Syllabi

for

The Bachelor of Technology Management and Marine Engineering (The Marine Engineer Training Programme)

Version 5.80, 1 February 2021

Overview of syllabi:

No.	Subject area	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	BM9
21000	Workshop Training and Safety (BM)	X	X							
22000	Work Experience (BM)		X	X						X
23000	Interdisciplinary Elements (BM)				X				X	
25001	Thermal Machinery and Systems (BM)	X			X	X	X			
25002	Electrical and Electronic Machinery and Systems (BM)	X			X	X	X	X		
25003	Process Analysis and Automation (BM)					X	X	x		
26000	Management (BM)					X	X	X	X	
28100	Elective Subjects (BM)								X	
28200	Maritime Elective Subjects (BM)								X	
28300	Automation Elective Subjects (BM)								X	
28400	Management Elective Subjects (BM)								X	
29000	Bachelor Project (BM)									X

Syllabus

Subject area:	**21000**	**Workshop Training & Safety (BM)**		
Subject(s):	21200	Workshop Training (35 ECTS)		
	21220	Vice Work and Technical Documentation	BM1	4 ECTS
	21250	Welding and Material Understanding	BM1	4 ECTS
	21260	Lathing and Milling	BM1	4 ECTS
	21270	Practical Work	BM1	4 ECTS
	21280	Interdisciplinary Project	BM1	4 ECTS
	21290	Workshop Project	BM2	15 ECTS
	25400	Thermal Machinery and Systems I (4 ECTS)		
	25410	Thermal machinery and systems I-I	BM1	2 ECTS
	25420	Thermal machinery and systems I-II	BM1	2 ECTS
	25700	Electrical and Electronic Machinery and Systems I (4 ECTS)		
	25710	Electrical and electronic machinery I	BM1	4 ECTS
	21100	Safety Training (2 ECTS)		
	21121	Safety at Work I including §17	BM1	1 ECTS
	21140	Elementary First Aid	BM1	1 ECTS
Admission criteria:	Workshop Project	Passed all other subjects in subject area Workshop Training & Safety (BM).		
Criteria to pass subject	These assessments make up the subject: 1. **None** assessments using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0 (no rounding) 2. **Eight** assessments graded Passed/Not Passed. • All assessments must be graded Passed.			
Semester:	BM1 + BM2			
ECTS credits:	30 + 15			
Course Regulations:	• Marine Engineer (BM) version 5.80, 1 February 2021.			

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Orders:	• Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programme – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended. • Order on measures for prevention of cancer risk by working with substances and materials (§17 course) – Danish order no 1795 of 18 December 2016, as amended.	
STCW:	*STCW Code, as amended: Part A, chapter VI - Emergency, safety, security:* Section A-VI/1, paragraph 2 • Elementary first aid as set in table A-VI/1-3	
Certificate(s):	*Certificate of Safety and Health Training in Welding and Thermal Cutting* is issued upon completion of the training programme prescribed in the Danish order on measures for prevention of cancer risk by working with substances and materials – Danish order no. 1795 of 18 December 2015, as amended - (paragraph 17 training programme).	
Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:	None	

Purpose

BM1:
The student must undergo a professional training and education to obtain the craftsman's skills that are necessary for an engineer, so the student can independently apply these skills both in planning and in execution of their craft including electro-technical maintenance and repair.
The performed tasks shall take into account environmental and safety regulations.
The student shall develop his/her understanding and insight in the relevant workmanship for an engineer, as well as the ability to assess the quality of the work performed.
The student must gain an understanding of general occupational safety and environmental issues, as well as the use of personal protective equipment.
During this Subject, the students will be presented with various oral and written assignments, the purpose of which is to enhance their knowledge and understanding of technical and maritime English.

Interdisciplinary Project - BM1:
The overall objective of this interdisciplinary workshop project is that the participating student gains the ability to connect subjects from BM1 towards a level that provides an optimal base for applying the acquired knowledge in the forthcoming BM2 workshop project and subsequently incorporates this knowledge and competence to further usage during the following BM3 profession internship. In addition, the interdisciplinary workshop project contains interdisciplinary work elements in form of energy calculations/heat balances together with labor and project planning which prepares the students for the upcoming theoretical semesters of their education program.
The interdisciplinary course provides students with the necessary set of skills in order to understand as well as, in a safety-related and responsible manner, contribute to an operation of a smaller propulsion or generator on board of a ship or on land.
Furthermore, the students are given an understanding of the relevant technical systems in a way that he/she, as an engineer trainee, can act rationally and appropriately in connection with the operation including locating and repairing of defects/malfunctions.
Next to that, applying an internal combustion engine in the form of a ship propulsion of a smaller vessel is another purpose of this course. Understanding the setup of components from engine to propeller of a ship propulsion and using this in practice by maneuvering the vessel are included as well.
During the interdisciplinary project, the student will acquire the knowledge and skills to implement an innovative process needed for less complex projects. In the performance of the task, the student should demonstrate the ability to produce technical project drawings and perform simple project management.

BM2:
By means of the project work, the student will acquire the knowledge and skills to implement an innovative process needed for such less complex projects. In the performance of the task, the student should demonstrate his craftsmanship in the manufacturing, and assembly together with troubleshooting skills. They also need to build up the ability for professional co-working and knowledge sharing.

Learning objectives

Workshop Training

Vice Work & Technical documentation, Welding & Material Understanding, Lathing & Milling, Practical Work, Electrical and Electronic Machinery, Plants and Equipment, Thermic Machinery and Plants.

After these sub-themes, the goal is that the student must have achieved the following:

Vice Work & Technical Documentation - BM1 (21220):

The student must attain **knowledge** of:

- Tolerances and other quality measures used in manufacturing, repairing and maintenance
- Calculation of the rotating speed of a rotating tool.
- Safety when working with rotating tools.

The student must attain the **skills** necessary to:

- Plan smaller tasks.
- Sharpen cutting tools.

The student must acquire the necessary **competencies** to:

- Perform simple tasks in the manufacturing, repairing and maintenance of facilities, systems, and components using the techniques learned for vice work.
- Be familiar with general regulations for drawings and general drawing entries (goal, tolerances, edges, texture, etc.) in order to understand mechanical engineering drawings and be able to produce simple production- and installation drawings.

Welding & Material Understanding - BM1 (21250):

The student must attain **knowledge** of:

- Welding plants and operations of equipment in order to use it safely and correctly.
- MAG welding (CO2 welding).
- The problems of welding aluminum.
- Conventional material types and their characteristics, have material composition, heat treatment and design affect the materials resistance to external influences.
- The main destructive material test methods.

The student must attain the **skills** necessary to:

- Use and maintain welding systems and equipment, including conducting workplace layout when performing welding and/or cutting.
- Select the most appropriate joining method taking into account the type of material and dimension used.
- assessing the quality of the craftsmanship of the work performed.

The student must acquire the necessary **competencies** to:

- Perform simple welding tasks using MMA.
- Perform cutting using oxygen and gas.
- Perform welding tasks using electrode, TIG and oxygen/gas-welding for joining of iron/steel with low carbon content and TIG welding of stainless steel.
- Perform brazing in the form of silver brazing metal using gas burner.

Lathing and Milling - BM1 (21260):

The student must attain **knowledge** of:

- Construction and operation of the lathe and the milling machines.
- The safe use of the lathe and the milling machine.

The student must attain the **skills** necessary to:

- Operate a lathe in a safe manner.
- Use tools for work with lathe.

The student must acquire the necessary **competencies** to:

- Manufacture and repair items on the lathe.

Practical Work - BM1 (21270):

The student must attain **knowledge** of:

- Proper use of normally occurring components in the form of screws, bolts, nuts, washers, pins, pins, retaining rings, bearings and seals etc. and the associated principles and methods used in the assembly/disassembly and assembly/disassembly of mechanical components, including understanding the securing methods against components accidental loosening of components.

The student must attain the **skills** necessary to:

- Use drawing in the manufacturing of new product.
- Perform Gas, Water and Sanitation Work.

The student must acquire the necessary **competencies** to:

- Make an overall assessment of the safety of the performance of a task, and - before each job function performed - be aware of possible anomalies and thereby avoid accidents.
- Apply normal hand tools and measuring equipment and machinery in the form of drilling, thread cutting tools, cold saws/crosscut, and lathe and milling machines to common manufacturing, maintenance and repair tasks.
- Perform an engineering task after design drawing.

Interdisciplinary Project - BM1 (21280):

The student must attain **knowledge** of:

- Simple project management, of a clearly defined uncomplicated project, with the starting point of well-worked out and concrete ideas.
- An internal combustion engine's energy flow and heat balance in an overall system including heat exchange, pumps and exhaustion.
- Basic ship maneuvering and sailing principles.

The student must attain the **skills** necessary to:

- Plan, organize, and understand the realization of a simple concrete project based on appropriate construction techniques and safety aspects.
- Produce project drawings and general drawing entries (goal, tolerances, edges, texture, etc.) in order to be able to produce single components and larger constructions in the workshop.
- During the operation of a diesel engine to be able to, through observations and operation tests on the system, to observe and determine simple heat balances and benefits.

The student must acquire the necessary **competencies** to:

- Individually understand and operate a medium speed diesel engine and its main auxiliary systems, including tanks, air compressors, pumps, and valves.
- Sail and maneuver a small motor vessel while taking safety for personnel and material into consideration.

Workshop Project - BM2 (21290):

The student must attain **knowledge** of:

- The innovation process, including idea-generation, and based on the integration of the different skills taught in semester 1, together with possible new ways of solving problems.
- Construction techniques, manufacture and troubleshooting, going further than the knowledge you acquired during semester 1.

The student must attain the **skills** necessary to:

- Realize the idea of the project and present the plan with special consideration for valid and useful perspectives.
- Carry out more complex craftsmanship and skills, than learnt during semester 1.
- Carry out the work independently, including the appropriate choice of method, specially adapted to the specific and changing problems presented by the project.

The student must acquire the necessary **competencies** to:

- Carry out simple project management, under guidance (from the instructors), of your own clearly defined uncomplicated project, with the starting point of well worked out and concrete ideas.
- Be able to plan, organize, and understand the realization of a simple concrete project based on appropriate construction techniques and safety aspects.

Thermal Machinery and Systems I:

Thermal machinery and Systems I-I (BM1) (25410):

- For further information, see Thermal Machinery and Systems Syllabus (BM).

Thermal machinery and Systems I-II (BM1) (25420):

- For further information, see Thermal Machinery and Systems Syllabus (BM).

Electrical and Electronic Machinery and Systems:

Electrical and electronic machinery I (BM1) (25710):

- For further information, see Technology Syllabus (BJ).

Safety Training

Safety at Work I including §17 – (BM1) (21121):

The student must attain **knowledge** of:

- The content of the § 17 course.

The student must attain the **skills** necessary to:

- Job related safety assessments and application of personal protective equipment.

The student must acquire the necessary **competencies** to:

- Show a good and responsible attitude in relation to own and others safety.
- Choose the correct personal protective equipment based on the contents of the workplace instructions.

Elementary First Aid - BM1 (21140):

The student must attain **knowledge** of:

- Assessment of needs of casualties and threats to own safety
- Appreciation of body structure and functions
- Understanding immediate measures to be taken in cases of emergency, including the ability to:
  - Position casualty
  - Apply resuscitation techniques
  - Control bleeding
  - Apply appropriate measures of basic shock management
  - Apply appropriate measures in event of burns scalds, including accidents caused by electric current
  - Rescue and transport a casualty
  - Improvise bandages and use materials in the emergency kit
- Body structure and function
- Fractions, dislocations and muscular injuries
- Spinal injuries
- Mental first aid
- Cardiac arrest, drowning and asphyxia

The student must acquire the necessary **skills** to:

- None

The student must acquire the necessary **competencies** to:

- Take immediate action upon encountering an accident or other medical emergency

Core literature

- Smedebogen
- Grundbog i håndværk og teknik
- Grundrids af teknisk tegning.

Note: All books must be the latest edition.

Examination

Vice Work and Technical Documentation - BM1 (21220):

Examination type:	Ongoing assessment.
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for examination:	None

Welding and Material Understanding I-(I+II) - BM1 (21250):

Examination type:	Ongoing assessment.
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for examination:	None

Lathing and Milling - BM1 (21260):

Examination type:	Ongoing assessment.
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for examination:	None

Practical Work - BM1 (21270):

Examination type:	Ongoing assessment.
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for examination:	None

Interdisciplinary Project – BM1 (21280):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for examination:	

Workshop Project - BM2 (21290):

Examination type:	Ongoing assessment.
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for examination:	None

Safety at Work I including §17 - BM1 (21121):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for examination:	None

Elementary First Aid - BM1 (21140):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for examination:	None

Qualification prerequisites for professors/instructors etc.

Associate professors, assistant professors or instructors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is the same or higher than the level of learning objectives for the subject
  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Instructors of Elementary First Aid courses shall have completed a training programme for teachers of First Aid approved by the Danish First Aid Council.

Syllabus

Subject area:	**22000**	**Work Experience (BM)**		
Subject(s):	22200	Work Experience (60 ECTS)		
	22110-L	Introductory Work Experience in a shore-based company	BM2	15 ECTS
	22120-L		BM3	30 ECTS
	22130-L	Professional Work Experience in a shore-based company	BM9	15 ECTS
	22110	Introductory Work Experience at Sea	BM2	15 ECTS
	22120		BM3	30 ECTS
	22130	Professional Work Experience at Sea	BM9	15 ECTS
	21100	Safety Training – BM2(SØ)		
	21110	Safety at Sea	BM2(SØ)	
	21161	Basic Fire Fighting Theory	BM2(SØ)	
	21162	Basic Fire Fighting Course		
	21180	Maritime Law	BM2(SØ)	
	21190	Designated Security Duties		
	25425	Basic Training for Oil, Chemical & Gas Tanker	BM2(SØ)	
Admission criteria:	Introductory Work Experience at ***shore***	The BM student must have passed all subjects in the first semester BM1 and the workshop project in BM2 in accordance to the course regulations for Marine Engineer as well as signed a work experience agreement.		
	Professional Work Experience at ***shore***	The BM student must have passed all subjects in accordance to the course regulations for Marine Engineer, except the bachelor project as well as signed a work experience agreement.		
	Introductory Work Experience at ***Sea***	The BM student must have passed all subjects in the first semester BM1 and the workshop project in BM2 in accordance to the course regulations for Marine Engineer as well as signed a work experience agreement. Subjects 21110, 21161, 21162, 21180, 21190 & 25425 must be passed before service at sea		
	Professional Work Experience at ***Sea***	The BM student must have passed all subjects in accordance to the course regulations for Marine Engineer, except the bachelor project as well as signed a work experience agreement.		

		Subjects 21110, 21161, 21162, 21180, 21190 & 25425 must be passed before service at sea
	Basic Fire Fighting Course:	A valid medical certificate for seafarers. Passed Basic Fire Fighting Theory.
Criteria to pass subject	These assessments make up the subject (**ashore**): 1. **None** assessments using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0 (no rounding) 2. **Three** assessments graded Passed/Not Passed. • All assessments must be graded Passed. These assessments make up the subject (**at sea**): 1. **None** assessments using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0 (no rounding) 2. **Nine** assessments graded Passed/Not Passed. • All assessments must be graded Passed.	
Semester:	BM2 + BM3 + BM9	
ECTS credits:	60	
Course Regulations:	• Marine Engineer (BM) version 5.80, 1 February 2021.	
Orders:	• Order on the professional Bachelor Training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional Bachelor Training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programme – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended. • Order on training programme and refresher training programme for safety at sea and firefighting on board ships – Danish order no 226 of 2 March 2015, as amended. • Order on training programme and refresher training programme in operation of fast rescue boats - order no 658 of 12 May 2015, as amended. • Order on training programme for Tanker Operations – Danish order no 1165 2 November 2014, as amended. • Order on training programme for operation of survival craft and rescue boat other than fast rescue boats – Danish order no 1207 23 October 2015, as amended. • Order on training programme in Maritime Security of Ships - order no 1279 of 7 November 2013, as amended.	

STCW:	*STCW Code, as amended: Part A, chapter III - Engine department* Section A-III/4 • Marine engineering at the support level as set in table A-III/4 *STCW Code, as amended: Part A, chapter VI - Emergency, safety, security:* Section A-VI/1, paragraph 2 • Personal survival techniques as set in table A-VI/1-1 • Fire prevention and fire-fighting as set in table A-VI/1-2 • Elementary first aid as set in table A-VI/1-3 • Personal safety and social responsibilities as set in table A-VI/1-4 Section A-VI/2, paragraph 1 to 12 • Proficiency in survival craft and rescue boats other than fast rescue boats as set in table A-VI/2-1. • Proficiency in fast rescue boats as set in table A-VI/2-2 Section A-VI/6, paragraph 6 to 8 • Designated Security Duties as set in tablet A-VI/6-2 *STCW Code, as amended: Part A, chapter V - Special training requirements:* Section A-V/1-1-1 • Basic training for oil and chemical tanker as set in table A-V/1-1-1. Section A-V/1-2-1 • Basic training for gas tanker as set in table A-V/1-2-1
Certificate(s):	*Certificate of Proficiency Basic Safety Training* is issued upon completion of the training programme prescribed in Regulation VI/1 and STCW Code; section A-VI/2 of the STCW Convention of 1978, as amended. *Certificate of Proficiency for Designated Security Duties* is issued upon completion of the specialized training programme prescribed in Regulation VI/6, paragraph 4 to 6 of the STCW Convention of 1978, as amended and the Danish order no 1279 of 7 November 2013, as amended. *Course Certificate of Basic Training for Oil, Chemical and Gas Tanker Cargo Operations* is issued upon completion of the training programme prescribed in Regulation V/1-1, paragraph 2.2 and Regulation V/1-2, paragraph 2.2 of the STCW Convention of 1978, as amended and the Danish order no 1165 2 November 2014, as amended. (”Carry out fire-fighting operations” as set in table A-V/1-1-1 and 1-2-1 of STCW Convention of 1978, as amended) *Course Certificate in survival craft and rescue boat other than fast rescue boats* is issued upon completed the training programme prescribed in Regulation VI/2, paragraph 1.3 of the STCW Convention of 1978, as amended and the Danish order no 1207 23 October 2015, as amended. *Certificate of Proficiency in survival craft and rescue boat other than fast rescue boats* is issued upon completion of at least 6 months relevant seagoing service is proved and completed the training programme prescribed in Regulation VI/2, paragraph 1 of the STCW Convention of 1978, as amended and the Danish order no 1207 23 October 2015, as amended. *Certificate of Proficiency in Fast Rescue Boats* is issued upon completion of the training programme prescribed in Regulation VI/2, paragraph 2.3 of the STCW Convention of 1978, as amended and the Danish order no 658 12 May 2015, as amended.

	Certificate of Proficiency in Fast Rescue Boats is issued when a holder of Certificate of Proficiency in survival craft and rescue boat other than fast rescue boats has completed the training programme prescribed in Regulation VI/2, paragraph 2 of the STCW Convention of 1978, as amended and the Danish order no 658 12 May 2015, as amended.		
Responsible:	Subject Manager		
Valid from:	2021-1	VTA	
Expired:			
Remarks:	12 months = 365 calendar days 6 months = 183 calendar days 4½ months = 137 calendar days		3 months = 91 calendar days 2 months = 61 calendar days

Prerequisites for service at sea or a shore-based company and change of study program

Duration of work experience in at shore-based company:

- The duration of the introductory work experience in a shore-based company (subjects: 22110 + 22120), equalling 45 ECTS credits, is considered fulfilled when the effective work experience time amounts to 30 weeks
- The duration of the professional work experience in a shore-based company (subject: 22130), equalling 15 ECTS credits, is considered fulfilled when the effective work experience time amounts to 10 weeks.
- The professional work experience in a shore-based company cannot be replaced by another work experience time or merit from another education.

Service at sea:

- The duration of the introductory work experience at sea (subjects: 22110 + 22120), equalling 45 ECTS credits, is considered fulfilled when the effective service at sea amounts to a minimum of 6 months (183 calendar days).
- The duration of the professional work experience at sea (subject: 22130), equalling 15 ECTS credits, is considered fulfilled when the effective service at sea amounts to a minimum of 2 months (61 calendar days).
- The professional work experience at sea cannot be replaced by another service at sea or merit from another education.
- Earned service at sea in ferries must be documented by showing a service at sea certificate. If this is not possible, the service at sea will count for 50%.

Change of study program from BJ to BM:

- By change of program from BJ to BM education, the student can transfer earned service at sea from the introductory work experience at sea (subject: 32110) in the relation 1:1, though a maximum of 3 months (91 calendar days) of service at sea can be transferred.

- From the introductory work experience at sea (subjects: 32120+32130) the student can get 50% of the earned service at sea transferred to the introductory work experience at sea in the BM education.
- The total transfer from the introductory work experience at sea in BM education cannot exceed 6 (183 calendar days) months efficient service at sea
- If a change of study causes an inconvenient study program, the student can apply for dispensation and get a part of the introductory work experience at sea postponed. However, the service at sea must at minimum be 4 months and 15 days (137 calendar days) in the introductory work experience at sea.
- The approved Training Record Book from the introductory work experience at sea in the BJ education is replaced with the green Training Record Book for Marine Engineers

Change of study program from BS to BM:

- By change of program from BS to BM education, the student can transfer earned service at sea from the introductory work experience at sea (subject: 12110) in the relation 1:1, though a maximum of 3 months (91 calendar days) of service at sea can be transferred to the introductory work experience at sea in the BM education.If a change of study causes an inconvenient study program, the student can apply for dispensation and get a part of the introductory work experience at sea postponed. However, the service at sea must at minimum be 4 months and 15 days (137 calendar days) in the introductory work experience at sea.
- The approved Training Record Book from the introductory work experience at sea in the BS education is replaced with the green Training Record Book for Marine Engineers

Purpose

Work experience in a shore-based company:

The introductory work experience on land is meant to give the student experience with the practical application of the artisan skills in a business environment. Furthermore, the goal is to be able to participate in a company organization with focus on communication, safety and collaboration.
The professional work experience in a shore-based company shall teach the student to work in a development-oriented and problem solving way with the profession as Maritime Engineer. The student will draw links between experiences and theoretical knowledge here by being able to identify and analyze subjects, fields and problems that are central in relation to the profession as Maritime Engineer.
The work experience shall lead to the exchange of knowledge, skills and values between education and profession/industry and establishment of a network.

Work experience at sea:

The introductory work experience at sea will give the student experience with the application of practical skills used on a ship. Furthermore, the goal is to be able to participate in ship organization with a focus on communication, safety and collaboration. The student must at minimum have completed 6 months of engine room service supervised by a Maritime Engineer or a qualified officer in accordance with STCW convention – regulation III/1. Engine room service should be organized such that the student gets the opportunity to stand watch by canal passages, sailing in trafficked waters and under maneuver. Emphasis must be put on understanding the necessity of following good discipline on the bridge and in the engine room, see STCW convention chapter VIII.
The professional work experience at sea shall teach the student to work in a development-oriented and problem solving way as a professional Maritime Engineer. The student will draw links between experiences and theoretical knowledge here by being able to identify and analyze subjects, fields and problems that are central in relation to the profession as Maritime Engineer.
The internship shall lead to the exchange of knowledge, skills and values between education and profession/industry and the establishment of a network.

Learning objectives

Work Experience

Introductory work experience in a shore-based company - BM2 & BM3 (22110-L & 22120-L):

The student must attain **knowledge** of:

- Company organization with focus on communication, safety and cooperation

The student must attain **skills** necessary to:

- apply the skills learned at the training school in a business environment
- conduct work safety and environmental considerations correctly

The student must acquire the necessary **competencies** to:

- communicate and collaborate in a business environment
- utilize the most appropriate work method considering quality, time, material, safety and environment

Professional work experience in a shore-based company - BM9 (22130-L):

The student must attain **knowledge** of:

- the Maritime Engineers ordinary administrative routines
- the theory underlying the areas that the maritime engineer at the internship company deals with
- practical selection and application of tools and measuring equipment
- the typical ways of communication in a company

The student must attain **skills** necessary to:

- handle practical situations occurring in the daily work
- apply the theory learned through the lessons
- deal with a selection of problems with a possible interdisciplinary background

The student must acquire the necessary **competencies** to:

- plan and complete smaller tasks belonging to the internship company's field of action
- participate in the ordinary administrative routines occurring at the internship company
- work in an interdisciplinary way with subjects belonging to the maritime engineering education
- work in a development-oriented manner

Introductory work experience at sea - BM2 & BM3 (22110 & 22120):

The student must attain **knowledge** of:

- The cooperation within the ships organization under different operational situations, focusing on communication and safety awareness.
- Routines in relation to engineering operations and teamwork with other working groups on board.
- Purpose and general understanding of different types of technical systems on board ships.
- Decision making processes in relation to engineering operations under consideration of quality, materials, time, work and environmental safety

The student must attain **skills** necessary to:

- Apply and reflect upon the knowledge attained through the Workshop Training, safety and Seamanship course in correlation to practical tasks within a ships organization.
- Operate different technical systems under consideration to different operational conditions and safety awareness

The student must acquire the necessary **competencies** to:

- Communicate and cooperate on board a ship

Professional work experience at sea - BM9(SØ) (22130):

The student must attain **knowledge** of:

- The Engineers tasks in connection to a ships administrative operations, under consideration to conventions and legislations.
- Use of administrative tools and document control in connection to Engine room management

The student must attain **skills** necessary to:

- Plan and conduct different work routines in the engine room under consideration to maintenance and optimization, taking into consideration personal and environmental safety.
- Apply and reflect upon the knowledge attained through the previous theoretical semesters and put it to use within the ships organization.

The student must acquire the necessary **competencies** to:

- Be part of an Engine Watch and have Watch duty responsibilities cf. STCW convention regulation III/1
- Plan and supervise operational work routines in correlation with ship operations, considering the environment, crew and ship safety.
- Conduct administrative duties
- Work in a development-oriented manner in order to optimize the operation the technical systems onboard.

Safety Training – BM2(SØ)

Safety at Sea – BM2(SØ) (21110):

The student must attain **knowledge** of:

- Construction and outfit of survival craft, fast rescue boat and rescue boats, individual items of their equipment and characteristics.
- Methods of, and safety precautions of launching survival craft, fast rescue boat and rescue boat including in rough seas
- Methods of recovering survival craft, fast rescue boat and rescue boats
- Dangers associated with on-load release devices
- Maintenance procedures in relation to boats, launching- and recovery gear.
- Operating winch, brakes, falls, painters and other equipment commonly fitted
- The precautions, in the case of "man overboard" and "fire" or "lifeboat" alarm.
- General sea survival requirements, the practical use of personal survival equipment and group survival equipment available on board.

The student must attain the **skills** necessary to:

- Right an inverted life raft while wearing a lifejacket or survival suit
- Prepare and safely launch survival craft and fast rescue boat using both on-load and off-load release devices
- Safely recover survival craft, fast rescue boat and rescue boats, including proper resetting of both on-load and off-load release devices
- Understand and use the necessary orders and tasks in English for safe evacuation

- Right a capsized fast rescue boat
- Handle a fast rescue boat in prevailing and adverse weather and sea conditions

The student must acquire the necessary **competencies** to:

- Take change of a survival craft, fast rescue boat or rescue boat during and after a launch.
- Manage survival craft after abandoning ship.
- Use appropriate GMDSS equipment including signaling apparatus and pyrotechnics.
- Operate the engine of survival craft, fest rescue boat and rescue boats.
- Distinguish between the alarm signals used in commercial vessels, and explain the structure and use of a merchant ship safety plan and be able to demonstrate proper behavior according to the ships muster list.
- Use and understand the rescue means available on board properly and enter water from a certain height
- Stay fluent without buoyancy

Basic Fire Fighting Theory – BM2(SØ) (21161):

The student must attain **knowledge** of:

- Shipboard fire-fighting organization
- Fire and smoke detection and automatic alarm systems
- The need for constant vigilance

The student must attain the **skills** necessary to:

- None.

The student must acquire the necessary **competencies** to:

- Minimize the risk of fire and maintain a state of readiness to respond to emergency situations involving fire.

Basic Fire Fighting Course – BM2(SØ) (21162):

The student must attain **knowledge** of:

- Flammable materials, fire hazards and spread of fire
- Location of firefighting appliances and emergency escape routes
- Types and sources of ignition
- The elements of fire and explosion (the fire triangle)
- Actions to be taken on board ship
- Classification of fire and applicable extinguishing agents
- Fire-fighting equipment and its location on board
- Instruction in:
    - Fixed installations
    - Fire-fighter's outfits
    - Personal equipment
    - Fire-fighting appliances and equipment
    - Fire-fighting methods
    - Fire-fighting agents

- Fire-fighting procedures
- Use of breathing apparatus for fighting fires and effecting rescues

The student must attain the **skills** necessary to:

- None.

The student must acquire the necessary **competencies** to:

- Fight and extinguish fire.

Maritime Law – BM2(SØ) (21180):

The student must attain knowledge of his rights and obligations according to The Seamen's Act.

Designated Security Duties (DSD) – BM2(SØ) (21190):

The student must attain **knowledge** of:

- Knowledge of current security threats and patterns;
- Recognition, on a non-discriminatory basis, of characteristics and behavioral patterns of persons who are likely to threaten security;
- Techniques used to circumvent security measures;
- Security related communications;
- Knowledge of emergency procedures and contingency plans;

The student must attain the **skills** necessary to:

- Recognize and detect weapons, dangerous substances and devices.
- Manage crowds and crowd control techniques.
- Test, calibrate and at-sea maintenance of security equipment and systems.
- Inspect, control, and monitoring techniques.
- Operate security equipment and systems.

The student must attain the **competencies** required to:

- Physically search persons, personal effects, and baggage, cargo, and ship stores.

Ship Technology – Basic:

The student must attain **knowledge** of:

- General ship layout and construction.
- The terms gravity, buoyancy, and water density.
- The influence of the distribution of weight on the ships stability.
- MARPOL legislation.
- When and how to raise the alarm onboard in case of oil spill or pollution
- Handle garbage onboard according to the garbage plan.
- How to act responsibly during SOPEP drills and in emergency situations

Basic Training for Oil, Chemical and Gas Tanker:– BM2(SØ) (25425):

The student must attain **knowledge** of:

- Types of oil, chemical and liquefied gas tankers, their equipment and operation
  - Piping systems and valves
  - Cargo pumps
  - Loading and unloading
  - Tank cleaning, purging, gas-freeing and inerting
- Cargos and properties
  - Pressure and temperature, including vapour pressure/temperature relationship
  - Types of electrostatic charge generation
  - Chemical symbols
  - ESD
- Safety culture and management
- Operational cargo hazards and how they are controlled
  - Health hazards
  - Environmental hazards
  - Corrosive hazards
  - Explosive and flammability hazards
  - Sources of ignition, including electrostatic hazards
  - Toxicity hazards
  - Vapour leaks and clouds
  - Extremely low temperatures
  - Pressure hazards
  - Inerting, water padding, drying agents and monitoring techniques
  - Anti-static measures
  - Ventilation
  - Segregation
  - Cargo inhibition
  - Importance of cargo compatibility
  - Atmospheric control
- Contents and purpose of a MSDS
- Safety equipment and PPE
  - Breathing apparatus and tank-evacuating equipment
  - Resuscitators
  - Rescue and escape equipment
- Gas-measuring equipment
- Safe operation of the vessel
- Safe working practices incl. legislation and guidelines
  - Precautions to be taken when entering enclosed spaces
  - Precautions to be taken before and during repair and maintenance work
  - Safety measures for hot and cold work
  - Electrical safety
  - Ship/shore safety check list
- Emergency action in case of injury, fire or spill
  - Reporting to responsible persons
  - SOPEP
- Prevention of brittle fractures

The student must attain the **skills** necessary to:

- Identify and take precautions to prevent hazards
- Apply occupational health and safety precautions and measures
- Take precautions to avoid pollution from cargo

The student must attain the **competencies** required to:

- Contribute to safe operation of tankers

Core literature

The latest issue of the Training record book for seagoing service – Marine Engineer.

Examination

Introductory work experience in a shore-based company - BM2 & BM3 (22110-L & 22120-L):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	The work experience supervisor supervises and ensures that the formal requirements in the logbook are followed. If there is uncertainty or disagreements, the subject is investigated by the Vice President (Academics) in collaboration with the student's internship company. Ultimately the decision which initiative needs to be further applied to receive the grading given is decided by the Vice President (Academics).
Prerequisites for examination:	None

Professional work experience in a shore-based company - BM9: (22130-L)

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	The work experience is evaluated in collaboration with SIMAC's internship supervisor and one of the contact persons/supervisors from the internship company. If there is uncertainty or disagreements, the subject is investigated by the Vice President (Academics) in collaboration with internship company supervisor/contact person. Ultimately the decision which initiatives need to be further applied to receive the grading given is decided by the Vice President (Academics)
Prerequisites for examination:	None

Introductory work experience at sea - BM2(SØ) & BM3(SØ) (22110 & 22120):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	The study administration supervises and ensures that the formal requirements in the Training Record Book are followed. If there is uncertainty or disagreements, the subject is investigated by the Vice President (Academics) in collaboration with the student's shipping company. Ultimately the decision which initiative needs to be further applied to receive the grading given is decided by the Vice President (Academics). The student must also show documentation for the achieved service at sea, which must be approved by the study administration.
Prerequisites for examination:	None

Professional work experience at sea - BM9(SØ) (22130):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	The study administration supervises and ensures that the formal requirements in the Training Record Book are followed. If there is uncertainty or disagreements, the subject is investigated by the Vice President (Academics) in collaboration with the student's shipping company. Ultimately the decision which initiative needs to be further applied to receive the grading given is decided by the Vice President (Academics). The student must show documentation for the achieved service at sea after sailing, which must be approved by the study administration.
Prerequisites for examination:	None

Safety at Sea – BM2(SØ) (21100):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	**This examination is for students who were registered in BM1 in the spring of 2017 or later (2017-1, 2017-2 ect.).**
Prerequisites for examination:	None

Basic Fire Fighting Theory – BM2(SØ) (21161):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for examination:	**This examination is for students who were registered in BM1 in the spring of 2017 or later (2017-1, 2017-2 ect.).**

Basic Fire Fighting Course – BM2(SØ) (21162):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for examination:	**This examination is for students who were registered in BM1 in the spring of 2017 or later (2017-1, 2017-2 ect.).**

Maritime Law – BM2(SØ) (21180):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for examination:	**This examination is for students who were registered in BM1 in the spring of 2017 or later (2017-1, 2017-2 ect.).**

Designated Security Duties – BM2(SØ) (21190):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for examination:	**This examination is for students who were registered in BM1 in the spring of 2017 or later (2017-1, 2017-2 ect.).**

Basic Training for Oil, Chemical & Gas Tanker – BM2(SØ) (25425):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for examination:	**This examination is for students who were registered in BM1 in the spring of 2017 or later (2017-1, 2017-2 ect.).**

Qualification prerequisites for professors/instructors etc.

Associate professors, assistant professors or instructors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is the same or higher than the level of learning objectives for the subject
  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	**23000**	**Interdisciplinary Elements & Methodology(BM)**		
Subject(s):	23200	Interdisciplinary Elements (10 ECTS)		
	23210	Interdisciplinary Elements I (Interdisciplinary - 23211)	BM4	5 ECTS
		Interdisciplinary Elements I (Methodology – 23212)		
	23220	Interdisciplinary Elements II (Interdisciplinary - 23221)	BM8	5 ECTS
		Interdisciplinary Elements II (Methodology - 23222)		
Admission criteria:	BM4	Passed Introductory Work Experience		
	BM8	Passed Interdisciplinary Elements I - (Methodology)		
Criteria to pass subject	These assessments make up the subject: 1. **None** assessments using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0 (no rounding) 2. **Two** assessments graded Passed/Not Passed. • All assessments must be graded Passed.			
Semester:	BM4+BM8			
ECTS credits:	10 ECTS			
Course Regulations:	• Marine Engineer (BM) version 5.80, 1 February 2021.			
Orders:	• Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.			
STCW:	None			
Certificate(s):	None			
Responsible:	Subject Manager			
Valid from:	2021-1	VTA		
Expired:				
Remarks:	None			

Purpose

The purpose of this subject is to enhance the students' competence in problem-oriented project studies and to train their skills in acquiring and combining knowledge from different subject matters while working on a project of their own choice as well as through problem based learning. Through working on projects students have the opportunity to develop competencies to evaluate and improve work flow, work processes and procedures, and thus finding innovative ways to improve these.

Learning objectives

Interdisciplinary Elements

Interdisciplinary Elements I - BM4 (23210):

The student must attain **knowledge** of:

- Basic Scientific methods
- Basic information retrieval
- Problem formulation

The student must attain the **skills** necessary to:

- Problem identification
- Plan and conduct research in accordance with academic standards
- Prepare a correct list of references

The student must acquire the necessary **competencies** to:

- Work problemoriented
- Aquire and apply knowledge in research
- Disseminate professional issues
- Assess sources of required information

Interdisciplinary Elements II - BM8 (23220):

The student must attain **knowledge** of:

- Project management
- Academic argumentation
- The complexity of professional and technical issues
- Qualitative and quantitative methods

The student must attain the **skills** necessary to:

- Problem formulation
- Take a critical stand on data and sources in use
- Assess complex issues and suggest solutions taking all facts and circumstances into consideration
- Writing a paper in accordance with academic standards
- Designate appropriate scientific methods

The student must acquire the necessary **competencies** to:

- Plan and conduct research in accordance with scientific methods and standards
- Discuss methods and findings with professionals

Core literature

Methodology:

- Den gode opgave – opgaveskrivning på videregående uddannelser, Lotte Rienecker og Peter Stray Jørgensen, 2004, Samfundslitteratur.

Examination

Interdisciplinary Elements I - (Interdisciplinary) - BM4 (23211):

Examination type:	For further information, see Thermal Machinery and Systems Syllabus (BM)
Grade scale:	
Preparation time:	
Duration:	
Aids allowed:	
Important Information:	The Interdisciplinary Elements I (Interdisciplinary) in BM4 is a part of examination of Thermal Machinery and Systems I – (III – VI) in BM4 The student is given one grade for both subjects.
Prerequisites for examination:	For further information see Thermal Machinery and Systems Syllabus (BM)

Interdisciplinary Elements I - (Methodology) - BM4 (23212):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for examination:	None

Interdisciplinary Elements II - (Interdisciplinary) – BM8 (23221):

Examination type:	For further information, see 26520 Syllabus (BM)
Grade scale:	
Preparation time:	
Duration:	
Aids allowed:	
Important Information:	The Interdisciplinary Elements II (Interdisciplinary) in BM8 is a part of examination of 26520. The student is given one grade for both subjects.
Prerequisites for examination:	For further information see 26520 Syllabus (BM)

Interdisciplinary Elements II - (Methodology) - BM8 (23222):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for examination:	None

Qualification prerequisites for professors/instructors etc.

Associate professors or assistant professors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is the same or higher than the level of learning objectives for the subject
  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	**25001**	**Thermal machinery and systems (BM)**		
Subject(s):	25400	Thermal machinery and systems I-(I-VI) (15 ECTS) (TMA)		
	25410	Thermal machinery and systems I-I (Combustion Engines - Basic)	BM1	SP21000
	25420	Thermal machinery and systems I-II (Hydraulic & Pneumatic - Basic)	BM1	SP21000
	25430	Thermal machinery and systems I-III (Combustion engines and aux systems)	BM4	4 ECTS
	25440	Thermal machinery and systems I-IV (Hydraulic and pneumatic systems and components)	BM4	4 ECTS
	25450	Thermal machinery and systems I-V (Stationary steam boilers and incinerators for fossil fuels and bio waste)	BM4	3 ECTS
	25460	Thermal machinery and systems I-VI (Pumps, compressors and associated piping and refrigeration and cooling technology)	BM4	4 ECTS
	25500	Thermal machinery and systems II-(I-IV) (15 ECTS) (TMA)		
	25510	Thermal machinery and systems II-I (Strength of Materials and basic thermodynamics; heat transfer, fluid physics, gas physics, etc.)	BM5	5 ECTS
	25520	Thermal machinery and systems II-II (System to transport liquids and gases)	BM5	3 ECTS
	25530	Thermal machinery and systems II-III (Building's air conditioning and refrigeration)	BM5	3 ECTS
	25540	Thermal machinery and systems II-IV (Environmental Facility / wastewater treatment plants and chemical process plants)	BM5	4 ECTS
	25600	Thermal machinery and systems III-I (10 ECTS) (TMA)		
	25610	Thermal machinery and systems III-I (System/plants of energy supply)	BM6	10 ECTS

Syllabus

Admission criteria:	TMA I-(I-VI)	BM1: None BM4: Passed Introductory Work experience
	TMA II-(I-IV)	BM5: None
	TMA III-(III-I)	BM6: None
Criteria to pass subject	These assessments make up the subject: 1. **Three** assessments using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0 (no rounding) 2. **Two** assessments graded Passed/Not Passed. • All assessments must be graded Passed.	
Semester:	BM1+BM4+BM5+BM6	
ECTS credits:	40 ECTS	
Course Regulations:	• Marine Engineer (BM) version 5.80, 1 February 2021.	
Orders:	• Order on the professional Bachelor Training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.	
STCW:	*STCW Code, as amended: Part A, chapter III - Engine department:* Section A-III/1 – Operational level. Section A-III/2 – Management level.	
Certificate(s):	None	
Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:		

Syllabus

Purpose

Thermal machines and systems are specialized themes in the work as a marine engineer. The subjects in the field of thermal plants and machinery should enable the student to perform the operation and maintenance of engines, steam boilers, combustion and cooling equipment and associated systems, in order to make these systems work reliably, economically, and optimally without danger and without causing damage to the environment. This involves the structural composition, properties and strength, as well as the state of the machinery based on material samples.
The student must, through teaching, also achieve knowledge and skills concerning: water treatment, fuels, refining processes and combustion gas control.
Finally, the student acquires knowledge and skills concerning the effects of the residues and contamination products from households, transport, construction, ship plants and industrial process plants on the environment.

Learning objectives

Thermal Machinery and Systems I

Thermal Machinery and Systems I-I (BM1) (25410)

Combustion Engines – Basic:

The student must attain **knowledge** of:

- Construction and operation of various types of diesel engines and their main components.
- The various auxiliary systems found on a merchant vessel, including boilers, air compressors, pumps, and air conditioning units.

The student must attain the **skills** necessary to:

- Understand general technical documentation, in the form of PI-diagrams that can be found on a ship.
- Understand how proper tightening is performed to the correct specified torque.

The student must acquire the necessary **competencies** to:

- Perform troubleshooting, disassembly and assembly of commonly occurring mechanical components.
- Use appropriate hand tools for repairs and maintenance on diesel engines.
- Conduct surveys and assess the condition of engine components according to technical documentation.

Thermal Machinery and Systems I-II (BM1) (25420):

Hydraulic & Pneumatic – Basic:

The student must attain **knowledge** of:

- Pressure and flow control in hydraulic systems.
- The importance of filtration and filter technology.

The student must attain the **skills** necessary to:

- Install hydraulic pipes and fittings.
- Flush hydraulic systems.

The student must acquire the necessary **competencies** to:

- Assist in minor repair and maintenance work in hydraulic and pneumatic power systems.

General remarks - BM4.

The overall scope of BM4 is to prepare the student to be able to **operate** different thermal systems. This is achieved through systematic use of simulators such as MC 90, GT and TPP. Throughout BM4, scientific methods are implemented in all subjects in written and verbal form in order to collect, assess and analyze relevant information. Where ever relevant, English literature and manuals are used as well as the language used in the simulators is English. All abstracts handed in, must be in English. To ensure a good safety culture, this must be a part of most subjects.
BM4 consists of various subjects, and during the semester there must be at least one multidisciplinary case.

Thermal Machinery and Systems I-III (BM4) (25430):

(Combustion engines and aux systems)

The student must attain **knowledge** of the:

- Construction and working principles of different types of engines.
- Historical and new technologies in conjunction with engine design and operation.
- Construction and function of the diesel engines main components.
- Operational understanding regarding heat extension and heat stress in diesel engines.
- Combustion process in the engine cylinder.
- Construction and working principles of aux systems and system media related to the diesel engine.
- Monitoring equipment and instrumentation for diesels engines.
- Performance optimization with regards to the environment and environmental legislation related to diesel engine operation.
- General technology information, in form of PI-diagrams that can be found on a ship.

The student must attain the **skills** necessary to:

- Perform speed and consumption tests on diesel power-plants.
- Calculate the power and efficiency of a diesel engine.
- Achieve performance optimization with regards to reducing the impact on the environment.
- Operate a diesel plant, taking personal safety, operational safety and environmental safety into account

The student must acquire the necessary **competencies** to:

- Observe and analyze the operational process of a diesel engine power plant and to be able to use this analysis to optimize plant operation.

Thermal Machinery and Systems I-IV (BM4) (25440):

(Hydraulic and pneumatic systems and components)

The student must attain **knowledge** of:

- Hydraulic and pneumatic main components, their operation and applications.
- Common hydraulic and pneumatic systems, including symbols and function diagrams.
- Operational excellence / performance optimization in terms of environmental impact.

The student must attain the **skills** necessary to:

- Use the documentation for hydraulic and pneumatic systems, as well as perform troubleshooting using the documentation.
- Safely handle and treat hydraulic oil and compressed air.
- Optimize hydraulic and pneumatic systems, to reduce their environmental impact.

The student must acquire the necessary **competencies** to:

- Select the correct hydraulic fluid to a hydraulic plant.
- Assess the purity requirements for hydraulic and pneumatic.
- Carry out operation and maintenance of hydraulic and pneumatic systems, as well as on the basis of measurement and monitoring to take relevant measures.
- Operate hydraulic and pneumatic power systems in an operationally correct way.

Thermal Machinery and Systems I-V (BM4) (25450):

Stationary steam boilers and incinerators for fossil fuels and bio fuel.

The student must attain **knowledge** of:

- Building up steam, condensate and feed water systems for both heating and turbine plants.
- The specification data for fossil fuels and bio fuel.
- The principles of boiler combustion and combustion air systems.
- The construction and operation of various types of marine boilers and larger stationary boilers, including exhaust boilers and their auxiliary systems and safety systems.

The student must attain the **skills** necessary to:

- Operate the boiler plant, obtained through simulation training, MC90 and TPP.

The student must acquire the necessary **competencies** to:

- Supervise the operation mode of the steam plant, and to remedy abnormal operation.
- To operate the steam plant and auxiliary systems by simulation.

Thermal Machinery and Systems I-VI (BM4) (25460):

Pumps, compressors and associated piping and refrigeration and cooling technology

The student must attain **knowledge** of:

- The cooling cycle, including evaporation, condensation, compression and expansion.
- The isentropic refrigeration cycle in a h-log p diagram.
- Refrigerants' physical and chemical properties and the impact on the environment.
- Refrigeration methods (natural and forced air circulation, dry evaporator and flooded evaporator).
- The principles of operation and adjustment of the refrigeration system and control and safety systems.
- The principles of one-stage CO2 cooling plants
- The operating principle of centrifugal pumps.
  The pumps and the associated characteristics of the system.
- The operating principles of piston, displacement and dynamic compressors.
- The construction principles of various types of evaporators, compressors, condensers and expansion valves.

The student must attain the **skills** necessary to:

- Work with refrigeration equipment in a safe manner.
- Operate a pump system using simulators or laboratory.
- Make operational prevention and remedying of cavitation

The student must acquire the necessary **competencies** to:

- Supervise the operational mode of cooling and, to remedy abnormal operation using laboratory or simulating systems..
- Supervise the operational mode of pump and compressor systems, and to remedy abnormal operation using simulators or laboratory.

Thermal Machinery and Systems II

General remarks – BM5.

The overall scope of BM5 is to give the student an understanding of the physics behind thermal machinery and the transport of liquid and gases. Throughout BM5, scientific methods are implemented in all subjects in written and verbal form in order to collect, assess and analyze relevant information. Where ever relevant, English literature and manuals are used as well as the language used in the simulators is English. All abstracts handed in, must be in English. To ensure a good safetyculture, this must be a part of most subjects.
BM5 consists of various subjects, and during the semester there must be at least one multidisciplinary case.

Thermal Machinery and Systems II-I (BM5) (25510):

Strength of Materials and basic thermodynamics: heat transfer, fluid physics, gas physics etc.

The student must attain **knowledge** of:

- The theoretical circuit process-cooling and steam systems with evaporation and condensation, including enthalpies for liquid, saturated steam and superheated steam. The thermodynamic laws in the distribution and conditioning of atmospheric air.
- Various static and dynamic load types and their impact on materials, including how external forces and degrees of torque affect the stress within the material.

- How the composition, heat treatment and design affect the material's resistance to external influences.
- The main material test methods, destructive.

The student must attain the **skills** necessary to:

- Calculate the effects, consumption and efficiency in the field of thermal and mechanical energy conversion.
- Calculate the necessary heat and energy balances. Perform stress analysis based on static loads.

The student must acquire the necessary **competencies** to:

- Evaluate the condition of thermal machinery and system components

Thermal Machinery and Systems II-II (BM5) (25520):

Systems for transport liquids and gases

The student must attain **knowledge** of:

- Pump and flow theory for the transport of fluids.
- When there is a risk of cavitation and carry out necessary rectification.
- The principles for controlling the mass flow.
- The principles for the use of pumps connected in parallel and series.
- The characteristics pumps and plant.
- The construction of a compressed air pipe system.
- Operational excellence in terms of environmental impact.

The student must attain the **skills** necessary to:

- Prevent and remedy cavitation.
- Identify opportunities for energy optimization and perform calculations to determine the potential savings.

The student must acquire the necessary **competencies** to:

- Optimize the operation of the plant so that it runs economically and environmentally using laboratory or simulators.

Thermal Machinery and Systems II-III (BM5) (25530):

Buildings air conditioning and refrigeration

The student must attain **knowledge** of:

Refrigeration:

- The characteristics of the evaporator and its impact on temperature as well as humidity in the refrigerator and freezer.
- The principles of two-stages CO2 cooling plants
- The principles of how to assess and adjust the control and safety systems in refrigeration plants.
- The refrigeration system's operating conditions and understanding of the evaporator and condenser pressure effect, the compression effect and the volumetric efficiency.
- Calculations of the evaporator, compressor and condenser effects and how to provide a heat balance for advanced refrigerationplants

- The emptying and filling of refrigerants in refrigeration safety and in an environmentally responsible manner.
- The design of typical systems, including one- stage systems, two-stage systems and cascade systems.
- The laws, regulations and technical requirements for refrigeration.
- The performance optimization in terms of environmental impact.

Climate control:

- Fan and plant characteristics.
- The importance of indoor climate on human comfort and hygiene.
- The state changes that atmospheric air is subjected to in an air conditioner.
- The building climate control system components and air duct systems, including fire.
- The ventilation principles and air inlet in rooms.
- The principles of operation and setting of the ventilation system control and protection system.
- Performance optimization in terms of environmental impact.

The student must attain the **skills** necessary to:

- Handle refrigerants properly and avoid spills.
- Work with refrigeration equipment in a safe manner.
- Calculate the heat exchange in a refrigeration system.
- Operate and control a ventilation plant by means of laboratory exercises.
- Use Mollier's diagram for moist air in order to assess air quality.
- Calculate the varied effects of an air conditioner.
- Optimize refrigeration and building ventilation systems, in order to reduce the environmental impact.

The student must acquire the necessary **competencies** to:

- Supervise the operation mode of the refrigeration and air conditioning systems and to remedy abnormal operation using laboratory equipment.
- Optimize the operation of refrigeration and air conditioning, so it runs economically and environmentally optimally using simulators or laboratory.

Thermal Machinery and Systems II-IV (BM5) (25540):

Environment Facility / wastewater treatment plants and chemical process engineering

The student must attain **knowledge** of:

- The water cycle and balance conditions in nature.
- The causes and consequences of water and air pollution.
- Methods for the purification of polluted water and air.
- Methods used to combat oil pollution at sea.
- The organic water treatment plant's construction, operation and management.
- The sludge treatment plant's construction, operation and management.
- The consequences of the disposal of residues and contamination products in nature.
- Basic sound theory.
- Noise and noise damage effects.
- Operational excellence in terms of environmental impact

The student must attain the **skills** necessary to:

- Perform noise measurements.
- Perform calculations of noise.
- Optimize environmental systems / wastewater treatment plants and chemical process plants, to reduce the environmental impact.

The student must acquire the necessary **competencies** to:

- Supervise the operation of environmental systems and to remedy abnormal operation.
- Optimize the operation of environmental systems so as to run economically and in an environmentally friendly way.

Thermal Machinery and Systems III

General remarks – BM6.

The overall scope of BM6 is to prepare the student to be able to understand and optimize different processes in thermal systems. This is achieved through systematic use of simulators such as MC 90, GT and TPP. Throughout BM6, scientific methods are implemented in all subjects in written and verbal form in order to collect, assess and analyze relevant information. Where ever relevant, English literature and manuals are used as well as the language used in the simulators is English. All abstracts handed in, must be in English. To ensure a good safety culture, this must be a part of most subjects. BM6 consists of various subjects, and during the semester there must be at least one multidisciplinary case including PAA.

Thermal Machinery and Systems III-I (BM6) (25610):

System/plants of energy supply

The student must attain **knowledge** of:

- Steam turbine design principles.
- The modes of operation in relation to condensation, bleed and backpressure at the turbine plant.
- Steam and turbine plant operating conditions, using calculations for the use of energy, such as heat balances and efficiencies.
- The free market of electricity supply in Denmark.
- The principles of boiler and turbine plant control and safety systems.
- The principles of exhaust gas condensation and absorption cooling plants
- The importance of water quality for the operation of a steam plant.
- The principles for water treatment and condensate filtering.
- Design principles for gas turbines, their operation, structure and application.
- Laws, regulations and technical requirements for the steam plant
- Installations for the production of renewable energy.
- Operational excellence in terms of environmental impact.

The student must attain the **skills** necessary to:

- Calculate the effects, consumption and efficiency in boilers and calculate the heat balance in combustion, heat transfer and steam generation.
- Calculate the effects, consumption and efficiency in steam turbine plants, in different operation conditions.

- Apply the laws, regulations and technical requirements for the steam plant.
- Optimize energy systems to reduce the environmental impact.

The student must acquire the necessary **competencies** to:

- Operate the steam plant for heating purposes and, on the basis of measurements and monitoring, and to take relevant measures in to account using simulator TPP.
- Supervise the operation mode of the steam plant and to remedy abnormal operation using simulators.
- Optimize the operation of the plant so that it runs economically and in an environmentally friendly manner.

Core literature

- Formelsamling til brug i maskinmesteruddannelsen, Poul Erik Pedersen og Niels W. Kringelum
- Dampkedler af K.F. Larsen
- Mekanisk fysik og varmelære af Arly Nielsen
- Opgaver til mekanisk fysik og varmelære af Arly Nielsen
- Damptabeller
- Skibsdieselmotorer af Peter Storegård Jensen, 2. udgave
- Skibsmotorlære (tekst) af Christen Knak, 18. udgave
- Skibsmotorlære (tegninger) af Christen Knak, 18. udgave
- Hydraulik for driftsteknikere af Leif Terkilsen
- Noget om køleteknik af Eigil Nielsen
- Udkast til dampturbiner af K.F. Larsen
- Miljøteknik af Jørgen Nielsen
- Pumpebogen, Pumpe drift og energi af Thomas Heilmann, 5. udgave.
- Termodynamik, Teoretisk grundlag – Praktisk anvendelse af Aage Birkkjær Lauritsen

Examination

Thermal machinery I-I (BM1) (25410):

Examination type:	Ongoing Assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important information:	None
Prerequisites for examination:	None

Thermal machinery I-II (BM1) (25420):

Examination type:	Ongoing Assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important information:	None
Prerequisites for examination:	None

Thermal machinery and systems I-(III-VI) (BM4) (25400 & 23211)):

Examination type:	Internal Oral Test
Grade scale:	7-point scale
Preparation time:	Minimum 72 hours
Duration:	60 minutes each, group of 4 persons.
Aids allowed:	All
Important information:	Thermal Machinery and Systems I and Interdisciplinary Elements I (Interdisciplinary) is examined together. The student is given one grade for both subjects. Each group is randomly assigned a scenario by WiseFlow or by the Study Services. The group has a minimum of 72 hours to work out their solutions and conclusions based on an operational point of view. Each student shall prepare á 5 minutes pitch that he/she presents at the start of the examination, and the students are then cross- examined in all relevant topics of the scenario.
Prerequisites for examination:	None

Thermal machinery and systems II-(I-IV) (BM5) (25500):

Examination type:	External Oral Exam
Grade scale:	7-point scale
Preparation time:	Minimum 72 hours
Duration:	60 minutes each group of 4 persons.
Aids allowed:	All
Important information:	Each group is randomly assigned a scenario by WiseFlow or by the Study Services. The group has a minimum of 72 hours to work out their solutions and conclusions. Each student shall prepare á 5 minutes pitch that he/she presents at the start of the examination and the students are then cross-examined in all relevant topics of the scenario.
Prerequisites for examination:	None

Thermal machinery and systems III-I (BM6) (25600 & 25920:

Examination type:	External Oral Exam
Grade scale:	7-point scale
Preparation time:	Minimum 72 hours
Duration:	25 minutes
Aids allowed:	All
Important information:	This exam is combined with PAA II in BM6 and is a formative evaluation. The evaluation is individual. Each group is randomly assigned a scenario by WiseFlow or by the Study Services. The group has a minimum of 72 hours to work out their solutions and conclusions, and to point out all relevant information considering the scenario or system. Each student shall prepare á 5 minutes pitch that he/she presents at the start of the examination and he/she are then cross- examined in all relevant topics of the scenario. The student is given one grade for both subjects - TMA III-I & PAA II.
Prerequisites for examination:	None

Qualification prerequisites for professors/instructors etc.

Associate professors, assistant professors or instructors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is the same or higher than the level of learning objectives for the subject
  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	**25002**	**Electrical and Electronic Machinery and Systems**		
Subject(s):	20700	Electrical and electronic machinery and systems (45 ECTS) (EEM)		
	25710	Electrical and electronic machinery I (**Part A**)	BM1	SP21000
	25720	Electrical and electronic machinery II (**Part A**)	BM4	10 ECTS
	25730	Electrical and electronic machinery III (**Part A**)	BM5	5 ECTS
	25740	Electrical and electronic machinery IV (**Part A**)	BM6	10 ECTS
	25750	El – Authorization (**Part B**) (The General Part & The Electrician Part) (25751 => written exam & 25752 => oral exam)	BM7	20 ECTS
Admission criteria:	Electrical and Electronic Machinery and Systems	BM1: None BM4: Passed Introductory Work experience BM5: None BM6: None BM7: Passed subject **Part A**		
Criteria to pass subject	These assessments make up the **Part A** subject: 1. **Three** assessments using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0 (no rounding) 2. **One** assessments graded Passed/Not Passed. • All assessments must be graded Passed. These assessments make up the **Part B** subject: 1. **Two** assessments using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0 (no rounding), and to pass the written assessment (25751) the grade must be at least 02. 2. **None** assessments graded Passed/Not Passed. • All assessments must be graded Passed.			
Semester:	BM1 + BM4 + BM5 + BM6 + BM7			
ECTS credits:	45 ECTS			
Course Regulations:	• Marine Engineer (BM) version 5.80, 1 February 2021.			
Orders:	• Order on the Marine Engineer training programme – Danish order no. 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.).			

	• Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.	
STCW:	STCW Code, as amended: Part A, chapter III - Engine department: Section A-III/1 - Operational level Section A-III/2 – Management level. Section A-III/6 – Electro-technical officers	
Certificate(s):	None	
Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:	None	

Purpose

Electrical and Electronic Machinery and Systems BM4, BM5, BM6 & BM7:

The purpose of Electrical and Electronic Machinery, Systems and Equipment is for the student to acquire qualifications within the electro-technical area to such an extent that he is able to take care of the operation and maintenance of electrical systems on board ships. The student shall be able to operate the electrical equipment under both normal and abnormal conditions and be able to carry out simple fault finding tasks.

El-Authorization - The General Part - BM7:

The student should be able to taking into account security, user requirements, environmental requirements, operational excellence wishes and regulatory requirements to perform commissioning and maintenance of electrical supply systems, electrical installations and consumption systems, performed for both high and low voltage, in accordance with relevant regulations, regulations, and directives.

El-Authorization - The Electrician Part - BM7:

The student must obtain the theoretical basis required in order to acquire an electrician's authorization *, while the choice of solutions takes into account economic, environmental and operational excellence.

* (After the apprenticeship under the law of Electrician (in danish “installatørloven”) are met)

Learning objectives

Electrical and Electronic Machinery and Systems I-V

Electrical and Electronic Machinery I - BM1 (25710):

The student must attain **knowledge** of:

- how an electrical connection is carried out properly, taking into account stripping, clamping and relief
- principles of proper materials and components
- general voltage systems design and installations on vessels
- construction of a 3-phase non synchronic motor/generator including coupling form
- standards and norms for electrical documentation for the 1 - and 3-phase installations

The student must attain the **skills** necessary to:

- handle control and maintenance of lead accumulators
- use appropriate hand tools for simple tasks associated with electrical installation
- handle fittings
- use electro-technical documentation
- perform calculations on simple electrical circuits
- do the assessment of the safety culture concerning the construction and operation of electrical installations and facilities

The student must acquire the necessary **competencies** to:

- install or replace simple components of an electrical installation under the supervision of responsible manager
- troubleshoot single-phase lighting installation as well as a 3-phase motor installation with start stop control and emergency stop
- use of English electro-technical terminology and concepts

Electrical and Electronic Machinery II - BM4 (25720):

The student must attain **knowledge** of:

- theories Ohm's law and Kirchhoff's laws in the estimation of simple series and parallel connections of resistive circuits
- electrical and magnetic field theories for later use in electrical and electronic machinery
- AC characteristics, characteristic of AC load and AC phase shift (power factor), including coils with iron core
- principles of 1-, 2- and 3-phase alternating current by sinus and not sinusoidal voltage including zero impedance normally
- present system voltages and their applications, including battery supply
- measurement methods used in the 1-, 2- and 3-phase AC systems
- selection of suitable measuring instruments
- electrochemistry
- general control technology using relays
- preparation of electro-technical documentation

The student must attain the **skills** necessary to:

- use of calculations with Ohm's law and Kirchhoff's laws related to serial and parallel connections in resistive circuit
- perform calculations relating to alternating current and the current characteristics

- perform simple calculations for 1-, 2- and 3-phase AC circuits
- perform the relevant measurements of 1, 2 and 3-phase AC systems
- establishment of common relay controls
- draw electrical documentation in small scale
- be able to handle the module relevant work safety in the laboratory exercises
- do the assessment of the safety culture concerning the construction and operation of electrical installations and facilities.
- construction and testing of electro-technical set-ups in the laboratory

The student must acquire the necessary **competencies** to:

- handle simple serial and parallel connections based on Ohm's law and Kirsch Offs laws in connection with resistive circuits
- handle simple compound 1-, 2- and 3-phase AC circuits incl. supply source
- carry out measurements on 1- and 3-phase AC systems
- identify errors and deficiencies in relay controls
- use of English electro-technical terminology and concepts

Electrical and Electronic Machinery III - BM5 (25730):

The student must attain **knowledge** of:

- principles for balanced or unbalanced loads at 1-, 2- and 3-phase AC circuitsprinciples
- the construction of power plants on ships including system voltages, breakdown, standby and emergency supply options
- electrical machines operating characteristics based on knowledge of the structure, components, operation and other characteristics including motors and generators by AC and DC
- electrical machines importance
- interaction between the prime mover, generator, excitation, synchronization equipment protection equipment and Switchgear for electrical machines
- the Classification Societies electro-technical requirements in the maritime field

The student must attain the **skills** necessary to:

- perform calculations on 1-, 2- and 3-phase AC circuits
- perform calculations on unbalanced loads on the AC circuit
- construction of power plants on ships including system voltages, breakdown, standby and emergency supply options
- perform calculations in connection with choice of engines from operating and environmental parameters
- assessment of an asynchronous machinery operating characteristics as power in the choice of type and mechanical performance
- perform calculations for synchronous machines
- managing the interaction between prime mover, generator, excitation and synchronization equipment
- use of protective and switching equipment
- be able to handle the module relevant work safety in the laboratory exercises
- do the assessment of the safety culture concerning the construction and operation of electrical installations and facilities
- construction and testing of electro-technical set-ups in the laboratory

The student must acquire the necessary **competencies** to:

- Identify the 1-, 2- and 3-phase AC circuits in the simple operation conditions

- participate in the construction of power plants and installations
- working with different engine types in the selection, environmentally friendly operation and maintenance
- Implement operation of a synchronous generator system with one or more generators
- use of English electro-technical terminology and concepts

Electrical and Electronic Machinery IV - BM6 (25740):

The student must attain **knowledge** of:

- voltage drop calculations for installations
- short circuit calculations anywhere in electrical installations
- calculation and choice of capacitor size in the power factor systems, construction and operation of automatic power factor systems
- operational characteristics of transformers based on knowledge of the structure, components, operation and other characteristics, including couplings and parallel operation
- software programs for simulation

Electronic:

- knowledge of components – including: linear and nonlinear resistors, capacitors and inductors, diodes, transistors, operational amplifiers, controlled diodes, analog- and digital circuits
- the structure and characteristics of a three-phase rectifier and power circuits with managed and unmanaged diodes
- causes and effects of transient over-voltage and electromagnetic interference, including electromagnetic compatibility (EMC / EMI)principles of
- applied fire alarm and other alarm systems on ships and in industry
- system components for integrated realizations control with associated signal handling

The student must attain the **skills** necessary to:

- voltage drop calculations for installations Short circuit calculations anywhere in electrical installations calculate the capacitor size to be used in a plant for simple or common power factor compensation
- perform calculations related to the use of single phase and three phase transformers including in parallel operation
- be able to handle the module relevant work safety in the laboratory exercises
- do the assessment of the safety culture concerning the construction and operation of electrical installations and facilities
- construction and testing of electro-technical set-ups in the laboratory
- the application of software programs for simulation purposes

Electronic:

- perform simple calculations in electronic circuits which include linear-, nonlinear resistors, diodes, transistors and operational amplifiers
- assessment of various digital and analog circuits including among other rectifier circuits, alarm input and output cards for controlling equipment with more
- assessment of conditions which include transient surges and electromagnetic interference, including electromagnetic compatibility (EMC / EMI)
- assessment of systems and associated signal handling

The student must acquire the necessary **competencies** to:

- to assess voltage, drop and short circuit currents in installations
- take charge of operation and maintenance of electrical systems for simple and common power factor correction
- using one- and three-phase transformers
- use of English electro-technical terminology and concepts. Some of the assignments must at least contain some English chapters

Electronic:

- identifying the electronic circuits that occur in connection with alarm systems and control and regulation equipment to perform maintenance and repairs of integrated control systems

El-Authorization (Electrician license) - The General Part - BM7 (25750):

The student must attain **knowledge** of:

- construction and operation of electrical installation material, including fuses and circuit breakers in order to conduct proper selection and sizing of equipment, including rules for electrical equipment insulation materiel and wire equipment, assembly equipment, sockets, sizing of fuses, design of switches, dimensioning of motor protection
- analysis of the effectiveness of short-circuit protection of electric installations and selectivity, including:
  - provision of release time and specific energy anywhere in the supply / installation make the correct selection of equipment and material.
- selectivity
- power generation, transmission and main transformer stations, including errors and relay protection, including
  - structure and performance of power generation building and construction of the transmission structure and performance of the main substations
  - types of errors and relay protection principles in power generation, transmission and main transformer stations
- design and dimension of the supply to power factor systems, including dimensioning of the supply to power factor systems
- construction and operation of earthing systems, including:
  - construction and operation of operational and protective earthing in high voltage grid construction and operation of operational earthing systems in low-voltage networks
  - calculations of the earth current operating-related and protective earthing in high voltage grid
  - calculations of earth current in the earthing system of the Low Voltage
- methods for detecting ground faults on high voltage networks including relay device for detecting ground faults in high voltage distribution systems
- requirements for the operation of power facilities
- working on or near the high- and low-voltage systems, as well as power less and live

The student must attain the **skills** necessary to:

- assessment of electrical installation material, including fuses and circuit breakers, in order to be able to make the correct selection and sizing of equipment, i
  - including rules for electrical equipment insulation materiel and wire equipment
  - assembly equipment
  - sockets

    - sizing of fuses design of switches dimensioning of motor protection
- calculation of the effectiveness of short-circuit protection in power plants, as well as skills in the selection of equipment and supplies, including:
    - provision of release time and specific energy anywhere in the supply / installation make the correct selection of equipment and supplies
- assessment of the selectivity ratio
- design of power generation, transmission and main transformer stations, including errors and relay protection, including
    - structure and performance of power generation plants
    - structure and performance of transmission
    - structure and performance of the main substations
    - types of errors and relay protection principles in power generation, transmission and main transformer stations
- sizing of supply to power factor systems
- construction and planning of earthing systems, including
    - construction and operation of operational and protective earthing in high voltage grid construction and operation of operational earthing systems in low-voltage networks
    - calculations of the earth current operating-related and protective earthing in high voltage grid,
    - calculations of earth current in the earthing system of the Low Voltage
- assessment of ground faults on high voltage networks including relay device for registration of ground faults in high voltage distribution systems
- operation of power facilities and skills in planning and conducting operations on or near the high- and low-voltage systems, as well as power less and live
- be able to handle the module relevant work safety in the laboratory exercises.
- do the assessment of the safety culture concerning the construction and operation of electrical installations and facilities
- construction and testing of electro-technical set-ups in the laboratory

The student must acquire the necessary **competencies** to:

- Appointing electrical installation material, including fuses and circuit breakers sizing incl. calculation of supply for power factor correction systems,
- to participate in the operation of power facilities and participate in the planning and execution of work on or near the high- and low-voltage systems, as well as power less and live
- use of English electro-technical terminology and concepts

El-Authorization (Electrician license) - The Electrician Part - BM7 (25750):

(❶ marks that the topic is mentioned partial in the previous teaching of electrical engineering, general part*)*

student must attain **knowledge** of:

- ❶ construction and operation of electrical installation material, including fuses and circuit breakers in order to conduct proper selection and sizing of equipment, including rules for electrical equipment insulation materiel and wire equipment, assembly equipment, sockets, sizing of fuses design of switches dimensioning of motor protection
- photometric basic concepts and luminaires and light sources properties, luminousness lamps and high voltage fluorescent optical properties and their installation conditions
- principles for the design of lighting systems, including:

- account for indoor and outdoor luminaires lighting, performance principles for the design of indoor and outdoor lighting systems

- electric space heating and heating methods in industrial plants, including
  - have knowledge of electrical heating of buildings have knowledge of industrial heaters

❶ analysis of the effectiveness of short-circuit protection of electric installations and selectivity, including:
  - provision of release time and specific energy anywhere in the supply / installation make the correct selection of equipment and material

❶ power generation, transmission and main transformer stations, including errors and relay protection, including:
  - structure and performance of power generation building and construction of the transmission
  - structure and performance of the main substations
  - types of errors and relay protection principles in power generation, transmission and main transformer stations

- building low-voltage distribution networks and design and dimensioning of associated wires / cables and overcurrent protection with respect to the fulfillment of requirements for selectivity and power quality, including
  - analyze and identify principles of a low-voltage distribution networks building account for used equipment in low-voltage distribution networks
  - design and dimensioning low-voltage distribution networks carried by the cable

- construction of high voltage distribution network and the design and dimensioning of the corresponding wires / cables and overcurrent protection with respect to the fulfillment of requirements for selectivity and power quality including :
  - analyze and identify principles of a high voltage distribution network building account for used equipment in high voltage distribution network
  - design and dimensioning high voltage distribution network performed as overhead lines and cable networks

❶ construction and operation of earthing systems and performing calculations of earth currents, including
  - understanding of the construction and operation of operational and protective earthing in high voltage grid
  - understanding of the construction and operation of operational earthing systems in low-voltage networks perform calculation of the earth current operating-related and protective earthing systems

  - high voltage grid performs
  - calculations of earth current in the earthing system of the low voltage

❶ detection of ground faults on high voltage grid and relay equipment for detecting ground faults in high voltage grid

- construction of substations in distribution networks, and choice of transformers and switching devices for high and low voltage, and knowledge of the design of the corresponding high voltage cables, low voltage, over current protection and earthing systems, including
  - analyze and identify principles of a distribution transformer station building
  - sizing and selecting transformers for distribution substations
  - sizing and selecting overcurrent protection for distribution substations
  - sizing and selecting switching apparatus for distribution substations
  - sizing and selecting high voltage and low voltage lines in distribution substations

- sizing and selecting the target fields in distribution substations sizing and selecting earthing of distribution substations

- rules and regulations for low voltage and knowledge of the design and dimensioning of such installations, including
  - building installations protection against electric shock protection against thermal stresses overcurrent
  - protection against overvoltage and under voltage separation and off switching
  - selectivity
  - using the above methods of protection
  - selection and installation of equipment provisions for special installations or areas
- rules and regulations for secondary high voltage and knowledge of the design and dimensioning of such installations, including
  - apply the rules and determines the secondary high voltage design and dimensioning of the secondary high voltage
- requirements for inspection and testing of installations prior to commissioning and the operation and maintenance of facilities, including
  - requirements for inspection and testing of installations prior to commissioning requirements for the operation and maintenance of installations.
- Rules for the construction of substations and wiring systems as well as ground connections for these station
  - understanding of SBUE
  - SBUE regulatory framework relating to the design

- ❶ regulatory framework for project planning regulations for the operation of power facilities and for planning and conducting operations on or near the high- and low-voltage systems, as well as unstressed live, including:
  - understanding of SBUE regulatory framework for the operation of power facilities
  - understanding of SBUE regulatory framework for the planning and execution of work on or near energized high- and low-voltage
  - understanding of SBUE regulatory framework for the planning and execution of work on or near energized high- and low-voltage
- requirements for machine safety and electrical equipment of machines, including
  - understanding of AT and the Machinery Directive requirements for machine safety understanding of the
- requirements for electrical equipment of machines requirements for low voltage switchgear, including busways

The student must attain the **skills** necessary to:

(❶ marks that the topic is mentioned partial in the previous teaching of electrical engineering, general part)

- ❶ assessment of electrical installation material, including fuses and circuit breakers in order to conduct proper selection and sizing of equipment, including:
  - rules for electrical equipment manager and insulation material
  - wires
  - assembly equipment sockets
  - sizing of fuses design of switches dimensioning of motor protection
- design of lighting systems, including:
  - account for indoor and outdoor luminaires lighting performance principles for the design of indoor and outdoor lighting systems

- choice of equipment for electric space heating and heating of industrial processes
    - have knowledge of electrical heating of buildings
    - have knowledge of industrial heaters
- calculation of the effectiveness of short-circuit protection in power plants, including the calculation about. fulfillment of selectivity as well as skills in the selection of equipment and supplies, including:
    - provision of release time and specific energy anywhere in the supply / installation make the correct selection of equipment and supplies
- design of power plants, transmission networks and main substations, including errors and relay protectionstructure and
    - performance of power generation plants structure and
    - performance of transmission structure and
    - performance of the main substations
    - types of errors and relay protection principles in power generation, transmission and main transformer stations
- building low-voltage distribution networks and design and dimensioning of associated wires / cables and overcurrent protection with respect to the fulfillment of requirements for selectivity and power quality, including:
    - analyze and identify principles of a low-voltage distribution networks
    - building account for used equipment in low-voltage distribution networks
    - design and dimensioning low-voltage distribution networks carried by the cable
- construction of high voltage distribution network and the design and dimensioning of the corresponding wires / cables and overcurrent protection with respect to the fulfillment of requirements for selectivity and power quality, including:
    - analyze and identify principles of a high-voltage distribution network building
    - explain the material used in high-voltage distribution networks
    - design and dimensioning high voltage distribution network performed as overhead lines and cable networks
- ❶ construction and operation of earthing systems and performing calculations of earth currents, including:
    - understanding of the construction and operation of operational and protective earthing in high voltage grid
    - understanding of the construction and operation of operational earthing systems in low-voltage networks
    - perform calculations of the earth current operating-related and protective earthing systems in
    - high voltage grid
    - perform calculations of earth current in the earthing system of the low voltage
- ❶ assessment of ground faults on high voltage networks including relay device for detecting ground faults in high voltage distribution systems
- construction of substations in distribution networks, and choice of transformers and switching devices for high and low voltage, and skills in the design of associated high voltage cables, low voltage, over current protection and earthing systems, including:
    - analyze and identify principles of a distribution transformer station building
    - sizing and selecting transformers for distribution substations
    - sizing and selecting overcurrent protection for distribution substations
    - design and selecting switching devices for distribution substationssizing and
    - selecting high voltage and low voltage lines in distribution substation
    - sizing and selecting the target fields in distribution substations
    - design and selecting earthing systems in distribution substationsdesign

- dimensioning of low voltage installations, including:
  - building installations protection against electric shock protection against thermal stresses overcurrent protection
  - protection against overvoltage and under voltage separation and
  - switching off
  - selectivity
  - using the above methods of protection selection and installation of equipment
  - provisions for special installations or areas
- design and dimensioning of the secondary high-voltage installations, including:
  - apply the rules and determines the secondary high voltage
  - design and dimensioning of secondary high voltage
- requirements for inspection and testing of installations prior to commissioning and the operation and maintenance of facilities, including:
  - requirements for inspection and testing of installations prior to commissioning
  - requirements for operation and maintenance of facilities
- assessment of the performance of substations and installations and grounding etc. in and around these facilities, including:
  - understanding of SBUE regulatory framework
  - SBUE regulatory framework relating to the design
- ❶ operation of power facilities and skills in planning and conducting operations on or near the high- and low-voltage systems, as well as unstressed live, including:
  - understanding of SBUE regulatory framework for the operation of power facilities
  - understanding of SBUE regulatory framework for the planning and execution of work on or near energized high- and low-voltage
  - understanding of SBUE regulatory framework for the planning and execution of work on or near energized high- and low-voltage be able to handle the module relevant work safety in the laboratory exercises.
- do the assessment of the safety culture concerning the construction and operation of electrical installations and facilities
- construction and testing of electro-technical set-ups in the laboratory

The student must acquire the necessary **<u>competencies</u>** to:

(❶ marks that the topic is mentioned partial in the previous teaching of electrical engineering, general part)

- appointing electrical installation material, including fuses and circuit breakers, in order to be able to make the correct selection and sizing of equipment
- participation in the design of lighting systems
- participate in the selection of equipment for electric space heaters and heating for industrial facilities
- ❶ to handle the calculation of the effectiveness of short-circuit protection in power plants, including the calculation about. fulfillment of selectivity as well as skills in the selection of equipment and supplies to
- ❶ participate in the design of power generation, transmission and main transformer stations, including errors and relay protection
- projecting low-voltage distribution networks and design and sizing associated wires / cables and overcurrent protection with respect to the fulfillment of requirements for selectivity and power quality

- designing high-voltage distribution networks and design and sizing associated wires / cables and overcurrent protection with respect to the fulfillment of requirements for selectivity and power quality
- design and construction of earthing
- to identify situations with ground fault on the high voltage grid including handling relay device for detecting ground faults in high voltage distribution systems
- participate in the construction of substations in distribution network, and handle choice of transformers and switching devices for high and low voltage, as well as participate in the design of associated high voltage cables, low voltage, over current protection and earthing
- handling the design of low voltage
- to participate in the design and dimensioning of secondary high voltage
- identify routines for inspection and testing of installations prior to commissioning and the operation and maintenance of facilities
- identify substations and installations and grounding etc. and in the case of these facilities
- to participate in the operation of power facilities and participate in planning and carrying out work on or near high and low voltage, and power less as live
- use of English electro-technical terminology and concepts

Examination

Electrical and electronic machinery I - BM1 (25710):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important information:	None
Prerequisites for examination:	None

Electrical and electronic machinery II - BM4 (25720):

Examination type:	Internal written test
Grade scale:	7-point scale
Preparation time:	None
Duration:	4 hours
Aids allowed:	All
Important information:	None
Prerequisites for examination:	None

Electrical and electronic machinery III - BM5 (25730):

Examination type:	Internal written test
Grade scale:	7-point scale
Preparation time:	None
Duration:	4 hours
Aids allowed:	All
Important information:	None
Prerequisites for examination:	None

Electrical and electronic machinery IV - BM6 (25740):

Examination type:	External written exam
Grade scale:	7-point scale
Preparation time:	None
Duration:	4 hours
Aids allowed:	All
Important information:	None
Prerequisites for examination:	None

El-authorization - BM7 (25751):

Examination type:	External oral exam
Grade scale:	7-point scale
Preparation time:	None
Duration:	20 minutes
Aids allowed:	All
Important information:	An appropriate number of representative exam questions will be prepared. The students are familiar with the exam questions in advance. Each student draws a random exam question on the exam day. The exam starts immediately afterwards, as the student demonstrates his/her knowledge in relation to the actual subject without aids and preparation.
Prerequisites for examination:	None

El-authorization - BM7 (25752):

Examination type:	External written exam
Grade scale:	7-point scale
Preparation time:	None
Duration:	6 hours
Aids allowed:	All
Important information:	None
Prerequisites for examination:	None

Qualification prerequisites for professors/instructors etc.

Associate professors, assistant professors or instructors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is the same or higher than the level of learning objectives for the subject
  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	25003	**Process Analysis and Automation (BM)**		
Subject(s):	25900	Process Analysis and Automation (15 ECTS) (PAA)		
	25910	Process analysis and Automation I	BM5	5 ECTS
	25920	Process analysis and Automation II	BM6	5 ECTS
	25930	Process analysis and Automation III	BM7	5 ECTS
Admission criteria:	Process Analysis and Automation	BM5: None BM6: None BM7: None		
Criteria to pass subject	These assessments make up the subject: 1. **Three** assessments using the 7-point grade scale. • To pass each assessment the grade must be at least 02. 2. **None** assessments graded Passed/Not Passed. • All assessments must be graded Passed.			
Semester:	BM5 + BM6 + BM7			
ECTS credits:	15 ECTS			
Course Regulations:	• Marine Engineer (BM) version 5.80, 1 February 2021.			
Orders:	• Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.			
STCW:	*STCW Code, as amended: Part A, chapter III - Engine department:* Section A-III/1 Section A-III/2.			
Certificate(s):	None			
Responsible:	Subject Manager			
Valid from:	2021-1	VTA		
Expired:				
Remarks:				

Purpose

Process Analysis and Automation:
The student should acquire the necessary professional skills and knowledge so that he can perform tasks in the areas of process analysis, optimization of operations , equipment selection , troubleshooting, and maintenance requirements for automation of technological processes within transport, power plants, production- and environmental technology.
The student must also obtain the necessary professional skills in data acquisition, data logging , control and management techniques to act rationally and correctly by monitoring and operating of ship control systems

Key subjects:

A. Monitoring of process plants
B. Control and control loops of plant
C. Process analysis and optimization
D. Integrated Control Systems

Learning objectives

Process Analysis and Automation

Process analysis and automation I - BM5 (25910):

The student must attain **knowledge** of:

1. **Sensors' and actuators**
   - Common purpose analog and digital sensors incl. calibration and adjustment
   - Common purpose analog and digital actuators
   - measurement uncertainty and the impact of automation systems
2. **Basics of machine control and control of dynamic systems**
   - Process -and Machine control
   - Automation technical terminologies
   - Technical and theoretical fundamentals of control loops
   - Different types of control loops and individual properties of parameters
   - Optimization of controller parameters
   - PI - diagrams
   - Sequential machine control
   - Documentation, including electrical documentation
3. **Integrated automation systems / system knowledge**
   - Distributed I / O
   - Controllers in integrated systems
   - Automation data network basics
   - graphic control panels
   - basic safety requirements for automation systems
   - control plants

The student must attain the **skills** necessary to:

1. **sensors and actuators**
   - use common analog and digital sensors
   - identify common analog and digital actuators
2. **Basics knowledge of automation technology**
   - the use of technical control loop fundamentals
   - the use of Process Instrumentation chart
   - simple sequential machine control

The student must acquire the necessary **competencies** to:

- identifying automation components in an integrated system and getting an overall system familiarity by using ordinary technical documentation

Process analysis and automation II - BM6 (25920):

The student must attain **knowledge** of:

1. **Process automation**
   - PLC/controller-based controllers
   - integrated controller and control loops
   - complex controller systems design and operation including " feedforward " - and cascade control
   - control equipment for common tasks
   - practically based controller tuning and setting methods
   - Concepts and presentation of Data types
     - Signed / unsigned Interger
     - Real /Float
   - PLC Programming
     - Language
       - Ladder
       - Function Block Diagram
       - CFC
     - Program structure
       - Main program
       - Using of Sub routines
   - Functions in PLC Programming
     - Timers
     - Comparators / Counters
     - Arithmetical operators
   - Perform tasks, both practically and theoretically, so he/she are challenged to demonstrate independently innovative thinking and behavior

2. **Signals and signal conditioning**
   - interface and signal conditioning devices including I / 0 card
   - EMC
3. **Machine Control**
   - components, function and properties of the PLC / controller equipment
   - development, programming, testing and documenting control tasks in accordance with use of DS / EN 60848 and DS / EN 61131-3 or latest version.

- PLC / controller equipment for common management tasks
- concepts of process- and personal safety
- commonly used safety laws, regulations, international and European directives, etc. in relation to automatic processes
- use of commonly occurring safety components

4. **HMI (Human Machine Interface)**
   - SCADA software
   - OPC

The student must attain the **skills** necessary to:

1. **Process Automation**
   - Practical use of PLC / controller based controllers and equipment
   - use of basic integrated command and control systems for general tasks
   - use of practical controller parameter setting methods
   - study technical literature and manuals in English language
2. **Signals and signal conditioning**
   - use interface and signal conditioning devices including I / O cards
3. **Machine Control**
   - programming, testing and documenting of control function
   - using PLC / controller equipment for commonly occurring management tasks
4. **HMI (Human Machine Interface)**
   - use of SCADA software

The student must acquire the necessary **competencies** to:

- solve and automate a process from a specification in consideration of operational, functional, safety and technical considerations
- to design an HMI system
- to balance a control loop in consideration of demands and system behavior

Process analysis and automation III - BM7 (25930):

The student must attain **knowledge** of:

- Commonly used data exchange technologies in automation networks and Ethernet TCP/IP
- Fieldbus
- Basic knowledge of data network
- Control systems structure and function by interaction with the individual components, including configuration and programming
- Concepts of data representation LSB and MSB.

The student must attain the **skills** necessary to:

- to work in a problem-oriented way in an automation -related context, both practically and theoretically, so he/she are challenged to demonstrate independently innovative thinking and behavior
- Instrumentation and measurements in processes, Including:
  - calibration and documentation
  - uncertainties and accuracy
  - different measuring principles for the determination of physical quantities
  - turndown
  - Installation and common errors sources for failure

- Parameterization
- Understand basics of data sheets for flow – and level measurements

The student must acquire the necessary **competencies** to:

- independently analyze complex automation-related issues, including acquire knowledge for the elaboration of solutions
- study technical literature and manuals in English language

Core literature

- Praktisk regulering og instrumentering, Thomas Heilmann, Heilmanns Forlag
- Logisk styring med PLC, Thomas Heilmann, Heilmanns Forlag,
- Automatiske anlæg, El-fagets forlag
- Various manuals for hard- and software, technical descriptions and datasheets for used equipment

Examination

Process analysis and automation I BM5 (25910):

Examination type:	Internal written test
Grade scale:	7-point scale
Preparation time:	None
Duration:	40 minutes
Aids allowed:	PC with NO access to the internet
Important information:	The Internal written test is a Multiple Choice-test.
Prerequisites for examination:	None

Process analysis and automation II - BM6 (25920):

Examination type:	External oral exam
Grade scale:	7-point scale
Preparation time:	72 hours
Duration:	25 minutes
Aids allowed:	All
Important information:	This exam is combined with TMA III-I in BM6 and is a formative evaluation. The evaluation is individual. Each group is randomly assigned a scenario by WiseFlow or by the Study Administration. The group has a minimum of 72 hours to work out their solutions and conclusions, and to point out all relevant information considering the scenario or system. Each student shall prepare á 5 minutes pitch that he/she can present at the start of the examination and he/she are then cross- examined in all relevant topics of the scenario. The student is given one grade for both subjects - TMA III-I & PAA II.
Prerequisites for examination:	None

Process analysis and automation III - BM7 (25930):

Examination type:	External oral exam
Grade scale:	7-point scale
Preparation time:	None
Duration:	30 minutes
Aids allowed:	All
Important information:	Preparing of a mandatory project / case report where academic subject and learning is the basis for examination.
Prerequisites for examination:	The mandatory project / case report had to be handled on time in accordance to lessons plan.

Qualification prerequisites for professors/instructors etc.

Associate professors or assistant professors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is the same or higher than the level of learning objectives for the subject
  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	**26000**	**Management (BM)**		
Subject(s):	26500	Management, Economics and Safety (20 ECTS)		
	26512	Management and Leadership	BM 5	5 ECTS
	26520	Business Economics	BM 8	5 ECTS
	26530	Standard Based Tools I (Safety, Health, Environment, Quality and Energy)	BM 6	5 ECTS
	26541	Standard Based Tools II (Operation and maintenance including planning and managing projects)	BM 7	5 ECTS
Admission - criteria:	None for subject area Management (BM)			
Criteria to pass subject	These assessments make up the subject: 1. **Four** assessments using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding) 2. **None** assessments graded Passed/Not Passed. • All assessments must be graded Passed.			
Semester:	BM5 + BM6 + BM7 + BM8			
ECTS credits:	20			
Course Regulations:	• Marine Engineer (BM) version 5.80, 1 February 2021.			
Orders:	• Order on the professional bachelor-training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.			
STCW:	*STCW Code, as amended: Part A, chapter III - Engine department:* Section A-III/1 Section A-III/2.			

Syllabus

Certificate(s):	None	
Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:	None	

Purpose

Students should be qualified to assume responsibility as a leader of personnel and operation with due diligence to safety, quality and environment. We will look at various industries, not only shipping but also trends in professional organizations in public and private sector. The purpose of this focus is to stimulate innovation from other industries into the maritime industry.

Learning objectives

Management, Economics and Safety

Management and leadership - BM5 (26512):

The student must attain **knowledge** of:

- Personality traits and personal development
- Stressors and fatigue
- Teams and groups
- Communications theories
- Conflict analysis and –handling
- Management theories and models
- Shareholders and stakeholders
- Maritime institutions
- Organizational structures, hierarchy, social structures, technology and strategy
- Cultural theory
- Employment law,

The student must attain the **skills** necessary to:

- Understand personal development
- Identify stress symptoms
- Support team processes
- Motivate people
- Understand cultural differences
- Handle conflicts
- Analyze organizational designs

The student must acquire the necessary **competencies** to:

- Support personal development processes
- Create and maintain a healthy work environment
- Communicate across cultural and social differences

Standard Based Tools I - BM6 (26530):

Safety, Health, Environment, Quality and Energy:

The student must attain **knowledge** of:

- Basic principles for standard methods for mapping out the working-environment and environmental status in an organization e.g. GAP analysis.
- Basic principles for standard based tools such as ISO 14001, ISO 9001, Danish Environmental Law, Marine environmental Law, SEEMP, EEDI and occupational Health and Safety.
- Basic quality assurance methods and auditing e.g. plan-do-check-act principle
- Environmental management planning and audits at management level
- Innovation

The student must attain **skills** attain the necessary to:

- Integrate occupational Health, Safety, Quality and Environmental management systems into the strategies of an organization
- Through reviews, identify areas for improvement and change within the assurance systems
- Implement changes and improvements within the assurance systems
- Apply the principles of processes of change in an organization in regard to environmental and health management

The student must acquire the necessary **competencies** to:

- Assist with coordinating Health, Safety, Environmental and energy management in an organization
- Plan sustainable energy optimization
- Assist in planning and integrate environmental management systems.

Standard Based Tools II - BM7 (26541):

Operation and maintenance including planning and managing projects:

The student must attain **knowledge** of:

- Common concepts of maintenance.
- Methods used in testing materials in a non-destructive manner.
- Maintenance standard requirements made by external interests, including Class, insurance companies and authorities.
- Different methods of managing projects
- Stakeholder analysis
- Common concepts of operation management

The student must attain the **skills** necessary to:

- Apply administrative maintenance tools, including electronic maintenance control programs.
- Apply specific NED- methods.
- Perform and analyze vibration measurements in conjunction to condition control.
- Plan projects using common methods and assessing the risks
- Perform and manage board-meetings (tavlemøder).
- Reduce the waste of resources

The student must acquire the necessary **competencies** to:

- Select the best possible maintenance tools.
- Analyze operation results
- Apply key-figures, standards and benchmarking
- Manage maintenance tasks by relevant principles.
- Plan maintenance tasks using relevant methods of planning project

Business Economics - BM8 (26520):

The student must attain **knowledge** of:

- Fundamental operations in any company
- The set-up on accounting and legal framework behind annual reports
- Basic principles behind budgets
- Entrepreneurship
- Stakeholder innovation
- Environmental economics
- The basic elements of the annual report
- Strategic analysis and decision making
- Company Law

The student must attain the **skills** necessary to:

- Analyze a company's assets and liabilities
- Asses the key performance indicators of a company
- Analyze strategic and market analysis
- Analyze organizations' internal resources and their role for strategic positioning
- Analyze the external environment of organizations, i.e. macroeconomic changes, industry and competitor analysis
- Identify organizational growth

The student must acquire the necessary **competencies** to:

- Make calculations on basic ratios as well as analyzing a company financially
- Understand the concepts Balance-sheet analysis
- Analyze annual reports
- Identify and develop relevant strategy positions of an organization

Core literature

Management and Leadership:

Knærkegaard P. L. & Steenstrup, H. (2010): Ledelse I teori og praksis. København, Hans Reitzels Forlag

Examination

Management and Leadership - BM5 (MAL – 26512):

Examination type:	External oral exam
Grade scale:	7-point scale
Preparation time:	Minimum 24 hours
Duration:	60 minutes for each group of 4 students
Aids allowed:	All
Important information:	Each group is randomly assigned a case scenario by Wiseflow or the Student Services. Each case scenario is accompanied by a set of questions. The group has a minimum of 24 hours for preparation. Each student prepares 5 minutes pitch, and the students are then cross- examined in relevant topics of the case and other learning objectives of the subject.
Prerequisites for examination:	None

Standard Based Tools I - BM6 (26530):

Safety, Health, Environment, Quality and Energy:

Examination type:	Ongoing assessment
Grade scale:	7-point scale
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important information:	None
Prerequisites for examination:	None

Standard Based Tools II - BM7 (26541):

Operation and maintenance including planning and managing projects:

Examination type:	External oral exam
Grade scale:	7-point scale
Preparation time:	None
Duration:	60 minutes for each group of 4 students
Aids allowed:	All
Important information:	The examination is based on case synopsis handed in by the study groups.
Prerequisites for examination:	The study student must hand in a case synopsis in accordance with the lesson plan

Business Economics - BM8 (26520):

Examination type:	External oral exam
Grade scale:	7-point scale
Preparation time:	None
Duration:	60 minutes for each group of 4 students
Aids allowed:	All
Important information:	Business Economics and Interdisciplinary Elements II (Interdisciplinary) are examined together. The student receives one grade. The examination is based on interdisciplinary project handed in by the study group.
Prerequisites for examination:	The study group must hand in the interdisciplinary project in accordance with the lesson plan.

Qualification prerequisites for professors/instructors etc.

Associate professors or assistant professors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is the same or higher than the level of learning objectives for the subject
  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	**29000**	**Bachelor Project (BM)**		
Subject (s):	29100	Bachelor Project (15 ECTS)		
	29110	Bachelor Project	BM9	15 ECTS
	29111	Bachelor Project in January		
	29112	Bachelor Project in April		
	29113	Bachelor Project in June		
	29114	Bachelor Project in October		
	29120	BA Methodology Course		
	29121	BA Methodology Course in January		
	29122	BA Methodology Course in April		
	29123	BA Methodology Course in June		
	29124	BA Methodology Course in October		
Admission criteria:	The final Bachelor Project period in BM9	All subjects of the BM education programme must be passed with accordance to the course regulations for Marine Engineer, except Professional Work Experience		
Criteria to pass subject	These assessments make up the subject: 1. **One** assessments using the 7-point grade scale. • To pass the assessment the grade must be at least 02 2. **One** assessments graded Passed/Not Passed. • Assessment must be graded Passed.			
Semester:	BM9			
ECTS credits:	15			
Course Regulations:	• Marine Engineer (BM) version 5.80, 1 February 2021.			
Orders:	• Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.			

Syllabus

STCW:	None	
Certificate(s):	None	
Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:	None	

Syllabus

Purpose

The purpose of the project is for the student to achieve competencies that contribute to the management of complex and development-oriented problems within the field of his or her profession
By drawing correlations between experience, practical skills and theoretical knowledge, the student must be able to identify, analyze and solve a specific problem, which is central and within the field of his or her profession.
The student must demonstrate the skills of independent and efficient learning by showing insight into an issue or problem, having acquired up-to-date knowledge about theories, methods, and practice that is relevant and knowledge generation within the subject area of the problem.
Through this process, the student must acquire skills in applying the knowledge previously learnt: setting up a problem statement with clear aims, use of relevant theory, systematic collation of data, and analysis and evaluation of the generated data, taking into consideration any theories relevant to the analysis, and finally stating important conclusions and recommendations. .

Learning objectives

Bachelor Project - BM9 (29111, 29112, 29113 & 29114):

The student must attain **knowledge** of:

- The scientific research method and scientific theory

The student must attain the **skills** necessary to:

- Select, argue for and structure a precise and relevant problem within the field of his or her profession.
- Search for, read, and in an appropriate way, account for and apply scientifically based knowledge relevant to the selected problem. The process will enable the student to participate and take part in any scientific study.

The student must acquire the necessary **competencies** to:

- Provide and analyze relevant information and data by means of appropriate usage of relevant techniques, procedures and methods suitable to the relevant area. This may be techniques, procedures and methods acquired previously in the study program or they may be newly acquired.
- Critically evaluate a project in terms of the scientific method used, and the scientific results.
- Prepare a written report, which seems to the reader to be structured, well-balanced and meaningful in terms of content, language, as well as style.
- Present the project and be able to discuss the results and perspectives with relevant stake holders

BA Methodology Course – BM9 (29121, 29122, 29123 & 29124):

The student must attain **knowledge** of:

- Define and formulate research problems and questions and, where appropriate, formulate hypotheses that can be tested
- Understand the use of, and be able to use, a range of methods and be able to decide on appropriate research designs and methods to investigate a research problem
- Understand the relationships between, and the rationale for using, particular qualitative and quantitative research methods
- Understand and master systematic critical thinking associated with argumentative writing
- Demonstrate and organize correct references
- Know how to write abstracts in the correct form and detail

The student must attain the **skills** necessary to:

- Design a feasible research study
- Determine relevant, logical and accurate research questions, study objectives and select appropriate research method(s)
- Plan, collect, manage and analyze qualitative and/or quantitative related research data and materials
- Select, analyze and structure a problem that is relevant for any research project
- Undertake a reasoned choice of methods for solving the problem, and reflect on the implications of the choices taken.

The student must acquire the necessary **competencies** to:

- Differentiate between various research study designs and methods
- Carry out a scientifically valid research project
- Work with different types of approach towards analyzing qualitative and quantitative data
- Write a good abstract in English

Core literature

None

Examination

Bachelor Project – BM9 (29111, 29112, 29113 & 29114)::

Examination type:	External, Oral Exam
Grade scale:	7-point scale
Preparation time:	None
Duration:	1 hour
Aids allowed:	All
Important Information:	**~~Exam~~ Language:** • The project can be written in either English or Danish, and evaluated in the language of the student's choice. • The examination will be carried out in either English or Danish. The student must notify the student administration if the project and the examination will be held in English. Notice is given when handing in the preliminary problem statement. • The ability to formulate and spell is an integral part of the assessment of the academic content. **Examination:** • The student starts the examination with a 15 minutes' presentation. **Before examination:** • The BA methodology course must be passed before handing in the preliminary problem statement. • The preliminary problem statement must be handed in no later than 2 weeks after commencing the project period in accordance with the lesson plan • The final problem statement must be approved by the supervisor and handed in/uploaded as described in the lesson plan no later than 3 weeks before the deadline set for the final hand-in of actual project. **After examination:** • Students resitting the exam do not need to hand in a preliminary problem statement or a final problem statement, provided it has been approved by the supervisor for re-examination.
Prerequisites for Examination	All other subjects and Professional Work Experience of the BM education programme must be passed in accordance with the course regulations for Master Mariner. The bachelor project must be handed-in on time in accordance with the lesson plan.

BA Methodology Course – BM8 (29121. 29122, 29123 & 29124):

Examination type:	Ongoing assessment
Grade scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	The students must attend all lessons in the BA methodology course in order to pass it.
Prerequisites for Examination	None

Qualification prerequisites for professors/instructors etc.

Associate professors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is higher than the level of learning objectives for the subject and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Assistant professors can act as bachelor supervisors when they are on the final part of their master's degree.

Syllabus

Subject area:	**28000**	**Elective Subject (BM)**	
Subject(s):	88100	Elective Subject (BS, **BM**, BJ & SE)	
	88108	Change Management	3 ECTS
	88109	Negotiating Skills	3 ECTS
	88110	Communication Skills	2 ECTS
	88115	Maritime Automation and IT	3 ECTS
	88117	Data Network for Automation Purpose	2 ECTS
	88119	PLC, Fieldbus and SCADA	2 ECTS
	88123	Robot I - Basic	2 ECTS
	88129	Advanced English	2 ECTS
	88130	Innovation and Entrepreneurship	6 ECTS
	88140	Electrical Maritime Practice	2 ECTS
	88142	How to Start a Business and Private Legislation	4 ECTS
	88143	Globalization	2 ECTS
	88145	Advanced Training for Oil & Chemical Tanker Cargo Operations	3 ECTS

		Automation Elective Subject (BM)	
	88108	Change Management	3 ECTS
	88115	Maritime Automation and IT	3 ECTS
	88117	Data Network for Automation Purpose	2 ECTS
	88119	PLC, Fieldbus and SCADA	2 ECTS
	88123	Robot I - Basic	2 ECTS
	88130	Innovation and Entrepreneurship	6 ECTS
	88140	Electrical Maritime Practice	2 ECTS

		Management Elective Subject (BM)	
	88108	Change Management	3 ECTS
	88109	Negotiating Skills	3 ECTS
	88110	Communication Skills	2 ECTS
	88130	Innovation and Entrepreneurship	6 ECTS
	88142	How to Start a Business and Private Legislation	4 ECTS
	88143	Globalization	2 ECTS

Syllabus

Subject area:	**88000**	**Elective Subject (BS+BM+BJ+SE)**	
Subject(s):	88100	Elective Subject	
	88108	Change Management	3 ECTS
Admission criteria:	None		
Criteria to pass subject	These assessments make up the subject: 1. **None** assessment using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **One** assessment graded Passed/Not Passed. • This assessment must be graded Passed.		
Semester:	BS7 + BM8 + BJ5/BJ6 + SE(SKF) +SE(MCH) + SE(SCH) BM8 (Specialization: Management) + BM8 (Specialization: Automation)		
ECTS credits:	3		
Course Regulations:	• Master Mariner (BS) Version 5.80, 1 February 2021. • Marine Engineer (BM) Version 5.80, 1 February 2021. • Ship Officer (BJ+SE) Version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Master – Danish order no. 1611 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Master - Danish order no. 1349 of 23 November 2018 as amended. This order is for students who were registered in BS1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Ship Officer – Danish order no. 1612 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Ship Officer - Danish order no. 1350 of 23 November 2018 as amended. This order is for students who were registered in BJ1, SE1 eller SE2 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.		

Syllabus

STCW:	None	
Certificate(s):	None	
Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:	None	

Purpose

This Change Management course will enable students to understand how they can carry out and implement any change in an organization, successfully. This course covers the basic theory within the change management theory. The course will give an introduction to different perspectives connected to organizational change. The main focus will be on change as a planned and managed process. Furthermore, there will be a discussion on the driving forces of change and how these - and their interpretations - may create different change processes.

Learning objectives

Change Management – BS5+BM8+BJ6+SE (88108)

Knowledge:

- How changes are initiated in organizations
- Different types of change
- The role and competences of change agents
- Management in organizations in change
- Organizational design and culture in relation to organizational change
- Communication process
- The role of leadership in planned change

Skills:

- Analyze a given organization and suggest changes
- Analyze and understand the basic aspects of organizational change; driving forces, content and context and process
- Understand the role of leadership in planned change processes, both possibilities and
- Work-out and implement a suitable strategy
- Finding innovative solutions to organizational change
- Understand the resistance in the organisation
- Understand how different cultures operate
- Identifiering Change Agents

Competencies:

- Work with different perspectives on organizational change, and how these perspectives relate to planned change
- Handle the basic strategies of change, and knowing under what contingencies they will work
- Handle the role of leadership in planned change processes, both possibilities and limitations
- Critically assess the possibility of planned change in different contexts.

Core literature

Following articles will be used from "Børsens Ledelseshåndbøger – Forandringsledelse":

2.4. Ledelse af forandringsprocesser – forandring eller forankring?
6.12. Forandringsledelse – Ledelsesadfærden skal afspejle den ønskede kultur
6.6. Værktøjer til forandringsledelse
2.12. Værktøjer til forandringsledelse
1.1. Introduktion
6.10. Forandringsprocesser
7.3. Coaching som strategiværktøj

Examination

Change Management – BS5+BM8+BJ6+SE (88108)

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Qualification prerequisites for professors/instructors etc.

Associate professors or assistant professors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is the same or higher than the level of learning objectives for the subject
  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	**88000**	**Elective Subject (BS+BM+BJ+SE)**	
Subject(s):	88100	Elective Subject	
	88109	Negotiating Skills	3 ECTS
Admission criteria:	None		
Criteria to pass subject	These assessments make up the subject: 1. **None** assessment using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **One** assessment graded Passed/Not Passed. • This assessment must be graded Passed.		
Semester:	BS7 + BM8 + BJ5/BJ6 + SE(SKF) + SE(MCH) + SE(SCH) BM8 (Specialization: Management)		
ECTS credits:	3		
Course Regulations:	• Master Mariner (BS) Version 5.80, 1 February 2021. • Marine Engineer (BM) Version 5.80, 1 February 2021. • Ship Officer (BJ+SE) Version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Master – Danish order no. 1611 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Master - Danish order no. 1349 of 23 November 2018 as amended. This order is for students who were registered in BS1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Ship Officer – Danish order no. 1612 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Ship Officer - Danish order no. 1350 of 23 November 2018 as amended. This order is for students who were registered in BJ1, SE1 eller SE2 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.		

Syllabus

STCW:	None	
Certificate(s):	None	
Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:	None	

Purpose

This negotiating skills course will enable students to understand how they can negotiate constructively with principals, colleagues, suppliers and contact negotiations and be able to carry out a negotiation, which creates a win-win outcome for all parties. This course covers all the basics of negotiating in a practical and interactive way.

Learning objectives

Negotiating Skills (88109):

Knowledge:

- Your values and how they impact on your negotiations.
- Understanding the nature of the gap between you and the other party.
- Styles and negotiators.
- Understand the structure underlying all negotiations.
- Identify the appropriate skills used in negotiations.
- Creating win-win negotiations.
- Preparing for a negotiation and setting objectives.
- Finding out as much as you can about the other party's needs and aspirations.
- Developing a strategy for success.
- Framing.
- Recognizing and dealing with 'underhand' tactics and manipulation.
- The importance of establishing a productive environment.
- Cross-cultural negotiations – understanding and dealing with different cultures.
- Understanding the meaning and importance of body language.
- Understanding the communication process.

Skills:

- Listening skills.
- Assertiveness - how to be assertive, but not aggressive, in negotiations.
- Questioning skills.
- Finding innovative solutions to objections.
- Summarizing and synthesizing skills.

Competencies:

- Open a negotiation.
- Conduct a negotiation both in English and in Danish.
- Handle objections.
- Question his or her negotiating partner.

Core literature

Forhandlingsteknik i teori og praksis af Anne Bay Nordtorp.

Examination

Negotiating Skills (88109):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Qualification prerequisites for professors/instructors etc.

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Syllabus

Subject area:	**88000**	**Elective Subject (BS+BM+BJ+SE+Tutor)**	
Subject(s):	88100	Elective Subject	
	88110	Communication Skills	2 ECTS
Admission criteria:	None		
Criteria to pass subject	These assessments make up the subject: 1. **None** assessment using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **One** assessment graded Passed/Not Passed. • This assessment must be graded Passed.		
Semester:	BS7 + BM8 + BJ5/BJ6 + SE(SKF) +SE(MCH) +SE(SCH) + Tutor BM8 (Specialization: Management)		
ECTS credits:	2		
Course Regulations:	• Master Mariner (BS) Version 5.80, 1 February 2021. • Marine Engineer (BM) Version 5.80, 1 February 2021. • Ship Officer (BJ+SE) Version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Master – Danish order no. 1611 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Master - Danish order no. 1349 of 23 November 2018 as amended. This order is for students who were registered in BS1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Marine Engineer – Danish order no1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Ship Officer – Danish order no. 1612 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Ship Officer - Danish order no. 1350 of 23 November 2018 as amended. This order is for students who were registered in BJ1, SE! eller SE2 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.		

Syllabus

STCW:	None	
Certificate(s):	None	
Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:	None	

Purpose

The student will obtain knowledge, skills, and competences for planning, carrying out, and reflecting on the communication of a message by various means.

Learning objectives

Communication Skills (88110):

Knowledge:

- The basic terms of communication.
- The background of the participants/receivers.
- The effects of various means of communicating a message and the interaction between the sender and receiver of a message.

Skills:

- Plan and carry out the communication of a message by various means and to various target audiences.
- Choose the method to communicate a message.
- Use common technical means to communicate or present a message (e.g. presentation software, A/V equipment).

Competencies:

- Reflect on a communication course carried out.
- Estimate which means of communication would be appropriate in a given situation.
- Suggest adjustments based on the evaluation of a communication course.

Core literature

None

Examination

Communication Skills (88110):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Qualification prerequisites for professors/instructors etc.

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Syllabus

Subject area:	**88000**	**Elective Subject (BM+SE)**	
Subject(s):	88100	Elective Subject	
	88115	Maritime Automation and IT	3 ECTS
Admission criteria:	BM: SE:	None None	
Criteria to pass subject	These assessments make up the subject: 1. **None** assessment using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **One** assessment graded Passed/Not Passed. • This assessment must be graded Passed.		
Semester:	BM8 + SE(MCH) + SE(SCH) BM8 (Specialization): Automation)		
ECTS credits:	3		
Course Regulations:	• Marine Engineer (BM) Version 5.80, 1 February 2021. • Ship Officer (BJ+SE) Version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Ship Officer – Danish order no. 1612 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Ship Officer - Danish order no. 1350 of 23 November 2018 as amended. This order is for students who were registered in BJ1, SE1 eller SE2 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.		
STCW:	None		
Certificate(s):	None		
Responsible:	Subject Manager		
Valid from:	2021-1	VTA	
Expired:			
Remarks:	None		

Syllabus

Purpose

The student shall acquire a basic knowledge about TCP/IP automation network solutions in ships, so he/she can contribute and participate in making decision according to operation, purchasing and maintains of Bridge- and Cargo control systems.

Learning objectives

Maritime Automation and IT (88115)

Knowledge:

- Physical data-network components.
- Network protocols in maritime automation networks.
- TCP/IP diagnose software.
- Description and analysis of the need's for maritime automation solutions.
- Solving a practical task with consideration to safety, options, operation and maintenance so he/she are challenged to pursue problem solving that demonstrates independently innovative thinking and behavior.

Skills:

- Study technical literature and manuals in English.
- Use practical automation and network equipment components in the laboratory.

Competencies:

- Use of automation components communicating by TCP/IP network.
- Use of antivirus software.
- Preparation of specifications and evaluation of tender documents from suppliers.

Core literature

- Praktisk regulering og automation af Thomas Heilmann.
- TCP/IP- Bogen af Mose & Ferré.
- Literature on the internet and manuals for Software and technical information for the used equipment (share 75 %).

Examination

Maritime Automation and IT (88115):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Qualification prerequisites for professors/instructors etc.

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Syllabus

Subject area:	**88000**	**Elective Subject (BM+SE)**	
Subject(s):	88100	Elective Subject	
	88117	Data Network for Automation Purpose	3 ECTS
Admission criteria:	BM student: SE student:	None None	
Criteria to pass subject	These assessments make up the subject: 1. **None** assessment using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **One** assessment graded Passed/Not Passed. • This assessment must be graded Passed.		
Semester:	BM8 + SE(MCH) + SE(SCH) BM8 (Specialization: Automation)		
ECTS credits:	3		
Course Regulations:	• Marine Engineer (BM) Version 5.80, 1 February 2021. • Ship Officer (BJ+SE) Version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Ship Officer – Danish order no. 1612 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Ship Officer - Danish order no. 1350 of 23 November 2018 as amended. This order is for students who were registered in BJ1, SE1 eller SE2 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.		
STCW:	None		
Certificate(s):	None		
Responsible:	Subject Manager		
Valid from:	2021-1	VTA	
Expired:			
Remarks:	None		

Purpose

The student shall archive basic knowledge about industrial IT solutions, so he can participate to make competent decisions within, purchasing, operating and maintenance.

Learning objectives

Data Network for Automation Purpose (88117):

Knowledge:

- Architecture of the internet.
- Network safety issue.
- Publishing of live data on the web.
- Demonstrate Innovative thinking in problem solving

Skills:

- Trouble shooting.
- Study manuals for equipment and technical literature in English language.
- Use of practical equipment components in laboratory to solve a problem, so he demonstrate independently thinking and behavior about solutions and options.

Competencies:

- After submission of this module it's the goal that the student are able to analyze and construct partially elements of an industrial data network system.
- Basic of TCP/IP Network

Core literature

- Articles and instructions manuals and technical literature according to the used equipment, (share: 85%).

Examination

Data Network for Automation Purpose (88117):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Qualification prerequisites for professors/instructors etc.

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Syllabus

Subject area:	**88000**	**Elective Subject (BM+SE)**	
Subject(s):	88100	Elective Subject	
	88119	PLC, Fieldbus and SCADA	2 ECTS
Admission criteria:	BM : SE:	None None	
Criteria to pass subject	These assessments make up the subject: 1. **None** assessment using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **One** assessment graded Passed/Not Passed. • This assessment must be graded Passed.		
Semester:	BM8 + SE(MCH) + SE(SCH) BM8 (Specialization: Automation)		
ECTS credits:	2		
Course Regulations:	• Marine Engineer (BM) Version 5.80, 1 February 2021. • Ship Officer (BJ+SE) Version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Ship Officer – Danish order no. 1612 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Ship Officer - Danish order no. 1350 of 23 November 2018 as amended. This order is for students who were registered in BJ1, SE1 eller SE2 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.		
STCW:	None		
Certificate(s):	None		
Responsible:	Subject Manager		
Valid from:	2021-1	VTA	
Expired:			
Remarks:	None		

Purpose

After completion the independent student is able to analyze an automation task and configure set-up and program PLC equipment in a fieldbus network.

Learning objectives

PLC, Fieldbus and SCADA (88119):

Knowledge:

- Use of practical equipment components in laboratory to solve a problem, so he/she demonstrate independent innovative thinking and behavior in problem solving.
- Handling of safety and documentation according to European and International standards.
- Use of diagnostic tools and equipment for Profibus

Skills:

- **PLC:**
  - Select equipment on basis of information in datasheets, configure set-up in software and programming of PLC equipment.
  - Study manuals for equipment and other technical literature for used equipment in English language.
- **Fieldbus:**
  - Able to configure a PROFIBUS fieldbus system.
  - Able to trouble shooting in PROFIBUS fieldbus system networks.

Competencies:

- Working on Profibus fieldbus by; replacing, set-up new Profibus nodes and perform trouble shooting.

Core literature

- Manuals, technical literature for used equipment and software in English language.

Examination

PLC, Fieldbus and SCADA (88119):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Qualification prerequisites for professors/instructors etc.

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  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	**88000**	**Elective Subject (BM+SE)**	
Subject(s):	88100	Elective Subject	
	88123	Robot I - Basic	2 ECTS
Admission criteria:	None		
Criteria to pass subject	These assessments make up the subject: 1. **None** assessment using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **One** assessment graded Passed/Not Passed. • This assessment must be graded Passed.		
Semester:	BM8 + SE(MCH) + SE(SCH) BM8 (Specialization: Automation)		
ECTS credits:	2		
Course Regulations:	• Marine Engineer (BM) Version 5.80, 1 February 2021. • Ship Officer (BJ+SE) Version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Master - Danish order no. 1349 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Ship Officer – Danish order no. 1612 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Ship Officer - Danish order no. 1350 of 23 November 2018 as amended. This order is for students who were registered in BJ1, SE1 eller SE2 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.		
STCW:	None		
Certificate(s):	None		
Responsible:	Subject Manager		
Valid from:	2021-1	VTA	
Expired:			
Remarks:	None		

Syllabus

Purpose

The focus is to gain basic knowledge about robot technology with focus on autonomous robot.

Learning objectives

Robot I – Basic (88123):

Knowledge:

- To classify robots.

Skills:

- Qualified selection of sensors.
- Using practical equipment components in laboratory, so the student are challenged to problem solving and doing exercises that demonstrate independent thinking and behavior and dealing with options and solutions.
- Study literature and manuals for equipment's and software in English language.

Competencies:

- Design simple robot program for autonomous application.

Core literature

- International version of user manuals for equipment and other technical product information, in English
- Use of Help function in programming software, in English
- Agreement with the teacher

Examination

Robot I – Basic (88123):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Qualification prerequisites for professors/instructors etc.

Associate professors or assistant professors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is the same or higher than the level of learning objectives for the subject
  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	**88000**	**Elective Subject (BS+BM+BJ+SE)**	
Subject(s):	88100	Elective Subject	
	88129	Advanced English	2 ECTS
Admission criteria:	The student should have demonstrated in a previous exam or in spoken and written tests the ability to speak and write English at the level 10 on the trini-scale or a level C1 on the Common European Scale for Languages (CEFR)		
Criteria to pass subject	These assessments make up the subject: 1. **None** assessment using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **One** assessment graded Passed/Not Passed. • This assessment must be graded Passed.		
Semester:	BS7 + BM8 + BJ5/BJ6 + SE(SKF) + SE(MCH) +SE(SCH)		
ECTS credits:	2		
Course Regulations:	• Master Mariner (BS) Version 5.80, 1 February 2021. • Marine Engineer (BM) Version 5.80, 1 February 2021. • Ship Officer (BJ+SE) Version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Master – Danish order no. 1611 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Master - Danish order no. 1349 of 23 November 2018 as amended. This order is for students who were registered in BS1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Ship Officer – Danish order no. 1612 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Ship Officer - Danish order no. 1350 of 23 November 2018 as amended. This order is for students who were registered in BJ1, SE1 eller SE2 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.		

Syllabus

STCW:	None	
Certificate(s):	None	
Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:	None	

Purpose

To enable the student to work as a Ships Officer or Master Engineer with a competence and ability in English so he/she can compete for jobs on sea or on land, conduct business in an international working environment, and carry out research and other enquiries in the maritime merchant sector.

Learning objectives

Advanced English (88129):

Knowledge:

- The language and vocabulary of job applications and interviews, human resources, qualifications and relevant personal experience.
- The language of technical reports, ordering supplies, communications with ship owners and charterers, and maintaining efficiency onboard.
- The language of environmental protection, emissions and the latest developments in these fields.
- The language of negotiating, diplomacy, and managing cultural differences.
- The language of planning, meetings, decision making and teamwork.
- Appropriate English for projects, surveys and research into maritime topics.

Skills:

- Write job applications and Curriculum Vitae to international companies.
- Conduct him/herself well in job interviews.
- Write letters and reports in relation to his job of Master or Chief Engineer.
- Analyze, advise and report on ship efficiency and environmental protection matters in English.
- Negotiate and use diplomacy in English when dealing with people of all ranks.
- Organize his/her own work and those of others in English.
- Carry out maritime research and surveys, and be familiar with project methodology language, in English.

Competencies:

- Act and speak with confidence in the modern international merchant shipping world.
- Communicate in writing to all major stakeholders.
- Complete research or projects in English which should be of a sufficient level to be published.

Core literature

Science Research Writing for non-Native Speakers, H.G.Glasman-Deal, 2014, Imperial College Press, UK

Examination

Advanced English (88129):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Qualification prerequisites for professors/instructors etc.

Associate professors or assistant professors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is the same or higher than the level of learning objectives for the subject
  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	**88000**	**Elective Subject (BS+BM+BJ+SE)**	
Subject(s):	88100	Elective Subject (6 ECTS)	
	88130	Innovation and Entrepreneurship - Module I+II	5 ECTS
Admission criteria:	None		
Criteria to pass subject	These assessments make up the subject: 1. **None** assessment using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **One** assessment graded Passed/Not Passed. • This assessment must be graded Passed.		
Semester:	BS7 + BM8 + SE(SKF) + SE(MCH) + SE(SCH) BM8 (Specialization: Management) + BM8 (Specialization: Automation)		
ECTS credits:	5		
Course Regulations:	• Master Mariner (BS) Version 5.80, 1 February 2021. • Marine Engineer (BM) Version 5.80, 1 February 2021. • Ship Officer (BJ+SE) Version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Master – Danish order no. 1611 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Master - Danish order no. 1349 of 23 November 2018 as amended. This order is for students who were registered in BS1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Ship Officer – Danish order no. 1612 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Ship Officer - Danish order no. 1350 of 23 November 2018 as amended. This order is for students who were registered in BJ1, SE1 eller SE2 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.		

Syllabus

STCW:	None	
Certificate(s):	None	
Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:	None	

Purpose

The student should obtain skills, knowledge and competences in order to understand and work with the fundamental focus areas of Innovation and Entrepreneurship.

Learning objectives

Innovation and Entrepreneurship – Module I & II (88130):

Both module I and module II are based on student ideas and projects – therefore the precise content and perspectives are variable.
Both in module I and module II, the students are encouraged to participate in "Start-Up-Programme" by "FFE-YE"

Module I:

Knowledge:

- Idea generating. Idea generating techniques and methods.
- The fundamental parts of an innovation process
- The principles of effectual entrepreneurship

Skills:

- Identify market needs and perspectives
- Idea screening and development
- Simple idea descriptions and prototyping
- Oral and written pitching

Competencies:

- None

Module II:

Knowledge:

- Basic elements of a business plan
- Content of "Business Model Canvas"
- Basic Business Models

Skills:

- Strategic business development
- Causation and effectuation principles
- Evaluation of business ideas and models.
- Oral presentation

Competencies:

- Written Business Plan and presentation

Core literature

"Entreprenørskab i teori og praksis" – IDEA 2009
"Innovation" – Systime
"Effectual Entrepreneurship" – S. Sarasvathy
www.iværk.dk
www.amino.dk
www.startvækst.dk

Examination

Module I & II:

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Qualification prerequisites for professors/instructors etc.

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  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	**88000**	**Elective Subject (BM + SE)**	
Subject(s):	88100	Elective Subject	
	88140	Electrical Maritime Practice (Maritime Electrical Installations and Switchboards, Documentation and Troubleshooting)	2 ECTS
Admission criteria:	None		
Criteria to pass subject	These assessments make up the subject: 1. **None** assessment using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **One** assessment graded Passed/Not Passed. • This assessment must be graded Passed.		
Semester:	BM8 + SE(MCH) + SE(SCH) BM8 (Specialization: Automation)		
ECTS credits:	2		
Course Regulations:	• Marine Engineer (BM) Version 5.80, 1 February 2021. • Ship Officer (BJ+SE) Version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Ship Officer – Danish order no. 1612 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Ship Officer - Danish order no. 1350 of 23 November 2018 as amended. This order is for students who were registered in BJ1, SE1 eller SE2 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.		

Syllabus

STCW:	None	
Certificate(s):	None	
Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:		

Purpose

Low voltage working at or near live electrical installations:
Competencies regarding work tasks and operation tasks at or near low voltage installations, with or without voltage in accordance with safety precautions regarding people, installations and operation.

Troubleshooting and circuit diagrams:
Competencies regarding troubleshooting in Maritime electrical equipment and systems based on circuit diagrams and function knowledge.

Construction and wiring of electrical switchboards:
Skills regarding construction, documentation and practical wiring of electrical switchboards

Electrical measurements:
Skills regarding measuring in electrical installations and safe handling of common instruments

Remarks:
The teaching methodology is mainly based on work shop principles regarding the troubleshooting tasks

Learning objectives

Electrical Maritime Practice (88140):

Knowledge:

- Security of necessary tools and equipment, measurement technique
- First Aid regarding electrical accidents
- Maritime Electro technical documentation

Skills:

- Safety management regarding electrical installations
- Preparation of documentation regarding risk assessment
- Operational skills regarding work at or near maritime low-voltage installations and systems, with or without live voltage

- Determination of functionality for electrical equipment, and documentation regarding main- and auxiliary circuit diagrams
- Operational skills regarding electrical measuring instruments
- Construction, documentation and wiring of electrical switchboards

Competencies:

- Operational competences within working at or near maritime low-voltage installations and systems, with or without live voltage in accordance with specified safety precautions for people, installations and operation
- Preparation of electrical documentation
- Troubleshooting in Maritime electrical installations

Core literature

- Power point
- Tasks and exercises (Moodle)
- Web -Automation: www.pcschematic.dk/skole

Examination

Electrical Maritime Practice (88140):

Examination type:	Ongoing assessment
Grading scale:	Passed/Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	Attendance is mandatory

Qualification prerequisites for professors/instructors etc.

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  and
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Syllabus

Subject area:	**88100**	**Elective Subjects (BS+BM+BJ+SE)**	
Subject(s):	88100	Elective Subject	
	88 142	How to Start a Business and Private Legislation	5 ECTS
Admission criteria:			
Criteria to pass subject	These assessments make up the subject: 1. **None** assessment using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **One** assessment graded Passed/Not Passed. • This assessment must be graded Passed.		
Semester:	BS7 + BM8 + SE(SKF) + SE(MCH) + SE(SCH) BM8(Specialization: Management)		
ECTS credits:	5		
Course Regulations:	• Master Mariner (BS) Version 5.80, 1 February 2021. • Marine Engineer (BM) Version 5.80, 1 February 2021. • Ship Officer (BJ+SE) Version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Master – Danish order no. 1611 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Master - Danish order no. 1349 of 23 November 2018 as amended. This order is for students who were registered in BS1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Ship Officer – Danish order no. 1612 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Ship Officer - Danish order no. 1350 of 23 November 2018 as amended. This order is for students who were registered in BJ1, SE1 eller SE2 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.		

Syllabus

STCW:		
Certificate(s):		
Responsible:	Subject Manager	
Valid from:	2021-1	
Expired:		
Remarks:		

Purpose

The purpose of this subject is to give the students an understanding of how to start a company. This subject will present methods and concepts that will help the student to select relevant assets and competencies and to develop strategies in branding, advertising, distribution, manufacturing and finance.

Learning objectives

How to Start a Business and Private Legislation (88142):

Knowledge:

- The 4 P's
- Industry and competitor analysis
- Consumer analysis and behavior
- Consumer in the marketplace
- Market analysis
- Environmental analysis
- Cost analysis
- Basic principles of commercial law
- Contracts when buying or selling

Skills:

- Develop an outline of a business plan for a new concept or business idea and analyze the same
- Asses the profitability and risk of a business model, including legal issues
- Understand the Contracts Act
- Understand the principles behind the Sale of Goods and Supply of Services Act (the Danish Sale of Goods Act)
- Understand the principles of liability law
- Apply knowledge of the Construction Act and AB92
- Apply knowledge of national and international private law
- Understand the principles behind insurance

Competencies:

- Evaluate the business value and feasibility of a new business idea or concept
- Prepare an outline of an implementation plan on how to start a new business based on a given business model

Core literature

N/A

Examination

How to Start a Business and Private Law (88142)

Examination type:	Ongoing assessment
Grading scale:	Passed/Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Qualification prerequisites for professors/instructors etc.

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  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	**88000**	**Elective subjects (BJ+BS+BM+SE)**	
Subject(s):	88100	Elective subject	
	88143	Globalization	2 ECTS
Admission criteria:			
Criteria to pass subject	These assessments make up the subject: 1. **None** assessment using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **One** assessment graded Passed/Not Passed. • This assessment must be graded Passed.		
Semester:	BS7 + BM8 + BJ5 + BJ6 + SE(SKF) + SE(MCH) + SE(SCH) BM8(Specialization Management)		
ECTS credits:	2		
Course Regulations:	• Master Mariner (BS) Version 5.80, 1 February 2021. • Marine Engineer (BM) Version 5.80, 1 February 2021. • Ship Officer (BJ+SE) Version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Master – Danish order no. 1611 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Master - Danish order no. 1349 of 23 November 2018 as amended. This order is for students who were registered in BS1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on the professional bachelor training programme for Ship Officer – Danish order no. 1612 of 13 December 2016, as amended. • Order on the professional bachelor training programme for Ship Officer - Danish order no. 1350 of 23 November 2018 as amended. This order is for students who were registered in BJ1, SE1 eller SE2 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.		

Syllabus

STCW:		
Certificate(s):		
Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:		

Purpose

The purpose of this subject is to give the students an understanding of the globalization process. This subject will equip the students with some knowledge of the happenings in the field of economy, finance, culture and politics – with an emphasis on market and consumer behavior.

Learning objectives

Globalization (88143):

Knowledge:

- Globalization and the new global economy
- Continuity and change in the world economy since the 1970s
- Regional and multilateral agreements
- The field of economy, finance, culture and politics
- The development of new markets
- Consumer behavior and how it affects international trade and shipping
- Techniques on how to spot market opportunities
- The consequences of outsourcing

Skills:

- Understand the globalization process
- Understand the mechanism of international economic connections through which it works and an idea of some of the debates it has evoked
- Analyze market opportunities
- Reflect on how the maritime industry can explore market opportunities
- Reflect on different scenarios raised

Competencies:

- Critically evaluate and assess a market
- Critically evaluate global transformation

Core literature

N/A

Examination

Globalization (88143):

Examination type:	Ongoing assessment
Grading scale:	Passed/Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Qualification prerequisites for professors/instructors etc.

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  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	**28200**	**Maritime Elective Subjects – BM(SØ)**	
Subject(s):	28210	Basic Safety Training	
	28211	Safety at Sea	1 ECTS
	28252	Safety at Work (II) – including §16	1 ECTS
	28213	Elementary First Aid	1 ECTS
	28219	Medical First Aid	
	28505	Basic Fire Fighting Theory	1 ECTS
	28506	Basic Fire Fighting Course	
	28507	Advanced Fire Fighting Theory	1 ECTS
	28508	Advanced Fire Fighting Course	
	28217	Basic Training for Oil, Chemical & Gas Tanker Cargo Operations (Tanker Basic)	1 ECTS
	28218	Watchkeeping Duty in Engine, including Full Mission Engine Room Simulator Course	1 ECTS
	28230	Ship Technology	
	28231	Ship Technology and Docking	4 ECTS
	28240	Maritime Technology including Maritime English	
	28241	Ship Propulsion	2 ECTS
	28242	Ship Auxiliary and Service Systems	2 ECTS
	28243	Maritime English	2 ECTS
	28260	Maritime Law and Ship Administration including SSO	
	28261	Maritime Law and Ship Administration including SSO	3 ECTS

Syllabus

Subject area:	**28200**	**Maritime Elective Subjects – BM(SØ)**	
Subject(s):	28210	Basic Safety Training	
	28211	Safety at Sea	1 ECTS
	28252	Safety at Work II including §16	1 ECTS
	28213	Elementary First Aid	1 ECTS
	28219	Medical First Aid	
	28505	Basic Fire Fighting Theory	1 ECTS
	28506	Basic Fire Fighting Course	
	28507	Advanced Fire Fighting Theory	1 ECTS
	28508	Advanced Fire Fighting Course	
Admission criteria:	Safety at Sea	None	
	Safety at Work	None	
	Elementary First Aid	None	
	Medical First Aid	Passed Elementary First Aid	
	Basic Fire Fighting Theory:	None	
	Basic Fire Fighting Course:	A valid medical certificate for seafarers. Passed Basic Fire Fighting Theory.	
	Advanced Fire Fighting Theory:	A valid medical certificate for seafarers. Passed Basic Fire Fighting Course.	
	Advanced Fire Fighting Course:	A valid medical certificate for seafarers. Passed Advanced Fire Fighting Theory.	
Criteria to pass subject	These assessments make up the subject: 1. **None** assessments using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **Eight** assessments graded Passed/Not Passed. • All assessments must be graded Passed.		
Semester:	Safety at Sea	BM2 (SØ) or BM8 (SØ).	
	Safety at Work	BM1 or BM8 (SØ).	
	Elementary First Aid	BM1, BM4 or BM8 (SØ).	

	Medical First Aid	BM8 (SØ).
	Basic Fire Fighting Theory:	BM2 (SØ) or BM8 (SØ).
	Basic Fire Fighting Course:	BM2 (SØ) or BM8 (SØ).
	Advanced Fire Fighting Theory:	BM8 (SØ).
	Advanced Fire Fighting Course:	BM8 (SØ).
ECTS credits:	5	
Course Regulations:	• Marine Engineer (BM) version 5.80, 1 February 2021.	
Orders:	• Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended. • Order on training programme and refresher training programme for safety at sea and firefighting on board ships - order no 226 of 2 March 2015, as amended. • Order on training programme and refresher training programme in operation of fast rescue boats - order no 658 of 12 May 2015, as amended. • Order on training programme for Tanker Operations - order no 1165 2 November 2014, as amended. • Order on training programme for operation of survival craft and rescue boat other than fast rescue boats - order no 1207 23 October 2015, as amended. • Order on training programme in Maritime Security of Ships - order no 1279 of 7 November 2013, as amended. • Order on training programme and refresher training programme for advanced fire-fighting on board ships - order no 1466 of 8 December 2015, as amended. Order on safety work in merchant ships (Working environment in ships) - Danish order no. 846 of 25 June 2018. • Order on safety work in merchant ships (Working environment in ships) - Danish order no. 846 of 25 June 2018..	

STCW:	*STCW Code, as amended: Part A, chapter II - Engine department:* Section A-III/1 *STCW Code, as amended: Part A, chapter VI - Emergency, safety, security:* Section A-VI/1, paragraph 2 • Personal survival techniques as set in table A-VI/1-1 • Fire prevention and fire-fighting as set in table A-VI/1-2 • Elementary first aid as set in table A-VI/1-3 • Personal safety and social responsibilities as set in table A-VI/1-4 Section A-VI/2, paragraph 1 to 12 • Proficiency in survival craft and rescue boats other than fast rescue boats as set in table A-VI/2-1. • Proficiency in fast rescue boats as set in table A-VI/2-2 Section A-VI/4, paragraph 1 to 3 • Medical first aid as set in table A-VI/4-1. Section A-VI/6, paragraph 6 to 8 • Designated Security Duties as set in tablet A-VI/6-2
Certificate(s):	*Certificate of Proficiency Basic Safety Training* is issued upon completion of the training programme prescribed in Regulation VI/1 and STCW Code; section A-VI/2 of the STCW Convention of 1978, as amended. *Certificate of Proficiency in Medical First Aid* is issued upon completion of the training programme prescribed in Regulation VI/4, paragraph 1 of the STCW Convention of 1978, as amended. *Certificate of Proficiency for Designated Security Duties* is issued upon completion of the specialized training programme prescribed in Regulation VI/6, paragraph 4 to 6 of the STCW Convention of 1978, as amended and the Danish order no 1279 of 7 November 2013, as amended. *Certificate of Proficiency in Advanced Fire Fighting on board Ships* is issued upon completion of the training programme prescribed in Regulation VI/3 of the STCW Convention of 1978, as amended and the Danish order no 1466 of 8 December 2015, as amended. *Course Certificate in survival craft and rescue boat other than fast rescue boats* is issued upon completion of the training programme prescribed in Regulation VI/2, paragraph 1.3 of the STCW Convention of 1978, as amended and the Danish order no 1207 23 October 2015, as amended. *Certificate of Proficiency in survival craft and rescue boat other than fast rescue boats* is issued upon completion of at least 6 months relevant seagoing service is proved and completed the training programme prescribed in Regulation VI/2, paragraph 1 of the STCW Convention of 1978, as amended and the Danish order no 1207 23 October 2015, as amended. *Course Certificate inn Fast Rescue Boats* is issued upon completion of the training programme prescribed in Regulation VI/2, paragraph 2.3 of the STCW Convention of 1978, as amended and the Danish order no 658 12 May 2015, as amended. *Certificate of Proficiency in Fast Rescue Boats* is issued when a holder of Certificate of Proficiency in survival craft and rescue boat other than fast rescue boats has completed the training programme prescribed in Regulation VI/2, paragraph 2 of the

	STCW Convention of 1978, as amended and the Danish order no 658 12 May 2015, as amended. *Course Certificate of Training in Safety & Health §16 course* is issued upon completion of the training programme prescribed in the Danish order no. 795 of 2 June 2017, as amended.	
Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:	None	

Purpose

Safety at sea:
During the course, the students must acquire the necessary knowledge, skills and qualifications to work on a merchant vessel as a marine engineer in consideration of the safety for ship and crew, according to the ship safety plan and safety procedures, so that he/she can act correctly during evacuation drills and in emergency situations.

Safety at Work:
During the course, the students must acquire the necessary knowledge, skills and qualifications to work on a merchant vessel as a marine engineer in consideration to own and others safety, according to ship safety management systems and job related safety assessments.

Maritime Fire Fighting:
The overall purpose is enhance fire safety awareness of the student and thereby reducing the risk of injuries, damage to and or loss of cargo and ship by fire. The course will provide the student the knowledge, skills and competences to recognize and prevent fire risks, participate in fire fighting with all available means on board ships including SCBA and fixed fire fighting installations and organize, train and lead fire fighting operations.

Learning objectives

Safety at Sea (28211):

Knowledge:

- Construction and outfit of survival craft, fast rescue boat and rescue boats, individual items of their equipment and characteristics.
- Methods of, and safety precautions of launching survival craft, fast rescue boat and rescue boat including in rough seas
- Methods of recovering survival craft, fast rescue boat and rescue boats
- Dangers associated with on-load release devices
- Maintenance procedures in relation to boats, launching- and recovery gear.
- Operating winch, brakes, falls, painters and other equipment commonly fitted
- The precautions, in the case of "man overboard" and "fire" or "lifeboat" alarm.
- General sea survival requirements, the practical use of personal survival equipment and group survival equipment available on board.

Skills:

- Right an inverted life raft while wearing a lifejacket or survival suit
- Prepare and safely launch survival craft and fast rescue boat using both on-load and off-load release devices
- Safely recover survival craft, fast rescue boat and rescue boats, including proper resetting of both on-load and off-load release devices
- Understand and use the necessary orders and tasks in English for safe evacuation
- Right a capsized fast rescue boat
- Handle a fast rescue boat in prevailing and adverse weather and sea conditions

Competencies:

- Take change of a survival craft, fast rescue boat or rescue boat during and after a launch.
- Manage survival craft after abandoning ship.
- Use appropriate GMDSS equipment including signaling apparatus and pyrotechnics.
- Operate the engine of survival craft, fest rescue boat and rescue boats.
- Distinguish between the alarm signals used in commercial vessels, and explain the structure and use of a merchant ship safety plan and be able to demonstrate proper behavior according to the ships muster list.
- Use and understand the rescue means available on board properly and enter water from a certain height
- Stay fluent without buoyancy

Safety at Work II including §16 (28252):

§16 Safety and Health Working Environment:

Knowledge:

- General knowledge about how occupational health can form part of safety management system including procedures for securing on-board health and safety
- Understand the most important occupational health effect on passenger and cargo ships, including the most important work related diseases and occupational accidents.
- Understand the most important tasks performed by the safety organization.
- Developing the attitude of the safety organization towards promoting a safe working environment.
- Accident investigations
- Safety enhancing tools and measures the purpose of which is to promote safe operations.
- Safe working practices in Polar Regions.

Skills:

- Instruct and monitor safe working practices to ensure that the work is conducted with due regard to the risk of accidents and the danger to health.
- Be responsible for toolbox meetings, risk assessments and workplace assessments.
- Show responsibility and commitment in promoting the working environmental effort on board.
- Update the safety organization's knowledge by retrieving information from acts, new safety regulations, material from relevant occupational health services and preventive measures.
- *Understand and use rest periods at sea.*

Competencies:

- Performance of tasks in the safety organization including consultancy in connection with the solving of occupational health problems in order to prevent and handle occupational health related conflicts.
- Cooperation at all operational levels with focus on securing on-board occupational health.

Safety at Work II including §16 (28252):

Knowledge:

- Assessment of needs of casualties and threats to own safety
- Appreciation of body structure and functions
- Understanding immediate measures to be taken in cases of emergency, including the ability to:
    - Position casualty
    - Apply resuscitation techniques
    - Control bleeding
    - Apply appropriate measures of basic shock management
    - Apply appropriate measures in event of burns scalds, including accidents caused by electric current
    - Rescue and transport a casualty
    - Improvise bandages and use materials in the emergency kit
- Body structure and function
- Fractions, dislocations and muscular injuries
- Spinal injuries
- Mental first aid
- Cardiac arrest, drowning and asphyxia

Skills:

- None

Competencies:

- Take immediate action upon encountering an accident or other medical emergency

Medical First Aid (28219):

Knowledge:

- First-aid Kit
- Body structure and function
- Toxicological hazards, including use of the MFAG for use in accidents involving Dangerous Goods
- Examination of casualty or patient
- Spinal injuries.
- Burns, scalds and effects of heat and cold
- Fractions, dislocations and muscular injuries
- Medical care of rescued persons
- Radio Medical Advice
- Pharmacology
- Sterilization
- Cardiac arrest, drowning and asphyxia

Skills:

- None

Competencies:

- Apply immediate first aid in the event of accident or illness on board

Basic Fire Fighting Theory (28505):

Knowledge:

- Shipboard fire-fighting organization
- Fire and smoke detection and automatic alarm systems
- The need for constant vigilance

Skills:

- None

Competencies:

- Minimize the risk of fire and maintain a state of readiness to respond to emergency situations involving fire.

Basic Fire Fighting Course (28506):

Knowledge:

- Flammable materials, fire hazards and spread of fire
- Location of firefighting appliances and emergency escape routes
- Types and sources of ignition
- The elements of fire and explosion (the fire triangle)
- Actions to be taken on board ship
- Classification of fire and applicable extinguishing agents
- Fire-fighting equipment and its location on board
- Instruction in:
    - Fixed installations
    - Fire-fighter's outfits
    - Personal equipment
    - Fire-fighting appliances and equipment
    - Fire-fighting methods
    - Fire-fighting agents
    - Fire-fighting procedures
    - Use of breathing apparatus for fighting fires and effecting rescues

Skills:

- None

Competencies:

- Fight and extinguish fire

Advanced Fire Fighting Theory (28507):

Knowledge:

- Ventilation control, including smoke extraction
- Control of fuel and electrical systems
- Fire-fighting process hazards (dry distillation, chemical reactions, boiler uptake fires, etc.)
- Fire-fighting involving dangerous goods
- Fire precautions and hazards associated with the storage and handling of materials (paints, etc.)

Skills:

- Requirements for statutory and classification surveys
- Assessment of cause of incidents involving fire

Competencies:

- Inspect and service fire-detection and fire-extinguishing systems and equipment
- Investigate and compile reports on incidents involving fire

Advanced Fire Fighting Course (28508):

Knowledge:

- Firefighting procedures at sea and in port with particular emphasis on organization, tactics and command
- Use of water for fire extinguishing, the effect on ship stability, precautions and corrective procedures
- Communication and coordination during fire-fighting operations
- Management and control of injured persons
- Procedures for coordination with shore-based fire fighters

Skills:

- Preparation of contingency plans
- Composition and allocation of personnel to fire parties
- Strategies and tactics for control of fires in various parts of the ship
- Fire-detection systems; fixed fire-extinguishing systems; portable and mobile fire-extinguishing equipment, including appliances, pumps and rescue, salvage, life-support, personal protective and communication equipment

Competencies:

- Control fire-fighting operations aboard ships
- Organize and train fire parties

Core literature

Safety at sea and Work:

- Ship Knowledge - Dokmar Maritime Puplishers B.V.
- Søfartens ABC - Iver C. Weilbach.
- Note: All books must be the latest edition.

Examination

Safety at Sea (28211):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Safety at Work II including §16 (28252):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Elementary First Aid (28213):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Medical First Aid (28219):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Basic Fire Fighting Theory (28505):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Basic Fire Fighting Course (28506):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Advanced Fire Fighting Theory (28507):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Advanced Fire Fighting Course (28508):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Qualification prerequisites for professors/instructors etc.

Associate professors, assistant professors or instructors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is the same or higher than the level of learning objectives for the subject
  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

In accordance with the Danish order no. 765 of 22 June 2017 the instructors of §16 safety and health working environment courses shall have completed a training programme for teachers of working environment approved by the Danish Maritime Authority.

Instructors of Elementary First Aid courses shall have completed a training programme for teachers of First Aid approved by the Danish First Aid Council.

Syllabus

Subject area:	**28200**	**Maritime Elective Subjects – BM(SØ)**	
Subject(s):	28200	Maritime Elective Subjects	
	28217	Basic Training for Oil, Chemical & Gas Tanker Cargo Operations (Tanker Basic)	1 ECTS
Admission criteria:	None		
Criteria to pass subject	These assessments make up the subject: 1. **None** assessments using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **One** assessment graded Passed/Not Passed. • This assessment must be graded Passed.		
Semester:	BM2(SØ): When BM1 is the first semester. BM8 (SØ): When BM4 is the first semester.		
ECTS credits:	1		
Course Regulations:	• Marine Engineer (BM) version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BMd1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended. • Order on training programme for Tanker Operations – Danish order no 1165 2 November 2014, as amended.		
STCW:	*STCW Code, as amended: Part A, chapter V - Special training requirements:* Section A-V/1-1-1 • Basic training for oil and chemical tanker as set in table A-V/1-1-1. Section A-V/1-2-1 • Basic training for gas tanker as set in table A-V/1-2-1		
Certificate(s):	*Course Certificate of Basic Training for Oil, Chemical and Gas Tanker Cargo Operations* is issued upon completion of the training programme prescribed in Regulation V/1-1, paragraph 2.2 and Regulation V/1-2, paragraph 2.2 of the STCW Convention of 1978, as amended and the Danish order no 1165 2 November 2014, as amended. (”Carry out fire-fighting operations” as set in table A-V/1-1-1 and 1-2-1 of STCW Convention of		

	1978, as amended)	
Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:	None	

Purpose

The purpose of the Tanker Basic course is for the participant to acquire the necessary knowledge, skills and competence to contribute to the safe operation of a tanker and once the SCBA Fire Fighting Course is successfully passed, receive certification of Basic Training in Oil, Chemical and Gas tankers.
The participant shall during the course acquire an understanding of various cargoes and which hazards they present to the occupational health, the ship and the environment. Furthermore, the participant will acquire an understanding of how the construction, cargo systems, equipment and operation of the tanker protect the occupational health and the environment whilst minimizing the risk of fire. Finally, the participant shall acquire understanding of the emergency procedures for and reactions to personal injury, fire and pollution.

Learning objectives

Basic Training for Oil, Chemical & Gas Tanker (28217):

Knowledge:

- Types of oil, chemical and liquefied gas tankers, their equipment and operation
  - Piping systems and valves
  - Cargo pumps
  - Loading and unloading
  - Tank cleaning, purging, gas-freeing and inerting
- Cargos and properties
  - Pressure and temperature, including vapour pressure/temperature relationship
  - Types of electrostatic charge generation
  - Chemical symbols ESD
- Safety culture and management
- Operational cargo hazards and how they are controlled
  - Health hazards
  - Environmental hazards
  - Corrosive hazards
  - Explosive and flammability hazards
  - Sources og ignition, including electrostatic hazards
  - Toxicity hazards
  - Vapour leaks and clouds
  - Extremely low temperatures

  - Pressure hazards
  - Inerting, water padding, drying agents and monitoring techniques
  - Anti-static measures
  - Ventilation
  - Segregation
  - Cargo inhibition
  - Importance of cargo compatibility
  - Atmospheric control
- Contents and purpose of a MSDS
- Safety equipment and PPE
  - Breathing apparatus and tank-evacuating equipment
  - Resuscitators
  - Rescue and escape equipment
- Gas-measuring equipment
- Safe operation of the vessel
- Safe working practices incl. legislation and guidelines
  - Precautions to be taken when entering enclosed spaces
  - Precautions to be taken before and during repair and maintenance work
  - Safety measures for hot and cold work
  - Electrical safety
  - Ship/shore safety check list
- Emergency action in case of injury, fire or spill
  - Reporting to responsible persons
  - SOPEP
  - Prevention of brittle fractures

Skills:

- Identify and take precautions to prevent hazards
- Apply occupational health and safety precautions and measures
- Take precautions to avoid pollution from cargo

Competencies:

- Contribute to safe operation of tankers

Core literature

None

Examination

Basic Training for Oil, Chemical & Gas Tanker (28217):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	None

Qualification prerequisites for professors/instructors etc.

Associate professors, assistant professors or instructors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is higher than the level of learning objectives for the subject in accordance with the Danish order no. 1165 of 3 November 2014, as amended and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	**28200**	**Maritime Elective Subjects – BM(SØ)**	
Subject(s):	28200	Maritime Elective Subjects	
	28218	Watchkeeping Duty in Engine, including Full Mission Engine Room Simulator Course	1 ECTS
Admission criteria:	A student must be register in BM8 to participate Full Mission Engine Room Simulator course.		
Criteria to pass subject	These assessments make up the subject: 1. **None** assessments using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **One** assessment graded Passed/Not Passed. • This assessment must be graded Passed.		
Semester:	BM8 (SØ)		
ECTS credits:	1		
Course Regulations:	• Marine Engineer (BM) version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Marine Engineer – Danish order nor 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.		
STCW:	*STCW Code, as amended: Part A, chapter III – Engine department:* • Section A-III/1 - Marine engineering at the operational level as set in table A-III/1 • Section A-III/6 – Electrical, electronic and control engineering at the operational level as set in table A-III/6 where use of simulator training is relevant. *STCW Code, as amended: Part A, chapter VIII - Watchkeeping:* • Section A-VIII/1 – Fitness for duty. • Section A-VIII/2 – Watchkeeping arrangement and principles to be observed. ○ Part 1: Certification, section 2. ○ Part 3: Watchkeeping principles in general ○ Part 4-2: Principles to be observed in keeping an engineering watch ○ Part 5: Watchkeeping in port ○ Part 5-2: Taking over the engineering watch ○ Part 5-4: Performing the engineering watch		

Certificate(s):	None	
Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:	None	

Purpose

The purpose of the Full Mission Engineering WatchKeeping Course is to give the course participants the competency of being able to independently to be in charge of the engineering watch (to be watchkeeping officer in the engine room).

Learning objectives

Watchkeeping Duty in Engine, including Full Mission Engine Room Simulator Course (28218):

Knowledge:

- of being in charge of, giving and recieving proper hand over the engine room watch at sea and in harbor according to "Bekendtgørelse om vagthold i skibe (Vagtholdsbekendtgørelsen)" and the STCW 2010 consolidated edition including the Manilla admentments
- of correct use of the Engineers' Logbook and Oil Record Book
- of change over to the most important emergency systems
- of complying of security related actions in conjunction with attending the watch and knowledge about correct actions on occurrence of fire and other incidents with special provision to oil systems
- of evaluating to which degree operational irregularities influence the ships propulsion and the ships ability to manoeuvre and the needed actions under regards of the actual situation in the engine room and the manoeuvrering situation
- of assessing and communicating relevant information concerning operating disturbances that can effect the ships propulsion and manoeuvrering
- of directions, procedures and checklists concerning planning, making ready, running and shutting down of main and auxillery systems in conjunction with departure harbour, see passage and arrival harbor witrh respect to operational reliability and avoiding pollution
- of making effective use of intership communications equipment
- of the use of English language in conjunction with attending the watch
- of effective communication, team work and situational awareness in the interaction with other crew members

Skills:

- to be in charge of, giving and recieving proper hand over the engine room watch at sea and in harbor according to "Bekendtgørelse om vagthold i skibe (Vagtholdsbekendtgørelsen)" and the STCW 2010 consolidated edition including the Manilla admentments
- to make correct entries in the Engineers' Logbook and the Oil Record Book
- to be able to change over to the most important emergency systems
- to comply with security related actions in conjunction with attending the watch and carry out correct actions on occurrence of fire and other incidents with special provision to oil systems
- to evaluate to which degree operational irregularities influence the ships propulsion and the ships ability to manoeuvre and to perform the proper actions under consideration of the actual situation in the engine room and the manoeuvrering situation
- to assess and communicate relevant information concerning operating disturbances that can effect the ships propulsion and manoeuvrering
- to use directions, procedures and checklists during the process of planning, making ready, running and shutting down of main and auxillery systems in connection with departure harbour, see passage and arrival harbor with respect to operational reliability and avoiding pollution
- to make effective use of intership communications equipment
- to use English language in conjunction with attending the watch
- to use effective communication, team work and situational awareness in the interaction with other crew members

Competencies:

- To be able to be in the position as the engeneering watch (to be watchkeeping officer in the engine room) according to the "Bekendtgørelse om vagthold i skibe (Vagtholdsbekendtgørelsen)" and the STCW 2010 consolidated edition including the Manila admentments.

Core literature

Examination

Watchkeeping Duty in Engine, including Full Mission Engine Room Simulator Course (28218):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	None
Duration:	N/A
Aids allowed:	N/A
Important Information:	None
Prerequisites for Examination:	Compulsory attendance for all courses related activities

Qualification prerequisites for professors/instructors etc.

Associate professors, assistant professors or instructors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is the same or higher than the level of learning objectives for the subject
  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

If conducting training using a simulator the instructor shall:

- have received appropriate guidance in instructional techniques involving the use of the simulator and
- have gained practical operational experience on the particular type of simulator being used

Syllabus

Subject area:	**28200**	**Maritime Elective Subjects – BM(SØ)**	
Subject(s):	28230	Ship Technology	
	28231	Ship Technology and Docking	4 ECTS
Admission criteria:	None		
Criteria to pass subject	These assessments make up the subject: 1. **None** assessments using the 7-point grade scale. • To pass the average of the assessments must be at least 2.0. (no rounding). 2. **One** assessment graded Passed/Not Passed. • This assessment must be graded Passed.		
Semester:	BM8 (SØ)		
ECTS credits:	4		
Course Regulations:	• Marine Engineer (BM) version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended. • Order of a special qualification requirements, etc. for personnel in passenger ships – Danish order no 391 of 22 April 2014, as amended		
STCW:	*STCW Code, as amended: Part A, chapter III - Engine department:* Section A-III/1 - Operational level Section A-III/2 - Management level *Annex to STCW Convention, as amended: Chapter V - Special training requirements:* Regulation V/2, paragraph 7 *STCW Code, as amended: Part A, chapter V - Special training requirements:* Section A-V/2, Paragraph 4, Passenger safety, cargo safety and hull integrity training		
Certificate(s):	*Certificate of proficiency in Passenger Safety, Cargo Safety and Hull Integrity* is issued when the student has passed the subject Ship Technology and Docking for Marine Engineers in accordance to the order of a special qualification requirements, etc. for personnel in passenger ships – order no 391 of 22 April 2014, as amended..		

Syllabus

Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:	None	

Purpose

Ship Technology:
The purpose of ship technology is for the student to acquire the qualifications in ships' design and conditions related to ships' stability, buoyancy, draught, trim and effects on the hull necessary to function safely as a watch-keeping engineer on board merchant ships in accordance with the conventions in force.

Docking:
The purpose of docking is for the student to attain knowledge about standard docking procedures and practices to acquire the necessary skills to communicate and cooperate with shipyard and classification society on an operational and management level.

Learning objectives

Ship Technology (28231):

Knowledge:

- Technical maritime vocabulary in Danish and English.
- Construction, arrangements and equipment of various ship types.
- Basic principles of ship stability.
- Internal and external factors affecting ship stability.
- Adverse internal and external forces affecting hull strength.
- Static and dynamic stability.
- Draft, load lines and draft surveys.
- Stability instruments.
- Good seamanship.

Skills:

- Apply hydrostatic data and curves from ships trim and stability book.
- Calculate transverse stability, trim and draughts.
- Utilize computerized stability instruments.
- Ability to apply any special safeguards, procedures and requirements regarding the carriage of dangerous goods on board ro-ro passenger ships.
- Apply correctly the provisions of the Code of Safe Practice for Cargo Stowage and Securing to the vehicles, rail cars and other cargo transport units carried.
- Ability to calculate load factors for decks on board ro-ro passenger ships.

Competencies:

- Assess ship stability.
- Interpret of stress data from computerized stability instruments.

Docking (28231):

Knowledge:

- Corrosion maintenance.
- The purpose of the enhanced survey program.
- Safe inspection planning, execution and subsequent reporting.
- Maintenance programs.
- Paint scheme maintenance.
- Ship plans including general arrangement, docking plan etc.

Skills:

- Fulfill a docking specification.
- Coordinate docking with flag state administration, other authorities, classification societies, technical inspectors, insurance companies and other parties during docking.
- Conduct daily communication, progress meetings etc. with the shipyard and subcontractors.
- Conduct machinery and hull inspections.
- Supervise and test performed maintenance work.
- Apply safe working practices.

Competencies:

- Planning and execution of docking of a vessel.
- Assess the work performed during docking.

Core literature

None

Examination

Ship Technology and Docking (28230):

Examination type:	Ongoing assessment
Grading scale:	Passed or Not Passed
Preparation time:	N/A
Duration:	N/A
Aids allowed:	N/A
Important Information:	N/A
Prerequisites for Examination:	N/A

Qualification prerequisites for professors/instructors etc.

Associate professors or assistant professors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is the same or higher than the level of learning objectives for the subject
  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	**28200**	**Maritime Elective Subjects – BM(SØ)**	
Subject(s):	28240	Maritime Technology including Maritime English	
	28241	Ship Propulsion	2 ECTS
	28242	Ship Auxiliary and Service Systems	2 ECTS
	28243	Maritime English	2 ECTS
Admission criteria:	Passed subject Thermal machinery and systems I-III Register subjects Ships Propulsion, Ship Auxiliary and Service Systems and Maritime English at the same time.		
Criteria to pass subject	These assessments make up the subject: 1. **One** assessment using the 7-point grade scale. • To pass the grade must be at least 02. 2. **None** assessments graded Passed/Not Passed. • All assessments must be graded Passed.		
Semester:	BM8 (SØ)		
ECTS credits:	6		
Course Regulations:	• Marine Engineer (BM) version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Marine Engineer – Danish order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended.		
STCW:	*STCW Code, as amended: Part A, chapter III - Engine department:* Section A-III/1 - Operational level Section A-III/2 - Management level		
Certificate(s):	None		
Responsible:	Subject Manager		
Valid from:	2021-1	VTA	
Expired:			
Remarks:	None		

Syllabus

Purpose

Ship Propulsion:

The student shall obtain the necessary knowledge, skills, and competencies for operating a vessel's propulsion system, taking into account the forces and conditions that influence the efficient propulsion of a ship.

Ship Auxiliary and Service Systems:

The student shall obtain the necessary knowledge about tank- and bilge systems, fuel systems incl. separators, lubricating oil systems incl. separators , sewage systems, firefighting systems, inert gas systems, stern tube systems, air-condition systems, fresh water systems and steam systems in order to handle and maintain these systems in a safety and environmentally secure way under normal and abnormal conditions.

Maritime English:

The student shall acquire the qualifications in oral and written English communication necessary to be able to function as an officer on board a merchant ship engaged in international voyages.

Learning objectives

Ship Propulsion (28241):

Knowledge:

- The main components of the propulsion system of a ship
- Various principles of construction of propulsion systems
- The various forces that affect the hull of a ship, leading to resistance against propulsion
- Basic construction principles and modes of operation of fixed pitch propellers and controllable pitch propellers

Skills:

- Operate the propulsion system of a ship in a safe and most efficient way
- Take into account the various possibilities and limitations of different types of propulsion plants

Competencies:

- Carry out performance tests of a propulsion plant, aided by the use of propeller curves, engine load diagrams etc. in order to evaluate, optimize and troubleshoot a propulsion plant.

Ship Auxiliary and Service Systems (28242):

Knowledge:

- Components which typically form pipe systems including shut off valves and control instruments
- Special operation conditions in fluid filled pipe systems as for example liquid shock and cavitation
- MARPOL legislation.

Skills:

- Operate systems for fresh water production and air-conditioning
- Operate systems for production and distribution of inert gas on tanker vessels
- Be able to use one´s knowledge about systems for keeping them well maintained
- Be able to use manuals in connection with fault finding and maintenance
- Act environmentally responsible in the daily routine work.
- Current measures to reduce emissions(NOx, SOx, CO etc.) from a vessel's main and auxiliary machinery.

Competencies:

- Be able to evaluate tank-, bilge and firefighting systems' influence on the stability of the ship and deal with it
- Be able to evaluate the environmental influence of systems especially bilge-, tank-, and sewage systems

Maritime English:

Knowledge:

- Comprehend and use maritime terms relating to the vessel itself as well as to the duties of an officer.
- Be familiar with the IMO Standard Maritime Communication Phrases and various treaties, their purpose and rules.
- Ship knowledge, understanding of types of vessels and their construction.
- Safety and optimum use of energy, as well as new developments in these areas.
- Forms of communication, both oral and written, with the vessel's crew and owners/customers.

Skills:

- Use maritime terminology in daily work and communicate with the crew clearly and effectively.
- Assess daily situations regarding safety, health and environmental protection.
- Decide and implement necessary actions based on the assessment.
- Guide the crew in matters of working environment and environmental protection.

Competencies:

- Use maritime English in daily work.
- Communicate clearly with the crew as well as with shore-based owners, customers, partners and authorities.
- Assess verbal statements and written material received and communicate the essence of both to relevant recipients.

Core literature

Ship Propulsion:

None

Ship Auxiliary and Service Systems:

The International Maritime Language Programme by P.C. van Kluijven together with various relevant articles, and key chapters of Ship Knowledge by K. van Dokkum .

Maritime English:

The International Maritime Language Program af P.C. van Kluijven samt diverse relevante artikler

Examination

Maritime Technology including Maritime English (28240):

Examination type:	Internal oral test
Grading scale:	7-point scale
Preparation time:	None
Duration:	60 minutes for each group of 4 students
Aids allowed:	All
Important Information:	Ship Propulsion, Ship Auxiliary and Service Systems and Maritime English are examined together. The student receives one grade. The examination is based on an interdisciplinary case handed in by the study group. Each student prepares 5 minutes pitch, and the students are then cross-examined in relevant topics of the case, and other learning objectives of the subject.
Prerequisites for Examination:	The study group must hand in the interdisciplinary case in accordance with the lesson plan.

Qualification prerequisites for professors/instructors etc.

Associate professors or assistant professors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is the same or higher than the level of learning objectives for the subject
  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.

Syllabus

Subject area:	**28200**	**Maritime Elective Subjects – BM(SØ)**	
Subject(s):	28260	Maritime Law and Ship Administration including SSO	
	28261	Maritime Law and Ship Administration	3 ECTS
		Ship Security Officers (SSO)	
Admission criteria:	None		
Criteria to pass subject	These assessments make up the subject: 1. **One** assessment using the 7-point grade scale. • To pass the grade must be at least 02. 2. **None** assessments graded Passed/Not Passed. • All assessments must be graded Passed.		
Semester:	BM8 (SØ)		
ECTS credits:	3		
Course Regulations:	• Marine Engineer (BM) version 5.80, 1 February 2021.		
Orders:	• Order on the professional bachelor training programme for Marine Engineer – Dansih order no 1610 of 13 December 2016 as amended. • Order on the professional bachelor training programme for Marine Engineer - Danish order no. 1348 of 23 November 2018 as amended. This order is for students who were registered in BM1 for first time in the spring of 2019 or later (2019-2, 2020-1 ect.). • Order on tests in the maritime training programmes – Danish order no 1585 of 13 December 2016, as amended. • Order on grading scale and other examination – Danish order no 114 of 3 February 2015, as amended. • Order on training programme in Maritime Security of Ships – Danish order no 1279 of 7 November 2013, as amended.		
STCW:	*STCW Code, as amended: Part A, chapter II - Engine department:* Section A-III/1 - Operational level Section A-III/2 - Management level *Annex to STCW Convention, as amended: Chapter VI – Emergency, Safety, Security:* Regulation VI/5 - Ship Security Officers *STCW Code, as amended: Part A, chapter VI -Emergency, Safety, Security:* Section A-VI/5, paragraph 1 to 4 • Ship Security Officers as set in tablet A-VI/5		
Certificate(s):	*Certificate of Proficiency as Ship Security Officers* is issued when experience of at least 12 months relevant seagoing service is proved and completed the specialized training programme prescribed in Regulation VI/5 paragraph 1.2 of the STCW Convention of 1978, as amended and the Danish order no 1279 of 7 November 2013, as amended.		

Syllabus

Responsible:	Subject Manager	
Valid from:	2021-1	VTA
Expired:		
Remarks:	None	

Purpose

The objective of this course it to qualify the course participant to understand and conduct the legal and administrative duties of a ships engineer and Ship Security Officer with due regard to securing the interests of his principals and the environment. These include the vessel, her owner, managers, charterer, crew and the international community. It is a fundamental goal of this course that the participant is able to combine his/her knowledge of all the topics of this course in a holistic fashion.

Learning objectives

Maritime Law and Ship Administration :

Maritime Law and Ship Administration including SSO (28261):

Knowledge:

- National and international maritime regulation.
- IMO and International conventions governing maritime law.
- UNCLOS.
- ISM.
- Class, Flag State and Port State Control.
- Certificates.
- Seafarer's rights and obligations under MLC.
- Crew insurance and injury.
- Oil Record Books and pollution prevention.
- Accurate log keeping and record entries.
- Chartering.

Skills:

- Apply knowledge of national and international law related to their duties on board.
- Preparing for class, flag state and PSC inspections.
- Determine whether the rights of the seafarer under the MLC are adhered to.

Competencies:

- Correct entries in logs and record books.
- Oil record book-keeping.

Ship Security Officers :

Knowledge:

- Ship Security at SSO level.

Skills:

- Conduct Security Assessments of the vessel and be responsible for security related matters at SSO level.

Competencies:

- Instruct and train crew members on security matters and pirate threats.

Core literature

- ISPS Code and literature as per course literature lists

Examination

Maritime Law and Ship Administration including SSO (28261):

Examination type:	Internal Written Test
Grading scale:	7-point scale
Preparation time:	None
Duration:	1 hour 30 minutes
Aids allowed:	All
Important Information:	None
Prerequisites for Examination:	None

Qualification prerequisites for professors/instructors etc.

Associate professors or assistant professors intended to be used in qualifying for certification under the STCW convention of 1978 as amended shall:

- have a qualification level that is the same or higher than the level of learning objectives for the subject
  and
- have a full understanding of the subject-training programme and the specified objectives for each type of training being conducted.