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Antwerp Maritime Academy

Study guide

Preparatory programme Academic Master in Marine Engineering

Academic year 2023-2024

Preparatory programme Academic Master in Marine Engineering

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ECTS Information Package

Programme	**Preparatory programme Academic Master in Marine Engineering**
Course	**SCIENTIFIC RESEARCH METHODOLOGY**
Lecturer(s)	**Peter BUEKEN, Han JACOBS, Deirdre LUYCKX, Geert POTTERS, Carine REYNAERTS**

Method of teaching	Self study with consultation
Semester(s)	1 + 2
Units of credit (UC)	3 UC
Instruction language	Dutch/French + English
Learning objectives	At the end of the course, the student is expected to be able to: - construct a scientific research question and develop it in a project-based manner; - identify scientific sources, use these to look up information and integrate them in a scientific study; - organise and visualise data in graphs; - produce a scientific report in text and poster format according to prevailing scientific and academic standards, using a classic word processor and LaTeX; - apply the principle of dimensional homogeneity in preparation of more focused and efficient research on mathematical models for relationships between physical quantities; - apply the principle of dimensional homogeneity in preparation of scale model research on relationships between physical quantities.
Course content	In this course, students are introduced to scientific research, whereby they understand and apply various basic techniques and methods of academic thinking and behaviour. Central to the course is the construction of a research question with attention to the SMART-principle (Specific - Measurable - Acceptable - Realistic - Time-bound). As a second important theme, the student learns to correctly look up, identify and use scientific sources in a scientific study. Next, he/she learns to edit a scientific report, paying attention to the adequate writing style, text structure and layout, and to draw up an appropriate source list using a software package. In addition, the student learns how to produce a scientific poster and is taught how to present his/her research to an audience. The student learns to embed his/her actions in project-based thinking and working. For this purpose, he/she works with the concept of the project cycle, and uses fishbone diagrams and pareto charts to structure their work and monitor the progress of their project. Project budgeting is also discussed. The student applies 'dimensional analysis' as a tool in technical research, and as a basis for designing scale models that allow experiments to be conducted in laboratory conditions. In doing so, he/she analyses a set of measurement data obtained for a scale model. Finally, as an alternative to more traditional word processors, the student works with LaTeX to format documents, such as research reports or theses. LaTeX is particularly suitable for correctly formatting technical texts with many formulas, but it can be used in a very wide range of applications.
Examination	Take home assignment

ECTS Information Package

Programme	Preparatory programme Academic Master in Marine Engineering
Course	**DISSERTATION WITHIN THE BRIDGING PROGRAMME**
Lecturer(s)	**Promotor**

Method of teaching	Self study with feedback
Semester(s)	1 + 2
Units of credit (UC)	5 UC
Instruction language	Dutch/French
Learning objectives	At the end of the course, the student is expected to be able to: - identify scientific and technical publications with regard to a self-selected example of an innovative maritime technology; - develop a critical analysis of this technology, indicating its advantages and disadvantages in the maritime world; - write a synthesis of these publications, applying a scientific writing style and source analysis; - place his/her work in a broader context (scientific, technological, social or economic, etc.) and indicate its importance for the maritime sector.
Course content	The student writes a well-substantiated scientific paper on a self- selected innovative maritime technology and discusses this paper with a promotor on a regular basis. In doing so, he/she bases him/herself on recent scientific and technical literature, which is examined with a critical eye. In practical terms, the student applies the rules for source referencing and structure in a scientific report (as discussed in the course Scientific Research Methodology).
Examination	Take home assignment

ECTS Information Package

Programme	Preparatory programme Academic Master in Marine Engineering
Course	**MATHEMATICS AND PHYSICS - PART 1**
Lecturer(s)	**Peter BUEKEN, Deirdre LUYCKX**

Method of teaching	Self study with consultation
Semester(s)	1
Units of credit (UC)	3 UC
Instruction language	Dutch/French
Learning objectives	At the end of the course, the student is expected to be able to: - solve simple and complex problems on related rates; - solve homogeneous first-order differential equations; - determine and correctly interpret double integrals and Fourier series of a number of functions; - calculate derivatives of a vector-valued function and interpret them in a physical context; - calculate and correctly interpret gradient, divergence and rotation of a function or vector field; - calculate line integrals of vector fields in various ways, and interpret these line integrals as work; - choose the appropriate technique to solve simple mathematical problems; - analyse and solve simple compound problems by breaking them down into a series of successive subproblems, determine or collect the necessary data, and carry out the required operations in the order in which they were planned by using the appropriate calculation technique; - apply the techniques of descriptive statistics and explanatory statistics to concrete data sets, interpret the results and summarise them in a scientifically sound manner, both graphically and in text.
Course content	The course consists of three parts: vector calculus, integral calculus and statitics. In the first part of the course, the student is immersed into more advanced methods of differential and integral calculus. He/she learns to deal with related rates, homogeneous first-order differential equations, multiple integrals and Fourier series. He/she practises these principles and methods sufficiently to be able to apply them in other scientific subjects. In the second part, the student is further immersed into the definition and geometric interpretation of vector-valued functions, the derivative of a vector-valued function and its geometric significance, 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 getting acquainted with line integrals (definition and calculation), the integral of a vector field along a curve, work, Green's theorem, conservative vector fields and their potential function. In the third part, the student is introduced 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 test for population mean). In addition, the student learns to use these methods correctly, to interpret the results and to report on them when analysing concrete data sets.
Examination	Take home assignment with presentation

ECTS Information Package

Programme	**Preparatory programme Academic Master in Marine Engineering**
Course	**MATHEMATICS AND PHYSICS - PART 2**
Lecturer(s)	**Deirdre LUYCKX, Carine REYNAERTS, Katrijn VERHASSELT**

Method of teaching	Self study with consultation
Semester(s)	2
Units of credit (UC)	4 UC
Instruction language	Dutch/French
Learning objectives	At the end of the course, the student is expected to be able to: - demonstrate theoretical understanding of what the phenomenon 'wave' entails and classify waves; - describe the general characteristics of wave phenomena using the harmonic wave and carry out calculations in connection with it; - understand how a suitable combination of (harmonic) waves produces beats and standing waves and perform calculations in relation to these; - analyse Doppler shift for sonar and radar systems and determine source and observer motions from these; - understand the principles of interference in general and in specific terms, classify and analyse interference patterns and calculate the related parameters; - understand the importance of the decibel scale and correctly calculate sound levels and intensities; - understand and apply the principles of the resistance and lift forces on immersed bodies and to carry out calculations in relation to this; - understand and explain physical phenomena such as the Coriolis force and the gyroscope, and illustrate their importance to navigation.
Course content	The course consists of 3 parts: waves, hydromechanics and dynamics. In the first part of the course, the student learns to classify wave phenomena into longitudinal and transverse waves on the one hand, and mechanical and electromagnetic waves on the other hand. He/she carries out calculations relating to wave function and wave speed, power and intensity, refraction and reflection of waves, and total internal reflection. He/she understands how beats and standing waves form and applies the Huygens principle in calculations. He/she classifies and analyses interference and diffraction patterns. He/she understands the Doppler effect and applies it to mechanical and electromagnetic waves. He/she calculates sound levels by correct application of the decibel scale. In the second part of the course, the student examines the principles of hydrodynamics. In particular, he/she studies the so-called boundary layer and forces on immersed bodies. Finally, the student applies concepts from rotational dynamics to gyroscope motion in the third part of the course. He/she studies the dynamics behind the Coriolis force and the centrifugal force due to the rotation of the earth on its axis. The student acquires knowledge in the domain of physics, insights and skills to support other subjects and assist in the creation of a thesis.
Examination	Written + take home assignment with presentation

ECTS Information Package

Programme	Preparatory programme Academic Master in Marine Engineering
Course	**MATHEMATICS - PART 3**
Lecturer(s)	**Peter BUEKEN, Deirdre LUYCKX**

Method of teaching	Self study with consultation
Semester(s)	This course is not organized in the academic year 2022-23
Units of credit (UC)	3 UC
Instruction language	Dutch
Learning objectives	At the end of the course, the student is expected to be able to: - work out techniques from linear algebra correctly in concrete situations; - perform matrix calculations correctly, and choose the correct technique for solving linear algebra problems; - solve problems in linear algebra correctly with scientific software; - use scientific and statistical software to create graphs, build mathematical calculation models and solve mathematical and physical problems; - build an appropriate (single or multiple) regression model from a set of measurement data and assess its quality; - quantify and visually represent the reliability of estimates and predictions obtained from regression models; - summarise the results of a regression analysis in a scientifically sound manner, both graphically and in text.
Course content	The student is introduced to linear algebra, the vector space R^n, vectors and their analytical representation, linear transformations and matrices. He/she learns how to apply these techniques to solve systems of linear equations. The student gets acquainted with the important concepts of determinant, eigenvalue and eigenvector and some applications of these concepts. The student learns to work with scientific software, such as Scilab, to work out more difficult problems with vectors and matrices. He/she learns to work with graphs, linear transformations and functions, for example, to build neural networks. The student learns single and multiple regression models for original or transformed data, and applies 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 estimating an average trend and for predicting 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.
Examination	Take home assignment

ECTS Information Package

Programme	**Preparatory programme Academic Master in Marine Engineering**
Course	**MARITIME ENGLISH**
Lecturer(s)	**Alison NOBLE**

Method of teaching	Self study with consultation
Semester(s)	1
Units of credit (UC)	3 UC
Instruction language	English
Learning objectives	At the end of the course, the student is expected to be able to: - orally provide advice and guidance in a maritime context; - mediate in conflicts and diplomatically express his/her opinion; - lead and direct a meeting and take minutes; - give a maritime briefing; - orally provide witness testimony; - search for, analyse and report on maritime incidents and accidents both orally and in writing; - reflect on the decision-making and thought processes of oneself and those of others.
Course content	The course consists of 3 main topics: English as a tool for maritime management, advanced maritime speaking skills and advanced maritime writing skills. In the first part, the student is immersed in more advanced methods of maritime management and administration by evaluating interviews and assessments. He/she reflects on and can form an opinion on the make-up of a competent manager in the maritime sector. Then, using case studies, the student hones his/her speaking skills by giving a briefing, providing witness testimony and verbally evaluating a maritime emergency. The student forms an opinion and is able to defend this in a diplomatic manner. Finally, the student enhances his/her writing skills, e.g. by writing a comprehensive maritime-related article, supported by academic research and in accordance with the requirements of scientific research methodology.
Examination	Take home assignment with presentation

ECTS Information Package

Programme	**Preparatory programme Academic Master in Marine Engineering**
Course	**PSYCHOLOGY: HUMAN ASPECTS OF NAVIGATION**
Lecturer(s)	**Camille DEBANDT**

Method of teaching	Self study with consultation
Semester(s)	2
Units of credit (UC)	3 UC
Instruction language	Dutch/French
Learning objectives	At the end of the course, the student is expected to be able to: - formulate psychological processes, such as perception and attention, and be aware of their impact on life on board; - assess how social situations can affect human behaviour, in order to demonstrate appropriate social skills during interpersonal contacts; - distinguish the qualities and pitfalls of different conflict styles in order to adopt the most appropriate style during a conflict and thus enhance teamwork; - understand the causes and prevention of fatigue, having knowledge of the sleep process, circadian rhythm and the disruptive effects of watchkeeping on sleep; - identify symptoms of excessive personal stress and those of others.
Course content	During the course, the student is immersed into maritime-related themes from applied and social psychology. He/she researches the influence of perceptual processes and attention on human thinking. The student also studies the sleep process and learns to argue the causes of fatigue. The student makes connections between social interactions and human behaviour. In doing so, he/she examines various themes such as conformity, attributions, social influence, stereotypes, etc. Finally, the student deals with mental health and learns to infer symptoms in him/herself and others.
Examination	Take home assignment with presentation

ECTS Information Package

Programme	**Preparatory programme Academic Master in Marine Engineering**
Course	**ECONOMICS AND BUSINESS MANAGEMENT**
Lecturer(s)	**Hubert PARIDAENS**

Method of teaching	Self study with feedback
Semester(s)	1
Units of credit (UC)	3 UC
Instruction language	Dutch/French
Learning objectives	At the end of the course, the student is expected to be able to: - explain various concepts of micro- and macro economy; - analyse and evaluate economic graphs and articles; - draw up elementary accounting transactions; - calculate financial ratios; - calculate and compare the profitability of investments using various selection criteria; - appreciate and explain the role of the maritime sector in globalisation; - analyse the economic aspects of merchant shipping; - assess the business model in the different sectors (line, bulk, etc.); - question and assess the recent economic developments in the maritime sector as well as the positions of the different actors with regard to these developments.
Course content	This course consists of three parts: general economy, business economy and maritime economy. In the first part of the course, general economy, the student assesses the core concepts of economy, starting from concrete themes such as inequality, economic crises, monetary instability and international relations. The student questions and documents economic issues by taking a critical distance from the sources of information and by confronting opposing viewpoints. In the second part of the course, business economy, the student gains insight into double-entry bookkeeping through exercises. The student calculates and interprets the concepts dealt with in the course by looking up relevant information in the annual accounts. Using the method of financial ratios, the student analyses the balance sheet and profit-and-loss account of an existing company in order to assess its financial structure and performance. The student evaluates different investment possibilities. The student justifies his/her choice by using the appropriate financial management tool for each situation. In the third part of the course, maritime economy, the student evaluates different charts to explain the mechanisms that govern today's international maritime trade. By interpreting data, the student assesses the new challenges facing shipping companies in terms of international competitiveness, market penetration and key innovation practices. In doing so, the student will examine the strategic, operational and societal issues underlying maritime transport activities, including the logistical dimension.
Examination	Written

ECTS Information Package

Programme	Preparatory programme Academic Master in Marine Engineering
Course	**SHIP CONSTRUCTION AND STABILITY**
Lecturer(s)	**Werner JACOBS, Remke WILLEMEN**

Method of teaching	Self study with consultation
Semester(s)	1
Units of credit (UC)	4 UC
Instruction language	English
Learning objectives	At the end of the course, the student is expected to be able to: - analyse ship plans; - understand the construction of ice-strengthened ships; - justify the required engine power; - 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 / bending moments; - understand and define trim and heel, and propose measures to reduce them without endangering the stability of the vessel; - 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 and interpret the changes in stability during docking or beaching, and propose the necessary appropriate measures; - make a simplified calculation of leak stability, in particular draught, heel and trim; - analyse the procedure for correctly carrying out a heeling test.
Course content	According to international regulations, ships have to comply with safety regulations regarding construction and stability, among other things. During the section Shipbuilding, the student analyses ship plans in the first part, making connections between the representation of a ship's structure and its application. Next, the student examines the ship structure of ice-strengthened ships and assesses and justifies the engine power with which the ship can meet its operational requirements. During the second part, the student studies simple sagging beam problems and visualises shear forces and bending moments by means of self-drawn diagrams. He/she masters the theoretical principles to calculate shear forces and bending moments and applies these to box-shaped ship structures. Finally, the student learns how the shear forces and bending moments are linked to stresses, where he/she evaluates the stresses as a function of whether or not the structure has failed. He/she applies this knowledge of stresses to a simplified cross-section of a ship. During the section Stability, the main focus is on analysing stability, its hazards and how to act correctly 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 investigates 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.
Examination	Written

ECTS Information Package

Programme	**Preparatory programme Academic Master in Marine Engineering**
Course	**ELECTRONICS AND ICT**
Lecturer(s)	**Pascal BOUQUET**

Method of teaching	Self study with consultation
Semester(s)	2
Units of credit (UC)	4 UC
Instruction language	Dutch/French
Learning objectives	At the end of the course, the student is expected to be able to: - understand, analyse and develop contemporary digital techniques related to embedded systems, in this case the microcontroller; - recognise and analyse the shape and structure of a transmission line; - understand and apply the propagation of running waves along a transmission line; - explain the origin of standing waves in transmission lines; - analyse and evaluate the reflection coefficient, adjustment networks and antennas in the context of data transmission; - investigate different digital data transmission protocols and bus systems; - detect errors in digital bus systems; - verify the communication performance of navigation devices; - compile and set up shore-to-ship digital communications to allow debugging and upgrading in a safe way.
Course content	Using the "Arduino" microcontroller, the student constructs and creates functional electronic circuits as used in embedded systems for electronic control and monitoring systems. He/she carries out concrete tasks in which physical variables such as temperature, humidity and angular rotation via sensors form the input variables/signals of the microcontroller. For this purpose, he/she builds the electronic circuit on a breadboard, designs C++ programme code, and analyses and implements this on the microcontroller. He/she programs a microcontroller, plc and C++ programme using advanced industrial programme structures. He/she evaluates the way the various structures are described in pseudo programming language or flowchart. He/she draws up a flow chart based on a simple problem and writes the programme code of the microcontroller and plc based on this flow chart. The student learns about high-frequency technology. She/he studies the implementation forms and the construction of a transmission line, explains the propagation of running waves along a transmission line and argues the creation of standing waves in transmission lines. The student studies the reflection coefficient and researches adaptive networks and antennas. The student makes himself familiar with the usual digital communication and bus systems on board a ship. He/she analyses and comments on the different protocols and bus systems.
Examination	Take home assignment with presentation

ECTS Information Package

Programme	**Preparatory programme Academic Master in Marine Engineering**
Course	**ELECTROTECHNICS**
Lecturer(s)	**Rik FLOREN**

Method of teaching	Self study with consultation
Semester(s)	1
Units of credit (UC)	6 UC
Instruction language	Dutch
Learning objectives	At the end of the course, the student is expected to be able to: - formulate the operation of electrical machines on the basis of the basic laws of electricity and magnetism; - interpret in a correct way the equivalent diagrams of the different electrical machines; - analyse the behaviour of the different electrical machines on the basis of the previously mentioned laws and diagrams; - recognise the different components of an electrical installation and justify their purpose; - evaluate the standards and regulations concerning the electrical installations on board; - generate a solution on the basis of a practical problem, in accordance with the standards and guidelines for electrical installations on board.
Course content	First of all, the student studies the various basic electrical and magnetic concepts and their relationships. Using this knowledge, he/she analyses several DC and AC voltage networks. For this purpose, the student applies the laws and theorems of electricity. Next, the student researches the operation and construction of various direct current and induction machines. He/she relates this to an understanding of electricity and magnetism. The student simplifies the equivalent diagrams of these different machines and explains the properties by interpreting the theorems of Thévenin and Norton. Finally, the student analyses the regulations of an electrical installation. He/she assesses the standards for the classification of electrical installations on board and gains insight into the construction of various electrical circuits and their components. Using practical examples, the student deduces the sequential logic of several electrical circuits.
Examination	Take home assignment with presentation

ECTS Information Package

Programme	**Preparatory programme Academic Master in Marine Engineering**
Course	**AUTOMATISATION**
Lecturer(s)	**Raf MAES**

Method of teaching	Self study with consultation
Semester(s)	2
Units of credit (UC)	3 UC
Instruction language	Dutch/French
Learning objectives	At the end of the course, the student is expected to be able to: - design a stable analogue control loop; - illustrate deeper insight into the system behaviour by transforming the signals into the so-called 'frequency domain'; - formulate a digital equivalent of a known classical controller; - discuss the stability of digital control loops; - apply the Z-transformation to digital signals; - analyse the reaction of the system to an impulse.
Course content	The student researches the design of control loops. He/she argues on the one hand analogue control loops, using the theory of root locus, and on the other hand digital control loops, using the discrete Fourier transformation and the fast Fourier transformation. When studying the stability of a digital control loop, the student decides on the use of the Z-transform.
Examination	Take home assignment with presentation

ECTS Information Package

Programme	**Preparatory programme Academic Master in Marine Engineering**
Course	**INTEGRATED SHIP ENGINEERING TECHNIQUES**
Lecturer(s)	**Stefaan BUEKEN, Tim COOLS, Tim JANSSENS**

Method of teaching	Self study with feedback
Semester(s)	2
Units of credit (UC)	3 UC
Instruction language	Dutch
Learning objectives	At the end of the course, the student is expected to be able to: - analyse, synthesise and evaluate recent marine engineering techniques from the maritime world in terms of their technical functioning and innovation; - identify and evaluate the advantages and disadvantages of different marine engineering techniques in order to be able to argue the appropriate application for a given situation; - understand the technical background of some current techniques from the maritime sector in order to develop a solution for concrete contemporary problems; - evaluate the results of an analysis in function of the research question.
Course content	In the section Integrated Marine Engineering, the student researches a new marine engineering technology used to promote sustainability, efficiency and the environment. In doing so, the student sketches and analyses the working principle. He/she argues the added value of the technology and substantiates this with demonstrable evidence. The student highlights the maintenance-technical sensitive features. He/she evaluates how this technology will behave towards the future and finally gives a critical reflection of this application.
Examination	Take home assignment with presentation

ECTS Information Package

Programme	**Preparatory programme Academic Master in Marine Engineering**
Course	**INNOVATIVE AND SUSTAINABLE MARITIME TECHNOLOGIES**
Lecturer(s)	**Geert POTTERS**

Method of teaching	Self study with feedback
Semester(s)	This course is not organized in the academic year 2022-23
Units of credit (UC)	4 UC
Instruction language	English
Learning objectives	At the end of the course, the student is expected to be able to: - construct a substantiated definition of innovation and illustrate it with concrete examples from the maritime sector; - devise a simple life cycle analysis and lifecycle cost analysis, collect the necessary information from scientific literature, and on this basis construct a substantiated appreciation of the possibilities and limitations of a technology; - identify opportunities for innovation, generate your proposal and present it in a business pitch.
Course content	The student studies the current innovations in the maritime world through an annually changing selection of technical and scientific literature, and company presentations: autonomous shipping, remotely operating vessels, sensors and big data, alternative fuels, augmented reality, etc. He/she understands why these developments are necessary for the future of shipping and distinguishes the different stakeholders involved. The student combines the technical background of these innovations and their impact on modern shipping. He/she develops a critical view on the applicability and the advantages and disadvantages of innovations by means of various tools, such as a lifecycle analysis and a lifecycle cost analysis, and applies these to an exemplary technology of his/her choice.
Examination	Take home assignment with presentation

ECTS Information Package

Programme	Preparatory programme Academic Master in Marine Engineering
Course	**HIGH VOLTAGE SAFETY**
Lecturer(s)	**Marc STERKENS**

Method of teaching	Course on campus
Semester(s)	1 + 2
Units of credit (UC)	-- UC
Instruction language	English
Learning objectives	At the end of the course, the student is expected to be able to: - meet the requirements of the 2010 STCW Convention, as amended, Table A-III/1, A-III/3, A-III/2 and A-III/6; - interpret, evaluate and integrate functional, operational and safety requirements for a high-voltage marine system.
Course content	**The STCW certificate 'High Voltage safety Entry Level III/2, III/3 and III/6' is part of the preparatory programme for the Master's degree programme in Marine Engineering. This certificate can be obtained by the student at an institution of his/her choice recognised by the FOD mobility.** **At AMA, this course is offered by the vocational training department (5 days on campus). Students following the bridging year in preparation of the Master Marine Engineering can join the courses that are organised.** The 'High Voltage Safety Entry Level III/2, III/3 and III/6' course is designed to meet the requirements of the 2010 STCW Convention, as amended, Table A-III/1, A-III/3, A-III/2 and A-III/6. The student will consider the following aspects: - rules, regulations and guidelines; - fundamentals of electricity, general electrical theory and safety precautions; - electrical equipment in a marine environment, overview of a typical marine installation; - basic calculations of failure levels, grounding, high voltage errors and protection; - high voltage safety, basic principles of risk management and safe working procedures; - developing alternating strategies for insulation; - first aid for electrical injuries. - For candidates who do not have the necessary competences (III/2, III/3 or III/6), an adapted course 'High Voltage Safety for All' can be followed, which, in addition to the above aspects, spends an extra day on the necessary preparations of electricity basics
Examination	Written