Maritime & Coastguard Agency

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

July 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 3rd April to the 8th May 2023 regarding the Cadet Training Syllabus Review. The consultation was published on 3rd April 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 sixth consultation was carried out between 3rd April and 8th May 2023 and can be found at: www.gov.uk

1.2.2 A total of 8 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 38 outcomes over eight templates were posed in the sixth 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 - Distributed Control Systems (DCS)			
Outcome	**Sub-Group 1.2 Recommended Action**	**Consultation Support %**	**Changes made as a result of industry feedback**
Outcome1: Explain the concept of DCS	**Modernise**	**No Feedback Received**	**None**
1.1 DCS layout in terms of communication paths and signal levels	Modernise	No Feedback Received	None
1.2 Highway based systems, communications controller and highway redundancy	Modernise	No Feedback Received	None
1.3 Distributed system from field devices to commercial data processing	Modernise	No Feedback Received	None
1.4 Component parts and their respective functions/specifications	Modernise	No Feedback Received	None
1.5 High/low level systems	Modernise	No Feedback Received	None
Outcome 2: Apply the construction and operation of a DCS controller	**Modernise**	**No Feedback Received**	**None**
2.1 Control modes; manual, automatic and cascade	Modernise	No Feedback Received	None
2.2 Mode attribute; operate and programme	Modernise	No Feedback Received	None
2.3 Structure of a DCS controller	Modernise	No Feedback Received	None
2.4 Tracking, initialization, past mode recall and alarms	Modernise	No Feedback Received	None

2.5 Advance multifunction controller functions and configuration words	Modernise	No Feedback Received	None
2.6 Diagnostic methods used in multifunction controllers	Modernise	No Feedback Received	None
2.7 Primary and reserve controllers and the use of uninterrupted automatic control	Modernise	No Feedback Received	None
2.8 Configuration to meet loop detail specification for feedback, feedforward, cascade, ratio systems	Modernise	No Feedback Received	None
Outcome 3: Explain operator interfaces	**Modernise**	**No Feedback Received**	**None**
3.1 Operator interface and associated hardware	Modernise	No Feedback Received	None
3.2 Ergonomic considerations	Modernise	No Feedback Received	None
3.3 Multiple operator stations	Modernise	No Feedback Received	None
3.4 Highway and media connections	Modernise	No Feedback Received	None
Outcome 4: Explain reporting systems	**Modernise**	**No Feedback Received**	**None**
4.1 Data point ownership	Modernise	No Feedback Received	None
4.2 Alarms — generation, reporting, acceptance and time stamped	Modernise	No Feedback Received	None
4.3 Alarms — configuration of priority action, setting and suppression	Modernise	No Feedback Received	None
4.4 Types of logs and reports, configurable on DCS	Modernise	No Feedback Received	None
4.5 Cross screen invocation and user defined keys	Modernise	No Feedback Received	None
Outcome 5: Apply maintenance considerations	**Modernise**	**No Feedback Received**	**None**
5.1 Hardware reliability — mean time between failures,	Modernise	No Feedback Received	None

mean time to repair and availability			
5.2 Diagnostic and maintenance routines — self diagnostics, module start up and failure messages	Modernise	No Feedback Received	None
5.3 Requirements of uninterruptible power supplies (UPS) and their application	Modernise	No Feedback Received	None
5.4 Recovery of DCS after power outage	Modernise	No Feedback Received	None
Outcome 6: Apply DCS applications and implementation	**Modernise**	**No Feedback Received**	**None**
6.1 Examples of process control — from highway level, main computer level and mainframe computer level	Modernise	No Feedback Received	None
6.2 DCS in different control environments — paper/pulp, boiler controls, petrol/chemical and gas processing	Modernise and remove	No Feedback Received	None
6.3 System strategy and automation plan — architecture, vendor, system requirements and system integrator and toolkit	Modernise	No Feedback Received	None
6.4 Project implementation phases — requirements definition, design, implementation, testing and start up, continuous improvement decommissioning	Modernise	No Feedback Received	None
6.5 Process life cycle versus system life cycle	Modernise	No Feedback Received	None
Outcome 7: Apply future DCS	**Modernise**	**No Feedback Received**	**None**

7.1 Open systems — choice of hardware/software and communication systems	Modernise	No Feedback Received	None
7.2 OPC – Data transfer between different vendor systems	Modernise	No Feedback Received	None
7.3 Industrial communications — Fieldbus and Ethernet standards needed for intrinsic safety	Modernise	No Feedback Received	None
7.4 Safety and shutdown systems — TMR systems and safety functions to DCS	Modernise	No Feedback Received	None
7.5 Embedding of EN 61511 and EN 61508	Modernise	No Feedback Received	None
7.6 Integration with business systems — E commerce for process control systems, web browser and applications	Modernise	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 - Engineering Mathematics 2			
Outcome	**Sub-Group 1.2 Recommended Action**	**Consultation Support %**	**Changes made as a result of industry feedback**
Outcome1: Solve trigonometric and hyperbolic function problems	**Modernise**	**50%**	**None**
1.1 Inverse trigonometric ratios	Modernise	50%	None
1.2 Compound angle formulae	Modernise	50%	None
1.3 Basic trigonometric identities	Modernise	50%	None
1.4 Hyperbolic functions	Modernise	50%	None
1.5 Basic hyperbolic identities	Modernise	50%	None
Outcome 2: Use differentiation techniques to solve Engineering problems	**Modernise**	**100%**	**None**
2.1 Differentiation of standards functions	Modernise	100%	None
2.2 Chain Rule	Modernise	100%	None
2.3 Second derivatives	Modernise	100%	None
2.4 Rates of change	Modernise	100%	None
2.5 Optimisation	Modernise	100%	None
Outcome 3: Use integration techniques to solve Engineering problems	**Modernise**	**50%**	**None**
3.1 Indefinite and definite integrals	Modernise	50%	None
3.2 Integration of standard functions	Modernise	50%	None
3.3 Applications of integration	Modernise	50%	None
Outcome 4: Matrices	**Add**	**50%**	**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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		do add any you feel may have been missed.	

Marine Engineering: Electrical and Electronic Devices			
Outcome	**Sub-Group 1.2 Recommended Action**	**Consultation Support %**	**Changes made as a result of industry feedback**
Outcome1: Explain the physical construction and the characteristics of electrical/electronic components	**Keep**	**No Feedback Received**	**None**
1.1 Electrical charge, current, e.m.f., potential difference, electrical energy, and power	Remove	No Feedback Received	None
1.2 Resistance, inductance, and capacitance in terms of physical dimensions and materials	Keep	No Feedback Received	None
1.3 Physical parameters of resistance, inductance, and capacitance	Keep	No Feedback Received	None
1.4 Effects of temperature on conductors, semi-conductors, and insulators	Keep	No Feedback Received	None
1.5 Temperature coefficient of resistance	Keep	No Feedback Received	None
Outcome 2: Solve problems relating to linear d.c. and a.c. electrical circuits	**Keep**	**No Feedback Received**	**None**
2.1 Series and parallel resistive d.c. circuits	Remove	No Feedback Received	None
2.2 Wheatstone Bridge	Keep	No Feedback Received	None
2.3 A.C. sinusoidal waveforms	Keep	No Feedback Received	None
2.4 Operation of circuits having R, L and C components	Remove	No Feedback Received	None
2.5 Shipboard electrical equipment	Keep	No Feedback Received	None

Outcome 3: Explain the characteristics and marine applications of semiconductor devices used in rectification and small signal circuits	**Keep**	**No Feedback Received**	**None**
3.1 Operations of p and n type diode	Remove	No Feedback Received	None
3.2 Explain how rectification of an a.c. single phase supply is achieved using: one diode; two diodes and a centre tapped transformer; bridge rectifier	Keep	No Feedback Received	None
3.3 Formation of a pnp and npn junction transistor	Keep	No Feedback Received	None
3.4 Bipolar transistors as switches in marine applications	Keep	No Feedback Received	None
3.5 Operation of small signal bipolar transistor amplifiers in marine applications	Keep	No Feedback Received	None
3.6 Photo-electric effect	Keep	No Feedback Received	None
Outcome 4: Explain Secondary Cells and Batteries for Marine applications	**Keep**	**No Feedback Received**	**None**
4.1 Lead-acid and alkaline (Nickel cadmium) cells	Modernise	No Feedback Received	None
4.2 Charge/discharge graphs for both types	Keep	No Feedback Received	None
4.3 Efficiency of batteries	Keep	No Feedback Received	None
4.4 Batteries in series and parallel	Keep	No Feedback Received	None
4.5 Charging circuits for batteries	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
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Marine Legislation and Leadership Marine Law and Management – An Introduction			
Outcome	**Sub-Group 1.2 Recommended Action**	**Consultation Support %**	**Changes made as a result of industry feedback**
Outcome1: Explain the relationship between shipboard and shore management structures	**Amend**	**100%**	**None**
1.1Shipboard management structures	Amend	100%	None
1.2 Shore management structures	Amend	100%	None
1.3 Responsibilities of individuals	Amend	100%	None
Outcome 2: Discuss Marine Legislation, on the management of shipboard operations	**Amend**	100%	None
2.1 Safety management system (SMS) on ships	Amend	100%	None
2.2 International Safety Management (ISM) Code	Amend	100%	None
2.3 SOLAS (Safety of Life at Sea)	Amend	100%	None
2.4 MARPOL (Prevention of Pollution from ships)	Amend	100%	None
2.5 MLC (Maritime Labour Convention)	Amend	100%	None
2.6 STCW (Standards of Training, Certification and Watchkeeping for Seafarers)	Amend	100%	None
Outcome 3: Analyse leadership and management techniques used on-board and explain factors affecting management of personnel on-board at the operational	**Amend**	50%	None

level in the context of the marine industry			
3.1 Management styles- Shipboard and shoreside management structures	Amend	50%	None
3.2 Authority and assertiveness Principles of management adopted on-board ship	Amend	50%	Added, "Industry feedback to ensure authority and assertiveness included in the academic guidance document for this module."
3.3 Situational awareness Applying management techniques in the workplace	Amend	50%	Added, "Industry feedback to ensure authority and assertiveness included in the academic guidance document for this module."
3.4 Communication The importance of a safety conscious, communicative environment	Amend	50%	None
3.5 Effects of fatigue and stress Awareness of requirements for response to bullying, harassment, Sexual Assault and Sexual Harassment (SASH)	Amend	50%	None
3.6 Judgement and decision-making Awareness of the concept of Psychological Safety	Amend	50%	None
3.7 Leadership in emergencies	Amend	50%	None
3.8 Cultural factors within multi-national crews	Amend	50%	

3.9 Situational Awareness & Decision Making	Add	N/A	These elements were originally in the Marine Engineering “Legislation and Leadership” module and industry feedback shows that they should remain to be included for both Deck and Engine.
Outcome 4: Explain the systems of law and guidance operating at national and international level.	**Add**	**100%**	**None**
4.1 The English legal system including statute law, common law and application of international law	Add	100%	None
4.2 Criminal and civil law including examples and court procedures	Add	50%	None
4.3 Legal and non-legal regulations and compliance	Add	100%	None
4.4: Awareness of legal and practical implications of working on a foreign flagged vessel.	Add	100%	None
4.5 Awareness of progressive development of national and international standards.	Add	100%	None
4.6 Awareness of Human Rights legislation applicable on board	Add	50%	Added, “Industry suggestion to add “The role of unions and collective bargaining agreements” into this outcome.”
Outcome 5: Describe the legal and guidance regulations relating to different areas of operations and safe practices on-board a ship	Add	100%	**None**

5.1 Content and application of current maritime legislation relating to safety, environmental protection and quality	Add	50%	Added, "Industry suggestion to ensure this includes, "Green passports, EEDI, EEXI, technical files, etc..."
5.2 Content and application of current maritime legislation relating to employment, certification and training of seafarers	Add	100%	None
5.3 The source and content of legislation and guidance concerning operational procedures and practices	Add	100%	None
5.4 Implementation of standards through port and flag state control	Add	100%	None
5.5 Record keeping and providing evidence on occurrence of incidents	Add	50%	Added, "Feedback from industry to be included in academic guidance document, "Cadets must be aware of what can constitute evidence, this should also cover the implications for disposal and falsification of evidence. It should also include what cadets and junior officers should do if they receive verbal or written instructions to carry out a action they beleive is unlawful."
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 %**

Outcome required to expand seafarer's knowledge of the wider industry and how they gain transferable skills.	To broaden the candidate's understanding of the maritime industry as a whole and how their role impacts other areas. This will also help candidates understand potential career paths they could follow within the industry, using the technical and soft skills gained while at sea.	Introduce a new outcome to cover the knowledge of the wider maritime industry and the transferable skills seafarers gain. This could include talks from maritime industry representatives.	50%
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.	50%

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%

Marine Engineering - Management			
Outcome	**Sub-Group 1.2 Recommended Action**	**Consultation Support %**	**Changes made as a result of industry feedback**
Outcome1: Apply marine legislation and safety management systems to shipboard operations	**Amend**	**50%**	**None**
1.1International regulations and regulatory bodies	Amend	100%	None
1.2 Application of regulations by flag states	Amend	100%	None
1.3 Code of Safe Working Practices (COSWP)	Amend	100%	None
1.4 Role of the Safety Officer	Amend	100%	None
1.5 Certification and certification bodies	Amend	100%	None
1.6 Classification Societies	Amend	100%	None
1.7 Survey and inspections processes	Amend	100%	None
1.8 Dealing with non-compliance	Amend	100%	None
Outcome 2: Analyse management theory and methods of system control in a shipboard context	**Amend**	**50%**	**None**
2.1 Quality assurance	Amend	100%	None
2.2 Application of the International Safety Management (ISM) code	Amend	100%	None
2.3 Purpose and practice of auditing	Amend	100%	None
2.4 Importance of accurate record keeping	Amend	100%	None
2.5 Communication methods	Amend	100%	None
2.6 Prepare a written report	Amend	100%	None

Outcome 3: Evaluate the principles and application of UK legislation and international treaties applicable to the shipping industry.	**Add**	**100%**	**None**
3.1 International law and its transition into UK national law applicable to the shipping industry	Add	100%	None
3.2 United Nations Convention on the Law of the Sea	Add	100%	None
3.3 Flag and port state legislation	Add	100%	None
3.4 Classification societies	Add	100%	None
3.5 Health, safety, human rights and employment legislation applicable to the shipping industry	Add	100%	None
Outcome 4: Analyse international requirements to ensure safety of ship, life, cargo and the protection of the marine environment.	**Add**	**100%**	**None**
4.1 Requirements of international conventions; Safety of Life at Sea (SOLAS), Marine Pollution (MARPOL) and the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2007.	Add	100%	None
4.2 Standard of Training Certification and Watchkeeping (STCW) convention on seafarers and marine industry in general	Add	100%	None

4.3 Maritime Labour Convention 2006	Add	100%	None
Outcome 5: Analyse personnel management theory as it applies to the role of a senior officer.	**Add**	**100%**	**None**
5.1 Concepts of personnel management theory	Add	50%	Added, "Industry suggestion to ensure the comparison of management vs leadership vs command is included within the indicative content."
5.2 Methods of implementing management theory	Add	50%	None
5.3 Methods of guidance and counselling, discipline and appraisal	Add	100%	None
5.4 Methods of compliance with the requirements for response to bullying, harassment, Sexual Assault and Sexual Harassment (SASH)	Add	100%	None
5.5 Methods for ensuring Psychological Safety	Add	100%	None
Outcome 6: Apply budgetary control in a shipboard context.	**Add**	**50%**	**Added, "Feedback from industry to ensure this outcome "covers cost codes, forecasting, basic book balancing, and how to use excel as a budgeting and cost tracking tool."**
6.1 Budgetary control theory methods	Add	50%	None
6.2 Basic financial information	Add	50%	None
Outcome 7: Interpret and apply employment law, quality assurance legislation and safety management systems to shipboard operations.	**Add**	**50%**	**None**

7.1 Purpose of quality assurance, codes and guidance	Add	100%	None
7.2 Methods of developing safety cultures and the role of safety management systems	Add	50%	None
7.3 Auditing procedures	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 %**
Add the legal implications of innovative technologies, including autonomous vessels.	Legislation is constantly evolving regarding autonomy and innovative technologies, so we should ensure this syllabus is future-proofed.	Include "Awareness of the legal implications of vessels operating with innovative technologies" as a separate outcome.	100%
Include facilitation of a learning journey, from law (bare minimum requirements), through shipboard policies/the SMS, and on towards safety culture, self-regulation and continuous improvement	Seafarers need to be able to: Understand how to develop operating procedures that take the human element into consideration Identify how policies and procedures can impact individuals differently Identify the benefits of considering who will be using policies and procedures, as well as when, why and how, when designing or reviewing policies and procedures Identify best practice in developing procedures e.g., consulting with staff it applies to, risk assessments etc Continually improve	Add an outcome to this module, covering the details of this proposal.	100%

	procedures e.g., reporting processes, toolbox talks		

Include an outcome on Seafarer Wellbeing, Suicide Awareness, Equality, Diversity and Inclusion.	Seafarers need to be able to: Consider 'suicide alertness' as an alternative to going in to the complex issue of mental health. It is more practical. Identify people thinking of suicide. Overcome barriers in talking about suicide. Identify reasons we may miss, dismiss or avoid suicide. Practice using the 4-step model of suicide alertness: Tell, Ask, Listen and Keep-safe Connect people at risk of suicide with further appropriate help. Understand the managers role in promoting wellbeing, ensuring welfare (including fair employment) and in managing stress.	Add an outcome covering seafarer wellbeing and suicide awareness. This could be similar to a suicide alertness course such as SafeTALK.	100%

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.	50%

Marine Engineering - Safety Engineering and the Environment			
Outcome	**Sub-Group 1.2 Recommended Action**	**Consultation Support %**	**Changes made as a result of industry feedback**
Outcome1: Explain the current Health and Safety legislation covering employers and employees	**Keep**	**100%**	**None**
1.1 Health and Safety at Work Act	Contextualise	100%	None
1.2 Provision and use of work equipment regulations	Contextualise	100%	None
1.3 Management of Health and Safety at Work Act	Keep	100%	None
1.4 Personnel Protective Equipment regulations	Contextualise	100%	None
1.5 Enclosed space regulations, risk assessment and guidance (as per COSWP)	Keep	100%	None
1.6 Noise at work regulations	Keep	100%	None
Outcome 2: Explain the handling, storage and disposal of dangerous substances	**Keep**	**100%**	**None**
2.1 Manual handling regulations	Keep	100%	None
2.2 Control of substances hazardous to health regulations	Keep	100%	None
2.3 Chemical hazard identification and packaging regulations	Keep	100%	None
2.4 Environmental protection act	Keep	100%	None
2.5 Introduction to extreme temperatures, pressure,	Add	100%	None

corrosivity and toxicity of fuels.			
Outcome 3: Explain work equipment safety requirements	**Keep**	**100%**	**None**
3.1 Provision and use of work equipment regulations	Keep	100%	None
3.2 Lifting Regulations (LOLER)	Add	100%	None
Outcome 4: Carry out a suitable risk assessment within a workplace environment	**Keep**	**100%**	**None**
4.1 Relevant health and safety legislation	Keep	100%	None
4.2 Risk assessment process	Contextualise	100%	None
4.3 Actions required following risk assessment	Contextualise	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%

Electro-Technical: Electrical Motors and Generators			
Outcome	**Sub-Group 1.2 Recommended Action**	**Consultation Support %**	**Changes made as a result of industry feedback**
Outcome1: Explain and solve problems on three-phase circuits	**Keep**	**No Feedback Received**	**None**
1.1Balanced star and delta connected loads	Keep	No Feedback Received	None
1.2 Power factor	Keep	No Feedback Received	None
1.3 Phasor diagrams	Keep	No Feedback Received	None
1.4 Unbalanced loads	Keep	No Feedback Received	None
1.5 Marine three phase systems	Keep	No Feedback Received	None
Outcome 2: Explain the principles of and solve problems on magnetism and electromagnetic induction	**Keep**	**No Feedback Received**	**None**
2.1 Non- magnetic and ferromagnetic materials	Keep	No Feedback Received	None
2.2 Non-composite magnetic circuits	Keep	No Feedback Received	None
2.3 Composite magnetic circuits	Keep	No Feedback Received	None
2.4 Current carrying conductor	Keep	No Feedback Received	None
2.5 Electro- motive- force in a coil	Keep	No Feedback Received	None
2.6 Self and mutual inductance	Keep	No Feedback Received	None
2.7 Electro motive force in a conductor	Keep	No Feedback Received	None
Outcome 3: Explain the action of generators	**Keep**	**No Feedback Received**	**None**

3.1 Constructions and connections of a.c. synchronous generators - Excitation methods - Full load current and rotor speed - Voltage and frequency in a.c. synchronous generators. - Synchronising using lamps, synchroscope and load sharing - Sychronising and load sharing - Automatic voltage regulators for a.c. generators - Failure of automatic voltage regulators - Causes of failures - Motoring and its effects - Preference trips - Operation and testing of a preference trip - Insulated and earthed neutral systems - Operation of reverse power relays - Earth fault detection - Methods of protection for a.c. synchronous generators	Modernise	No Feedback Received	None
3.2 Excitation methods	Keep	No Feedback Received	None
3.3 Full load current and rotor speed	Keep	No Feedback Received	None
3.4 Voltage and frequency in a.c. synchronous generators	Keep	No Feedback Received	None
3.5 Synchronising using lamps, synchroscope and load sharing	Keep	No Feedback Received	None
3.6 Sychronising and load sharing	Keep	No Feedback Received	None

3.7 Automatic voltage regulators for a.c. generators	Keep	No Feedback Received	None
3.8 Failure of automatic voltage regulators	Keep	No Feedback Received	None
3.9 Causes of failures	Keep	No Feedback Received	None
3.10 Motoring and its effects	Keep	No Feedback Received	None
3.11 Preference trips	Keep	No Feedback Received	None
3.12 Operation of a preference trip	Keep	No Feedback Received	None
3.13 Insulated and earthed neutral systems	Keep	No Feedback Received	None
3.14 Operation of reverse power relays	Keep	No Feedback Received	None
3.15 Earth fault detection	Keep	No Feedback Received	None
3.16 Methods of protection for a.c. synchronous generators	Keep	No Feedback Received	None
Outcome 4: Explain and solve problems on the action of motors	**Keep**	**No Feedback Received**	None
4.1 Principles and characteristics of induction motors	Keep	No Feedback Received	None
4.2 Production of torque	Keep	No Feedback Received	None
4.3 Slip	Keep	No Feedback Received	None
4.4 Slip formula	Keep	No Feedback Received	None
4.5 Torque/speed characteristic	Keep	No Feedback Received	None
4.6 Rotor resistance	Keep	No Feedback Received	None
4.7 Power flow chart	Keep	No Feedback Received	None
4.8 Shaft output power and efficiency	Keep	No Feedback Received	None
4.9 Operation of synchronous motors	Keep	No Feedback Received	None
4.10 Construction of stators and rotors for induction and synchronous motors	Keep	No Feedback Received	None
4.11 Speed control	Modernise	No Feedback Received	None

4.12 Phasor diagrams	Keep	No Feedback Received	None
4.13 Synchronous and induction motors for marine propulsion	Modernise	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:			
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Marine Engineering: Ship Construction and Survey (Management Level)			
Outcome	**Sub-Group 1.2 Recommended Action**	**Consultation Support %**	**Changes made as a result of industry feedback**
Outcome1: Analyse flood protection and seaworthiness for different vessel types	**Keep**	**100%**	**None**
1.1Freeboards for different vessel types subdivisions and damage stability elements for different vessel types	Keep	100%	None
1.2 Subdivisions and damage stability elements for different vessel types	Keep	100%	None
1.3 Structural watertight components and the open deck drainage arrangements for different vessel types	Modernise	100%	None
1.4 Testing for water tightness of doors, hatches, and bulkheads	Keep	100%	None
1.5 Drainage system for different ship's spaces and vessels	Keep	100%	None
1.6 Methods of roll stabilisation	Keep	100%	None
Outcome 2: Analyse ship's structure with reference to fire protection, vibration and noise for different Merchant Navy vessels	**Keep**	**100%**	**None**
2.1 Structural fire protection arrangements	Contextualise	100%	None
2.2 Construction requirements of fire class bulkheads	Keep	100%	None
2.3 Sources of vibration within a vessel	Keep	100%	None

2.4 Effects of vibration	Modernise	100%	None
2.5 Methods of vibration reduction	Keep	100%	None
2.6 Source of noise and its transmission throughout a vessel	Modernise	100%	None
2.7 Reduction of noise transmission	Keep	100%	None
Outcome 3: Evaluate load line and dry-docking surveys for Merchant Navy vessels	**Contextualise.**	**100%**	**None**
3.1 Assignment of freeboard (load line survey)	Keep	100%	None
3.2 Factors required to maintain conditions of assignment	Keep	100%	None
3.3 Information required for tonnage measurement and the tonnage certificate	Keep	100%	None
3.4 Load line survey and analyse and compare dry-docking surveys	Keep	100%	None
3.5 The procedure for survey by a Classification Society and Dry-docking	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 %**

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