Training Record Book - Marine Engineer

Seagoing Service

2025

Danish Agency for Higher Education and Science

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Particulars of the Cadet

PARTICULARS OF THE CADET:
(To be filled in by the Cadet)

Family name _____

First name _____

Date of birth _____

Home address _____

_____

_____

Phone no. _____

Seamans book no. _____ **Issue date** _____

Content

On board training record book for Marine Engineers

Introduction

To continue to the theoretical modules of the Marine Engineer's education program (Bachelor of Technology Management and Marine Engineering), the cadet must complete seagoing service periods according to a training program approved by the Danish Agency for Higher Education and Science.

The Training Record Book, which is published by the Danish Agency for Higher Education and Science, must be introduced to the cadets before they complete the 1st period of theory.

When the cadets attend the educational institution after the preliminary seagoing service period, they must present the Training Record Book to the education institution, which will check that it is in accordance with these guidelines. This includes whether the mandatory assignments have been completed and whether the cadet has obtained the required signatures for completion of checklists and signatures of approval.

The cadet is responsible for obtaining all the relevant training and signatures in the Training Record Book.

Of the 10 assignments in the Training Record Book the cadet must choose 4 assignments to be completed as written assignments. The cadet must be able to present all 4 assignments, which the cadet has chosen to be completed in writing, to the academy upon request, even though the academic assessment is done by the Designated Training Officer.

The forms and assignments must be approved by the Designated Training Officer on board the ship.

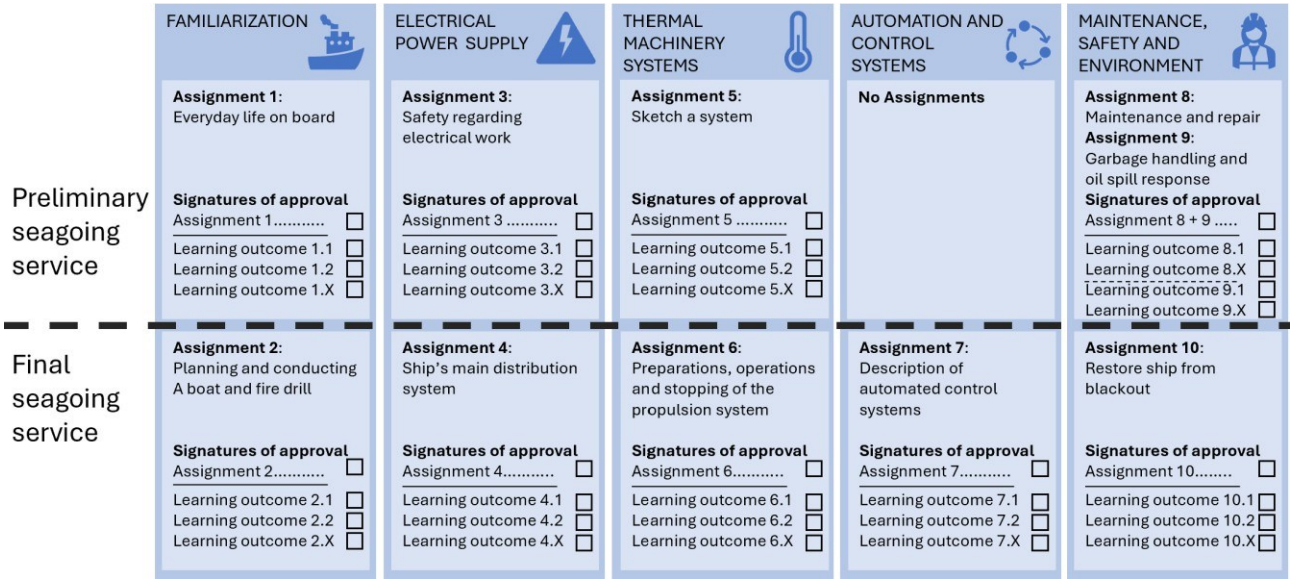
The purpose of the Training Record Book

The purpose of the Training Record Book is to:

- Manage the onboard training during the cadet's seagoing service period, so the cadet, the ship's management and the Designated Training Officer are properly informed about meeting the objectives of the onboard training, and
- Serve as documentation that the intended learning outcome has been obtained.

The Training Record Book is an important element in the training program for Marine Engineers. All cadets must complete the Training Record Book to document that they have obtained the required training and experience during their seagoing service periods.
The cadets will not be able to complete their education if they are unable to present the Training Record Book in completed form by the end of their final seagoing service period.
The Training Record Book is the cadet’s personal property, and the book is expected to be kept in a safe manner, so that it is always in good condition.

Structure of the Training Record Book



Guidelines concerning seagoing service

1. The Designated Training Officer and the ship management are encouraged to evaluate the cadet's onboard training progress on a continuous basis. It is recommended that the Designated Training Officer holds weekly status meetings with the cadet to discuss progress and newly obtained signatures.

2. The ship management must inspect the Training Record Book monthly and with every sign-on and sign-off.

3. The training in the intended learning outcomes, as described in the Training Record Book, must be completed to the extent that the ship's equipment, design, cargo, and trade allow. The general items, including assignments and checklists, must be completed. It is important that all assignments and checklists for the respective seagoing service periods are completed. If this is not the case, the consequence may be that the Training Record Book is not approved, and it will then need to be assessed whether the student can continue the theoretical modules at the academy.

4. The cadets are responsible for utilizing the on board training in the best possible way, so they get the best possible basis for their future work as marine engineers.

   The Designated Training Officer must give signature of approval with the date and their signature when the cadet has obtained the intended learning outcome for the subject. The Designated Training Officer can delegate the responsibility of approving individual signatures of approval to another qualified officer if this officer has supervised the obtainment of the intended learning outcome.

   Note that even though the cadets have completed assignments/signatures of approval in the Training Record Book, this does not mean that the cadet is exempted from further learning or participation in the individual subjects. For example, just like the rest of the

crew, the cadets must continue to participate in all forms of safety and emergency exercises during the entire period of onboard training, so that the cadet may obtain the greatest possible experience and routine.

5. It is important that the ship's management/Designated Training Officer are careful to note down central comments on the cadet's level of learning achieved by the cadets in their performance of tasks onboard the ship in the pages designated for handover in the back of this Training Record Book.

   Since the duration of the seagoing service period is short, thorough transfer of information between Designated Training Officers is particularly important in order to provide continuity in the training program, so that training in any of the cadet's weak areas may be continued during the onboard training. If the cadet changes vessel or Designated Training Officer it is particularly important to fill out the handover page at page 39.

6. If part of an intended learning outcome cannot be completed during the cadet's preliminary seagoing service period, it must be completed during the final seagoing service period.

7. If the cadets complete the required service at sea and the Training Record Book as junior engineers, they must return the Training Record Book to their academy for final approval. For the purpose of this book, the term "cadet" applies to both cadets and junior engineers.

Guidelines on how to use the Training Record Book

The Danish education to become Bachelor of Technology Management and Marine Engineering is based on alternating theoretical studies and onboard training as visualized in the graphic below.
This book can therefore be used by cadets with varying backgrounds and at different levels of their education.

There are five scenarios for the use of this Training Record Book:

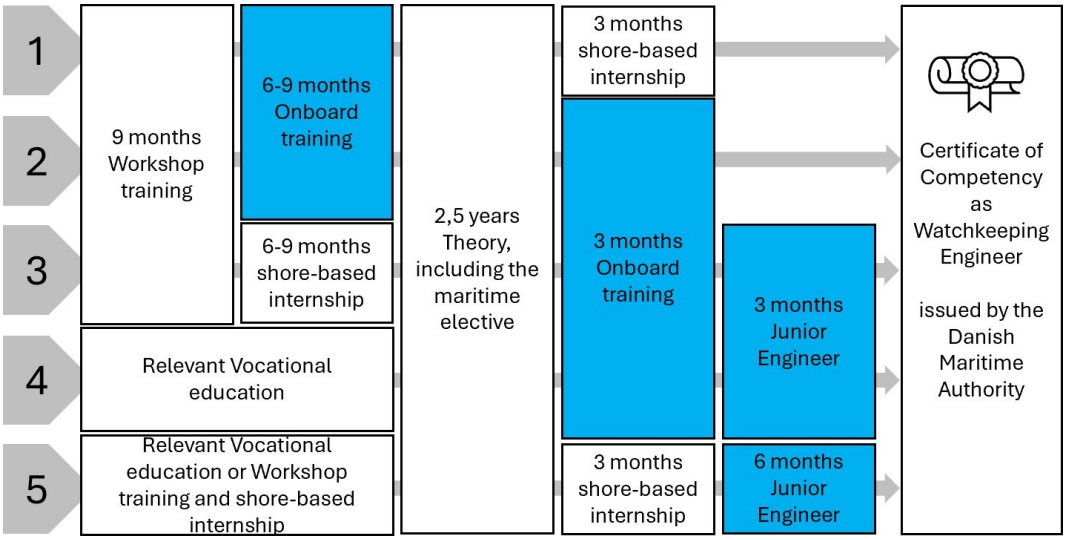
① The cadet has attended the academy from the beginning of the education to become a marine engineer and is embarking the vessel as part of the first on bord training period. Prior to embarkation the cadet has received nine months of workshop training.

② The cadet has attended the academy from the beginning of the education to become a marine engineer and is embarking the vessel as part of the final on bord training period. Prior to this, the cadet has received nine months of workshop training, nine months of onboard training and two and a half years of theory.

③ The cadet has attended the academy from the beginning of the education to become a marine engineer and are embarking the vessel as part of the first on bord training period. Prior to this, the cadet has received nine months of workshop training, six months of shore-based internship and two and a half years of theory.

④ The cadet has a diploma from a relevant vocational education and have therefore attended the academy from the 4th semester. The cadet is embarking the vessel as part of the first on board training period. Prior to this, the cadet has obtained a relevant vocational education and received two and a half years of theory.

⑤ The cadet has completed their education to become a marine engineer with only shore-based internships and are embarking the vessel as junior engineers.



Intended Learning Outcome:

The on board Training Record Book is divided into five main areas: *Familiarization, Thermal Machinery and Systems, Electrical Power Supply, Automation and Control Systems and Maintenance, Safety and Environment.* Each area is defined by a list of Intended Learning Outcomes, which are then divided into a preliminary and a final seagoing service period, as recommended by the academies.
The Intended Learning Outcomes are to be seen as a guideline for the daily learning activities and as a help for the planning of the cadet's daily work.

When the cadet has completed a task/subject satisfactorily and thus complies with the Intended Learning Outcome, the Designated Training Officer must sign for the task/Intended Learning Outcome by filling in the signature field of the relevant form with date/signature.
The cadet is not limited to working only with Intended Learning Outcomes recommended for preliminary seagoing service in their preliminary seagoing service, if a situation arises that offer learning otherwise recommended for final seagoing service.

The written assignments must be completed during their designated onboard training period, marked as either preliminary or final sea going service. See cadet scenarios ① to ⑤ outlined in the beginning of this section.
If the cadets embark their first vessel during the 2nd internship period of the education program or after graduation, it is recommended that the cadets or junior engineers complete the assignments related to the preliminary onboard training prior to completing the assignment related to the final onboard training period.

SOLO taxonomy (Structure of Observed Learning Outcomes)

The SOLO taxonomy is a model of learning. It is a theory about teaching and learning. The SOLO taxonomy categorizes learning outcomes into different levels, each representing a higher level of cognitive complexity.

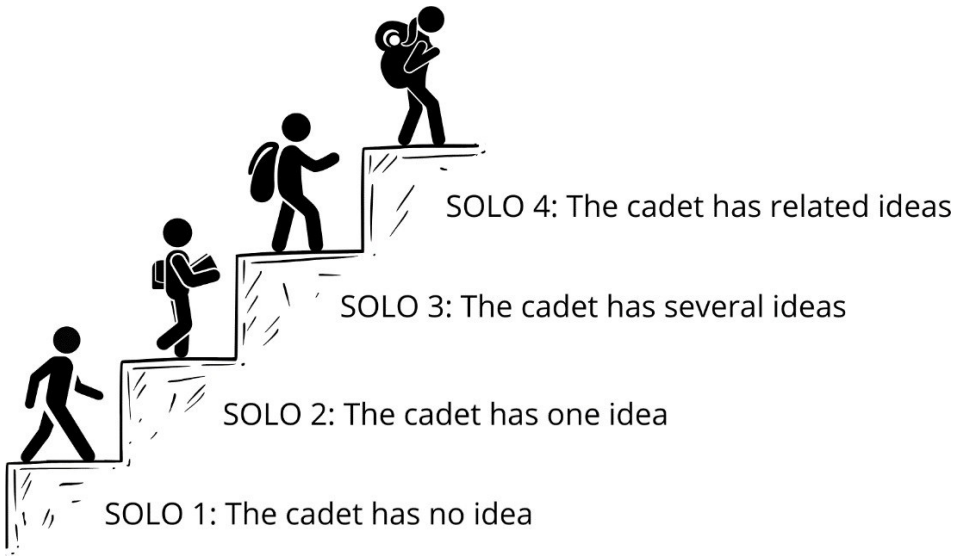
The levels in the SOLO taxonomy are as follows:
SOLO 1, where the learner has no idea.
At this level, the cadets have not grasped the concept or skill yet. *They do not know anything about the subject.*

SOLO 2, where the learner has one idea.
The cadets understand one aspect or element of the concept or skill. *They know some within the subject.*

SOLO 3, where the learner has several ideas.
The cadets can understand and identify several independent aspects or elements of the concept or skill.

SOLO 4, where the learner has related ideas.
The cadets can make connections between different aspects or elements, demonstrating a deeper understanding.

SOLO 5, where the learner has extended ideas.
The cadets are not expected to reach this level during their on board training program. This level is obtainable as an officer. Therefore level 5 is not part of the figures at page 9.


SOLO 4: The cadet has related ideas
SOLO 3: The cadet has several ideas
SOLO 2: The cadet has one idea
SOLO 1: The cadet has no idea

SOLO Levels

Functioning knowledge	**SOLO 1**	**SOLO 2**	**SOLO 3**	**SOLO 4**
Outcome	The cadets need help to start.	If the cadets are directed, they can start themselves.	The cadets know the task but can make mistakes.	The cadets know the task, when and why. Can identify mistakes.
Learning intention	The cadets need help or guidance to start.	The cadets can fulfill the task themselves if directed or shown what to do.	The cadets can fulfill the task themselves but do not know why or when. The cadets can make mistakes.	The cadets can fulfill the task themselves, seek feedback to improve, and help others.
E.g. For learning outcome	**Participate** as an integral part of the engine room team. **Familiarized** with the bridge, engine, etc. and other working areas. **Observe** the operation and maintenance of the machinery.	**Identify** a specific control system. **Register** entries into the ship's planned maintenance system. **Point out** redundancy mechanisms.	**Demonstrate** proficiency in taking measurements on electrical equipment. **Demonstrate** understanding of the purpose of automatic and manual controls. **Describe** working principles of a centrifugal pump.	**Explain** the handling and disposal of waste oil. **Exemplify** potential fault scenarios. **Plan** a drill.

SOLO verbs

SOLO 1	**SOLO 2**	**SOLO 3**	**SOLO 4**
Participate	Identify	Apply	Summarize
Familiarize	Sketch	Compose	Explain
Produce	Register	Describe	Plan
	Point out	Demonstrate	Exemplify
		Carry out	Operate
		Formulate	
		Prove	
		Make	

Checklist for the Cadet:

- To fill out the personal data sheet in the Training Record Book.
- To have the familiarizing officer sign for their completion of "Safety Familiarization" as quickly as possible after each sign-on once the familiarization has been completed.
- To fill in the form "Particulars of the Ship" by the embarkation of each new vessel.
- To read the shipping company's internal guidelines concerning onboard training.
- To present the Training Record Book to the ship's management at least once every month and by sign-on and sign-off for review and signature.
- To have the Designated Training Officer sign regularly for any completed assignments, tasks, signatures of approval and reviews of the book.
- To complete all tasks listed in the Training Record Book.
- To have all completed tasks approved before signing off the ship.
- To present the Training Record Book to the institution after completion of the seagoing service period.

The cadets are encouraged to keep a learning journal throughout their seagoing service period.

Checklist for the Designated Training Officer:

- To read the introduction and guidelines to the use of the Training Record Book.
- To align expectations between the DTO and the cadet considering the cadet's educational level.
- Make sure the cadets know what is expected from them regarding their on-board training.
- To be familiar with the shipping company's internal guidelines concerning onboard training.
- Sign for completed tasks, signatures of approval and reviews of the Training Record Book.
- To write the handover in the back of this book when signing off.

The DTO is encouraged to have regular conversations with the cadets regarding the progress of their on board training.

Form 1: Documentation for completion of ship's familiarization

	NAME OF VESSEL	VESSEL CALL SIGN	SIGNATURE FROM FAMILIARIZING OFFICER:
FIRST VESSEL			
SECOND VESSEL			
THIRD VESSEL			
FOURTH VESSEL			
FIFTH VESSEL			

Form 2: Documentation of biweekly review by the Designated Training Officer

Certification of inspection and control by the Designated Training Officer

The cadet must biweekly present the Training Record Book to the Designated Training Officer for endorsement of completed tasks, assignments and signatures of approval.

SHIP'S NAME:	DESIGNATED TRAINING OFFICER:	PERIOD:		DATE AND SIGNATURE
STAMP	CAPITAL LETTER	FROM:	TO:	DESIGNATED TRAINING OFFICER

SHIP'S NAME:	DESIGNATED TRAINING OFFICER:	PERIOD:		DATE AND SIGNATURE
STAMP	CAPITAL LETTER	FROM:	TO:	DESIGNATED TRAINING OFFICER

SHIP'S NAME:	DESIGNATED TRAINING OFFICER:	PERIOD:		DATE AND SIGNATURE
STAMP	CAPITAL LETTER	FROM:	TO:	DESIGNATED TRAINING OFFICER

Form 3: Documentation for monthly review by the Chief Engineer or Master

Review and verification of the Training Record Book must be certified by the Chief Engineer once a month and by the Master when the cadet signs on and off the ship.

SHIP'S NAME: STAMP	**REMARKS:**	**SENIOR OFFICERS:** MASTER OR CHIEF ENGINEER	**DATE AND SIGNATURE:**

Form 4: Signature for completion of Ship's Particulars

Signature for completion of ship's particulars:

VESSEL:	DATE:	OFFICER'S SIGNATURE:

Instruction for completion of ship's particulars:

The purpose of the ship's particulars is for the cadets to get acquainted with the vessel they have recently embarked. To complete the ship's particulars, it is expected that the cadets will explore the different departments around the vessel guided by the familiarizing officer. The specific subjects of the ship's particulars can serve as conversation topics with the crew on board for the cadets to gain an understanding of the ship.

Form 5: Ship's Particulars *(To be completed each time the cadet embarks a new vessel)*

First vessel

Vessel name:				
Call Sign		**IMO Number**		
Port of Registry		**Period from:**		
Type of Ship		**Period to:**		
Dimensions		**Deck Equipment**	**Number**	**Type**
Length Over All	m	Cargo Capacity		
Breadth	m	Passenger capacity		
Depth	m	Cranes		
Gross Tonnage		Winches		
Net Tonnage		*Other deck/cargo equipment*		
Deadweight	t			
Light Displacement	t			
Fresh Water Capacity	t	**Life-Saving Appliances**	**Number**	**Type**
Cargo Capacity	t	MOB-boat		
Ballast Capacity	t	Liferaft		
Ballast Tanks (number)		Lifeboat		
Bridge Equipment		Davits		
RADAR (Brand)		Lifebouys		
Gyro (Brand)		Life Jacket		
Autopilot (Brand)		Lifeboat dimensions		
ECDIS (Brand)		Capacity per lifeboat		
Fixed Fire Fighting System		Capacity per liferaft		
-Deck (type)		**Fire Fighting Equipment**	**Number**	**Capacity**
-Engine (type)		Fireman's Outfits		
Engine Room		Breathing Apparatuses		
Main Engine (type)		Fire Hoses		
Main Engine Output	kW	*Portable Fire Extinguishers*		
Bunker capacity	t	Dry powder		
Daily consumption	t	CO_2		
Service speed	Knots	Soda / Acid		
Auxiliary engines (type)		Foam		
Boilers (type)		Water		
Steering gear (type)				

To be completed by the cadet.

Notes:

Second vessel

Vessel name:				
Call Sign		**IMO Number**		
Port of Registry		**Period from:**		
Type of Ship		**Period to:**		
Dimensions		**Deck Equipment**	**Number**	**Type**
Length Over All	m	Cargo Capacity		
Breadth	m	Passenger capacity		
Depth	m	Cranes		
Gross Tonnage		Winches		
Net Tonnage		*Other deck/cargo equipment*		
Deadweight	t			
Light Displacement	t			
Fresh Water Capacity	t	**Life-Saving Appliances**	**Number**	**Type**
Cargo Capacity	t	MOB-boat		
Ballast Capacity	t	Liferaft		
Ballast Tanks (number)		Lifeboat		
Bridge Equipment		Davits		
RADAR (Brand)		Lifebouys		
Gyro (Brand)		Life Jacket		
Autopilot (Brand)		Lifeboat dimensions		
ECDIS (Brand)		Capacity per lifeboat		
Fixed Fire Fighting System		Capacity per liferaft		
-Deck (type)		**Fire Fighting Equipment**	**Number**	**Capacity**
-Engine (type)		Fireman's Outfits		
Engine Room		Breathing Apparatuses		
Main Engine (type)		Fire Hoses		
Main Engine Output	kW	*Portable Fire Extinguishers*		
Bunker capacity	t	Dry powder		
Daily consumption	t	CO_2		
Service speed	Knots	Soda / Acid		
Auxiliary engines (type)		Foam		
Boilers (type)		Water		
Steering gear (type)				

To be completed by the cadet.
Notes:

Third vessel

Vessel name:				
Call Sign		**IMO Number**		
Port of Registry		**Period from:**		
Type of Ship		**Period to:**		
Dimensions		**Deck Equipment**	**Number**	**Type**
Length Over All	m	Cargo Capacity		
Breadth	m	Passenger capacity		
Depth	m	Cranes		
Gross Tonnage		Winches		
Net Tonnage		*Other deck/cargo equipment*		
Deadweight	t			
Light Displacement	t			
Fresh Water Capacity	t	**Life-Saving Appliances**	**Number**	**Type**
Cargo Capacity	t	MOB-boat		
Ballast Capacity	t	Liferaft		
Ballast Tanks (number)		Lifeboat		
Bridge Equipment		Davits		
RADAR (Brand)		Lifebouys		
Gyro (Brand)		Life Jacket		
Autopilot (Brand)		Lifeboat dimensions		
ECDIS (Brand)		Capacity per lifeboat		
Fixed Fire Fighting System		Capacity per liferaft		
-Deck (type)		**Fire Fighting Equipment**	**Number**	**Capacity**
-Engine (type)		Fireman's Outfits		
Engine Room		Breathing Apparatuses		
Main Engine (type)		Fire Hoses		
Main Engine Output	kW	*Portable Fire Extinguishers*		
Bunker capacity	t	Dry powder		
Daily consumption	t	CO_2		
Service speed	Knots	Soda / Acid		
Auxiliary engines (type)		Foam		
Boilers (type)		Water		
Steering gear (type)				

To be completed by the cadet.
Notes:

Fourth vessel

Vessel name:				
Call Sign		**IMO Number**		
Port of Registry		**Period from:**		
Type of Ship		**Period to:**		
Dimensions		**Deck Equipment**	**Number**	**Type**
Length Over All	m	Cargo Capacity		
Breadth	m	Passenger capacity		
Depth	m	Cranes		
Gross Tonnage		Winches		
Net Tonnage		*Other deck/cargo equipment*		
Deadweight	t			
Light Displacement	t			
Fresh Water Capacity	t	**Life-Saving Appliances**	**Number**	**Type**
Cargo Capacity	t	MOB-boat		
Ballast Capacity	t	Liferaft		
Ballast Tanks (number)		Lifeboat		
Bridge Equipment		Davits		
RADAR (Brand)		Lifebouys		
Gyro (Brand)		Life Jacket		
Autopilot (Brand)		Lifeboat dimensions		
ECDIS (Brand)		Capacity per lifeboat		
Fixed Fire Fighting System		Capacity per liferaft		
-Deck (type)		**Fire Fighting Equipment**	**Number**	**Capacity**
-Engine (type)		Fireman's Outfits		
Engine Room		Breathing Apparatuses		
Main Engine (type)		Fire Hoses		
Main Engine Output	kW	*Portable Fire Extinguishers*		
Bunker capacity	t	Dry powder		
Daily consumption	t	CO_2		
Service speed	Knots	Soda / Acid		
Auxiliary engines (type)		Foam		
Boilers (type)		Water		
Steering gear (type)				

To be completed by the cadet.
Notes:

Assignments - Intended Learning Outcome for Familiarization:

Every time the cadet embarks a new ship, the cadet must fill out the ship's familiarization checklist (Form 1) and particulars of the ship (Form 5). Assignment 1.1 is only to be completed on board the first vessel of the cadet's seagoing service. The training objectives stated below are applicable to both preliminary and final seagoing services.

Immediately after joining any new ship, the cadet must - as everybody else on board - receive training and instructions regarding fire precautions, abandoning ship and the ship's safety procedures. The Master or the Familiarizing Officer must sign Form 1 "Documentation for completion of Ship's familiarization" above, when the cadet has received the necessary training and/or instructions upon completing the ship's familiarization checklist.

As soon as possible after joining the ship, the cadet must receive detailed training and instruction in the ship's safety procedures, work- and watchkeeping routines, organization, etc.
The cadet must be **familiarized** with the bridge, engine room, forecastle, poop deck, main deck and other working areas.

Intended learning outcome according to the SOLO taxonomy for both preliminary and final seagoing service:

Mark with an X in the boxes below after having completed the tasks ☒

☐ **Participate** and act in accordance with the boat-, fire, MOB and other safety related muster lists at a functional level (taking into consideration that the cadet is supernumerary).
☐ **Identify** muster and embarkation stations and emergency escape routes.
☐ **Describe** how to raise the general alarm and act in accordance with the ship's safety procedures.
☐ **Demonstrate** how to use the ship's emergency equipment, i.e. EEBD and immersion suits.
☐ **Explain** the purpose of Personal Protective Equipment.
☐ **Demonstrate** the ability to communicate with crew members and other persons on board on safety matters.
☐ **Formulate** how to take immediate action in case of an accident or medical emergency.
☐ **Demonstrate** how to locate and don a life jacket correctly.
☐ **Prove** a basic knowledge of using portable fire extinguishers.
☐ **Demonstrate** how to close and open fire doors and weather- and watertight doors fitted in the ship other than those for hull openings.
☐ **Demonstrate** thorough knowledge of the ship's work- and watch keeping routines.
☐ **Demonstrate** how to operate fire dampers.
☐ **Demonstrate** the use of firefighting equipment.
☐ **Describe** the ship's procedure for prevention of pollution.
☐ **Explain** the safety musters, their purpose and participants.
☐ **Explain** safety information, -symbols, -signs, emergency escape routes and alarm signals.
☐ **Summarize** what to do if a person falls overboard.
☐ **Summarize** what to do if fire or smoke is detected.
☐ **Summarize** what to do if the fire alarm is sounded.
☐ **Summarize** what to do if the alarm for abandon ship is sounded.
☐ **Explain** how garbage is to be handled to avoid pollution of the environment and how to react in case pollution is observed.

☐ **Explain** how to raise the fire alarm.
☐ Point out and **explain** the use of alarm activating points, alarm bells, fire extinguishers, hydrants and fire hoses.
☐ **Summarize** special instructions/procedures regarding smoking, dressing, alcohol, drugs, etc.
☐ **Summarize** instructions regarding work hours, wake-up calls, eating time, slop chest, etc.

Assignment 1: Everyday life on board

Preliminary seagoing service
①②③④⑤

Purpose:
The purpose of the assignment is to give the cadet an insight into the everyday life on a ship and the job as an engine officer. After having completed the familiarization, the cadet must make a description of the everyday life on board. The assignment must as a minimum include the answers to the questions below:

1. **Describe** the purpose of a familiarization checklist.
2. **Explain** who is on board and what their responsibilities are.
3. **Compose** a general overview of the different crewmembers' work time and spare time.
4. **Describe** areas of responsibilities for all crewmembers during arrival and departure.

Approval of the assignment:
The solution to the assignment is prepared in written and/or oral form and is presented in a conversation with the Designated Training Officer.
In light of this conversation, the DTO will determine whether the purpose of the assignment has been fulfilled according to the SOLO taxonomy (see page 9).

Signatures of approval	**Date and signature**
Designated Training Officer's signature for approval of the above assignment 1.	
Explain the use of the ship's safety musters, safety information, - symbols, -signs, -emergency escape routes and alarm signals to the Designated Training Officer.	
Demonstrate how to open and close fire doors and weathertight doors fitted in the ship other than those for hull openings.	
Demonstrate how to locate and don a lifejacket correctly.	
Describe which emergency drills the ship must conduct and at which intervals.	

Assignment 2: Planning and conducting a boat and fire drill

Final seagoing service (not necessarily immediately after embarkation)
②③④⑤

Purpose:
To ensure the cadet understands the importance of thorough preparation and planning of required drills.

1. The cadet must **plan** and **carry out** a drill, i.e. boat drill, fire drill, a MOB drill or SOPEP drill according to company procedures, taking into consideration the following, but not limited to:
   - Scenario of the emergency
   - Roles and responsibilities of the participating crewmembers
   - Lines of communication
2. **Identify** areas of special attention (weather conditions, dangerous cargo, electrical machinery, fuel tanks, environmental impact, etc.).

3. **Make** a possible backup plan in case of unforeseen changes to the scenario.

4. **Demonstrate** and **explain** the correct use of firefighting equipment and lifesaving appliances.

Approval of the assignment:
The solution to the assignment is prepared in written and/or oral form and is presented as either a real-life exercise or a tabletop exercise.
In light of this conversation, the DTO will determine whether the purpose of the assignment has been fulfilled according to the SOLO taxonomy (see page 9).

Signatures of approval:	**Date and signature**
Designated Training Officer's signature for approval of the above assignment 2.	
Demonstrate how to correctly don a firefighter outfit.	
Demonstrate proper use of a breathing apparatus.	
Demonstrate the ability to communicate relevant safety information with the crew.	
Explain the captain's duties during an emergency.	
Explain the launch procedure of the lifeboat and MOB boat.	
Explain how drills contribute to a higher level of emergency preparedness.	

Intended learning outcome for Electrical Power Supply and Main Switchboard:

Intended learning outcome according to the SOLO taxonomy:

Mark with an X in the boxes below after having completed the tasks ☒

Recommended for preliminary seagoing service:

- ☐ **Explain** the meaning of various electrical symbols.
- ☐ **Explain** the function of safety components within the electrical system.
- ☐ **Explain** the effects of starting large consumers and associated precautions.
- ☐ **Demonstrate** proficiency in taking measurements on electrical equipment.
- ☐ **Participate** in the maintenance of electrical equipment.
- ☐ **Explain** personal safety protocols for working on electrical equipment, including lockout procedures.

Recommended for final seagoing service:

- ☐ **Operate** electrical- and control systems.
- ☐ **Apply** diagrams to identify various electrical equipment, such as circuit breakers, transformers, generators, consumers, etc.
- ☐ **Explain** the starting and synchronizing procedure for generators.
- ☐ **Describe** what an earth fault is.
- ☐ **Explain** how to rectify earth faults.

Assignment 3: Safety regarding electrical work

Preliminary seagoing service
①②③④⑤

Purpose
The objective of the assignment is to enhance the cadet's understanding of safety measures when working with electrical systems. This includes awareness of potential hazards and how to mitigate them to ensure the safety of the cadet and the safety of others on board.

Instructions:
1. **Describe** which safety measures are to be taken when performing maintenance, repairs and troubleshooting on an electrical system.
2. **Produce** a short guide in your own words on how to follow lockout/tagout procedures.
3. **Explain** how tools and protective equipment are used to ensure safe working conditions while working on electrical systems.

Approval of the assignment:
The solution to the assignment is prepared in written and/or oral form and is presented in a conversation with the Designated Training Officer.
In light of this conversation, the DTO will determine whether the purpose of the assignment has been fulfilled according to the SOLO taxonomy (see page 9).

Signatures of approval	**Date and signature**
Designated Training Officer's signature for approval of the above assignment 3.	
Demonstrate isolation and lock out of electrical equipment.	
Identify and explain main areas of personal risks with work on electrical systems.	
Describe what to do if they find someone who has experienced electric shock.	

Assignment 4: Ship's main distribution system

Final seagoing service
②③④⑤

Purpose
The purpose of the assignment is for the cadets to familiarize themselves with and get an understanding of the architecture of the ship's electrical distribution system. The cadets will get practical insight into the general construction and main components of the electrical distribution system by sketching and discussing relevant topics.

Instructions:

1. **Sketch** the main distribution system.
   Create a detailed **sketch** of the ship's main distribution system. The sketch should contain generators, switchboards, bus bars, main circuit breakers, transformers and main consumers (e.g. grouping load for accommodation as one).
2. **Alternators**
   Describe the role of the alternators and main specification of the generators. Include details such as power output and source of power input. **Point out** the importance of redundancy for power generation at sea.
3. **Main circuit breakers**
   Explain how main circuit breakers are ensuring safety and stability of the electrical distribution system.
4. **Voltage levels**
   Describe the different voltage levels and what main consumers are connected to each voltage level.
5. **Load shedding (preferential trip)**
   Describe the term load shedding and **explain** how and why it may occur.

Approval of the assignment:
The solution to the assignment is prepared written and/or oral and presented to the Designated Training Officer. Based on a conversation between the cadet and the DTO, the DTO determines whether the purpose of the assignment has been fulfilled according to the SOLO taxonomy (see page 9).

Signatures of approval	**Date and signature**
Designated Training Officer's signature for approval of the above assignment 4.	
Demonstrate the use of electrical diagrams including symbol understanding.	
Carry out measurements on electrical systems using multimeter and megger.	
Carry out inspection of emergency lighting.	
Explain how the starting of large electric motors affect the electrical system.	
Identify the location of major protection devices in the electrical system.	
Explain how earth faults can occur and how to identify them.	

Intended learning outcome for Thermal Machinery and Systems

Intended learning outcome according to the SOLO taxonomy:

Mark with an X in the boxes below after having completed the tasks ☒

Recommended for preliminary seagoing service:

☐ **Apply** piping diagrams and drawings to understand construction and function of various systems.
☐ **Demonstrate** understanding of auxiliary and service systems.
☐ **Demonstrate** knowledge of fundamental engine room equipment such as;
- Pumps
- Coolers
- Compressors
- Etc.

☐ **Explain** safe operation of auxiliary and service systems in the engine room, such as boilers, compressors, auxiliary engines, freshwater generators, oil purification units, etc.
☐ **Demonstrate** sounding of tanks.
☐ **Demonstrate** sampling of lube oil and how to analyze lube oil.

☐ **Carry out** post start-up checks of engine room equipment.

Recommended for final seagoing service:

☐ **Operate** main and auxiliary machinery along with associated controls.
☐ **Operate** fluid transfer systems, including cooling water, lubrication oil, steam, etc., and their controls.
☐ **Explain** the preparation of the propulsion system for departure and arrival.

Assignment 5: Sketch a system

Preliminary seagoing service
①②③④⑤

Purpose
The purpose of the assignment is to give the cadet an understanding of the systems and the physical interconnection between them within the ship's engine room. By focusing on one system, the cadet will gain insight into the individual components, their function and interconnections.

Instructions
Choose a specific system within the engine room. Examples include fuel oil system, lubrication oil system, cooling water system, refrigeration or any other relevant system, except for electrical systems.

1. **Explain** the main purpose of the chosen system.
2. **Identify** all individual components by tracing the chosen system using piping diagrams.
3. **Explain** briefly the individual components' function within the system.
4. **Sketch** the system. The sketch must include key components such as pumps, valves, heat exchangers, connections to other systems and any other relevant components.

Approval of the assignment:
Present your sketch and your considerations regarding the system's main purpose to the Designated Training Officer. The sketch must be presented in physical form. The description of the main function and explanation of the individual components' function can either be in oral or written form.

In light of the conversation, the DTO will determine whether the purpose of the assignment has been fulfilled according to the SOLO taxonomy (see page 9).

Signatures of approval	**Date and signature**
Designated Training Officer's signature for approval of the above assignment 5.	
Demonstrate sounding of tanks and sounding tables.	
Demonstrate sampling of lube oil and how to analyze lube oil.	
Carry out post start-up checks of engine room equipment.	
Describe the working principles of the centrifugal, gear and lobe pumps.	
Describe the working principles of heat exchangers.	
Describe the working principles of compressors.	
Explain the construction and working principle of pumps and associated systems.	
Demonstrate the use of piping diagrams to identify components of various systems.	

Assignment 6: Preparations, operations and stopping of the propulsion system

Final seagoing service
②③④⑤

Purpose
The purpose of the assignment is for the cadets to demonstrate their understanding of the ship's propulsion and associated systems.

Instructions:
1. **Describe** the construction of the propulsion system including main components such as the main engine, reduction gears, shaft system, stern tube and propeller.
2. **Explain** the steps necessary for making the engine room ready for departure and arrival.
3. **Identify** and **explain** factors important to or affecting efficient propulsion.

Approval of the assignment:
The solution to the assignment is prepared in written and/or oral form and is presented in a conversation with the Designated Training Officer.
In light of this conversation, the DTO will determine whether the purpose of the assignment has been fulfilled according to the SOLO taxonomy (see page 9).

Signatures of approval	**Date and signature**
Designated Training Officer's signature for approval of the above assignment 6.	
Participate in preparations for departure.	
Participate in preparations for arrival.	
Explain watchkeeping requirements during normal operation and during departure/arrival.	
Explain the handing over of the watch.	
Demonstrate routine inspection of the engine room.	
Demonstrate inspection of the main propulsion system.	
Explain the purpose of the engine room logbook.	

Intended learning outcome for Automation and Control Systems

Intended learning outcome according to the SOLO taxonomy:

Recommended for final seagoing service:

Mark with an X in the boxes below after having completed the tasks ☒

- ☐ **Operate** the ship's integrated control system.
- ☐ **Demonstrate** understanding of the purpose of automatic and manual controls.
- ☐ **Explain** the flow in automated control signals and actions.
- ☐ **Demonstrate** understanding of PID controllers and their operational principles.
- ☐ **Identify** specific control systems and **explain** their operations.
- ☐ **Explain** equipment monitoring and control systems, including those of the main propulsion system.
- ☐ **Exemplify** potential fault scenarios and the corresponding reactions of the control system.
- ☐ **Demonstrate** routine testing of alarms.

Assignment 7: Description of automated control systems

Final seagoing service
②③④⑤

Purpose
The primary objective of this assignment is to provide a detailed understanding of the ship's steering gear control system. In order to understand the control system, the main components and function of the steering gear system must be identified and explained. The main focus of the assignment should be on the automated controls of the system. The assignment should give the cadet an understanding of the interaction of electronic control systems and physical components.

Instructions:

1. **Identify** key components including controllers, sensors, actuators and any other elements crucial for the steering gear system operation.
2. **Explain** how the steering gear system is integrated with navigational systems.
3. **Describe** various functionalities of the steering gear system, including its primary purpose during normal navigation.
4. **Explain** different modes of operations and how the system adapts to varying sea conditions.
5. **Point out** redundancy mechanisms in place.
6. **Explain** how the steering gear can be operated in emergency situations.

It is important that the main focus of the assignment is on the automated controls of the steering gear system.

Approval of the assignment:
The solution to the assignment is prepared in written and/or oral form and is presented in a conversation with the Designated Training Officer.
In light of this conversation, the DTO will determine whether the purpose of the assignment has been fulfilled according to the SOLO taxonomy (see page 9).

Signatures of approval	**Date and signature**
Designated Training Officer's signature for approval of the above assignment 7.	
Describe the Ship's steering gear system's auto and manual control.	
Demonstrate the changing over between manual and automatic control of engine room equipment.	
Demonstrate knowledge of PID control characteristics and associated systems.	
Demonstrate knowledge of the ship's integrated control system and how to operate it.	

Intended learning outcome for Maintenance, Safety and Environment

Intended learning outcome according to the SOLO taxonomy:

Mark with an X in the boxes below after having completed the tasks ☒

Recommended for preliminary seagoing service:

☐ **Demonstrate** familiarity with emergency preparedness protocols.
☐ **Demonstrate** effective communication with crew members in the engine room and other departments.
☐ **Participate** as an integral part of the engine room team.
☐ **Demonstrate** proper use of hand tools, including pneumatic or electrical tools.
☐ **Describe** different packing materials and their applications.
☐ **Register** entries into the ship's planned maintenance system.
☐ **Explain** procedures for working in hazardous areas such as enclosed spaces, hot work, working aloft, working on pressurized systems, etc.
☐ **Demonstrate** knowledge of garbage handling procedures.
☐ **Explain** the handling and disposal of waste oil.

Recommended for final seagoing service:

☐ **Explain** the principles of a safe engineering watch and the proper handover procedures.
☐ **Carry out** inspections of the engine room for immediate safety concerns and take corrective actions as necessary.
☐ **Describe** immediate actions to be taken following a blackout, including task prioritization.
☐ **Demonstrate** emergency steering maneuvers.
☐ **Demonstrate** entries in the engine room logbook and other relevant records.
☐ **Demonstrate** proficiency in various metalworking practices, including welding, lathing, riveting, etc.
☐ **Explain** the purpose of and **apply** the ship's planned maintenance system.
☐ **Identify** the environmental impact of the ship's operation and possible risk of pollution.
☐ **Describe** actions to be taken in the event of immediate pollution risks.
☐ **Demonstrate** environmental logging onboard. E.g. Oil Record Book and Garbage Record Book.

Assignment 8: Maintenance and repair

Preliminary seagoing service
①②③④⑤

Purpose
The purpose of this assignment is for the cadets to enhance their knowledge of general maintenance. By completing this assignment, the cadet will demonstrate proficiency in managing specific maintenance tasks, including procedural knowledge, safety integration, risk mitigation, planning, execution and evaluation.

Instructions
Describe the procedure of planning, conducting and evaluating a specific maintenance task of the cadet's choice. It could be piston pull, auxiliary engine, sea chest cleaning or any other relevant maintenance task. The cadet should choose a maintenance task of a certain complexity in order to fully comply with the purpose of the assignment. The description must include safety aspects and how risk mitigation is handled, e.g. toolbox talk.

1. Choose a maintenance task.
2. **Describe** the overall purpose of the task.
3. **Describe** how the task is;
    a. planned,
    b. conducted and
    c. evaluated.
4. **Explain** how safety is managed for the chosen task, including possible risks.

Approval of the assignment:
The solution to the assignment is prepared in written and/or oral form and is presented in a conversation with the Designated Training Officer.
In light of this conversation, the DTO will determine whether the purpose of the assignment has been fulfilled according to the SOLO taxonomy (see page 9).

Signatures of approval	**Date and signature**
Designated Training Officer's signature for approval of the above assignment 8.	
Demonstrate the use of lubricating plans to identify correct lubricants for tasks on board.	
Carry out lubrication of moving parts on the engine room machinery.	
Demonstrate knowledge of material safety data sheets.	
Demonstrate safe use of various tools to perform maintenance tasks.	
Explain the purpose and use of the ships planned maintenance system.	
Demonstrate inspection and maintenance of equipment based on the manufacturer's drawings and instructions.	
Explain precautions to be taken in maintenance tasks in hazardous areas such as enclosed spaces, working aloft, pressurized systems, etc.	

Assignment 9: Garbage handling and oil spill response

Preliminary seagoing service
①②③④⑤

Purpose
The purpose of the assignment is for the cadet to obtain a comprehensive understanding of the proper handling of ship-generated waste. This includes solid waste such as plastics, paper, metals and food, and liquid waste such as sewage, sludge and waste oil. The cadet must also acquire knowledge of emergency responses where the risk of pollution of the environment is present such as an oil spill.

Instructions:
1. **Provide** an overview of which types of waste are generated on board on how they are immediately dealt with. E.g. sorting into different bins or collected to designated tanks.
2. **Explain** how the different types of waste are disposed of. E.g. landing ashore while in port or onboard processing/cleaning such as sewage treatment.
3. **Describe** how waste management is handled on board, including who is responsible for a management plan, any logging of waste related data and special requirements for shipboard waste management that the ship is complying with.
4. **Explain** the procedure for emergency response in case of a potential oil spill. The explanation must include a description of facilities for oil spill prevention, equipment for oil spill cleanup and training for oil spill preparedness.

Approval of the assignment:
The solution to the assignment is prepared in written and/or oral form and is presented in a conversation with the Designated Training Officer.
In light of this conversation, the DTO will determine whether the purpose of the assignment has been fulfilled according to the SOLO taxonomy (see page 9).

Signatures of approval	**Date and signature**
Designated Training Officer's signature for approval of the above assignment 9.	
Explain immediate action if risk of pollution is observed.	
Demonstrate proper garbage handling following the ship's instructions.	
Demonstrate the use of equipment designated for prevention of pollution.	
Demonstrate proper handling of waste oil and identify the risk of improper handling.	
Explain the purpose and function of the bilge system.	
Participate in the emptying of bilge wells.	
Explain the purpose of environmental logging such as the oil record book and garbage record book.	

Assignment 10: Restore ship from blackout

Final seagoing service
②③④⑤

Purpose
The main purpose of this assignment is for the cadet to get a comprehensive understanding of procedures for safe recovery of the engine room from a blackout situation. The cadet will explore critical steps, safety considerations and effective communication to restore and resume normal engine room operation.

Instructions:

1. **Describe** common causes and scenarios that may lead to a blackout. Describe how the individual cause may affect the blackout recovery process. E.g. electrical faults.
2. **Describe** the immediate actions to be taken when a blackout occurs. Include steps for securing safety of personnel, isolating affected systems and establishing communication.
3. **Describe** automated actions that occur when a blackout occurs, and how these are aiding in the recovery process. The description must include automatic startup of emergency equipment, e.g. emergency generator.
4. **Explain** how the safety of the ship's personnel, the environment and the equipment can be compromised following a blackout.

Approval of the assignment:
The solution to the assignment is prepared in written and/or oral form and is presented in a conversation with the Designated Training Officer.
In light of this conversation, the DTO will determine whether the purpose of the assignment has been fulfilled according to the SOLO taxonomy (see page 9).

Signatures of approval	**Date and signature**
Designated Training Officer's signature for approval of the above assignment 10.	
Demonstrate the procedure regarding blackout.	
Demonstrate emergency steering.	
Demonstrate how to reset machinery following a fault.	
Explain priorities for restoring services.	
Demonstrate knowledge of the ship's emergency power generation.	
Explain how to restore power following a blackout to normal operation.	

Handover between Designated Training Officers

The following pages are designated for the handover between the off-signing and on-signing DTO.

This section is for handover between the on/off signing DTO. It is to help the officers better understand where the cadets are in their training onboard.

The following are some examples of what the handover could include.

- Outline the goals and objectives set for the cadet.
- Update the cadet's training progress, highlighting any completed learning outcome and where the cadet may need more training.
- Outline the upcoming plans for the cadets' training, including any upcoming tasks responsibilities or training sessions they are scheduled to undertake.
- Describe the mentorship and supervision structure of the cadet and include the names or personnel involved in their training.
- Discuss the cadets' adherence to safety procedures and regulations onboard. Include any safety drills or training sessions they have participated in.
- Share any feedback received about the cadet from crew members as well as your own observations of the cadet's progress.
- Highlight any issue or challenges the cadets have faced during their time onboard.