Proposal to modernise the Methodology of Teaching, Assessment/ Examination

Marine Engineering - STCW III / 1 CoC			
Competency/ Module: Engineering Mathematics 2			
Knowledge, understanding and proficiency	Recommendation of working group regarding the outcome and objective.	Rationale	Action required
Outcome1: Solve trigonometric and hyperbolic function problems	**Modernise**	**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.**	**Include graphical representation of waves** **Contextualise in an applied maths sense. Show how they are used on ship and where problems can arise.**
1.1 Inverse trigonometric ratios	Modernise	See main outcome rationale	See main outcome action required
1.2 Compound angle formulae	Modernise	See main outcome rationale	See main outcome action required
1.3 Basic trigonometric identities	Modernise	See main outcome rationale	See main outcome action required
1.4 Hyperbolic functions	Modernise	See main outcome rationale	See main outcome action required
1.5 Basic hyperbolic identities	Modernise	See main outcome rationale	See main outcome action required

Proposal to modernise the Methodology of Teaching, Assessment/ Examination

Outcome 2: Use differentiation techniques to solve Engineering problems	**Modernise**	**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.**	**Modernise with derivatives of trigonometric functions. This is for signal processing and control functions** **Contextualise in an applied maths sense. Show how they are used on ship and where problems can arise.**
2.1 Differentiation of standards functions	Modernise	See main outcome rationale	See main outcome action required
2.2 Chain Rule	Modernise	See main outcome rationale	See main outcome action required
2.3 Second derivatives	Modernise	See main outcome rationale	See main outcome action required
2.4 Rates of change	Modernise	See main outcome rationale	See main outcome action required
2.5 Optimisation	Modernise	See main outcome rationale	See main outcome action required
Outcome 3: Use integration techniques to solve Engineering problems	**Modernise**	**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.**	**Modernise with integration of trigonometric functions. This is for signal processing and control functions** **Contextualise in an applied maths sense. Show how they are used on ship and where problems can arise.**
3.1 Indefinite and definite integrals	Modernise	See main outcome rationale	See main outcome action required
3.2 Integration of standard functions	Modernise	See main outcome rationale	See main outcome action required
3.3 Applications of integration	Modernise	See main outcome rationale	See main outcome action required
Outcome 4: Matrices	**Add**	**Matrices are useful to solve complex network, data processing techniques,**	**Add outcome four to this module, specific outcome details will be finalised if approved.**

Proposal to modernise the Methodology of Teaching, Assessment/ Examination

		useful for easy solution of simultaneous equations	
Proposal submitted by:	Any other outcomes for this competency, above and beyond STCW which would be needed due to use of modern technology and impact of future fuels onboard:		
	Objective	Reason Why	Action required
Cadet Training & Modernisation Working Group	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.
Cadet Training & Modernisation Working Group	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.
Cadet Training & Modernisation Working Group	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.