritime world through a student-oriented and communicative approach.
Learning outcomes	

<table>
<tr><td>Examination</td><td>
<table>
<tr><td>Following Module 1.1 integrated practical test</td><td>Following Module 1.2
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-</td></tr>
</table>
</td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Murphy, R. (2004). English Grammar in Use (4th ed.). Cambridge, UK: Cambridge University Press. ISBN 97811075339334.
- No calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td>- International Maritime Organization. (2002). Standard Marine Communication Phrases. London, UK: IMO
- Logie, C., Vivers, E. & Nisbet, A. (1998). Marlins English for Seafarers Study Pack 1. Edinburgh, UK: Marlins. ISBN: 0953174808.
- Murphy, R. (1990). Essential Grammar in Use (3rd ed.). Cambridge, UK: Cambridge University Press. ISBN: 9780521675437.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**THERMODYNAMIC PROCESSES - PART 2 (6 UC)**
Course element	**Thermodynamics - part 2 (HZS-SW-SWM221)**
Lecturer(s)	**Tim COOLS**
Lecturer in charge	Tim COOLS
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture			
Other teaching methods	Portfolio			
Instruction language	Dutch/French			
Required preliminary credit(s)	**Standard succession (must have followed)** Thermodynamic processes - part 1			
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: - accurately prepare mass, energy and entropy balances and accurately analyse and evaluate both closed and open systems; - understand the basic thermal concepts of energy and entropy; - critically reflect on the obtained results; - correctly apply and use thermodynamic tables; - correctly analyse a thermodynamic cycle; - process and analyse data from exercises and real-life examples.			

<table>
<tr><td>Course content</td><td>In the course thermodynamics 2 the student will build on the course thermodynamics 1 where the student starts to apply heat transfer in practice and the student investigates the relationships of these laws in heat exchangers. A synthesis is made of both the co-current and counter-current heat exchangers as well as the practical heat exchanger.
Next, the student will analyze the second law of thermodynamics in detail, assessing the state variable Entropy in detail. This is substantiated on the basis of applications such as: Clausius inequality, isentropic processes of ideal gases, reversible work for control volumes. The student will also use differentials (TdS) set up, calculate the isentropic efficiency of turbines, compressors and nozzles, as well as analyzing the entropy balance of closed systems and control volumes. The energy transport for open systems is analyzed via heat, work and mass. Then he/she sees the first law of thermodynamics applied to nozzles, turbines, compressors and throttle valves and the energy balance for stationary open systems is worked out. The second law of thermodynamics is demonstrated with an analysis of the efficiency of thermal machines, specifically the performance of cooling systems and heat pumps is being validated. This is continued by elaborating on Carnot's cycle and Rankine's cycle related to analyzing reversible and irreversible processes and determining the efficiency of a reversible thermal machine.

Finally, the student will analyze thermodynamic cycles of real processes such as marine engines, combustion engines and gas turbines, as well as systems such as boilers, cooling and HVAC systems, refrigeration and properties of LPG and LNG, etc.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)</td></tr>
<tr><td>Examination</td><td>
<table>
<tr><td>Following Module 1.1
-</td><td>Following Module 1.2
written exam</td><td>Following Module 2.1
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<tr><td colspan="4">Second session
written exam</td></tr>
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</td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Ordinary scientific and graphic scientific calculators allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td>- Andre Houberechts. (1996). La thermodynamique technique. Bruxelles, Belgique: Vander.
- Cengel, Y. (2009). Introduction to thermodynamics and heat transfer. New York, US: McGraw-Hill.
- Kimmenaede. (2010). Warmteleer voor technici. Groningen, Nederland: Noordhoff Uitgevers.
- Moran, M., Shapiro, H., Boettner, D., Bailey, M. (2012). Principles of Engineering Thermodynamics – SI Version (7th ed.). Hoboken, N.J., US: Wiley.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**THERMODYNAMIC PROCESSES - PART 2 (6 UC)**
Course element	**Thermal recovery techniques - part 2 (HZS-SW-SWM241)**
Lecturer(s)	**Stefaan BUEKEN**
Lecturer in charge	Tim COOLS
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Thermodynamic processes - part 1
Units of credit (UC)	3
Hours of formal lecture/practical exercise	24/12
Semester + module(s)	**Semester 1, Module 1.1** **12/-** **Semester 1, Module 1.2** **12/12** 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: - interpret and apply schematics of installations; - describe each component on and around the boiler and make a critical evaluation of its usefulness in the installation; - assess problems during operation and solve them in a safe way; - analyse the different steps in the production of boiler water; - demonstrate the use of the installation; - assess problems with water quality; - evaluate the operation of an automated steam boiler and control circuits; - recognise the different types of burners, including their individual components, and make a basic evaluation of the burner condition.
Course content	The student is immersed into the construction and functioning of steam installations and installations with thermal oil, more specifically the construction and functioning of the double pressure boiler and the boiler burner. In doing so, he/she studies the different types of injection systems, the power control, the monitoring of combustion and placement in the boiler. Subsequently, the student combines the preparation of the boiler water and the chemical systems for improved steam quality and boiler service life. He/she assesses the heat distribution, the construction of the pipes, including the devices to protect the pipes. Finally, the student integrates the automation of the installations, the level control, the pressure control and the TDS control.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
-</td><td>Following Module 1.2
written and permanent evaluation</td><td>Following Module 2.1
-</td><td>Following Module 2.2
-</td></tr><tr><td colspan="4">Second session
written and practical test</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></td></tr>
<tr><td>Additional information</td><td></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**SHIP'S AUXILIARY MACHINES - PART 1 (3 UC)**
Course element	**Ship's auxiliary machines - part 1 (HZS-SW-SWM251)**
Lecturer(s)	**Gijs VANDEN BOGAERDE**
Lecturer in charge	Gijs VANDEN BOGAERDE
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	
Units of credit (UC)	3
Hours of formal lecture/practical exercise	18/8
Semester + module(s)	Semester 1, Module 1.1 -/- | **Semester 1, Module 1.2 6/-** | Semester 2, Module 2.1 -/- | **Semester 2, Module 2.2 12/8**
Learning objectives	At the end of the course, the student is expected to be able to: - describe auxiliary machinery and identify its components; - explain the operation of auxiliary machinery and relate its application to the operation of a ship; - interpret pump, piping, and system characteristics.; - understand the possibilities/applications of different types of pumps and compressors.
Course content	A ship has many other tools besides the main engine that ensures propulsion. During this course, the student discovers these so-called auxiliary tools and analyses their application. On the one hand, this concerns auxiliary machinery that makes the main engine run (e.g. valves, filters, level gauges, piping systems, pumps, compressors, ejectors, couplings, gaskets, etc.). Many of these auxiliary tools are also used elsewhere on board, with the emphasis on the use of pumps and compressors. On the other hand, students explore auxiliary machinery related to, and not limited to, steering gear (e.g. variable pitch propeller, gear boxes, winches, electro-pneumatic systems, etc.) or cargo handling (e.g. lifting equipment, etc.).

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1
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written exam</td><td>Following Module 2.1
-</td><td>Following Module 2.2
written exam</td></tr>
<tr><td colspan="4">Second session
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<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Ordinary scientific and graphic scientific calculators allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td>Hydromechanics</td></tr>
<tr><td>Additional information</td><td></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**STRENGTH OF MATERIALS AND STRUCTURAL MECHANICS (4 UC)**
Course element	**Strength of materials and structural mechanics (HZS-SW-SWM261)**
Lecturer(s)	**Stefaan BUEKEN, Deirdre LUYCKX**
Lecturer in charge	Stefaan BUEKEN
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture			
Other teaching methods	Group work			
Instruction language	Dutch/French			
Required preliminary credit(s)				
Units of credit (UC)	4			
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: - distinguish different materials from each other; - recommend a well-considered choice of materials in function of the construction of a structure; - analyse constructions and validate their limits; - analyse the deformation of simple constructions where the maximum load is verified; - recommend possible structural improvements; - identify the main frequency components of a measured vibration using a Fast Fourier Transform.			

<table>
<tr><td>Course content</td><td>This course builds on the properties of materials and composition of steels. The student further explores these properties, in particular their limits, and relates them to mechanical stresses. He/she examines these by analysing problems with a particular load due to external forces or thermal deformations. Both static and hyperstatic problems are dealt with. The student analyses kinking as well as the stresses and deformations occurring in a loaded slender column. Finally, the student calculates and evaluates shear stresses on bolt, rivet and wedge connections as well as on torsion-loaded shafts.
From a structural point of view, vibration behaviour is also important in constructions, besides the parameters of stiffness and strength, in order to be able to offer the necessary resistance to bending moments and shearing forces. The student identifies vibrations based on the basic principles and integrates them as a common means of predictive maintenance. Using a Fast Fourier Transform, the student will learn to detect critical vibration levels, which can, after all, lead to deformation or fracture of engine components on board.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)</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
written exam</td><td>Following Module 2.2
written exam met integrated practical test</td></tr><tr><td colspan="4">Second session
written exam met integrated practical test</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td>- Obtain a minimum of 8/20 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>Matter and materials part 1
Schip's construction - part 1</td></tr>
<tr><td>Additional information</td><td></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**SHIP'S AUTOMATION - PART 1 (4 UC)**
Course element	**Ships automation - part 1** **(HZS-SW-SWM271)**
Lecturer(s)	**Raf MAES**
Lecturer in charge	Raf MAES
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Mathematics and Physics - part 1
Units of credit (UC)	4
Hours of formal lecture/practical exercise	24/8
Semester + module(s)	Semester 1, Module 1.1 -/- Semester 1, Module 1.2 -/- **Semester 2, Module 2.1** **12/8** **Semester 2, Module 2.2** **12/-**
Learning objectives	At the end of the course, the student is expected to be able to: - choose the right sensor for a given application; - correctly interpret measurements; - analyse PID values; - take a critical look at a control loop; - perform a calculation of the PID values.
Course content	Automation and control are very closely related, as the ultimate goal of a control loop is to make the system work automatically. In the theoretical part of this course, the student first compares techniques of control loops to control a system. He/she deciphers block diagrams and becomes familiar with actuators and signal converters in addition to sensors. He/she then examines what a Laplace transformation is, including its application. After understanding control loops and transfer functions, the student applies this theory to the various systems that exist, covering stability, transition behaviour and offset with frequency response methods such as the Bode and Nyquist diagram. In the second theoretical part, the student works with the most common process controller, the PID controller. He/she calculates and optimises signals in control loops and takes into account, among other things, an important requirement of the control loop, i.e. the overshoot. During the labs, he/she interprets PID values by changing them in certain processes and constructs a control loop after analysing the used components of an existing control loop.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Manage and control complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (mastSW-c)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)</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
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</table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- No calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td>- Distefano J. (1987). Feedback and control systems. Columbus, US: McGraw-Hill Company.
- Verwer, A., Golten, J. (1991). Control system design and simulation. Columbus, US: McGraw-Hill Company.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**NAVAL ELECTRONICS AND ICT - PART 1 (5 UC)**
Course element	**Ship electroniques and ICT - part 1 (HZS-SW-SWM281)**
Lecturer(s)	**Pascal BOUQUET**
Lecturer in charge	Pascal BOUQUET
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Theory of electricity & Ship's electrotechnics - part 1
Units of credit (UC)	5
Hours of formal lecture/practical exercise	24/32
Semester + module(s)	**Semester 1, Module 1.1 6/8** | **Semester 1, Module 1.2 6/8** | **Semester 2, Module 2.1 12/8** | **Semester 2, Module 2.2 -/8**
Learning objectives	At the end of the course, the student is expected to be able to: -reduce a real problem to a logical function; -reconstruct this logical function into its most practical form; -convert the simplified function to a pneumatic, electronic, hydraulic or electrical diagram; -convert the simplified function into a pseudo code for PLC, microcontroller or computer; -understand the operation of sequential components; -recognise basic components of industrial electronics; -illustrate the U/I characteristics of analogue components; -derive basic properties from the data sheet of a component, dimension them according to the application, and understand their operation in diagrams; -recognise and dimension basic circuits with these components; -be able to establish the system equations of basic circuits with operational amplifiers.

<table>
<tr><td>Course content</td><td>The course Ship Electronics and ICT consists of a theoretical part, followed by an illustration during practical sessions.
In the section Digital Techniques, the student analyses the basic principles of digital logic and its use in electronics, ICT, pneumatics, hydraulics, electrical switching and automation.
The student converts all states of a real-life problem into a logical equation and uses the rules of Boolean algebra to simplify this equation. The student converts this simplified equation into an electronic, electrical, pneumatic or hydraulic diagram or into a programme for PLC or microcontroller.
The student uses both combinatorial and sequential logic. In combination with the above, he/she will master the basic principles of programming.
In the section Analogue Techniques, the student analyses the basic principles of industrial analogue electronics.
The student substantiates the characteristics and operation of semiconductors and integrated circuits (for example, opamps), including their basic circuits. Their application in industrial electronics is studied and evaluated.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1 permanent evaluation</td><td>Following Module 1.2 oral exam with written preparation and permanent evaluation</td><td>Following Module 2.1 oral exam with written preparation and permanent evaluation</td><td>Following Module 2.2 permanent evaluation en practical test</td></tr><tr><td colspan="4">Second session
oral exam with written preparation en practical test</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 8/20 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.
- Breadboard
- Hambley, A.R. (latest ed.). Electrical Engineering: Principles and Applications, Pearson Education Ltd., UK. ISBN 978-0-13-448414-3 (English)
- Only ordinary scientific calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td>Theory of electricity - part 1
Theory of electricity - part 2
Ship's electrotechnics - part 1</td></tr>
<tr><td>Additional information</td><td>- Egglestone, D.L. (latest ed.) Basic electronics for Scientists and Engineers, Cambridge University Press, UK.
- Horowitz, P, Hill, W (latest ed.). The Art of Electronics, Cambridge University Press, UK.
- Malvino, A.P(latest ed.). Electronic principles, McGraw Hill Int’l editions, USA.
- Y. Granjon, B. Estibals, S. Weber. Tout en fiches : Le cours d'électronique, DUNOD, ISBN 978-2-084791-4 (Français)</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**SHIP'S ELECTROTECHNICS - PART 2 (7 UC)**
Course element	**Ship's electrotechnics - part 2 (HZS-SW-SWM201)**
Lecturer(s)	**Rik FLOREN, Marc STERKENS**
Lecturer in charge	Rik FLOREN
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	Dutch/French + English
Required preliminary credit(s)	**Standard succession (must have followed)** Theory of electricity & Ship's electrotechnics - part 1 Mathematics and Physics - part 1
Units of credit (UC)	6
Hours of formal lecture/practical exercise	36/32
Semester + module(s)	**Semester 1, Module 1.1 12/8** | **Semester 1, Module 1.2 12/8** | **Semester 2, Module 2.1 -/8** | **Semester 2, Module 2.2 12/8**
Learning objectives	At the end of the course, the student is expected to be able to: - analyse the behaviour of electrical machines; - select the right machine for the right application; - plan and execute maintenance and repair of electrical installations in a safe way and according to the procedures applicable on board; - examine the location of errors by means of circuit diagrams, and propose and implement a repair or modification strategy in a safe manner; - understand the importance of on-board short-circuit calculations, reflect on them and take them into account when setting parameters on electrical devices and safety equipment.
Course content	The student examines, by means of theoretical and practical exercises, the behaviour of different types of electrical DC and AC machines. In doing so, he/she acquires a thorough knowledge of the complete electrical network on board. He/she applies power and short-circuit calculations and learns to critically evaluate their importance. He/she uses the correct procedures to test and maintain the electrical machines. Next, the student analyses his/her findings and draws the necessary conclusions. In the second part, the student applies his/her knowledge to develop electrical circuits for real problems. He/she devises sequential solutions for existing circuits. During the design process, the student maintains a critical attitude towards the end product.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1 permanent evaluation</td><td>Following Module 1.2 oral exam with written preparation and permanent evaluation</td><td>Following Module 2.1 permanent evaluation</td><td>Following Module 2.2 oral exam with written preparation and permanent evaluation with practical test</td></tr>
<tr><td colspan="4">Second session
oral exam with written preparation en practical test</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 8/20 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.
- Wildi, T. (latest ed.). Electrical Machines, Drives, and Power Systems, Pearson Education.
- Only ordinary scientific calculator 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	Academic Bachelor in Marine Engineering
Course	**SHIP'S ELECTROTECHNICS - PART 2 (7 UC)**
Course element	**Pneumatics** **(HZS-SW-SWM203)**
Lecturer(s)	**Marc STERKENS**
Lecturer in charge	Rik FLOREN
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Practical exercises
Other teaching methods	Demonstration
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Theory of electricity & Ship's electrotechnics - part 1 Mathematics and Physics - part 1
Units of credit (UC)	1
Hours of formal lecture/practical exercise	-/8
Semester + module(s)	Semester 1, Module 1.1 -/- | **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 and interpret pneumatic diagrams; - problem based construction of a pneumatic diagram; - carry out a practical simulation of a pneumatic diagram.
Course content	The student studies the construction of pneumatic systems, which can be found in various machinery. The applications are diverse and therefore he/she integrates the different components of the systems based on applications. The student(s) develops pneumatic solutions for a technical problem.
Learning outcomes	- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a) - Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b) - Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
Examination	Following Module 1.1 - | Following Module 1.2 - | **Following Module 2.1 permanent evaluation with integrated practical test** | Following Module 2.2 - **Second session practical test**

Caesura measures	- 100% presence in practical sessions mandatory to be evaluated in the first and second exam session; - Obtain a minimum of 8/20 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	

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**MARINE PROPULSION - PART 2 (4 UC)**
Course element	**Marine propulsion - part 2 (HZS-SW-SWM211)**
Lecturer(s)	**Tim JANSSENS**
Lecturer in charge	Tim JANSSENS
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Marine propulsion - part 1
Units of credit (UC)	4
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: - identify the various components of power distribution in a marine engine; - describe the different parts of a diesel injection system and explain the purpose and operation; - describe the different components of a lubrication system and explain the purpose and operation; - interpret the influence of internal and external factors on the efficiency of a marine engine: air intake, injection timing, load, etc.; - name and illustrate the different functions of a speed controller; - explain the application of alternative propulsion and fuels in shipping; - describe and evaluate the working principle of alternative propulsion techniques.

<table>
<tr><td>Course content</td><td>The course builds on the course marine propulsion Part 1.
The components of the drive line are explored in more detail. The student demonstrates the working principle of the distribution components and the transmission of forces within an engine, coupled to a slow runner, a medium runner and a fast runner. He/she determines the purpose, working principles and use of forced air on an engine and relates this to its efficiency. The student analyses the engine combustion process as a relationship between pressure and volume, using the pv diagram and the Ricardo diagram. He/she explains the working principles of various fuel injection techniques, as well as the application of a speed controller on a marine diesel engine. The student analyses the working principle of dual-fuel and other alternative propulsion techniques in shipping.
By means of examples and diagrams, the student substantiates the purpose, the working principles and the use of lubrication, lubrication circuits, lubricants, and cooling circuits.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI, for Engineer Officers on seagoing vessels (mastSW-a)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
-</td><td>Following Module 1.2
written exam</td><td>Following Module 2.1
-</td><td>Following Module 2.2
-</td></tr><tr><td colspan="4">Second session
written exam</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Ordinary scientific and graphic scientific calculators allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td>Thermodynamic processes - part 1
Thermal recovery techniques - part 1
Marine engineering skills training - part 1</td></tr>
<tr><td>Additional information</td><td>- Briand, J. (2008). Diesels marins. Rennes, France: Infomer.
- Kuiken, K. (2008). Diesel Engines I & II. Onnen, The Netherlands: Target Global Energy Training.
- Van Maanen, P. (1992). Scheepsdieselmotoren 1. Harfsen, Nederland: Nautech.
- Van Maanen, P. (1994). Scheepsdieselmotoren 2. Harfsen, Nederland: Nautech.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**MARINE ENGINEERING SKILLS TRAINING - PART2 (3 UC)**
Course element	**Marine engineering skills training - part 2 (HZS-SW-SWM232)**
Lecturer(s)	**Tim JANSSENS, Marc STERKENS, Gijs VANDEN BOGAERDE**
Lecturer in charge	Tim JANSSENS
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Practical exercises
Other teaching methods	
Instruction language	Dutch/French + English
Required preliminary credit(s)	**Strict succession (must have followed and passed)** Marine engineering skills training - part 1
Units of credit (UC)	3
Hours of formal lecture/practical exercise	-/48
Semester + module(s)	**Semester 1, Module 1.1 -/12** | **Semester 1, Module 1.2 -/12** | **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: - discuss the different possibilities of manufacturing components; - argue a risk assessment; - assemble and use appliances, engines and machines; - handle and apply mechanical processes; - independently evaluate and apply welding settings for different welding techniques; - carry out a task both individually and in a group.

Course content	During the lab Ship Mechanical Skills Training - Part 2, the student elaborates on the acquired skills from Part 1. The student makes safe and correct use of the tools, measuring instruments and machines (e.g. lathe, grinder, drill, sanding belt, welding equipment, etc.), used by the marine engineer on board. The student evaluates the safety of the workplace and the use of the machines. He/she learns how to set up a lathe so that both internal and external turning operations can be performed. Then the student learns to measure and calculate the angle of a conical part. He/she becomes proficient in setting up the lathe to produce a workpiece with the predetermined characteristics by applying the learned techniques. In addition, the student becomes familiar with the methods for carrying out welding operations in a vertical plane. He/she learns how to carry this out by independently determining the specifications of the welding equipment and electrode, adjusting them and carrying out the operation. Furthermore, the student gets acquainted with alternative welding processes besides BMBE, such as MIG/MAG and TIG. He/she acquires the necessary knowledge to independently determine the required settings and carry out welding operations correctly. The student studies oxy-fuel welding and then performs the necessary settings and welding on thin sheet material. During a disassembly exercise, the student explains the operation of an injection pump and injector, validating this with information from manuals, specifications and documentation provided.
Learning outcomes	- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a) - Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e) - Function in an international, multicultural environment, adopt a flexible attitude and act with respect when dealing with others (bachSW-f) - Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h) - Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)
Examination	**Following Module 1.1 permanent evaluation** | **Following Module 1.2 permanent evaluation** | **Following Module 2.1 permanent evaluation** | **Following Module 2.2 oral exam and permanent evaluation** **Second session practical test**
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. - Safety clothing. - Analog Vernier Caliper - Ordinary scientific and graphic scientific calculators allowed.
Recommended preliminary competences	Marine propulsion - part 1
Additional information	

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**MULTIDISCIPLINARY SIMULATOR EXERCISES - PART 1 (3 UC)**
Course element	**Multidisciplinary simulator exercises - part 1 (HZS-SW-SWM231)**
Lecturer(s)	**Bart GABRIEL**
Lecturer in charge	Bart GABRIEL
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Maritime English - part 1
Units of credit (UC)	3
Hours of formal lecture/practical exercise	-/48
Semester + module(s)	Semester 1, Module 1.1 -/- | Semester 1, Module 1.2 -/- | **Semester 2, Module 2.1 -/24** | **Semester 2, Module 2.2 -/24**
Learning objectives	At the end of the course, the student is expected to be able to: - master the operation and control of the main propulsion engine(s); - master the operation and control of auxiliary equipment; - apply proper procedures; monitor the engine room as a whole; - find the links between the various systems; - interpret the various diagrams; - localise the errors introduced and generate solutions for them; - make an equipment safe.
Course content	In the lab multidisciplinary simulator exercises, the student(s) gain insights into the different tools and their function in the engine room. He/she operates and monitors these implements, masters the different diagrams needed to achieve a working whole of the engine room and understands the relationship between main and auxiliary machinery. The stundent deals with introduced faults and their respective alarms . He/she will also be introduced to safe working and how to isolate equipment on a sailing vessel.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module
1.1
-</td><td>Following Module
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-</td><td>Following Module
2.1
permanent
evaluation</td><td>Following Module
2.2
permanent
evaluation</td></tr>
<tr><td colspan="4">Second session
practical test</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.</td></tr>
<tr><td>Required study material</td><td>- Ordinary scientific and graphic scientific 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	Academic Bachelor in Marine Engineering
Course	**SAFETY TECHNIQUE - PART 2: ISPS AND ISM (3 UC)**
Course element	**ISM** **(HZS-NW-EXP-SWM201)**
Lecturer(s)	**Marieke UTEN**
Lecturer in charge	Marieke UTEN
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture			
Other teaching methods				
Instruction language	Dutch/French			
Required preliminary credit(s)				
Units of credit (UC)	2			
Hours of formal lecture/practical exercise	18/-			
Semester + module(s)	Semester 1, Module 1.1 -/-	**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: - know and apply the basic principles and regulations of the ISM and code; - Identify, ensure, and evaluate the requirements of a safety management system; - Perform risk analysis techniques for safety.			
Course content	In a first phase the student becomes acquainted with the background and origin of the ISM code. Secondly, the student discovers the structure of both codes and becomes acquainted with the administrative and practical requirements prescribed by the code. Accordingly, the student delves into the various risk analysis techniques and requirements of safety management systems.			
Learning outcomes	- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a) - Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)			
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	- International Maritime Organization. (latest ed.). *International Safety Management Code (ISM).* London, UK: IMO.

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**SAFETY TECHNIQUE - PART 2: ISPS AND ISM (3 UC)**
Course element	**ISPS** **(HZS-NW-EXP-SWM202)**
Lecturer(s)	**Frederik BOUMANS**
Lecturer in charge	Marieke UTEN
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	
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 -/- 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: - demonstrate and apply the principles and regulations of the ISPS and PFSO codes; - identify, ensure, and evaluate the requirements of a ship security plan; - identify, ensure, and evaluate the requirements of a port facility security plan; - carry out risk analysis techniques concerning safety and security;

<table>
<tr><td>Course content</td><td>The student first studies the background and origin of the ISPS and PFSO codes. Secondly, the student explores the structure of these codes and becomes familiar with the administrative and practical requirements prescribed by them. The student delves into various risk analysis techniques and the requirements of security management systems.</td></tr>
<tr><td>Learning outcomes</td><td></td></tr>
<tr><td>Examination</td><td>
<table>
<tr><td>Following Module
1.1
-</td><td>Following Module
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-</td><td>Following Module
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-</td><td>Following Module
2.2
written exam</td></tr>
<tr><td colspan="4">Second session
written exam</td></tr>
</table>
</td></tr>
<tr><td>Caesura measures</td><td></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 Maritime Organization. (latest ed.). International Ship and Port Facility Security Code (ISPS). London, UK: IMO.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**STABILITY AND SHIP'S CONSTRUCTION - PART 2 (3 UC)**
Course element	**Stability - part 2** **(HZS-NW-EXP-SWM211)**
Lecturer(s)	**Ynse JANSSENS**
Lecturer in charge	Remke WILLEMEN
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	**Standard succession (must have followed)** Stability and Ship construction - part 1
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: - understand and define trim and heel, and propose measures to reduce them, without jeopardising the stability of the ship; - understand and calculate the effect of free liquid surfaces on ship stability for a beam-shaped tank and propose measures to minimise this effect; - examine the changes in stability during docking or beaching, interpret them and propose the necessary appropriate measures; - perform a simplified leak stability calculation, in particular draught, heel and trim; - analyse the procedure for the correct performance of a heeling test.
Course content	The main focus of this course is the analysis of ship stability, its hazards and how to act correctly in order to improve ship stability. In the first part, the student explores transverse and longitudinal stability. The emphasis is on trim and heel and the forces involved, as well as the negative effect of free liquid surfaces on stability. In the second part, the student examines the impact of drydocking and beaching on ship stability. He/she learns to correctly assess the dangers of the operation and to offer possible solutions. In the third part, the student calculates and interprets the leak stability in a simplified form, in which the change of draught, trim and heel are the most important elements. Finally, the student studies the correct procedure for performing the heeling test.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module
1.1
written exam</td><td>Following Module
1.2
-</td><td>Following Module
2.1
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2.2
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<tr><td colspan="4">Second session
written exam</td></tr>
</table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Only ordinary scientific calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td>- Barrass, B., Derrett, D.R. (latest ed.) Ship Stability for Masters and Mates. London, UK: Butterworth-Heinemann. ISBN 10: 0-7506-6784-2
- 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. Edinburgh: Witherby Seamanship International Ltd. ISBN 978-1-90533-164-2.
- Rhodes, M. (2020). Ship Stability, Strength and Loading Principles, Edinburgh: Witherby Seamanship International Ltd. ISBN 978-1-85609-944-8
- van Dokkum, K. (latest ed.). Ship Stability. Enkhuizen, The Netherlands: Dokmar.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**STABILITY AND SHIP'S CONSTRUCTION - PART 2 (3 UC)**
Course element	**Ship's construction - part 2 (HZS-NW-EXP-SWM212)**
Lecturer(s)	**Remke WILLEMEN**
Lecturer in charge	Remke WILLEMEN
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	**Standard succession (must have followed)** Stability and Ship construction - part 1
Units of credit (UC)	1
Hours of formal lecture/practical exercise	10/-
Semester + module(s)	Semester 1, Module 1.1 -/- Semester 1, Module 1.2 -/- **Semester 2, Module 2.1** **10/-** Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - calculate and evaluate shear forces and bending moments; - draw diagrams of shear forces and bending moments of beam structures and simple ship hulls; - investigate and evaluate the relationship between stress and shear forces and bending moments; - have theoretical knowledge of the resistance of a ship in relation to propulsion and speed; - be able to motivate a required engine power.
Course content	In the first part of the course, simple beam bending problems are analysed, after which the student is able to draw diagrams of shear forces and bending moments. After mastering the theoretical principles of calculating shear forces and bending moments, box-shaped ship structures are analysed. Finally, the student learns how shear forces and bending moments are linked to stresses, on which are linked in turn to the possibility of failure. The knowledge of stresses is then applied on a simplified midship-section. In the second part, the student studies the ship's resistance by analysing all components of the total hull resistance. Subsequently, the principles of the towing tank are explained, including the modelling of a ship. The effective horsepower is then linked to the resistance leading to the required engine power.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module
1.1
-</td><td>Following Module
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-</td><td>Following Module
2.1
written exam</td><td>Following Module
2.2
-</td></tr><tr><td colspan="4">Second session
written exam</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Only ordinary scientific calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td>- Clarck, I.C. (2008). Stability, trim and strength for merchant ships and fishing vessels. London, UK: The Nautical Institute. ISBN: 1870077873.
- Gere, J.M. & Timoshenko, S.P. (1998). Mechanics of Materials. London, UK: Stanley Thornes Publishers. ISBN: 0748740848.
- van Dokkum, K. (latest ed.). Ship Knowledge. Enkhuizen, The Netherlands: Dokmar.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**MATHEMATICS AND PHYSICS - PART 2 (7 UC)**
Course element	**Integral calculus - part 2 and statistical methods for scientific research (HZS-WE-TE-SWM211)**
Lecturer(s)	**Peter BUEKEN, Jonas JOOS, Deirdre LUYCKX**
Lecturer in charge	Deirdre LUYCKX
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Mathematics and Physics - part 1
Units of credit (UC)	2
Hours of formal lecture/practical exercise	18/6
Semester + module(s)	**Semester 1, Module 1.1** **18/6** 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: - solve first- and second-order differential equations using the techniques discussed in the course; - determine double integrals and Fourier series of given functions, and interpret these correctly; - choose the appropriate technique for solving singular mathematical problems; - analyse and solve simple composite problems by dividing them into a series of successive sub-problems, identifying or collecting the necessary data, and carrying out the required operations in the order provided and using the appropriate calculation technique; - apply the techniques of descriptive statistics and statistical inference to concrete data sets,interpret the results and summarise them in a scientifically sound manner, both graphically and in text.

<table>
<tr><td>Course content</td><td>The student studies more advanced methods from integral calculus. He/she learns how to fluently handle multiple integrals, first- and second-order differential equations, Laplace transformations and Fourier sequences. He/she practises these principles and methods sufficiently to be able to apply them in other scientific subjects.

In addition, the student receives an introduction to statistics. He/she refreshes basic knowledge from descriptive statistics (graphical representation, measures of central tendency and of dispersion, normal distribution) and is introduced to the simplest principles of statistical inference (confidence interval and hypothesis testing for the population mean). The student learns to use these methods correctly, to interpret the results, and to report on them when analysing concrete data sets.</td></tr>
<tr><td>Learning outcomes</td><td>- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1
-</td><td>Following Module 1.2
written exam met integrated practical test</td><td>Following Module 2.1
-</td><td>Following Module 2.2
-</td></tr>
<tr><td colspan="4">Second session
written exam met integrated practical test</td></tr>
</table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Ordinary scientific and graphic scientific calculators allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td>- Ayres, F., & Mendelson, E. (2013). Schaum’s outlines calculus. Schaum’s outline series (6th ed.). New York, NY: McGraw-Hill.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**MATHEMATICS AND PHYSICS - PART 2 (7 UC)**
Course element	**Vector calculus - part 2 and dynamics (HZS-WE-TE-SWM212)**
Lecturer(s)	**Peter BUEKEN, Jonas JOOS, Deirdre LUYCKX**
Lecturer in charge	Deirdre LUYCKX
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	Tutoring
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Mathematics and Physics - part 1
Units of credit (UC)	3
Hours of formal lecture/practical exercise	24/12
Semester + module(s)	**Semester 1, Module 1.1 6/3** | **Semester 1, Module 1.2 6/3** | **Semester 2, Module 2.1 6/3** | **Semester 2, Module 2.2 6/3**
Learning objectives	At the end of the course, the student is expected to be able to: - calculate the gradient, divergence, and rotation of a function or vector field, and interpret these concepts correctly; - calculate line integrals of vector fields in different ways, and interpret these line integrals as work; - divide composite physical problems into sub-problems and solve them by selecting the appropriate method from the basic principles of Newtonian mechanics for the movement of point particles and for the plane rotation of rigid bodies; - approach physical problems both from the laws of Newton and from the work-energy-principle; - understand the effect of a damping force and/or an external source of vibration on a spring-mass system and to calculate the position of the mass as a function of time in these cases; - understand and explain physical phenomena (such as: resonance, the Coriolis force, the gyroscope, ...) and their importance for navigation.

<table>
<tr><td>Course content</td><td>The student studies further the definition and geometric interpretation of vector-valued functions, the derivative of a vector-valued function and its geometric interpretation, the tangent line to a curve. In addition, he/she learns the relationship between this theory and its applications in dynamics by correctly defining the concepts of velocity and acceleration, curvature and arc length.

He/she extends the differential calculus to vector-valued functions and learns to work with directional derivative and gradient of a function of several variables, with vector fields and their divergence and rotation. The student also extends the integral calculus to vector-valued functions by becoming acquainted with line integrals (definition and calculation), integral of a vector field along a curve, work, Green’s theorem, conservative vector fields and their potential function.

In the second part of the course, the student acquires further insight into the principles of Newtonian mechanics: kinematics and dynamics of a point particle, of a system of point particles and of a rigid body. He/she learns to break down and solve composite problems related to work and mechanical energy, to the most important types of forces in dynamics (terrestrial gravity, the restoring force of a spring, dry friction). He/she becomes acquainted with the concepts of impulse and linear momentum and their importance in collision problems of two point particles. He/she then applies the mathematical theory of differential equations to questions of free, damped and/or forced oscillations in order to learn to assess their importance on board a ship. The student learns concepts from rotational dynamics, such as angular momentum, torque and moment of inertia, and applies these concepts to problems of plane rotation and gyroscopic motion. He/she studies the dynamics behind the Coriolis force and the centrifugal force resulting from the rotation of the earth around its axis.</td></tr>
<tr><td>Learning outcomes</td><td>- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1
-</td><td>Following Module 1.2
written exam</td><td>Following Module 2.1
-</td><td>Following Module 2.2
written exam</td></tr>
<tr><td colspan="4">Second session
written exam</td></tr>
</table></td></tr>
<tr><td>Caesura measures</td><td></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>
</table>

Additional information	- Giancoli, D. C. (2008). *Physique générale, Volume 1, Mécanique et thermodynamique*. Bruxelles, Belgique: De Boeck. - Giancoli, D. C., Poelman, D., & Kerkhof, M. (2015). *Natuurkunde Deel 1, Mechanica en thermodynamica*. Amsterdam, Nederland: Pearson. - Hibbeler, R. C. (2016). *Engineering mechanics, Dynamics*. Hoboken, NJ; Singapore: Pearson. - Hibbeler, R. C., Fan, S. C., Lefeber, D., van Overmeire, M., & Sol, H. (2011). *Dynamica*. Amsterdam, Nederland: Pearson Education Benelux. - Spiegel, M. R. (1967). *Schaum's Theory and Problems of Theoretical Mechanics*. New York, NY: McGraw-Hill. - Wrede, R. C., & Spiegel, M. R. (2010). *Schaum's outline of advanced calculus*. Schaum's outline series (3rd ed.). New York, NY: McGraw-Hill.

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**MATHEMATICS AND PHYSICS - PART 2 (7 UC)**
Course element	**Hydromechanics (HZS-WE-TE-SWM213)**
Lecturer(s)	**Katrijn VERHASSELT**
Lecturer in charge	Deirdre LUYCKX
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	Tutoring Demonstration
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Mathematics and Physics - part 1
Units of credit (UC)	2
Hours of formal lecture/practical exercise	18/12
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** **6/6**
Learning objectives	At the end of the course, the student is expected to be able to: - understand the basic equation of hydrostatics; - apply this equation to the determination of hydrostatic pressure in stationary liquids and liquids in relative equilibrium; - determine the resulting force on plane and curved surfaces on the basis of the basic equation of hydrostatics, to understand the relation between these resulting forces and the Archimedes upthrust, and to determine the Archimedes force in the various cases of translational equilibrium; - understand the fundamental concepts and laws of hydrodynamics and their practical applications; - apply these laws to stationary flow through networks formed by reservoirs, pipes, fittings, pumps, and turbines; - understand and apply the principles of the resistance and lift forces on immersed bodies and of the so-called boundary layer, and to carry out calculations in relation to this.
Course content	The student is introduced to the basic principles of hydrostatics: hydrostatic pressure, resulting hydrostatic pressure force on both plane and curved surfaces, centre of pressure, Archimedes' law, liquids at relative equilibrium. He/she will also study the basic principles of hydrodynamics: Bernoulli's equation for both ideal and real fluids, volume flow rate continuity equation, Venturi tube, Pitot tube, total head of a pump, cavitation, loss head for both laminar and turbulent flow in circular pipes, forces on immersed bodies. The student acquires knowledge in the domain of physics, insights and skills to support other subjects and assist in the creation of a thesis.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)</td></tr>
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-</td><td>Following Module 2.2
written exam</td></tr><tr><td colspan="4">Second session
written exam</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Ordinary scientific and graphic scientific 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	**Academic Bachelor in Marine Engineering**
Course	**MATTER AND MATERIALS - PART 2 (5 UC)**
Course element	**Matter and materials - part 2 (HZS-WE-TE-SWM221)**
Lecturer(s)	**Joeri HORVATH**
Lecturer in charge	Joeri HORVATH
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	Demonstration
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Matter and materials part 1
Units of credit (UC)	3
Hours of formal lecture/practical exercise	24/9
Semester + module(s)	Semester 1, Module 1.1 -/- Semester 1, Module 1.2 -/- **Semester 2, Module 2.1** **12/3** **Semester 2, Module 2.2** **12/6**
Learning objectives	At the end of the course, the student is expected to be able to: - describe and classify organic molecules based on the most frequent organic groups, and list typical properties; - list fuel properties and explain how they can be tested for use on board; - identify and classify the most important plastics and explain their properties on the basis of their composition; - perform thermochemical calculations; - perform calculations on the strength of acids and bases and explain the behaviour of these substances on the basis of the theory of equilibrium reactions; - evaluate the quality of boiler water on board ships on the basis of simple measurements; - calculate simple electrochemical concepts; - explain the origin of corrosion and the most important defence systems against it.

<table>
<tr><td>Course content</td><td>In Matter and Materials 2, the student initially studies the chemical and physical properties of organic molecules. The student learns about the main groups of organic substances, in particular hydrocarbons. This gives him/her insight into the properties of marine fuels and lubricants, and how the quality of these substances can be analysed. Subsequently, the student learns to recognise and classify plastics and to explain their properties based on their composition.
Fuel combustion links this course with the courses of Thermodynamics: the student applies the concepts of enthalpy, entropy and Gibbs' free energy to combustion reactions and related matters.
Subsequently, the student examines the concept of equilibrium reactions and applies this general theory in describing and explaining acid-base reactions and redox reactions. He/she applies this knowledge when analysing boiler waters on board ships. Finally, the student applies the seen concepts in understanding corrosion as a maritime phenomenon and the measures to combat it.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)</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</td></tr><tr><td colspan="4">Second session
oral exam with written preparation</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></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>Matter and materials part 1</td></tr>
<tr><td>Additional information</td><td></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**MATTER AND MATERIALS - PART 2 (5 UC)**
Course element	**Hazardous products for man and environment (HZS-WE-TE-SWM222)**
Lecturer(s)	**Joeri HORVATH, Marc VERVOORT**
Lecturer in charge	Joeri HORVATH
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	Portfolio
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Matter and materials part 1
Units of credit (UC)	1
Hours of formal lecture/practical exercise	12/3
Semester + module(s)	Semester 1, Module 1.1 -/- Semester 1, Module 1.2 -/- **Semester 2, Module 2.1** **12/-** **Semester 2, Module 2.2** **-/3**
Learning objectives	At the end of the course, the student is expected to be able to: - explain the meaning of the IMDG Code and correctly interpret the regulations discussed; - identify the risks of hazardous substances through specific literature; - to derive the required segregation of hazardous substances on board from the properties and regulations in the IMDG Code; - identify the most common hazardous substances and their properties; - design and explain a scientific poster.
Course content	In this course, the student is introduced to the International Maritime Dangerous Goods Code (IMDG), the maritime regulations concerning the handling and transport of dangerous goods. After a general introduction to the scope of the IMDG code, the student learns to classify dangerous substances and to deduce the risks of substances from their description (in the IMDG code itself and in the safety data sheets). The student then applies the rules of the Code concerning the stowage and segregation of dangerous goods on board a ship. During the practical sessions, the student trains to use the IMDG code and various safety data sheets to research the properties of dangerous substances and determine the required separation of cargoes on the basis of this. The course ends with a lesson on the detection of dangerous gases and the use of personal protective equipment.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</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</td></tr><tr><td colspan="4">Second session
oral exam with written preparation</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Only ordinary scientific calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td>- International Maritime Organization. (latest ed.). International Maritime Dangerous Goods Code. London, UK: IMO.
- Lewis, R.J. (2001). Hawley's Condensed Chemical Dictionary (14th ed.). New York, NY: John Wiley & Sons
- Meyer, E. (2005). Chemistry of hazardous materials (4th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
- Samson Chemical Publishers. (1991). Chemical Safety Sheets: Working safely with hazardous chemicals. Dordrecht, Nederland: Kluwer Academic Publishers.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**MARITIME ENGLISH - PART 2 (4 UC)**
Course element	**Maritime English - part 2 (HZS-WE-HT-SWM231)**
Lecturer(s)	**Pieter DECANCQ**
Lecturer in charge	Pieter DECANCQ
Educational programme	**Second year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	**Standard succession (must have followed)** Maritime English - part 1
Units of credit (UC)	4
Hours of formal lecture/practical exercise	24/12
Semester + module(s)	**Semester 1, Module 1.1 6/6** | **Semester 1, Module 1.2 6/6** | **Semester 2, Module 2.1 12/-** | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - remember, understand, apply and create the general-maritime and specific-maritime vocabulary given in Part 2 in communicative situations from a marine engineering perspective; - remember, understand and apply English grammar in general English, general-maritime, and specific-maritime communicative situations from the perspective of a marine engineer; - understand and apply the reading, listening, writing and speaking skills given in Part 2 in general-maritime and specific-maritime communicative situations from a marine engineering perspective; - analyse and evaluate themselves and others through critical reflection in exercises given in Part 2 in general-maritime and specific-maritime communicative situations from a marine engineering perspective; - understand, apply and analyse scientific research methods.

<table>
<tr><td>Course content</td><td>The student uses general-maritime and specific-maritime English vocabulary and grammar at an extended level from the perspective of marine engineering. For this purpose, he/she makes use of texts, listening and video files, as well as the course documents. He/she designs general-maritime and specific-maritime speaking and writing exercises.
Next, the student applies the specific-maritime language environment of the engine room (technical simulations), engineering maintenance (wear and tear, and repair), marine accident investigations (case studies), etc., at an extended level.
He/she also practises a number of language genres at an extended level and makes a written and oral self-evaluation and peer-evaluation for, among others, a conflict discussion and a feedback discussion.
The student also applies scientific research methods at an advanced level in projects such as the development of a research question, the correct use of sources, the correct reporting of data processing results, writing and presenting a report.
The student experiences that the theoretical and the practical part of the course are not strictly separated but alternate strategically according to the linguistic and methodological needs of the marine engineering student (student-centred and communicative approach) within the framework of process and product evaluation.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
- Function in an international, multicultural environment, adopt a flexible attitude and act with respect when dealing with others (bachSW-f)
- Communicate effectively and professionally in English under all kinds of maritime circumstances (nautical-technical situations) (bachSW-g)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1 permanent evaluation</td><td>Following Module 1.2 permanent evaluation</td><td>Following Module 2.1 oral exam with written preparation and permanent evaluation</td><td>Following Module 2.2 -</td></tr><tr><td colspan="4">Second session
oral exam with written preparation</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
</table>

Required study material	- Lecturer's course text available. - Buckowska, W. (2014). *MarEngine English Underway.* Dokmar, the Netherlands. ISBN: 9789071500268. - International Maritime Organization. (2002). *Standard Marine Communication Phrases*. London, UK: IMO. ISBN: 9789280142112. - Murphy, R. (2004). *English Grammar in Use.* (4th ed.). Cambridge, UK: Cambridge University Press. ISBN: 97811075339334. - Murphy, R. (2004). *Essential Grammar in Use* (3rd ed.). Cambridge, UK: Cambridge University Press. ISBN 9781107480551. - Nisbet, A., Witcher Kutz, A. & Logie, C. (1997). *Marlins English for Seafarers, Study Pack 1*. Edinburgh, UK: Marlins. ISBN: 0 9531748 08. - Nisbet, A., Witcher Kutz, A. & Logie, C. (1998). *Marlins English for Seafarers, Study Pack 2*. Edinburgh, UK: Marlins. ISBN 0953174816. - Petkova, V. & Toncheva, S. (2016). *Correspondence and Communications in Shipping.* Varna, Bulgaria: Steno Publishing House. ISBN: 978-954-449-853-5. - Van Kluijven, P.C. (2007). *The International Maritime Language Programme*. Sint Pancras, the Netherlands: Alk & Heijnen Publishers ISBN: 9789059610064. - No calculator allowed.
Recommended preliminary competences	
Additional information	- 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. (2002). Standard Marine Communication Phrases. London, UK: IMO.

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**SHIP'S ELECTROTECHNICS - PART 3 AND HIGH VOLTAGE (4 UC)**
Course element	**Ship's electrotechnics - part 3 (HZS-SW-SWM301)**
Lecturer(s)	**Rik FLOREN, Gijs VANDEN BOGAERDE**
Lecturer in charge	Rik FLOREN
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises			
Other teaching methods				
Instruction language	Dutch/French			
Required preliminary credit(s)	**Standard succession (must have followed)** Ship's electrotechnics - part 2			
Units of credit (UC)	4			
Hours of formal lecture/practical exercise	24/28			
Semester + module(s)	Semester 1, Module 1.1 -/-	Semester 1, Module 1.2 -/-	**Semester 2, Module 2.1** **12/8**	**Semester 2, Module 2.2** **12/20**
Learning objectives	At the end of the course, the student is expected to be able to:			
Course content				
Learning outcomes	- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a) - Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b) - Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d) - Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e) - Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)			
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 with practical test**
	Second session **oral exam with written preparation en practical test**			

Caesura measures	- 100% presence in practical sessions mandatory to be evaluated in the first and second exam session; - Obtain a minimum of 8/20 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	

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**SHIP'S ELECTROTECHNICS - PART 3 AND HIGH VOLTAGE (4 UC)**
Course element	**High Voltage (HZS-SW-SWM302)**
Lecturer(s)	**Marc STERKENS**
Lecturer in charge	Rik FLOREN
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Ship's electrotechnics - part 2
Units of credit (UC)	2
Hours of formal lecture/practical exercise	12/20
Semester + module(s)	**Semester 1, Module 1.1** **12/-** **Semester 1, Module 1.2** **-/8** **Semester 2, Module 2.1** **-/12** Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - understand and demonstrate the functional, operational and safety requirements for a marine high-voltage system; - take necessary corrective actions during system failures; - establish a safe switching strategy for isolating HV system components; - select suitable equipment for isolating and testing HV equipment; - perform a switching and isolation procedure on an HV system with the safety documentation; - perform insulation resistance tests on HV equipment and evaluate the condition of the insulation.
Course content	The student acquires the required knowledge of the functional, operational and safety requirements for a high-voltage offshore system. In doing so, he/she works out exercises, according to the usual procedures and documents, as well as the preparation and execution of the actual switching programmes, with great emphasis on safety and risk reduction. On the PPT simulator, he/she critically evaluates possible crisis situations and handles them correctly and safely according to the guidelines. Using the generator simulator, the student studies the properties and behaviour of HV synchronous generators in both single and parallel operation. The student correctly performs isolation tests on HV components and evaluates them. This is always done under well-considered risk management and safe working procedures.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1
oral exam with written preparation</td><td>Following Module 1.2
permanent evaluation</td><td>Following Module 2.1
permanent evaluation with integrated practical test</td><td>Following Module 2.2
-</td></tr>
<tr><td colspan="4">Second session
oral exam with written preparation en practical test</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 8/20 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.
- Safety clothing.

- Only ordinary scientific calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td>Maritime English - part 2</td></tr>
<tr><td>Additional information</td><td></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**MARINE PROPULSION - PART 3 (4 UC)**
Course element	**Marine propulsion - part 3 (HZS-SW-SWM311)**
Lecturer(s)	**Tim COOLS, Pedro DECROP, Gijs VANDEN BOGAERDE**
Lecturer in charge	Gijs VANDEN BOGAERDE
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Marine propulsion - part 2
Units of credit (UC)	4
Hours of formal lecture/practical exercise	24/18
Semester + module(s)	**Semester 1, Module 1.1 6/12** | **Semester 1, Module 1.2 6/6** | **Semester 2, Module 2.1 12/-** | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - analyse and identify an engine's control system; - review start/stop procedures; - explain engine-specific processes; - recognise and analyse irregularities in engine parameters; - have confidence in using the manufacturer's manuals and sparepart documentation.

<table>
<tr><td>Course content</td><td>With this course, students build on the marine propulsion part 2 course. He/she describes and discusses the working principles of the various control systems of both 2-stroke and 4-stroke diesel engines. The student learns to estimate the engine load in various ways. The p-V diagram is discussed in detail. The student becomes familiar with the load characteristics of both classical and modern drive systems. He/she/it learns to interpret the engine load diagram. The operation of journal bearings and the various systems to prevent bearing and engine damage are also covered. Other engine protections are discussed as well. The student takes another look at injection systems, both classical and more modern types. A connection is made with torque/speed control. The concept of load sharing is discussed. The student demonstrates and explains the start/stop procedures of the main aggregate as well as the operating principles of Vit control.

The student performs analyses on the operation of the engine using parameters in the simulator. The starting point is a perfectly functioning engine. Then, step by step, defective components and/or faulty ones are inserted into the motor controller. The aim is for the student to be able to find the faults using the parameters. Then, using the motor's documents, then he/she discusses the components and the correct way to replace them.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI, for Engineer Officers on seagoing vessels (mastSW-a)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Manage and control complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (mastSW-d)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
permanent evaluation</td><td>Following Module 1.2
oral exam with written preparation and permanent evaluation</td><td>Following Module 2.1
oral exam with written preparation</td><td>Following Module 2.2
-</td></tr><tr><td colspan="4">Second session
oral exam with written preparation en practical test</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>- Ordinary scientific and graphic scientific calculators allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td>- (1946) The fundamentals of Ship Propulsion. F.H. Todd, B.Sc , Ph.D., M.I.N.A.
- (2013) Basic Principles of Ship Propulsion. MAN Diesel & Turbo.
- Bearing damage. Miba Bearing Group.
- Bearing Installation and Replacement Criteria. Miba Bearing Group.
- Bearing Operating Principle. Miba Bearing Group.
- MAN B&W MC-C Vol. I OPERATION. MAN Diesel & Turbo.
- MAN B&W MC-C Vol. II MAINTENANCE. MAN Diesel & Turbo.
- MAN B&W MC-C Vol. III COMPONENTS, DESCRIPTIONS. MAN Diesel & Turbo.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**MARINE ENGINEER SKILLS TRAINING - PART 3, SEMINARS - PART 1 AND MULTIDISCIPLINARY SIMULATOR EXERCISES - PART 2 (5 UC)**
Course element	**Marine engineer skills training - part 3 and seminars - part 1 (HZS-SW-SWM331)**
Lecturer(s)	**Stefaan BUEKEN, Tim JANSSENS, Marc STERKENS**
Lecturer in charge	Tim JANSSENS
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Practical exercises
Other teaching methods	Excursion
Instruction language	Dutch/French + English
Required preliminary credit(s)	**Strict succession (must have followed and passed)** Multidisciplinary simulator exercises - part 1 Marine engineering skills training - part2
Units of credit (UC)	3
Hours of formal lecture/practical exercise	-/36
Semester + module(s)	**Semester 1, Module 1.1 -/12** | **Semester 1, Module 1.2 -/12** | **Semester 2, Module 2.1 -/12** | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - act independently in the manufacture and assembly of workpieces (motors and machines); - assess and adjust mechanical processes; - critically choose a welding process, apply it in a given situation and evaluate its result; - focused on organizing a task (both in groups and individually).
Course content	In the workshop lab, the student will make safe and correct use of the tools, measuring instruments and machines (grinding disc, drilling machine, sanding belt, ...) that are regularly used by the marine engineer on board. The student masters shaft alignment, learns threading on the lathe, brazing, plasma cutting and working with the cutting torch. The student designs, implements and tests a flange connection to solve a given problem. The student learns to work in a structured and organized way on the basis of a group disassembly/assembly exercise. Finally, he/she learns to collect and apply information himself according to the rules of the manufacturer.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
- Function in an international, multicultural environment, adopt a flexible attitude and act with respect when dealing with others (bachSW-f)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
permanent evaluation</td><td>Following Module 1.2
permanent evaluation</td><td>Following Module 2.1
permanent evaluation</td><td>Following Module 2.2
oral exam</td></tr><tr><td colspan="4">Second session
practical test</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.</td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.
- Safety clothing.
- Analog Vernier Caliper
- Only ordinary scientific calculator 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	Academic Bachelor in Marine Engineering
Course	**MARINE ENGINEER SKILLS TRAINING - PART 3, SEMINARS - PART 1 AND MULTIDISCIPLINARY SIMULATOR EXERCISES - PART 2 (5 UC)**
Course element	**Multidisciplinary simulator exercises - part 2 (HZS-SW-SWM332)**
Lecturer(s)	**Bart GABRIEL, Pedro DECROP**
Lecturer in charge	Tim JANSSENS
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Strict succession (must have followed and passed)** Multidisciplinary simulator exercises - part 1 Marine engineering skills training - part2
Units of credit (UC)	2
Hours of formal lecture/practical exercise	-/48
Semester + module(s)	**Semester 1, Module 1.1 -/24** | **Semester 1, Module 1.2 -/24** | 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: - putting and maintaining a ship in full operational condition; - detect faults in systems; - solve problems and set priorities to ensure smooth operation; - synthesise alternatives to arrive at solutions to technical problems.
Course content	The student keeps the engine room operational and takes corrective decisions in case of problems. He/she monitors the operation of the various ship's auxiliary equipment under different operating conditions and must be able to recognise and correct occurring errors. This is done in teams, simulating the hierarchy on a ship on the simulator. The student brings the ship into a fully operational situation at full speed as well as from dry-dock conditions. This requires all systems on board to be switched on. The student masters the use of the shaft generator and turbogenerator and applies the exhaust restriction systems. He/she responds to all alarms during the sea voyage regarding good seamanship, priorities, procedures and safety. As part of the watch, the student(s) notes the fuel meters and calculates the consumption of the generator and main engine.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Manage and control complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (mastSW-c)
- Manage and control complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (mastSW-d)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1
permanent evaluation</td><td>Following Module 1.2
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-</td><td>Following Module 2.2
-</td></tr>
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practical test</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.</td></tr>
<tr><td>Required study material</td><td>- Ordinary scientific and graphic scientific 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	Academic Bachelor in Marine Engineering
Course	**SHIP AUXILIARIES - PART 2 (4 UC)**
Course element	**Ship auxiliaries - part 2 (HZS-SW-SWM351)**
Lecturer(s)	**Tim COOLS, Bart GABRIËL**
Lecturer in charge	Bart GABRIEL, Tim COOLS
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Ship's auxiliary machines - part 1
Units of credit (UC)	4
Hours of formal lecture/practical exercise	24/24
Semester + module(s)	Semester 1, Module 1.1 -/- Semester 1, Module 1.2 -/- **Semester 2, Module 2.1** **12/12** **Semester 2, Module 2.2** **12/12**
Learning objectives	At the end of the course, the student is expected to be able to: - explain start-up procedures of auxiliary equipment on board and describe its operation; - monitor and control the operation of marine auxiliary machinery as part of a team; - analyse hydraulic circuits; - detect faults in hydraulic systems and other auxiliary equipment and provide solutions as well as motivate improvements; - recognise and describe freshwater preparation machinery; - analyse wastewater treatment problems and suggest alternatives; - describe the drive system and weigh its advantages and disadvantages; - perform IGF load treatment, both cold and hot tanks; - determine all components of the HVAC circuit.

<table>
<tr><td>Course content</td><td>In this course unit, the student learns, both theoretically and on the simulator, the operation and maintenance of the various marine auxiliary equipment under different operating conditions, such as steam generator, freshwater generator, refrigerators, diesel generators, turbo generators, separators (oil-water and water-fuel), rudder installation, propeller shaft seal, hydraulic pumps, engines, cylinders, steering valves ....
The student describes the hydraulic systems and circuits, such as those of the steering gear, winches and valves, and also describes waste water treatment and fresh water preparation by distillation and reverse osmosis.
The cooling cycle is discussed in detail with the student applying it to auxiliary installations. A test set-up is used for clarification and understanding is deepened using calculation examples.
The student monitors the operation of the auxiliary equipment. In doing so, he/she analyses occurring errors, solves problems and motivates possible improvements. During the simulator hours, this is done in teams, taking into account the hierarchy on a ship.
During the simulator hours, the student gains insight into IGF cargo handling. In this, IGF bunker operations with LNG are performed, once with cold tanks and once with hot tanks.
Finally, student is introduced to HVAC systems and dissects the AC circuit in detail.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
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oral exam with written preparation en practical test</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></td></tr>
<tr><td>Additional information</td><td></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**SHIP ELECTRONICS AND ICT - PART 2 (5 UC)**
Course element	**Ship electronics and ITC - part 2 (HZS-SW-SWM381)**
Lecturer(s)	**Pascal BOUQUET**
Lecturer in charge	Pascal BOUQUET
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Naval electronics and ICT - part 1
Units of credit (UC)	5
Hours of formal lecture/practical exercise	32/32
Semester + module(s)	**Semester 1, Module 1.1 12/8** | **Semester 1, Module 1.2 4/8** | **Semester 2, Module 2.1 12/8** | **Semester 2, Module 2.2 4/8**
Learning objectives	At the end of the course, the student is expected to be able to: - investigate different digital data transmission protocols and bus systems; - identify and dimension various Op-Amp circuits ; - develop and dimension a multivibrator "555" circuit ; - understand the functioning of thyristors (power electronics) and check their proper operation; - describe the operation of a switch-mode-power-supply and qualify its different components; - understand the operation of an embedded system, i.e. microcontroller; - qualify the different components in the architecture of a microcontroller and describe their function; - apply the correct programming methods; - evaluate the functioning of the programme with respect to the requirements of the assignment.

<table>
<tr><td>Course content</td><td>The student becomes proficient in high-frequency technology. She/he studies the forms of implementation and construction of a transmission line, explains the propagation of travelling waves along a transmission line and argues the origin of standing waves in transmission lines.
The student studies the reflection coefficient, investigates adaptation networks and antennas.
The student uses more advanced industrial programme structures when programming a microcontroller, plc, c-programme. He/she sees how to describe in pseudo programming language or flowchart the different structures (cold start, hot start, watchdog, interrupt, etc.). The student learns to create a flowchart from a simple problem and to write code from this flowchart for microcontroller and plc programming.
In the section 'analogue techniques', the student analyses the characteristics and operation of the opamp in a:
- comparator;
- Schmitt trigger -Integrator;
- differentiator;
- multivibrator circuit;
as well as their application in industrial electronics.
The student studies the characteristics of the "555 timer" integrated circuit and its configuration as a monostable, bistable and astable multivibrator and applications.
Finally, the student studies the characteristics and operation of IGBTs, the MOSFET and thyristors including SRC, DIAC and TRIAC of industrial analogue power electronics with its applications in switch mode power supplies.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1 permanent evaluation</td><td>Following Module 1.2 oral exam with written preparation and permanent evaluation</td><td>Following Module 2.1 permanent evaluation</td><td>Following Module 2.2 oral exam with written preparation and permanent evaluation with practical test</td></tr><tr><td colspan="4">Second session
oral exam with written preparation en practical test</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 8/20 for each part of the exam to pass for this element.</td></tr>
</table>

Required study material	- Lecturer's course text available. - Arduino Uno: microcontroller starter set - Breadboard - Only ordinary scientific calculator allowed.
Recommended preliminary competences	Ship electroniques and ICT - part 1
Additional information	- Egglestone, D.L., (latest ed.). *Basic electronics for Scientists and Engineers*, Cambridge University Press, UK. - Granjon, Y., Estibals, B., Weber, S. *Tout en fiches : Le cours d'électronique*, DUNOD, ISBN 978-2-084791-4 (Français) - Hambley, A.R., (latest ed.). *Electrical Engineering: Principles and Applications,* Pearson Education Ltd., UK. - Horowitz, P, Hill, W., (latest ed.). *The Art of Electronics*, Cambridge University Press, UK. - Malvino, A.P., (latest ed.). *Electronic principles*, McGraw Hill Int'l editions, USA.

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**SHIP AUTOMATION - PART 2 (4 UC)**
Course element	**Ship automation - part 2 (HZS-SW-SWM371)**
Lecturer(s)	**Raf MAES, Gijs VANDEN BOGAERDE**
Lecturer in charge	Raf MAES
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Ship's automation - part 1
Units of credit (UC)	4
Hours of formal lecture/practical exercise	24/44
Semester + module(s)	**Semester 1, Module 1.1 12/8** | **Semester 1, Module 1.2 12/8** | **Semester 2, Module 2.1 -/8** | **Semester 2, Module 2.2 -/20**
Learning objectives	At the end of the course, the student is expected to be able to: - design a stable analogue control loop; - discuss the stability of a digital control loop; - analyse a system automated with fuzzy logic; - think critically about the investment cost of an automated system; - validate the use of a sensor; - evaluate measured values and system efficiency.

<table>
<tr><td>Course content</td><td>The student investigates the design of control loops. He/she analyses analogue control loops on the one hand, using the theory of root curves (root locus), and digital control loops on the other hand, using the discrete Fourier transform and the fast Fourier transform. The stability of a control loop is also part of the analysis. The student deduces concepts from fuzzy logic (fuzzy logic/fuzzy logic) and argues a number of special control concepts with a view to the operational aspect of these circuits, in particular the rigorous control of processes to make effective decisions. Next, the student hardware-matically analyses some sensors as well as electronic, pneumatic and hydraulic controllers. Finally, the student evaluates the intrinsic safety of a control loop and working safely in an automated environment.
In the lab, the student applies theory in practice. He/she analyses an arrangement of a control loop using a Bode diagram. He/she reads the value of a sensor (including the use of the HART protocol), analyses the values and then comments on the suitability of the sensor. Also, the student experimentally establishes the link between automation and the cost of automation.
In the simulator exercises section, the student links theory, practice and the lab. Here, the student assesses a process of practical control on board a ship and makes adjustments where necessary.</td></tr>
<tr><td>Learning outcomes</td><td>- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Manage and control complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (mastSW-c)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Manage and control complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (mastSW-d)
- Have advanced understanding of digital system controls and data processing (mastSW-g)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)
- Independently set up and carry out a scientific maritime research project at the level of a beginner researcher; select and correctly apply relevant research methods and techniques; critically process and scientifically report the results of this research (mastSW-i)
- Bear responsibility as an expert in safety and sustainability (mastSW-k)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1 permanent evaluation</td><td>Following Module 1.2 oral exam with written preparation and permanent evaluation</td><td>Following Module 2.1 permanent evaluation</td><td>Following Module 2.2 permanent evaluation</td></tr><tr><td colspan="4">Second session
oral exam with written preparation en practical test</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.</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>
</table>

Additional information	

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**INNOVATIVE AND SUSTAINABLE MARITIME TECHNOLOGIES (4 UC)**
Course element	**Innovative and sustainable maritime technologies (HZS-SW-SWM391)**
Lecturer(s)	**Joeri HORVATH, Tim JANSSENS, Geert POTTERS**
Lecturer in charge	Joeri HORVATH
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	Group work
Instruction language	Dutch/French
Required preliminary credit(s)	
Units of credit (UC)	4
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: - placing innovative technologies and their application in a maritime world in the right context; - assess the impact of these technologies on people and the environment; - understand the content of new technologies and compare them with the current situation; - reflect critically on these new technologies, their operation and possible shortcomings.
Course content	The student gains insight into basic concepts of innovation, technological development and sustainability thinking as a framework to assess technological developments in the maritime sector. He/she then studies several relevant examples of innovative technologies through seminars by guest lecturers from the field, company visits and own research. Through a group work, the student investigates different facets of one technology, in which he/she discusses economic and ecological implications in addition to the purely technical, analyzes the steps and thresholds that still need to be taken for further development, and estimates the impact on the people at board. Subjects from which a choice can be made each year are - for example - the evolution and development of engines for alternative fuels, drones for underwater inspection, dual fuel engines, underwater communication, predictive maintenance and class, cybersecurity, antifouling coatings, applications of the internet of things, etc. .

<table>
<tr><td>Learning outcomes</td><td>- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)</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
integrated practical test</td></tr><tr><td colspan="4">Second session
practical test</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></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></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**SAFETY TECHNIQUES - PART 3 AND SHIPS EXPLOITATION (6 UC)**
Course element	**Ship safety (HZS-NW-EXP-SWM301)**
Lecturer(s)	**Frederik BOUMANS, Raf MESKENS, Anne-Pascale MORNARD**
Lecturer in charge	Helen VERSTRAELEN
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	
Units of credit (UC)	2
Hours of formal lecture/practical exercise	12/12
Semester + module(s)	Semester 1, Module 1.1 -/- | **Semester 1, Module 1.2 12/-** | **Semester 2, Module 2.1 -/8** | **Semester 2, Module 2.2 -/4**
Learning objectives	At the end of the course, the student is expected to be able to: - describe and discuss the risks and control measures related to operations on gas and chemical tankers, as well as vessels using gas as fuel; - apply safe working methods and procedures in line with legislation, industry standards, and personal safety on board — including entry into enclosed spaces, hot work, and other permit-required tasks; - select the appropriate personal protective equipment based on the work and conditions (including chemical suits, hearing protection, etc.); - describe the relevant procedures in case of emergencies on board tankers (including activation of ESD and ERC systems); - indicate where and how to find missing information related to cargo and its hazards (such as MSDS sheets and the MFAG); - demonstrate the practical competencies required for *Proficiency in Survival Craft and Rescue Boats other than fast rescue boats* (PSCRB); - independently organise, execute, and evaluate a safety drill related to shipboard operations.

<table>
<tr><td>Course content</td><td>The student builds on the knowledge gained in previous safety training courses. First, he/she makes a direct connection between the nature of the transported cargo (with a focus on liquid cargoes), the associated hazards, and the appropriate firefighting and protective equipment and techniques. The importance of the MSDS document in conjunction with the MFAG is emphasized.

Next, the student becomes familiar with the procedures required for entering enclosed spaces, with specific attention to atmospheric testing and monitoring, and the correct preparation of the necessary entry documentation (‘permits’). The work permit system is reviewed using new examples, such as the ‘hot work permit’.

The student works through the bunkering checklist and learns to recognize and apply key terms and safety concepts. Finally, the risks related to vibration exposure are discussed, and the student learns to distinguish between different types of hearing protection, along with their advantages and disadvantages.

In the practical part of the course, the student independently plans, carries out, and evaluates exercises related to entering and evacuating a simulated enclosed space. He/she also practices the proper use of survival craft and rescue boats, excluding fast rescue boats.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
-</td><td>Following Module 1.2
oral exam with written preparation</td><td>Following Module 2.1
permanent evaluation</td><td>Following Module 2.2
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.</td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.
- Safety clothing.

- No calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
</table>

Additional information	- International Association on Classification Societies. (latest ed.). *Guideance for entry into enclosed spaces*. London, UK: IACS. - International Chamber of Shipping / OCIMF. (2006). *International Safety Guide for Oil Tankers and Terminals.* Edingburgh, UK: Witherbys Publishing. - International Chamber of Shipping. (latest ed.). *Tanker Safety Guide Liquified Gas. London, UK:* Marisec Publications. - International Chamber of Shipping. (latest ed.). *Tanker Safety Guide Petroleum. London, UK:* Marisec Publications. - International Chamber of Shipping. (latest ed.). *Tanker Safety Guide Chemicals. London, UK:* Marisec Publications. - 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. (2000). *International Code for Fire and Safety Systems (FSS Code)*. 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. - International Maritime Organization. (latest ed.). *Code on noise levels on board ships*. London, UK: IMO. - International Maritime Organization. (latest ed.). *IMO International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code).* London, UK: IMO.

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**SAFETY TECHNIQUES - PART 3 AND SHIPS EXPLOITATION (6 UC)**
Course element	**Maritime ecology and environmental regulations (HZS-NW-EXP-SWM302)**
Lecturer(s)	**Helen VERSTRAELEN**
Lecturer in charge	Helen VERSTRAELEN
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	
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: - define the sources of maritime pollution and assess their environmental impact; - apply theoretical knowledge of the international environmental legislation in force for shipping; - make connections between sources of pollution and applicable environmental regulations; - apply international environmental regulations in specific situations; - fill in logbooks with regard to environmental regulations and understand the importance of these logbooks; - understand certificates and other documents related to environmental regulations and their importance; - advise on how to reduce the environmental impact of shipping in the future; - act preventively with the aim of minimising the environmental impact of shipping; - formulate proposals for the prevention and reduction of environmental damage caused by shipping.

<table>
<tr><td>Course content</td><td>Shipping has a major impact on the maritime environment. During this course, the student studies this impact on the basis of the MARPOL convention and the other international conventions on maritime pollution. More specifically, the student acquires knowledge and insights on the following topics: pollution by tankers and bulk carriers, air pollution, pollution by garbage and sewage, the impact of ballast water, biofouling, antifouling, noise pollution and pollution during ship recycling. However, the course goes beyond the legislation and the resulting obligations of seafarers. The impact of men to te environment is one of the biggest challences of the 21st century. The student learns from background information to make connections between causes of pollution and effects on the maritime environment. In addition, he/she helps with the search for possible future options to prevent, reduce and eliminate this impact.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</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
written exam</td></tr>
<tr><td colspan="4">Second session
written exam</td></tr>
</table></td></tr>
<tr><td>Caesura measures</td><td></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>Basic tanker training (oil, gas, chem and IGF)
Ship administration and maritime law</td></tr>
<tr><td>Additional information</td><td>- International Maritime Organization. (1973-1978). International Convention for the Prevention of Pollution from Ships 1973-1978, as amended. London, UK: IMO.
- International Maritime Organization. (2001). International Convention on the Control of Harmful Anti-fouling Systems on Ships 2001, as amended. London, UK: IMO.
- International Maritime Organization. (2004). International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004, as amended. London, UK: IMO.
- International Maritime Organization. (2009). Hong Kong International Convention for the Safe and Environmental Sound Recycling of Ships 2009, as amended. London, UK: IMO.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**SAFETY TECHNIQUES - PART 3 AND SHIPS EXPLOITATION (6 UC)**
Course element	**Ship administration and maritime law (HZS-NW-EXP-SWM303)**
Lecturer(s)	**Marieke UTEN**
Lecturer in charge	Helen VERSTRAELEN
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	
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 -/12** | Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - understand the legal framework in which ships are operated and interpret concepts such as flag, ownership and registration; - know and be able to interpret the origin and content of the main IMO conventions; - know the administrative obligations associated with vessel operation; - know and be able to apply the survey requirements for ship's certificates; - know the duties of classification societies.
Course content	The student discovers the international institutions within shipping, as well as the content of nationally and internationally mandatory shipping documents, conventions and regulations developed by the IMO and the UN. The student thus acquires a general overview of the legal framework in which ships are operated.
Learning outcomes	- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI, for Engineer Officers on seagoing vessels (mastSW-a) - Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
Examination	Following Module 1.1 - | Following Module 1.2 - | **Following Module 2.1 written exam** | 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	- International Maritime Organization. (1966). *International Load Lines Convention (ILL) 1966, as amended.* London, UK: IMO. - International Maritime Organization. (1969). *International Tonnage Convention 1969, as amended.* London, UK: IMO. - 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. - International Maritime Organization. (latest ed.). *International Code for the Construction Equipment of Ships Carrying Liquefied Gases in Bulk.* London, UK: IMO. - International Maritime Organization. (latest ed.). *International Safety Management Code (ISM), as amended.* London, UK: IMO.

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**BASIC TANKER TRAINING (OIL, GAS, CHEM AND IGF) (3 UC)**
Course element	**Basic tanker training (oil, gas, chem and IGF) (HZS-NW-EXP-SWM321)**
Lecturer(s)	**Ynse JANSSENS, Anne-Pascale MORNARD, Denis STEVENS**
Lecturer in charge	Anne-Pascale MORNARD
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	Dutch/French + English
Required preliminary credit(s)	**Standard succession (must have followed)** Stability and Ship's construction - part 2
Units of credit (UC)	3
Hours of formal lecture/practical exercise	24/12
Semester + module(s)	**Semester 1, Module 1.1** **12/6** **Semester 1, Module 1.2** **12/6** 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: - operate the simulator; - name the different parts of the loading and discharging process; - outline the pipelines through which a tanker will be loaded and/or discharged; - carry out a cargo calculation and conclude whether the vessel can be loaded correctly; - understand why some loading calculations are erroneous; - to partially load and/or unload a tanker; - identify, recognise and solve problems; - manage tank cleaning.

<table>
<tr><td>Course content</td><td>During this course, the student gains an understanding of the issues of storage, handling and transportation of crude oil, chemicals and liquefied gas in accordance with the STCW2010 Specifications of minimum standards of competence in:
- Basic training for oil and chemical tanker cargo operations (A-V/1-1-1);

- Basic training for liquefied gas tanker cargo operations (A-V/1-2-1);
- Basic training on ships subject to IGF Code (A-V/3-1);
- Advanced training for oil cargo operations (A-V/1-1-2);

- Model Courses 1.01, 1.02, 7.13.
The following topics will be covered:
- Extensive introduction to the construction and equipment of the various tanker types;

- Valves and pipeline systems on board;
- cargo handling pumps;
- Tank cleaning;
- Measuring and sampling of liquid cargo;
- Tank vent;
- Tankers & Marpol annex 1;

- Introduction to inert gas.
The student learns to work with the simulator and carries out a load calculation. On the basis of the calculated amount of cargo the student will load the ship. A tank cleaning exercise completes the practical part.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1
permanent evaluation</td><td>Following Module 1.2
written and permanent evaluation</td><td>Following Module 2.1
-</td><td>Following Module 2.2
-</td></tr>
<tr><td colspan="4">Second session
oral exam with written preparation and written exam</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.</td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.
- Geen tweede zit voor praktijk indien afwezigheid labo. Indien aanwezig maar niet geslaagd: examenvorm schriftelijk, mondeling en simulatoroefening
- STCW Vak - cesuurregel 10/20 (theorie en praktijk).
- No calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
</table>

Additional information	- Bruhn, C. (latest ed.). *Dr. Verwey's Tank Cleaning Guide.* Dassendorf, Germany: ChemServe. - International Chamber of Shipping. (latest ed.). *Clean seas guide for oil tankers.* London, UK: ISC. - International Chamber of Shipping. (latest ed.). *International safety guide for oil tankers and terminals (ISGOTT)*. London, UK: ICS. - International Chamber of Shipping. (latest ed.). *Ship to ship transfer guide.* London, UK: ISC. - 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. (1978). *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) 1978, as amended.* London, UK: IMO. - Intertanko. (latest ed.). *Effective crude oil washing.* Oslo, Norway: Intertanko.

ECTS Information Package

Antwerp Maritime Academy

Programme	Academic Bachelor in Marine Engineering
Course	**BACHELOR TERM PAPER AND SCIENTIFIC RESEARCH METHODS (5 UC)**
Course element	**Bachelor term paper (HZS-WE-HT-SWM301)**
Lecturer(s)	**Promotor**
Lecturer in charge	Deirdre LUYCKX
Educational programme	**Third year Bachelor in Marine Engineering**

Other teaching methods	
Instruction language	Dutch/French
Required preliminary credit(s)	**Standard succession (must have followed)** Introduction to scientific research
Units of credit (UC)	4
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 evaluate information from sources and technological tools and synthesise it in combination with their own input; - set up his/her own maritime scientific research under supervision; - frame his/her work in a broader context (scientific, technological, social, or economic, etc.) and interpret its importance for the maritime sector; - report his/her work in a scientific document (thesis).
Course content	In the Bachelor Thesis the student makes an in-depth and critical study of the literature on a self-chosen theme from Mechanical Engineering. This theme is in line with the programme and/or the professional field. The literature study will lead to the formulation of a research question that will be explored in depth later on in the master's thesis. In this bachelor thesis, the student therefore already sets out how he/she will approach further technical research. At the end of BACH 3, the student submits the result of that work in the form of an academic report. The student shows commitment and initiative, is punctual and assertive, and keeps to agreements and timing.
Learning outcomes	- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e) - Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)

<table>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1
permanent evaluation with integrated practical test</td><td>Following Module 1.2
permanent evaluation with integrated practical test</td><td>Following Module 2.1
permanent evaluation with integrated practical test</td><td>Following Module 2.2
permanent evaluation with integrated practical test</td></tr>
<tr><td colspan="4">Second session
permanent evaluation with integrated practical test</td></tr>
</table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Ordinary scientific and graphic scientific 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	**Academic Bachelor in Marine Engineering**
Course	**BACHELOR TERM PAPER AND SCIENTIFIC RESEARCH METHODS (5 UC)**
Course element	**Methods of scientific research (HZS-WE-HT-SWM302)**
Lecturer(s)	**Peter BUEKEN, Deirdre LUYCKX, Katrijn VERHASSELT**
Lecturer in charge	Deirdre LUYCKX
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	
Instruction language	Dutch/French + English
Required preliminary credit(s)	**Standard succession (must have followed)** Introduction to scientific research
Units of credit (UC)	1
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: - use the principles of scientific writing and scientific methodology as building blocks for the bachelor's thesis; - produce a scientific report in accordance with current scientific and academic standards, by using LaTeX; - either elaborate a research design for a scientific experiment based on desired validity and reliability of the results to be obtained; - or apply the principle of dimensional homogeneity in preparation for research into relationships between physical quantities.
Course content	The student deepens his/her competences to participate in (research) projects in various fields, initially refining his/her skills in writing scientific texts. In addition, the student deepens a particular subfield of scientific thinking and acting, as an aid in technical research. Here, he/she learns to set up a scientific experiment or elaborate a dimensional analysis. Finally, as an alternative to more traditional word processors, the student learns to use LaTeX for formatting documents, such as research reports or theses. LaTeX is particularly suited to correctly format technical texts with many formulas, but can be used very broadly.

<table>
<tr><td>Learning outcomes</td><td>- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1
-</td><td>Following Module 1.2
integrated practical test</td><td>Following Module 2.1
-</td><td>Following Module 2.2
-</td></tr>
<tr><td colspan="4">Second session
integrated practical test</td></tr>
</table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Ordinary scientific and graphic scientific 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	**Academic Bachelor in Marine Engineering**
Course	**MATHEMATICS PART 3 AND DATA ANALYSIS (3 UC)**
Course element	**Mathematics (part 3) and data analysis (HZS-WE-HT-SWM311)**
Lecturer(s)	**Peter BUEKEN, Deirdre LUYCKX**
Lecturer in charge	Deirdre LUYCKX
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	
Instruction language	English
Required preliminary credit(s)	**Standard succession (must have followed)** Mathematics and Physics - part 2
Units of credit (UC)	3
Hours of formal lecture/practical exercise	12/12
Semester + module(s)	Semester 1, Module 1.1 -/- **Semester 1, Module 1.2** **6/6** **Semester 2, Module 2.1** **6/6** Semester 2, Module 2.2 -/-
Learning objectives	At the end of the course, the student is expected to be able to: - build an appropriate (single or multiple) regression model from a set of measured data and assess its quality; - quantify and visually represent the reliability of estimates and predictions by regression models; - summarise the results of a regression analysis scientifically justified both graphically and in text; - correctly work out techniques from linear algebra in concrete situations; - perform matrix calculations correctly, and choose the appropriate technique for solving problems from linear algebra; - solve problems from linear algebra correctly using scientific software; - use scientific and statistical software to create graphical representations, build mathematical mathematical models and solve mathematical and physical problems.

<table>
<tr><td>Course content</td><td>The student will study single and multiple regression models for original or transformed data, and apply these techniques to concrete measurement data. He/she learns to assess the quality of regression models by checking the conditions for regression, determining the correlation coefficient and determining the precision of the estimators. He/she uses regression models both for the estimation of an average trend and for the prediction of an individual value and determines the reliability of both. Finally the student learns to communicate the results of a regression analysis clearly, both in a scientific text and to a wider audience.

Further, the student is introduced to linear algebra, the vector space R^n, vectors and their analytic representation, linear transformations and matrices. He/she learns how these techniques are applied to solve systems of linear equations. The student is introduced to the important concepts of determinant, eigenvalue and eigenvector and some applications of these concepts.

The student learns to work with scientific software, e.g. Scilab, to work out harder problems with vectors and matrices. He/she learns to work with graphs, linear transformations and functions, e.g. for building neural networks.</td></tr>
<tr><td>Learning outcomes</td><td>- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of exact sciences (bachSW-c)
- Deal with complex technical systems on board ships and maritime installations based on a thorough understanding of applied technical sciences (bachSW-d)
- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)</td></tr>
<tr><td>Examination</td><td>
<table>
<tr><td>Following Module 1.1
-</td><td>Following Module 1.2
oral exam with written preparation</td><td>Following Module 2.1
-</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></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.

- Ordinary scientific and graphic scientific 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	Academic Bachelor in Marine Engineering
Course	**MARITIME ENGLISH - PART 3 (3 UC)**
Course element	**Maritime English - part 3** **(HZS-WE-HT-SWM331)**
Lecturer(s)	**Pieter DECANCQ, Felix HERMANS**
Lecturer in charge	Pieter DECANCQ
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Formal lecture
Other teaching methods	Portfolio Group work
Instruction language	English
Required preliminary credit(s)	**Standard succession (must have followed)** Maritime English - part 2
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: - recognize, understand, remember and apply specific maritime vocabulary at an in-depth level in general and specific maritime communicative situations and in the context of the themes included in Maritime English 3; - understand, apply and employ accurate English (grammar, pronunciation, structure, vocabulary, etc.) and recognize and apply language genres accordingly at maritime management level; - understand, analyse and process a variety of maritime material in terms of the skills: reading, writing, listening and speaking; - understand and recognise the value of self reflection and peer evaluation; - look up scientific sources, cite sources and write texts in English at an academic level; - recognize, understand, remember and use, as appropriate, the specific maritime communication system of the IMO 'Standard Marine Communication Phrases' in authentic situations.

<table>
<tr><td>Course content</td><td>In the course Maritime English 3, the student learns to:
- use specific maritime English vocabulary at an in-depth level using a variety of study materials, as well as the course documents, with emphasis on certain themes relevant to students of both Nautical Sciences & Marine Engineering. These themes include effective communication, the marine environment and sustainability, green shipping and alternative fuels, material types and material processing, women in the maritime, ports of the future and the ship’s routine;
- apply accurate English (grammar, pronunciation, structure, vocabulary, etc.) at an in-depth level through use of the language at maritime management level. This involves being able to employ a range of language genres (eg. argumentative-persuasive, informative, instructive, narrative, reflective, etc.) in different maritime communicative contexts (debates, briefings, presentations, brainstorming, testimony, self-evaluation & peer evaluation, etc.);
- search for scientific sources, cite sources and write texts at academic level as part of a portfolio based on specific topics (see above);
- master the specific maritime communication system IMO Standard Marine Communication Phrases (SMCP), as appropriate, by applying the phrases in authentic situations.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
- Function in an international, multicultural environment, adopt a flexible attitude and act with respect when dealing with others (bachSW-f)
- Communicate effectively and professionally in English under all kinds of maritime circumstances (nautical-technical situations) (bachSW-g)
- Research, assimilate, interpret, evaluate and report scientific and technical information related to marine engineering (bachSW-h)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
permanent evaluation</td><td>Following Module 1.2
permanent evaluation</td><td>Following Module 2.1
oral exam with written preparation</td><td>Following Module 2.2
-</td></tr><tr><td colspan="4">Second session
oral exam with written preparation</td></tr></table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
</table>

Required study material	- Lecturer's course text available. - Buckowska, W. (2014). *MarEngine English Underway.* Dokmar, the Netherlands. ISBN: 9789071500268. - International Maritime Organization. (2002). *Standard Marine Communication Phrases*. London, UK: IMO. ISBN: 9789280142112. - Murphy, R. (2004). *English Grammar in Use.* (4th ed.). Cambridge, UK: Cambridge University Press. ISBN: 97811075339334. - Murphy, R. (2004). *Essential Grammar in Use* (3rd ed.). Cambridge, UK: Cambridge University Press. ISBN 9781107480551. - Nisbet, A., Witcher Kutz, A. & Logie, C. (1997). *Marlins English for Seafarers, Study Pack 1*. Edinburgh, UK: Marlins. ISBN: 0 9531748 08. - Nisbet, A., Witcher Kutz, A. & Logie, C. (1998). *Marlins English for Seafarers, Study Pack 2*. Edinburgh, UK: Marlins. ISBN 0953174816. - Petkova, V. & Toncheva, S. (2016). *Correspondence and Communications in Shipping.* Varna, Bulgaria: Steno Publishing House. ISBN: 978-954-449-853-5. - Van Kluijven, P.C. (2007). *The International Maritime Language Programme*. Sint Pancras, the Netherlands: Alk & Heijnen Publishers ISBN: 9789059610064. - No calculator allowed.
Recommended preliminary competences	
Additional information	- 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. (2002). Standard Marine Communication Phrases. London, UK: IMO.

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**GENERAL AND INTERCULTURAL COMMUNICATION AND MCRM (4 UC)**
Course element	**General and Intercultural Communication (HZS-WE-HT-SWM321)**
Lecturer(s)	**Sophie LIMBOS**
Lecturer in charge	Sophie LIMBOS
Educational programme	**Third year Bachelor in Marine Engineering**

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)** Multidisciplinary simulator exercises - part 1
Units of credit (UC)	2
Hours of formal lecture/practical exercise	8/12
Semester + module(s)	**Semester 1, Module 1.1** **4/4** **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: - have an understanding of the communication process, with particular attention to the possible pitfalls and causes of miscommunication; - apply this knowledge in the analysis of communication situations; - make a SWOT analysis of one's own communicative skills and to reflect critically on one's own competences and the perception of them by other communication partners; - formulate and apply remedial strategies; - understand, apply and adapt the acquired oral and written communication strategies to the physical and (inter)cultural context in which the communication takes place; - search for and use appropriate sources as an introduction to scientific research in order to prepare an oral intervention/presentation with correct citation of sources; - demonstrate insight into communication processes specific to on-board crisis situations, with attention to leadership, coordination, and safety; - select and apply communication strategies that support effective interaction in high-pressure or large-scale emergency settings.

<table>
<tr><td>Course content</td><td>In this course the student of Marine engineering learns to acquire a deeper insight into the communication process and all factors involved, both in a general as well as in a maritime context. A lot of attention is paid to the specific nature of communicative interactions (types of interactions, a professional multicultural environment) on board a ship, its impact on our way to communicate and which communication skills are required. Consequently, the student learns to analyze and refine or enhance his/her own communication skills through various written and oral activities (presentation, briefing,pitch,…). Finally, in this course, the student will master communication principles relevant to crisis contexts, as encountered in Crowd and Crisis Management on board.</td></tr>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Function in an international, multicultural environment, adopt a flexible attitude and act with respect when dealing with others (bachSW-f)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1
permanent evaluation</td><td>Following Module 1.2
permanent evaluation</td><td>Following Module 2.1
-</td><td>Following Module 2.2
-</td></tr>
<tr><td colspan="4">Second session
oral exam en portfolio</td></tr>
</table></td></tr>
<tr><td>Caesura measures</td><td></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></td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**GENERAL AND INTERCULTURAL COMMUNICATION AND MCRM (4 UC)**
Course element	**Maritime Crew Resource Management (HZS-WE-HT-SWM322)**
Lecturer(s)	**Rik FLOREN**
Lecturer in charge	Sophie LIMBOS
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Practical exercises
Other teaching methods	Group work
Instruction language	English
Required preliminary credit(s)	**Standard succession (must have followed)** Multidisciplinary simulator exercises - part 1
Units of credit (UC)	2
Hours of formal lecture/practical exercise	-/32
Semester + module(s)	**Semester 1, Module 1.1 -/8** | **Semester 1, Module 1.2 -/8** | **Semester 2, Module 2.1 -/8** | **Semester 2, Module 2.2 -/8**
Learning objectives	At the end of the course, the student is expected to be able to: - explain the core principles of MCRM and teamwork on board; - describe different leadership styles and the importance of emotional competence; - apply effective communication and motivation techniques within a team; - assess situational awareness; - recognize and respond appropriately to cultural differences, values, and attitudes; - identify stress, fatigue, and conflicts as safety risk factors on board; - analyze incidents based on human factors and formulate appropriate actions; - apply MCRM principles during simulator training.
Course content	The student is introduced to the fundamentals of Maritime Crew Resource Management (MCRM) and learns how human and organizational factors influence the safe and efficient functioning of a shipboard team. The course provides insight into teamwork skills, leadership, communication, and decision-making on board, with particular attention to emotional intelligence, motivation, and conflict management. The student analyzes how situational awareness, culture, values, and attitudes shape behavior on board and learns to build mental models and shared understanding within a team. They learn the importance of effective communication (such as active listening and closed-loop communication) and understand how fatigue, stress, and unexpected situations impact safety. The theory is applied through simulator training, realistic scenarios, group reflection, and structured briefings and debriefings.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)
- Function in an international, multicultural environment, adopt a flexible attitude and act with respect when dealing with others (bachSW-f)
- Communicate effectively and professionally in English under all kinds of maritime circumstances (nautical-technical situations) (bachSW-g)
- Through an awareness of social responsibility (the environment, safety, etc.), act conscientiously and function when under stress in a crisis, particularly in the professional context of a marine engineer (bachSW-i)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
permanent evaluation</td><td>Following Module 1.2
permanent evaluation</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>- 100% presence in practical sessions mandatory to be evaluated in the first exam session.</td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.
- CAE, MCRM student's workbook, latest edition, by CAE maritime training team
- No calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td>- Lagadec, P. (1993). Preventing chaos in a crisis: Strategies for prevention, control, and damage limitation. New-York, US: McGraw-Hill. ISBN: 978-0077077747.
- Roberts, P. (1996). Watchkeeping Safety and Cargo Management in Port: A Practical Guide. London, UK: Nautical Institute. ISBN 978-1870077293.</td></tr>
</table>

ECTS Information Package

Antwerp Maritime Academy

Programme	**Academic Bachelor in Marine Engineering**
Course	**ECONOMICS FOR THE MARITIME SECTOR (3 UC)**
Course element	**Economics for the maritime sector (HZS-WE-HT-SWM341)**
Lecturer(s)	**Theo NOTTEBOOM**
Lecturer in charge	Theo NOTTEBOOM
Educational programme	**Third year Bachelor in Marine Engineering**

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 8/-**	**Semester 1, Module 1.2 16/-**	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 and use key economic principles and concepts related to the foundations of economics; demand, supply and market equilibrium; the theory of production and cost; and market structure; • Analyse and assess the macro environment in which the merchant shipping industry operates; • Understand the functioning of key shipping markets, including shipbuilding, shipbreaking and freight markets, across market segments such as liner and bulk shipping; • Demonstrate a solid grasp of how shipping company managers and their clients can navigate market cycles, make strategic decisions, and manage risk effectively.			

<table>
<tr><td>Course content</td><td>The course consists of two parts.

In the first part, the student familiarizes himself with general economics principles and concepts. He/she dives into four themes: (1) Foundations of economics; (2) Demand, Supply and Market Equilibrium; (3) The Theory of Production and Cost; and (4) Market structure.

In the second part, the student studies the core questions and mechanisms of maritime economics. He/she starts with exploring the market environment in which shipping companies operate, followed by a structured overview of the main segments of the maritime industry. Using a range of datasets and industry publications, the student analyses demand, supply, and the balance between them in the shipbuilding, shipbreaking, and freight markets. He/she then unpacks the dynamics that shape freight market behaviour, with particular attention to chartering choices, market timing tools, asset play, and risk management. The course also offers an in depth examination of the shipbuilding, shipbreaking, and cruise markets.</td></tr>
<tr><td>Learning outcomes</td><td>- Work in a result-oriented fashion by planning efficiently and by thinking and acting in an accurate, creative and innovative manner (bachSW-e)</td></tr>
<tr><td>Examination</td><td><table>
<tr><td>Following Module 1.1
-</td><td>Following Module 1.2
written exam</td><td>Following Module 2.1
-</td><td>Following Module 2.2
-</td></tr>
<tr><td colspan="4">Second session
written exam</td></tr>
</table></td></tr>
<tr><td>Caesura measures</td><td></td></tr>
<tr><td>Required study material</td><td>- Lecturer's course text available.
- Pdf’s of powerpoint presentations per topic will be made available by course coordinator via Blackboard. This also includes a set of background papers and reports per topic. Furthermore, some shipping-related chapters of the online book ‘Port Economics, Management and Policy’ will be used during classes (https://porteconomicsmanagement.org/)
- No calculator 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	Academic Bachelor in Marine Engineering
Course	**ADVANCED FIRE FIGHTING AND TANKER FIRE FIGHTING (UC)**
Course element	**Advanced fire fighting and tanker fire fighting (HZS-NW-EXP-SWM331)**
Lecturer(s)	**Laura DE WEL, Inez HOUBEN, Raf MESKENS, Dries VAN ZUNDERT**
Lecturer in charge	Raf MESKENS
Educational programme	**Third year Bachelor in Marine Engineering**

Method of teaching	Formal lecture and practical exercises
Other teaching methods	Excursion Group work Demonstration
Instruction language	Dutch/French + English
Required preliminary credit(s)	
Units of credit (UC)	-
Hours of formal lecture/practical exercise	6/24
Semester + module(s)	**Semester 1, Module 1.1 6/-** | 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: - initiate, control and lead firefighting operations on board ships; - communicate correctly in case of firefighting on board ships when co-ordinating crews, act appropriately when controlling ventilation, fuel systems and control the organisation of first aid; - assess the consequences of the use of water for fire fighting on the stability of the ship and use this effectively with any necessary corrections; - know and control the processes/risks related to e.g. dry distillation and chemical processes in case of fire fighting; - take appropriate action when fighting fires involving hazardous materials; - know and understand hazards and precautions to be taken and apply when handling and storing materials such as paints; - know procedures and coordinate firefighting with shore-based crews; - organise and train firefighting teams to fight fires in the engine room, cargo spaces, galley or recreation areas and for certain types of fires; - inspect, monitor and maintain fire detection systems and fire-fighting equipment and their various components, without triggering, disabling or damaging them, as well as inspecting these systems and equipment to maintain their compliance with applicable laws and regulations; - investigate fire incidents and make reports on the origin and cause, with recommendations on corrective actions.

Course content	The "Advanced fire fighting & tanker fire fighting" course is **optional** and is composed as follows: - admission test to make sure the basic fire fighting knowledge is know; - 6 hours theoretical course at the AMA in module 1.1; - 3 days practical exercises, the first at the AMA and then 2 at a specialised fire fighting training centre, during the IHS-SA weeks. During this course, students receive a profound training according to the standards listed in the STCW A VI/3 (Advanced fire fighting), A V/1.1.1. en A V/1.2.1. (tanker fire fighting). - fire-fighting procedures at sea and in port, with emphasis on organisation, tactics and command : A : upon receipt of a report or any other indication of fire, take all necessary initial actions to alert the necessary teams and ensure proper assistance. B : upon receipt of initial reports on the spot, make the assessment of the source of the fire and the actions to be taken to control and extinguish the fire; - communication and coordination during firefighting, control ventilation/fuel systems and organisation towards injured persons : A : in a simulation, order the stopping of all appropriate systems, B : deploy the necessary extra manpower in fighting the fire and rescuing injured persons; - take the appropriate measures to control water flows in relation to the stability of the ship, to preserve and control them at all times; - take the right measures in case of fire fighting in case of dry distillation, chemical reactions and boiler installations. - take proper measures when fighting fires with dangerous goods; - take the right precautions and know the risks when storing and handling materials in a simulated fire drill in a specialised storage area; - demonstrate command, control, communication and coordination of and with firefighting with shore based personnel. Organisation and training of firefighting teams: - preparation of an emergency plan, including allocation of personnel and description of tactics for containment/control and extinguishing a fire; - prepare, conduct and evaluate an exercise for a particular type of fire. Inspection and maintenance of detection and extinguishing systems and accessories: - A : demonstration of knowledge of inspection and maintenance of different systems and their components. B : demonstration of knowledge related to the operation of different systems and their components; - inspection of fire-fighting systems in relation to regulatory validity. Investigation and reporting after incidents with fire: - description of the process in designating the place of origin of a fire, using fire patterns, charred remains, structural damage, discoloration and bending or any other physical evidence; - idem but identify and report the cause of a fire. - describe effective countermeasures after evaluation of origin, cause and witness statements following a fire.

<table>
<tr><td>Learning outcomes</td><td>- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI, for Engineer Officers on seagoing vessels (mastSW-a)
- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/1, A-V and A-VI1, for Engineer Officers on seagoing vessels (bachSW-a)
- Act in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6, A-V and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (mastSW-b)
- Have a basic knowledge of the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) A-III/6 and A-VI for Electro-Technical Officers (ETO) on seagoing vessels (bachSW-b)</td></tr>
<tr><td>Examination</td><td><table><tr><td>Following Module 1.1
permanent evaluation</td><td>Following Module 1.2
permanent evaluation</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>- 100% presence in practical sessions mandatory to be evaluated in the first 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.
- Safety clothing.

- No calculator allowed.</td></tr>
<tr><td>Recommended preliminary competences</td><td></td></tr>
<tr><td>Additional information</td><td>- 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. (2000). International Code for Fire and Safety Systems (FSS Code). London, UK: IMO.</td></tr>
</table>

info@hzs.be
www.amacademy.be
Noordkasteel Oost 6
B-2030 Antwerpen

Antwerp Maritime Academy

Required preliminary credits - summary

Academic Bachelor in Marine Engineering

Academic year 2026-2027

info@hzs.be
www.amacademy.be
Noordkasteel Oost 6
B-2030 Antwerpen

Antwerp Maritime Academy

Required preliminary credits - summary (first enrolment from 2023-24)

Academic Bachelor in Marine Engineering

Academic year 2026-2027

Second year Bachelor in Marine Engineering

Faculty of Marine Engineering	
THERMODYNAMIC PROCESSES - PART 2	**Standard succession (must have followed)** THERMODYNAMIC PROCESSES - PART 1
SHIP'S AUTOMATION - PART 1	**Standard succession (must have followed)** MATHEMATICS AND PHYSICS - PART 1
NAVAL ELECTRONICS AND ICT - PART 1	**Standard succession (must have followed)** THEORY OF ELECTRICITY & SHIP'S ELECTROTECHNICS - PART 1
SHIP'S ELECTROTECHNICS - PART 2	**Standard succession (must have followed)** THEORY OF ELECTRICITY & SHIP'S ELECTROTECHNICS - PART 1 MATHEMATICS AND PHYSICS - PART 1
MARINE PROPULSION - PART 2	**Standard succession (must have followed)** MARINE PROPULSION - PART 1
MARINE ENGINEERING SKILLS TRAINING - PART2	**Strict succession (must have followed and passed)** MARINE ENGINEERING SKILLS TRAINING - PART 1
MULTIDISCIPLINARY SIMULATOR EXERCISES - PART 1	**Standard succession (must have followed)** MARITIME ENGLISH - PART 1
Nautical Faculty	
STABILITY AND SHIP'S CONSTRUCTION - PART 2	**Standard succession (must have followed)** STABILITY AND SHIP CONSTRUCTION - PART 1
Faculty of Sciences	
MATHEMATICS AND PHYSICS - PART 2	**Standard succession (must have followed)** MATHEMATICS AND PHYSICS - PART 1
MATTER AND MATERIALS - PART 2	**Standard succession (must have followed)** MATTER AND MATERIALS PART 1
MARITIME ENGLISH - PART 2	**Standard succession (must have followed)** MARITIME ENGLISH - PART 1

Third year Bachelor in Marine Engineering

Faculty of Marine Engineering	
SHIP'S ELECTROTECHNICS - PART 3 AND HIGH VOLTAGE	**Standard succession (must have followed)** SHIP'S ELECTROTECHNICS - PART 2
MARINE PROPULSION - PART 3	**Standard succession (must have followed)** MARINE PROPULSION - PART 2
MARINE ENGINEER SKILLS TRAINING - PART 3, SEMINARS - PART 1 AND MULTIDISCIPLINARY SIMULATOR EXERCISES - PART 2	**Strict succession (must have followed and passed)** MULTIDISCIPLINARY SIMULATOR EXERCISES - PART 1 MARINE ENGINEERING SKILLS TRAINING - PART2
SHIP AUXILIARIES - PART 2	**Standard succession (must have followed)** SHIP'S AUXILIARY MACHINES - PART 1
SHIP ELECTRONICS AND ICT - PART 2	**Standard succession (must have followed)** NAVAL ELECTRONICS AND ICT - PART 1
SHIP AUTOMATION - PART 2	**Standard succession (must have followed)** SHIP'S AUTOMATION - PART 1
Nautical Faculty	
BASIC TANKER TRAINING (OIL, GAS, CHEM AND IGF)	**Standard succession (must have followed)** STABILITY AND SHIP'S CONSTRUCTION - PART 2
Faculty of Sciences	
BACHELOR TERM PAPER AND SCIENTIFIC RESEARCH METHODS	**Standard succession (must have followed)** INTRODUCTION TO SCIENTIFIC RESEARCH
MATHEMATICS PART 3 AND DATA ANALYSIS	**Standard succession (must have followed)** MATHEMATICS AND PHYSICS - PART 2
MARITIME ENGLISH - PART 3	**Standard succession (must have followed)** MARITIME ENGLISH - PART 2
GENERAL AND INTERCULTURAL COMMUNICATION AND MCRM	**Standard succession (must have followed)** MULTIDISCIPLINARY SIMULATOR EXERCISES - PART 1