

Proposal to modernise the Methodology of Teaching, Assessment/ Examination

Marine Engineering - STCW III/2 CoC			
Competency/ Module: Marine Engineering: Strength of Materials (Management Level)			
Knowledge, understanding and proficiency	Recommendation of working group regarding the outcome and objective.	Rationale	Action required
Outcome1: Explain terminology as used in strength of materials and solve related problems.	Modernise	Modern and future materials and fuels may interact in different ways to those currently used and these interactions should be taught.	Include information on modern/ future materials including their interaction with future fuels.
1.1 Direct stress and strain, shear stress and strain, modulus of elasticity “E”, factor of safety and proof stress	Contextualise	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.	Use of practical examples/ simulation/ loading computer software to show these theories in practice.
1.2 Stresses in simple and stepped bars subjected to linear thermal strain	Keep	Relevant	None
1.3 Temperature change on composite members	Keep	Relevant	None
1.4 Differential thermal expansion and contraction	Keep	Relevant	None
1.5 Compound bars subjected to both direct loading and temperature change	Keep	Relevant	None

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Outcome 2: Explain and solve problems relating to shear forces and bending moments on simply supported and cantilever beams	Contextualise	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.	Use of practical examples/ simulation/ loading computer software to show these theories in practice, where appropriate within this outcome.
2.1 Support reactions for beams subjected to point or uniformly distributed loads	Keep	Relevant	None
2.2 Shear force and bending moment diagrams for simply supported and cantilever beams	Keep	Relevant	None
2.3 Point of contraflexure	Keep	Relevant	None
2.4 Uniformly varying distributed loading	Keep	Relevant	None
2.5 Bending Equation	Keep	Relevant	None
2.6 Section modulus “Z”	Keep	Relevant	None
Outcome 3: Explain and solve problems on the theory of torsion involving circular sections and close coiled helical springs	Contextualise	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.	Use of practical examples/ simulation/ loading computer software to show these theories in practice, where appropriate within this outcome.
3.1 Assumptions for deriving the torsion theory	Keep	Relevant	None
3.2 Torsion equation	Keep	Relevant	None
3.3 Power transmitted by a rotating shaft	Keep	Relevant	None
3.4 Torsional stiffness	Keep	Relevant	None

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3.5 Relationship between torque transmitted by a shaft and shear force induced in the coupling bolts	Keep	Relevant	None
3.6 Formula for stress and deflection of a helical spring subjected to an axial load	Keep	Relevant	None
3.7 Design of helical springs	Keep	Relevant	None
Outcome 4: Explain and solve problems on elastic strain energy and stresses on oblique planes of stressed material	Contextualise	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.	Use of practical examples/ simulation/ loading computer software to show these theories in practice, where appropriate within this outcome.
4.1 Strain energy and resilience	Keep	Relevant	None
4.2 Expression for elastic strain energy	Keep	Relevant	None
4.3 Impact Loading	Keep	Relevant	None
4.4 Conversion of PE and KE into strain energy to determine maximum instantaneous stress deformation	Keep	Relevant	None
4.5 Expression for strain energy of a helical spring	Keep	Relevant	None
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

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<p>Cadet Training & Modernisation Working Group</p>	<p>Include Human Element Factors throughout the syllabus</p>	<p>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.</p>	<p>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.</p>
<p>Cadet Training & Modernisation Working Group</p>	<p>Include Data Science skills throughout the syllabus</p>	<p>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.</p>	<p>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.</p>
<p>Cadet Training & Modernisation Working Group</p>	<p>Ensure all outcomes are contextualised to help Cadets understand what they are learning in relation to what they will experience at sea.</p>	<p>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.</p>	<p>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.</p>