Proposal to modernise the Methodology of Teaching, Assessment/ Examination

Engineering STCW III/1 COC			
Competency/ Module: Engineering Workshop Skills			
Knowledge, understanding and proficiency	**Recommendation of working group regarding the outcome and objective.**	**Rationale**	**Action required**
Outcome 1: Safe and efficient use of equipment using COSWP and permit to work systems.	**Keep**	**Relevant**	**None**
1.1 Inspection of equipment, care, selection, and suitability of equipment.	Include Human Element Factors in this outcome.	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.	Awareness of ergonomics as part of risk assessment for permit to work.

1.2 Use and care of hand tools: File Hacksaw Chisel Screwdriver Hammers Spanners Sockets Torque wrench Scraper Taps and dies Hand reamers Power Tools	Remove Hand Reamers Add Power Tools	Hand Reamers not used on board Power Tools are used on board	Remove Hand Reamers from this outcome Add Power Tools to this outcome
1.3 Inspection of tools for their fitness for use	Keep	Relevant	None
1.4 Sharpening and dressing of hand tools.	Keep	Relevant	None
1.5 Use of abrasive wheels, certificates and regulations pertaining.	Keep	Relevant	None

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Outcome 2: Measuring equipment	**Modernise**	**Digital/ modern version of these tools are now regularly used in the engineering environment and should be covered.**	**Include digital/ modern version of this measuring equipment, where appropriate.**
2.1 Callipers and rules	Modernise	As per the main outcome rationale	As per the main outcome action required.
2.2 Internal and external micrometer	Modernise	As per the main outcome rationale	As per the main outcome action required.
2.3 Vernier calliper	Modernise	As per the main outcome rationale	As per the main outcome action required.
2.4 Feelers	Modernise	As per the main outcome rationale	As per the main outcome action required.
2.5 DTIS	Modernise	As per the main outcome rationale	As per the main outcome action required.
2.6 Marking out	Modernise	As per the main outcome rationale	As per the main outcome action required.
Outcome 3: Effective use of communicating technical information.	**Keep**	**Relevant**	**None**
3.1. Technical Drawings	Keep	Relevant	None
Outcome 4: Safe use of machinery.	**Keep**	**Relevant**	**None**
4.1 Drilling machine	Keep	Relevant	None
4.2 Centre lathe	Keep	Relevant	None
4.3 Vertical milling machine	Remove	These are no longer used on board vessels	Remove this outcome
4.4 Off-hand grinding machine	Remove	These are no longer used on board vessels	Remove this outcome
4.5 Metal joining and gas cutting	Keep	Relevant	None
4.6 Mechanical joints including pipe work	Keep	Relevant	None

Outcome 5: Specification for training in maintenance, assembly skills, Electrical and electronic skills:	**Keep**	**Relevant**	**None**
5.1 Safe and efficient use of suitable equipment in conjunction with COSWP	Keep	Relevant	None
5.2 Inspection and care of equipment	Keep	Relevant	None
5.3 Selection and suitability of equipment	Keep	Relevant	None
Outcome 6: Maintenance Skills	**Keep**	**Relevant**	**None**
6.1 Work planning	State the requirements of this outcome	Currently the details of work planning are taught but this is not clearly stated within the outcome, it should be.	Include details of work planning: - Researching technical manuals, - Resources required, - etc…
6.2 Safety precautions	Keep	Relevant	None
6.3 Permits to work	Keep	Relevant	None
6.4 Spare parts requirement	Keep	Relevant	None
6.5 Use of drawings	Keep	Relevant	None
6.6 Interpretation of electrical circuit diagrams and symbols	Keep	Relevant	None
6.7 Completing the job safely	Keep	Relevant	None
6.8 Testing and commissioning	Keep	Relevant	None
6.9 Restoring work area	Keep	Relevant	None
6.10 Completion of records	Keep	Relevant	None
Outcome 7: Assembly skills	**Keep**	**Relevant**	**None**
7.1 Lifting and slinging	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	Include lifting plants with reference to LOLER.

		current and future seagoing technologies and practices.	
7.2 Fault diagnosis	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.	Include data science and human machine interface
7.3 Tool selection and usage	Keep	Relevant	None
7.4 Use of drawings and manuals	Keep	Relevant	None
7.5 Dis-assembly and assembly using methods of sealing techniques	Keep	Relevant	None
7.6 Appropriate use of force	Keep	Relevant	None
7.7 Use of pulling tools.	Keep	Relevant	None
7.8 Component management and care using marking, damage protection, cleanliness and care during maintenance.	State the requirements of this outcome	Currently the details of care during storage are taught but this is not clearly stated within the outcome, it should be.	Include care during storage
7.9 Assessment of condition by way of checking clearances, wear, alignment.	Keep	Relevant	None
7.10 Torque and tightening sequences.	Keep	Relevant	None
7.11 Adjustments and settings.	Keep	Relevant	None
7.12 Limits and fits.	Keep	Relevant	None
7.13 Bearing fitting.	Keep	Relevant	None
Outcome 8: Electrical/electronic practice	**Keep**	**Relevant**	**None**
8.1 Safety aspects.	Keep	Relevant	None
8.2 Use and care of tools.	Keep	Relevant	None

8.3 Minor wiring installation and repair.	Keep	Relevant	None
8.4 Basic diagnostic skills.	Keep	Relevant	None
8.5 Recognizing common components, symbols and configuration	Keep	Relevant	None
8.6 Electrical power circuits, rectification and amplification circuits-- Build and test full wave and half wave rectifiers.	Keep	Relevant	None
8.7 Ripple frequency, smoothing, build and test a single stage amplifier and determine stage gain and use of test equipment.	Keep	Relevant	None
8.8 Maintenance testing and fault finding of machines and controllers both AC and DC— strip down and re-build.	Keep	Relevant	None
8.9 Insulation testing on machines, single phasing, Identification in a range of starters, DOL, Star, Delta, Auto transformer.	Keep	Relevant	None
8.10 Maintenance procedures.	Keep	Relevant	None
8.11 Fault finding.	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.	Include data science and human machine interface
8.12 Generator maintenance and control.	Keep	Relevant	None

8.13 HV and LV distribution.	Keep	Relevant	None
8.14 Hazardous area installation, equipment and maintenance.	Contextualisation	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 intrinsically safe equipment, Zener barriers and explosion proof fittings to link theory and practice.
8.15 Use of drawings and international circuit diagrams.	Keep	Relevant	None
8.16 Electrochemical as applied to batteries, electro-chlorination, cathodic protection and water sterilization methods.	Contextualisation	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 modern technologies currently used on board and future technologies that will become more common.
Outcome 9: Refrigeration and air conditioning technologies	**Add**	**Currently the details of refrigeration and air conditioning technologies are taught but this is not clearly stated within the module, it should be.**	**Add this outcome - exact content to be developed**
Outcome 10: Awareness of 3-D Printing	**Add**	**A high-level overview of 3-D printing should be provided as the technology is available, despite not yet being regularly found on ships now.**	**Add this outcome Add this outcome - exact content to be developed**
Outcome 11: Human Machine Interface similar to ETO workshop skills	**Add**	**Having an outcome within this part of the training "The application of human factors principles to the design of devices and systems" would send a clear message that the human element is not just about people/soft and woolly stuff. The goal of HFE is to design devices that**	**Add this outcome Add this outcome - exact content to be developed**

		users accept willingly and operate safely in realistic conditions	
Outcome 12: Use of diagnostic software and remote assistance for fault finding	Add	Modern fault finding and problem solving occurs with the use of software with remote assistance using plug-in and diagnostic tools. These include, but are not limited to, manufacturer provided software and vibration analysis software.	Add this outcome Add this outcome - exact content to be developed
Outcome 13: Hydraulics and pneumatics	Add	Currently the details of Hydraulics and pneumatics are taught but this is not clearly stated within the module, it should be.	Add this outcome Add this outcome - exact content to be developed
Hydraulics and pneumatics	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 and Modernisation Working Group	Consider crossover between workshop skills for Engineers and ETOs.	If there is crossover between the two workshop skills modules, they could be taught in conjunction to save time and resources for colleges, cadets and shipping companies alike.	When creating the finalised academic modules CT&M Sub-Group 1.2 will highlight any crossover between the two modules.
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.

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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.