Proposal to modernise the Methodology of Teaching, Assessment/ Examination

Engineering STCW III/1 CoC	Name of respondent, role and organisation:		
Competency/ Module: Marine Engineering: Mechanical Principles	***Operate main and auxiliary machinery and associated control system***		
Knowledge, understanding and proficiency	**Recommendation of working group regarding the outcome and objective.**	**Rationale**	**Action required**
Outcome 1: Analyse linear and angular motion within an engineering environment	**Keep**	**This is the foundation for understanding data, application of this is required in applied mechanics, understanding scientific principles and data interpretation and machinery parameters.**	**Include practical exercises using laboratory equipment / 3D graphics** **Develop engineering scenario-based problems and case studies.** **Increased use of simulation** **Contextualise to help students understand how this outcome is relevant to safety bulletins from machinery manufacturers (e.g. rotating machinery, v-belts, etc…)**
1.1 Displacement, velocity, speed and acceleration for linear motion.	Keep	See Outcome 1 rationale	See Outcome 1 action required
1.2 Distance time graphs for constant velocity, linear motion.	Keep	See Outcome 1 rationale	See Outcome 1 action required

1.3 Velocity time graphs for uniform acceleration, linear motion.	Keep	See Outcome 1 rationale	See Outcome 1 action required
1.4 Linear and angular velocity equations	Keep	See Outcome 1 rationale	See Outcome 1 action required
1.5 Relationship between linear and angular motion	Keep	See Outcome 1 rationale	See Outcome 1 action required
1.6 Inertia	Keep	See Outcome 1 rationale	See Outcome 1 action required
1.7 Momentum	Keep	See Outcome 1 rationale	See Outcome 1 action required
Outcome 2: Evaluate the forces and moments concerned with static equilibrium	Keep	This is the foundation for mechanics, applied mechanics, heat engine principles, understanding scientific principles, energy efficiency and data interpretation and machinery parameters.	Include practical exercises using laboratory equipment / 3D graphics Develop engineering scenario-based problems and case studies. Increased use of simulation Contextualise to help students understand how this outcome is relevant to safety bulletins from machinery manufacturers
2.1 Resolution of forces	Keep	See Outcome 2 rationale	See Outcome 2 action required
2.2 Vector and scalar quantities	Keep	See Outcome 2 rationale	See Outcome 2 action required
2.3 Equilibrium, resultant and equilibrant	Keep	See Outcome 2 rationale	See Outcome 2 action required
2.4 Moments of a force	Keep	See Outcome 2 rationale	See Outcome 2 action required

2.5 Work, power and energy	Keep	See Outcome 2 rationale	See Outcome 2 action required
2.6 Friction	Keep	See Outcome 2 rationale	See Outcome 2 action required
2.7 Bodies on a horizontal plane	Keep	See Outcome 2 rationale	See Outcome 2 action required
Outcome 3 Evaluate the strength of materials in a range of engineering environments	Keep	This is the foundation, this is required in strength of materials and mechanics, understanding scientific principles and data interpretation and machinery parameters, structural strength.	Include practical exercises using laboratory equipment / 3D graphics Develop engineering scenario-based problems and case studies. Increased use of simulation Contextualise to help students understand how this outcome is relevant to safety bulletins from machinery manufacturers
3.1 Stress and strain	Keep	See Outcome 3 rationale	See Outcome 3 action required
3.2 Modulus of elasticity	Keep	See Outcome 3 rationale	See Outcome 3 action required
3.3 Ultimate tensile stress and breaking stress	Keep	See Outcome 3 rationale	See Outcome 3 action required
3.4 Factor of safety	Keep	See Outcome 3 rationale	See Outcome 3 action required
3.5 Cantilever and simply supported beams	Keep	See Outcome 3 rationale	See Outcome 3 action required

3.6 Bending moment and shear force diagrams	Keep	See Outcome 3 rationale	See Outcome 3 action required
3.7 Bending moment equation	Keep	See Outcome 3 rationale	See Outcome 3 action required
3.8 Properties of a material	Keep	See Outcome 3 rationale	See Outcome 3 action required
Outcome 4: Analyse simple machines and their uses within a marine engineering environment	Keep	This is the foundation, this is required in strength of materials and mechanics, propulsion, auxiliary machinery	Include practical exercises using laboratory equipment / 3D graphics Develop engineering scenario-based problems and case studies. Increased use of simulation Contextualise to help students understand how this outcome is relevant to safety bulletins from machinery manufacturers
4.1 Lifting machines	Keep	See Outcome 4 rationale	See Outcome 4 action required
4.2 Law of a machine	Keep	See Outcome 4 rationale	See Outcome 4 action required
4.3 Effort, load, velocity ratio, efficiency and mechanical advantage	Keep	See Outcome 4 rationale	See Outcome 4 action required
4.4 Simple and compound gear systems	Keep	See Outcome 4 rationale	See Outcome 4 action required

4.5 Vee belt power transmission	Keep	See Outcome 4 rationale	See Outcome 4 action required
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	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	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

	in relation to what they will experience at sea.	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.	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.