

# Proposal to modernise the Methodology of Teaching, Assessment/ Examination

Nautical - STCW II/ CoC	Name of respondent, organisation and role:		
<b>Competency/ Module: Navigational Mathematics and Science</b>	<i>Competency: Plan and conduct a passage and determine position</i>		
Knowledge, understanding and proficiency	Recommendation of working group regarding the outcome and objective.	Rationale	Action required
<b>Outcome 1: Describe and apply navigational terms and calculate courses and distances.</b>	Modernise	All items in this section are essential to understand how ECDIS plots course lines and provide a greater understanding of electronic navigation in order for a candidate to monitor the system for errors.	For more effective learning, the below sub-outcomes should be followed by practical application of course plotting on an ECDIS practically show how these manual calculations are done by the software and be able to recognise possible errors.
1.1 Navigational terms	Keep	Relevant	None
1.2 Plane trigonometry	Keep	Relevant	None
1.3 Spherical trigonometry	Keep	Relevant	None
1.4 Sailings on the earth's surface: (parallel, plane, Mercator and great circle)	Modernise	See rationale for main outcome 1.	See action for main outcome 1.
1.5 Load lines and limiting latitudes	Modernise	See rationale for main outcome 1.	See action for main outcome 1.
1.6 Estimated Time of Arrival (ETA) calculations	Modernise	See rationale for main outcome 1.	See action for main outcome 1.

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<b>Outcome 2: Describe the basic theory of the ship's magnetic compass and its associated errors and maintenance.</b>	Keep	Relevant	See sub-outcome actions.
2.1 Earth's magnetic field	Keep	Valid, keep as this is the working principle for magnetic compass Keep the content at a basic level for OOW. Essential in case of possible electronic equipment failure	None
2.2 Ship's magnetic field	Keep	This is only covered to a basic level and is required to differentiate between deviation and variation. All compass adjustments are done by compass adjusters; however, junior officers are usually assigned to assist so it is critical that they understand what the adjustors are doing.	None
2.3 Compass errors and their causes	Keep	Relevant	None
2.4 Ship's magnetic compass and maintenance	Modernise	We must contextualise this topic to help candidates understand the onboard relevance and how it may impact their work.	Include practicalities of magnetic compass maintenance including the paperwork that should be issued to the ship following adjustment/ship swing so that junior officers know what should be present when preparing for audits etc.
<b>Outcome 3: Describe the operation of the marine gyrocompass and its associated errors.</b>	Keep	Relevant	See sub-outcome actions.
3.1 Free gyroscope	Keep	Relevant	None
3.2 Marine gyrocompass	Keep	Relevant	None
3.3 Gyrocompass errors	Modernise	We must contextualise this outcome to not only understand how to calculate	Include the impact of gyrocompass errors

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		<p>gyro errors but also how to recognise and respond to these errors.</p> <p>Understanding of gyros critical but also needs to be coupled with practical use of this equipment.</p> <p>Also, junior officers need to understand that inputs from different gyros can be switched in case of error/failure, and they should know how to do this on each new vessel they are on.</p>	<p>on modern integrated bridges, such as the impact on other equipment.</p> <p>Introduce the practical elements of gyrocompass errors in a simulator, with the candidate recognising a gyro errors/failure and demonstrating how to respond to it.</p>
<b>Proposal submitted by:</b>	<b>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:</b>		
	<b>Objective</b>	<b>Reason Why</b>	<b>Action required</b>
Cadet Training & Modernisation Working Group	Include alternative types of compasses - fiberoptic 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.
Cadet Training & Modernisation Working Group	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.
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	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

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		theory into practice in the work they carry out at sea.	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.