Maritime & Coastguard Agency

Consultation Report:
Cadet Training & Modernisation Programme Syllabus Review – Second Group of Consultation Templates

May 2023

Contents

Foreword

The Maritime and Coastguard Agency (MCA), an executive Agency of the Department for Transport (DfT), carried out a public consultation on behalf of the Cadet Training and Modernisation (CT&M) Programme from 6th February to the 6th March 2023 regarding the Cadet Training Syllabus Review. The consultation was published on 6th February 2023 and notification of the consultation was sent to all participants of the CT&M Programme for wider dissemination through the maritime industry. This was also promoted on social media platforms and maritime news outlets.

The proposed amendments to the Cadet training syllabus were published in multiple formats and feedback on these amendments was gathered through surveys hosted on Smart Survey.

1 Key Findings

1.1 Introduction

1.1.1 Through the process of the consultation, it has been found that the majority of survey respondents agreed with the changes suggested by CT&M Sub-Group 1.2.

1.2 Consultation

1.2.1 The second consultation was carried out between 6th February and 6th March 2023 and can be found at: www.gov.uk

1.2.2 A total of 61 responses were received across the eight templates. With all respondents answering every question posed on their survey. A summary of consultee responses and the action taken by CT&M Sub-Group 1.2 as a result can be found in **Annex A**. A more detailed summary can be found in the accompanying 'Detail of feedback received' section of the consultation page. The answers given have been fully and carefully considered.

1.2.3 This consultation has been completed in order to ensure best practice has been followed and provide the opportunity for feedback from the entire maritime industry. There was no legal requirement to undertake this consultation.

Consultation Outcome

2 Summary of responses

2.1 Introduction

2.1.1   A total of 35 outcomes over nine templates were posed in the second consultation.

2.1.2   These outcomes, together with the consultees comments and the Cadet Training & Modernisation Sub-Group 1.2's response, are shown in detail in the accompanying 'Detail of feedback received' section of the consultation page. However, the main points are summarised below at Annex A.

2.1.3   Finalised versions of each module can also be found in the 'Detail of outcome' section of the consultation page.

3 Our response

3.1 What happens next?

3.1.1   The MCA will make the appropriate amendments to the syllabus templates. These will then be used to create academic modules that will form the new Cadet training syllabus with a view to complete this process by the end of 2023.

3.1.2   Once these academic modules have been created, it will take approximately 12 to 18 months to implement the new syllabus.

3.1.3   Cadet Assessment and the Training Record Book will also be amended to reflect these changes.

ANNEX A

SUMMARY OF THE CONSULTATION OUTCOMES, CONSULTEE FEEDBACK AND SUB-GROUP 1.2 RESPONSES TO THE FEEDBACK

Each module had its own survey which included the recommendations of Sub-Group 1.2:

ETO - Analogue Electronic Principles			
Outcome	**Sub-Group 1.2 Recommended Action**	**Consultation Support %**	**Changes made as a result of industry feedback**
Outcome 1: Investigate the operation and characteristics of a range of discrete semiconductor devices	**Keep**	**100%**	**None**
1.1 Rectifier, Signal, Zener, Light-Emitting and Photo Diodes	Modernise	100%	None
1.2 NPN and PNP Bipolar Junction Transistors	Keep	100%	None
1.3 N-Channel and P-Channel JFET	Remove to avoid duplication	100%	None
Outcome 2: Investigate and demonstrate applications of semiconductor diodes	**Keep**	**100%**	**None**
2.1 Rectification	Remove to avoid duplication	100%	None
2.2 Voltage Reference Source	Keep	100%	None
2.3 Clipping	Keep	100%	None
2.4 Clamping	Keep	100%	None
2.5 Light-Emitting	Keep	100%	None
2.6 Photo Diode	Modernise	100%	None
Outcome 3: Investigate and demonstrate transistor applications	**Remove to avoid duplication**	**100%**	**None**
3.1 Common-Emitter Amplifier	Remove to avoid duplication	100%	None

3.2 Common-Collector Amplifier	Remove to avoid duplication	100%	None
3.3 Common-Source Amplifier	Remove to avoid duplication	100%	None
3.4 Common-Drain Amplifier	Remove to avoid duplication	100%	None
3.5 Transistor Switching	Remove to avoid duplication	100%	None
Outcome 4: Investigate and demonstrate linear operational amplifier characteristics and applications	**Keep**	**100%**	**None**
4.1 Ideal operational amplifier characteristics	Keep	100%	None
4.2 Inverting Amplifier	Keep	100%	None
4.3 Non-inverting Amplifier	Keep	100%	None
4.4 Voltage Follower	Keep	100%	None
4.5 Summing Amplifier	Keep	100%	None
4.6 Difference Amplifier	Keep	100%	None

Outcomes for this competency, above and beyond STCW which would be needed due to use of modern technology and impact of future fuels onboard:			
How would you deliver this outcome/ objective?	**How would you assess this outcome/ objective?**	**Action required**	**Consultation Support %**
Ensure all outcomes are contextualised to help Cadets understand what they are learning in relation to what they will experience at sea.	While some outcomes are intrinsically linked to work carried out at sea, some need to be contextualised to show how they apply to work on board. Where this is the case, it is important to make sure Cadets clearly understand how the outcome relates to work at sea and it is essential to make sure that this context is given with reference to current and	Where outcomes do not specifically cover a topic which relates to work carried out at sea, more must be done to contextualise the outcome and make it relevant to the maritime industry, giving specific shipping examples of how the outcome may be applied in a modern shipping context. Not every template has contextualisation recommendations but please	100%

	future seagoing technologies and practices.	do add any you feel may have been missed.	
Include Human Element Factors throughout the syllabus	To provide seafarers with a contextualised understanding of the Human Element in the maritime industry, showing how they can put theory into practice in the work they carry out at sea.	Raise awareness throughout the Cadet's training of the areas in which human element factors will have an impact. Recommendations on where this can be included have been noted throughout the entire syllabus. Not every template has Human Element Factor recommendations but please do add any you feel may have been missed.	100%
Include Data Science skills throughout the syllabus	Data Science Skills (Comprehension, Analysis, Presentation, etc...) are already required within much of the syllabus. A further, specific focus on these skills needs to be taught where relevant.	A specific topic will need to be introduced to improve Cadets' Data Science skills. Practical application of data science skills should be highlighted throughout the syllabus. Not every template has Data Science recommendations but please do add any you feel may have been missed.	100%

ETO - Applications of PLC			
Outcome	**Sub-Group 1.2 Recommended Action**	**Consultation Support %**	**Changes made as a result of industry feedback**
Outcome 1: Explain and classify PLC hardware	**Keep**	**No Feedback Received**	**None**
1.1 Architecture of a PLC	Modernise	No Feedback Received	None
1.2 Function of the element parts of a PLC	Keep	No Feedback Received	None
1.3 Causes and consequences of failures within a PLC controlled system	Modernise	No Feedback Received	None
1.4 Classification of PLC systems (in terms of memory capacity, number of input and output terminals, complexity of programming functions, and typical application)	Modernise	No Feedback Received	None
1.5 Benefits of PLC control systems	Modernise	No Feedback Received	None
Outcome 2: Describe the operation of PLC software	**Keep**	**No Feedback Received**	**None**
2.1 Function and operation of a timer within a PLC program	Modernise	No Feedback Received	None
2.2 Function and operation of a counter within a PLC program	Modernise	No Feedback Received	None
2.3 Function and operation of a latching circuit within a PLC program	Keep	No Feedback Received	None
2.4 Function and operation of a shift register within a PLC program	Keep	No Feedback Received	None
2.5 Function and operation of auxiliary relays within a PLC program	Keep	No Feedback Received	None
2.6 Interpretation of PLC programs	Keep	No Feedback Received	None
2.7 Method of program execution	Keep	No Feedback Received	None

Outcome 3: Simulate the safe control of an industrial process by the application of PLC technology	Keep	No Feedback Received	None
3.1 Preparation of a PLC program to simulate safe control of an industrial process	Modernise	No Feedback Received	None
3.2 Allocation of PLC inputs and outputs	Keep	No Feedback Received	None
3.3 Entering a program into a PLC	Keep	No Feedback Received	None
3.4 Editing a PLC program	Keep	No Feedback Received	None
3.5 Verifying correct operation of a PLC program	Modernise	No Feedback Received	None
3.6 Demonstrating the operation of a PLC program	Keep	No Feedback Received	None
3.7 Documentation of control strategy and software	Keep	No Feedback Received	None
Outcomes for this competency, above and beyond STCW which would be needed due to use of modern technology and impact of future fuels onboard:			
How would you deliver this outcome/ objective?	**How would you assess this outcome/ objective?**	**Action required**	**Consultation Support %**
Ensure all outcomes are contextualised to help Cadets understand what they are learning in relation to what they will experience at sea.	While some outcomes are intrinsically linked to work carried out at sea, some need to be contextualised to show how they apply to work on board. Where this is the case, it is important to make sure Cadets clearly understand how the outcome relates to work at sea and it is essential to make sure that this context is given with reference to current and future seagoing technologies and practices.	Where outcomes do not specifically cover a topic which relates to work carried out at sea, more must be done to contextualise the outcome and make it relevant to the maritime industry, giving specific shipping examples of how the outcome may be applied in a modern shipping context. Not every template has contextualisation recommendations but please do add any you feel may have been missed.	No Feedback Received

Include Human Element Factors throughout the syllabus	To provide seafarers with a contextualised understanding of the Human Element in the maritime industry, showing how they can put theory into practice in the work they carry out at sea.	Raise awareness throughout the Cadet's training of the areas in which human element factors will have an impact. Recommendations on where this can be included have been noted throughout the entire syllabus. Not every template has Human Element Factor recommendations but please do add any you feel may have been missed.	No Feedback Received
Include Data Science skills throughout the syllabus	Data Science Skills (Comprehension, Analysis, Presentation, etc...) are already required within much of the syllabus. A further, specific focus on these skills needs to be taught where relevant.	A specific topic will need to be introduced to improve Cadets' Data Science skills. Practical application of data science skills should be highlighted throughout the syllabus. Not every template has Data Science recommendations but please do add any you feel may have been missed.	No Feedback Received

ETO - Implementing Small Local Area Networks			
Outcome	**Sub-Group 1.2 Recommended Action**	**Consultation Support %**	**Changes made as a result of industry feedback**
Outcome 1: Explain the main LAN types, their operation and relative merits	**Modernise**	**No Feedback Received**	**None**
1.1 Explain the relationship between bandwidth and data transmission rates	Keep	No Feedback Received	None
1.2 Describe the topology and operation of the main LAN types	Modernise	No Feedback Received	None
1.3 Explain the relative merits of each transmission media in terms of data rates, installation cost, noise immunity, reliability and cost	Keep	No Feedback Received	None
1.4 Advantages/disadvantages of peer to peer and client server LANs	Keep	No Feedback Received	None
Outcome 2: Implementing Small Local Area Networks	**Combine**	**No Feedback Received**	**None**
2.1 Explain the effect of the size of the network on choice	Keep	No Feedback Received	None
2.2 Explain the effect numbers of users and frequency of use has on the choice	Keep	No Feedback Received	None
2.3 Explain the effect of types of files to be transferred across the network on bandwidth requirements and hence choice of network	Keep	No Feedback Received	None
2.4 Justify the selection of either a peer to peer or client server operating system	Keep	No Feedback Received	None
2.5 Explain the implication of types of external links (Internet, etc) and required data rates to the LAN	Keep	No Feedback Received	None

Outcome 3: Install and commission a small LAN	Modernise	No Feedback Received	None
3.1 Select appropriate type of cable and connectors for the network	Modernise	No Feedback Received	None
3.2 Select appropriate network interface cards (NICs)	Modernise	No Feedback Received	None
3.3 Correctly install cables, NICs and any other necessary network equipment	Modernise	No Feedback Received	None
3.4 Select and install appropriate uninterruptible power supply and surge protection equipment	Keep	No Feedback Received	None
3.5 Use supplied test software to verify the correct operation of the LAN	Keep	No Feedback Received	None
Outcomes for this competency, above and beyond STCW which would be needed due to use of modern technology and impact of future fuels onboard:			
How would you deliver this outcome/ objective?	How would you assess this outcome/ objective?	Action required	Consultation Support %
Ensure all outcomes are contextualised to help Cadets understand what they are learning in relation to what they will experience at sea.	While some outcomes are intrinsically linked to work carried out at sea, some need to be contextualised to show how they apply to work on board. Where this is the case, it is important to make sure Cadets clearly understand how the outcome relates to work at sea and it is essential to make sure that this context is given with reference to current and future seagoing technologies and practices.	Where outcomes do not specifically cover a topic which relates to work carried out at sea, more must be done to contextualise the outcome and make it relevant to the maritime industry, giving specific shipping examples of how the outcome may be applied in a modern shipping context. Not every template has contextualisation recommendations but please do add any you feel may have been missed.	No Feedback Received

Include Human Element Factors throughout the syllabus	To provide seafarers with a contextualised understanding of the Human Element in the maritime industry, showing how they can put theory into practice in the work they carry out at sea.	Raise awareness throughout the Cadet's training of the areas in which human element factors will have an impact. Recommendations on where this can be included have been noted throughout the entire syllabus. Not every template has Human Element Factor recommendations but please do add any you feel may have been missed.	No Feedback Received
Include Data Science skills throughout the syllabus	Data Science Skills (Comprehension, Analysis, Presentation, etc...) are already required within much of the syllabus. A further, specific focus on these skills needs to be taught where relevant.	A specific topic will need to be introduced to improve Cadets' Data Science skills. Practical application of data science skills should be highlighted throughout the syllabus. Not every template has Data Science recommendations but please do add any you feel may have been missed.	No Feedback Received

Marine Engineering - Stability and Structure of Merchant Ships			
Outcome	Sub-Group 1.2 Recommended Action	Consultation Support %	Changes made as a result of industry feedback
Outcome 1: Apply the principles of hydrostatics to solve problems relating to merchant navy vessels	**Modernise**	**100%**	**None**
1.1 Principles of Flotation, Buoyancy and Displacement	Keep	100%	None
1.2 Coefficients of Form	Keep	100%	None
1.3Tonnes per centimetre immersion TPC	Keep	100%	None
1.4 Small changes in draught over change in mass or density	Keep	100%	None
1.5 Hydrostatic Forces	Keep	100%	None
Outcome 2: Determine Small Angle Stability including Free Surface Effect on typical merchant navy vessel.	**Modernise**	**100%**	**None**
2.1 Centre of Gravity	Modernise	100%	None
2.2 Transverse stability at small angles of heel	Keep	100%	None
2.3 Angle of List	Keep	100%	None
2.4 Free Surface Effect	Keep	100%	None
2.5 Effects on stability of transferring fluids within the vessel	Modernise	100%	None
2.6 Centre of Gravity when loading/discharging	Keep	100%	None
Outcome 3: Analyse Basic Ship Construction of standard merchant ship types.	**Modernise**	**100%**	**None**
3.1 Basic Ship's Geometry	Modernise	100%	None
3.2 Ship's Cross Sections	Modernise	100%	None
3.3 Basic Propeller Terminology	Keep	100%	None

3.4 Include rudder construction.	Add	100%	None
Outcomes for this competency, above and beyond STCW which would be needed due to use of modern technology and impact of future fuels onboard:			
How would you deliver this outcome/ objective?	**How would you assess this outcome/ objective?**	**Action required**	**Consultation Support %**
Ensure all outcomes are contextualised to help Cadets understand what they are learning in relation to what they will experience at sea.	While some outcomes are intrinsically linked to work carried out at sea, some need to be contextualised to show how they apply to work on board. Where this is the case, it is important to make sure Cadets clearly understand how the outcome relates to work at sea and it is essential to make sure that this context is given with reference to current and future seagoing technologies and practices.	Where outcomes do not specifically cover a topic which relates to work carried out at sea, more must be done to contextualise the outcome and make it relevant to the maritime industry, giving specific shipping examples of how the outcome may be applied in a modern shipping context. Not every template has contextualisation recommendations but please do add any you feel may have been missed.	100%
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		please do add any you feel may have been missed.	

Marine Engineering - Naval Architecture (Management Level)			
Outcome	**Sub-Group 1.2 Recommended Action**	**Consultation Support %**	**Changes made as a result of industry feedback**
Outcome 1: Calculate small and large angle stability in marine vessels	**Keep**	**100%**	**None**
1.1 Inclining Experiment	Modernise	100%	None
1.2 GZ Curves	Modernise	100%	None
1.3 Wall Sided Formula	Modernise	100%	None
1.4 Longitudinal Stability	Modernise	100%	None
1.5 Bilging	Modernise	100%	None
1.6 Simpsons Rule	Keep	100%	None
Outcome 2 Calculate ship powering and resistance from model test data	**Keep**	**100%**	**None**
2.1 Shear force and bending moment diagrams	Modernise	100%	None
2.2 Shear force and bending moment calculations	Modernise	100%	None
2.3 Frictional Resistance	Modernise	100%	None
2.4 Residual Resistance	Modernise	100%	None
2.5 Model testing	Modernise	100%	None
2.6 Admiralty Coefficient	Modernise	100%	None
Outcome 3: Calculate ship fuel consumption from propeller dimensions	**Keep**	**100%**	**None**
3.1 Fuel consumption	Modernise	100%	None
3.2 Propeller calculations involving slip, thrust, torque and efficiency	Keep	100%	None
3.3 Relationship between powers	Keep	100%	None
3.4 Propeller cavitation	Keep	100%	None
3.5 Rudder balance and principal forces	Keep	100%	None
3.6 Rudder problems involving angle of heel	Keep	100%	None

Outcome 4: Discuss constructional details used to resist stress	Keep	100%	None
4.1 Stresses in ship's structures	Keep	50%	None
4.2 Structural components	Keep	100%	None
4.3 Fore and aft end construction	Keep	100%	None
4.4 Framing	Keep	100%	None
4.5 Ship's cross sections	REMOVE	100%	None
4.6 Bulkheads	Keep	100%	None
4.7 Rudders	Keep	50%	We have changed "Rudders" to "Control Systems". This will provide a catch-all sub-outcome that should cover future technological developments. This will ensure other forms of control systems such as azimuth thrusters or water/ pump jet technology are included.

Outcomes for this competency, above and beyond STCW which would be needed due to use of modern technology and impact of future fuels onboard:			
How would you deliver this outcome/ objective?	**How would you assess this outcome/ objective?**	**Action required**	**Consultation Support %**
Ensure all outcomes are contextualised to help Cadets understand what they are learning in relation to what they will experience at sea.	While some outcomes are intrinsically linked to work carried out at sea, some need to be contextualised to show how they apply to work on board. Where this is the case, it is important to make sure Cadets clearly understand how the outcome relates to work at sea and it is essential to make sure that this context is given with reference to current and future seagoing technologies and practices.	Where outcomes do not specifically cover a topic which relates to work carried out at sea, more must be done to contextualise the outcome and make it relevant to the maritime industry, giving specific shipping examples of how the outcome may be applied in a modern shipping context. Not every template has contextualisation recommendations but please do add any you feel may have been missed.	100%

Include Human Element Factors throughout the syllabus	To provide seafarers with a contextualised understanding of the Human Element in the maritime industry, showing how they can put theory into practice in the work they carry out at sea.	Raise awareness throughout the Cadet's training of the areas in which human element factors will have an impact. Recommendations on where this can be included have been noted throughout the entire syllabus. Not every template has Human Element Factor recommendations but please do add any you feel may have been missed.	100%
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Deck - Marine Cargo Operations			
Outcome	**Sub-Group 1.2 Recommended Action**	**Consultation Support %**	**Changes made as a result of industry feedback**
Outcome 1: Explain the principles and safe working practices for the proper loading, stowage and carriage of dry cargoes and offshore vessel operations.	**Keep**	**100%**	**None**
1.1 Loading, discharging, securing and carriage of dry cargoes	Modernise	100%	None
1.2 Relevant codes for carriage of cargoes	Keep	94%	None
1.3 Procedures to ensure efficient cargo operations	Modernise	94%	None
1.4 Care and maintenance of cargo handling equipment	Keep	88%	None
1.5 Cargo calculations	Modernise	100%	None
Outcome 2: Explain the principles and safe methods of arranging for the proper loading, stowage and carriage of bulk liquid and chemical cargoes.	**Keep**	**94%**	**None**
2.1 Loading, discharging, securing and carriage of bulk liquid cargoes	Modernise	100%	None
2.2 Tank entry procedures	Keep	94%	Added the action to, "Include Human Element Factors to reinforce safe operation/culture/ emergency response."
2.3 Inert gas systems	Modernise	100%	None
2.4 Crude oil washing and tank/pipeline cleaning	Modernise	100%	None
2.5 Ballast management	Modernise	94%	None

2.6 Single/multiple grade cargoes	Modernise	94%	None
2.7 Liquid cargo calculations	Modernise	94%	None
Outcome 3: Explain the duties of the Officer of the Watch (OOW) whilst maintaining a deck cargo watch.	**Keep**	**100%**	**None**
3.1 Safety and security procedures. Which may arise during a cargo watch	Keep	88%	None
3.2 Legislative requirements for safe access as per COSWP	Keep	100%	None
3.3 Legislative requirements for lifting appliances as per COSWP	Keep	100%	None
3.4 Legislative requirement for cargo documentation and record keeping	Keep	100%	None
3.5 Code of safe working practice	Keep	100%	None
3.6 Pollution prevention measure during cargo watch	Keep	100%	None
3.7 Response to emergencies	Keep	88%	Added the action to, "Include the use of case studies."
Outcome 4: Explain the precautions and procedures to be taken to prevent pollution of the marine environment.	**Keep**	**94%**	**None**
4.1 International Convention for the Prevention of Pollution from Ships (MARPOL)	Keep	100%	None
4.2 Shipboard Marine Pollution Emergency Plans (SMPEP)	Keep	94%	None
4.3 Hazardous goods	Keep	94%	None
4.4 Bunkering operations	Keep	100%	None
Outcomes for this competency, above and beyond STCW which would be needed due to use of modern technology and impact of future fuels onboard:			

How would you deliver this outcome/ objective?	How would you assess this outcome/ objective?	Action required	Consultation Support %
Ensure all outcomes are contextualised to help Cadets understand what they are learning in relation to what they will experience at sea.	While some outcomes are intrinsically linked to work carried out at sea, some need to be contextualised to show how they apply to work on board. Where this is the case, it is important to make sure Cadets clearly understand how the outcome relates to work at sea and it is essential to make sure that this context is given with reference to current and future seagoing technologies and practices.	Where outcomes do not specifically cover a topic which relates to work carried out at sea, more must be done to contextualise the outcome and make it relevant to the maritime industry, giving specific shipping examples of how the outcome may be applied in a modern shipping context. Not every template has contextualisation recommendations but please do add any you feel may have been missed.	100%
Include Human Element Factors throughout the syllabus	To provide seafarers with a contextualised understanding of the Human Element in the maritime industry, showing how they can put theory into practice in the work they carry out at sea.	Raise awareness throughout the Cadet's training of the areas in which human element factors will have an impact. Recommendations on where this can be included have been noted throughout the entire syllabus. Not every template has Human Element Factor recommendations but please do add any you feel may have been missed.	100%
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Deck - Management of Vessel Operations			
Outcome	**Sub-Group 1.2 Recommended Action**	**Consultation Support %**	**Changes made as a result of industry feedback**
Outcome 1: Analyse and plan cargo operations for dry cargoes, including loading, discharging, securing and cargo handling equipment and safe operating procedures.	**Keep**	**93%**	**None**
1.1 Dry cargo operations and legislative requirements	Modernise	100%	Added, "Include the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (BWM Convention)"
1.2 Cargo operation management and control	Modernise	93%	None
1.3 Cargo stowage and securing legislation	Keep	100%	None
1.4 Cargo handling equipment	Modernise	100%	None
Outcome 2: Analyse and plan cargo operations for bulk liquid cargoes, including loading, discharging and cargo handling equipment and safe operating procedures.	**Keep**	**93%**	**None**
2.1 Liquid cargo operations and legislative requirements	Modernise	93%	None
2.2 Liquid cargo operation management and control	Modernise	100%	None
Outcome 3: Analyse the planning and operational procedures for passenger operations.	**Keep**	**93%**	**None**
3.1 Passenger operations to meet legislative requirements	Keep	93%	None

3.2 Passenger operations: control and monitoring	Modernise	80%	Added, "Include case studies of successful emergency passenger operations"
Outcome 4: Calculate cargo quantity within the constraints of prevailing legislations and contact of carriage.	**Keep**	**100%**	**None**
4.1 Load line zone calculation	Modernise	100%	None
4.2 Quantity on board (bulk liquid calculations)	Modernise	93%	None
4.3 Quantity to load to fill the hold using stowage factor and broken stowage	Modernise	93%	None
4.4 Draught surveys	Modernise	93%	None
Outcomes for this competency, above and beyond STCW which would be needed due to use of modern technology and impact of future fuels onboard:			
How would you deliver this outcome/ objective?	**How would you assess this outcome/ objective?**	**Action required**	**Consultation Support %**
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Introduce an outcome on liquid hydrogen cargo.	This learning related to liquid hydrogen cargo carriers needs to be introduced due to their presence in the industry.	Group to confer with relevant experts for feedback and introduce outcome.	100%

Marine Engineering - Pneumatics and Hydraulic Systems			
Outcome	**Sub-Group 1.2 Recommended Action**	**Consultation Support %**	**Changes made as a result of industry feedback**
Outcome 1: Explain the operation of pneumatic and hydraulic systems	**Keep**	**100%**	**None**
1.1 Identification of component symbols to British Standards.	Keep	100%	None
1.2 Operation of pneumatic circuit components.	Modernise	100%	None
1.3 Operation of hydraulic circuit components	Modernise	100%	None
1.4 Properties of air as working fluid	Keep	100%	None
1.5 Properties of hydraulic fluids	Keep	100%	None
1.6 Safety precautions regarding pneumatic and hydraulic systems	Keep	100%	None
Outcome 2: Design, assemble and test a fluid power and control system	**Keep**	**100%**	**None**
2.1 Design of circuit for a given application.	Keep	100%	None
2.2 Assembly of circuit using standard components	Keep	100%	None
2.3 Test of circuit to ensure correct operation	Keep	100%	None
Outcome 3: Demonstrate fault-finding competence on a fluid power system	**Keep**	**100%**	**None**
3.1 Interpretation of industrial drawings	Keep	100%	None
3.2 Diagnostic techniques	Modernise	100%	None
3.3 Rectification of faults	Modernise	100%	None

Outcomes for this competency, above and beyond STCW which would be needed due to use of modern technology and impact of future fuels onboard:			
How would you deliver this outcome/ objective?	How would you assess this outcome/ objective?	Action required	Consultation Support %
Ensure all outcomes are contextualised to help Cadets understand what they are learning in relation to what they will experience at sea.	While some outcomes are intrinsically linked to work carried out at sea, some need to be contextualised to show how they apply to work on board. Where this is the case, it is important to make sure Cadets clearly understand how the outcome relates to work at sea and it is essential to make sure that this context is given with reference to current and future seagoing technologies and practices.	Where outcomes do not specifically cover a topic which relates to work carried out at sea, more must be done to contextualise the outcome and make it relevant to the maritime industry, giving specific shipping examples of how the outcome may be applied in a modern shipping context. Not every template has contextualisation recommendations but please do add any you feel may have been missed.	100%
Include Human Element Factors throughout the syllabus	To provide seafarers with a contextualised understanding of the Human Element in the maritime industry, showing how they can put theory into practice in the work they carry out at sea.	Raise awareness throughout the Cadet's training of the areas in which human element factors will have an impact. Recommendations on where this can be included have been noted throughout the entire syllabus. Not every template has Human Element Factor recommendations but please do add any you feel may have been missed.	100%
Include Data Science skills throughout the syllabus	Data Science Skills (Comprehension, Analysis, Presentation, etc...) are already required within much of the syllabus. A further, specific focus on these skills needs to be taught where relevant.	A specific topic will need to be introduced to improve Cadets' Data Science skills. Practical application of data science skills should be highlighted throughout the syllabus. Not every template has Data Science recommendations but please do add any you feel may have been missed.	100%

Deck - Navigational Mathematics and Science			
Outcome	Sub-Group 1.2 Recommended Action	Consultation Support %	Changes made as a result of industry feedback
Outcome 1: Describe and apply navigational terms and calculate courses and distances.	**Modernise**	**89%**	**None**
1.1 Navigational terms	Keep	94%	None
1.2 Plane trigonometry	Keep	83%	None
1.3 Spherical trigonometry	Keep	94%	None
1.4 Sailings on the earth's surface: (parallel, plane, Mercator and great circle)	Modernise	94%	None
1.5 Load lines and limiting latitudes	Modernise	100%	None
1.6 Estimated Time of Arrival (ETA) calculations	Modernise	94%	None
Outcome 2: Describe the basic theory of the ship's magnetic compass and its associated errors and maintenance.	**Keep**	**100%**	**None**
2.1 Earth's magnetic field	Keep	100%	None
2.2 Ship's magnetic field	Keep	94%	None
2.3 Compass errors and their causes	Keep	100%	None
2.4 Ship's magnetic compass and maintenance	Modernise	100%	None
Outcome 3: Describe the operation of the marine gyrocompass and its associated errors.	**Keep**	**100%**	**None**
3.1 Free gyroscope	Keep	100%	None
3.2 Marine gyrocompass	Keep	100%	None
3.3 Gyrocompass errors	Modernise	100%	None

Outcomes for this competency, above and beyond STCW which would be needed due to use of modern technology and impact of future fuels onboard:			
How would you deliver this outcome/ objective?	**How would you assess this outcome/ objective?**	**Action required**	**Consultation Support %**
Ensure all outcomes are contextualised to help Cadets understand what they are learning in relation to what they will experience at sea.	While some outcomes are intrinsically linked to work carried out at sea, some need to be contextualised to show how they apply to work on board. Where this is the case, it is important to make sure Cadets clearly understand how the outcome relates to work at sea and it is essential to make sure that this context is given with reference to current and future seagoing technologies and practices.	Where outcomes do not specifically cover a topic which relates to work carried out at sea, more must be done to contextualise the outcome and make it relevant to the maritime industry, giving specific shipping examples of how the outcome may be applied in a modern shipping context. Not every template has contextualisation recommendations but please do add any you feel may have been missed.	100%
Include Human Element Factors throughout the syllabus	To provide seafarers with a contextualised understanding of the Human Element in the maritime industry, showing how they can put theory into practice in the work they carry out at sea.	Raise awareness throughout the Cadet's training of the areas in which human element factors will have an impact. Recommendations on where this can be included have been noted throughout the entire syllabus. Not every template has Human Element Factor recommendations but please do add any you feel may have been missed.	100%
Include Data Science skills throughout the syllabus	Data Science Skills (Comprehension, Analysis, Presentation, etc...) are already required within much of the syllabus. A further, specific focus on these skills needs to be taught where relevant.	A specific topic will need to be introduced to improve Cadets' Data Science skills. Practical application of data science skills should be highlighted throughout the syllabus. Not every template has Data Science recommendations but please do add any you feel may have been missed.	94%

Include alternative types of compasses – fibreoptic compass, GPS compass (not SOLAS approved)	Multiple different types of compasses will be encountered at sea.	Include alternative compass types in Outcome 3 of this module.	89%
Use of calculation software to determine compass error (Azimuth and amplitude calculations)	Calculation software is prevalent on board modern vessels, as such an understanding of it should be covered within this module.	Use calculation software found on board as a teaching aid.	78%