

## COURSE PACKAGE

### Part A: Course Specifications

Course Code	:	COLREGS							
Course Descriptive Title	:	Collision Regulations							
Prerequisite	:	None			Corequisite	:	None		
Year Level	:	First Year			Semester Offered	:	Second Semester		
Course Credits	:	4 units	Theoretical Contact Hours Per Week		:	3 hours	Demonstration/Practical Work Contact Hours Per Week	:	3 hours
Course Description	:	The course <b>Collision Regulations</b> provides an important introduction in maintaining a safe navigational watch through a comprehensive discussion of the Convention on the International Regulations for Preventing Collisions at Sea COLREGS, 1972, as amended. It delves into each rule of the Colregs with activities designed to synthesise learning towards the end of the course. Students are to be engaged into participative discussion and in simulated exercises to apply learning.							
STCW Reference	:	STCW Table	Function	Competence	Knowledge, Understanding and Proficiency				
		A-II/1	F1. Navigation at the operational level	C2. Maintain a safe navigational watch	Watchkeeping  KUP1. Thorough knowledge of the content, application and intent of the International Regulations for Preventing Collisions at Sea, 1972, as amended				
Course Outcome	:	PO-A.3 PO-B.3 PO-D.2 PO-D.6 PO-D.8	CO1. Demonstrate thorough knowledge and understanding of the content, application and intent of the International Regulations for Preventing Collisions at Sea, 1972, as amended						
		PO-A.2	CO2. Analyse the application of COLREGS, 1972, as amended for collision avoidance in case studies						
Course Intake Limitations	:	The number of students that can be accommodated shall not exceed 40 for lecture and 20 for laboratory.							

<b>Faculty Requirement</b>	<p><b>Instructor</b> The faculty that will be assigned to handle the course must possess the following qualifications:</p> <ul style="list-style-type: none"> <li>• graduate of Bachelor of Science in Marine Transportation;</li> <li>• with at least 12 months of seagoing experience as Officer-in-charge of a Navigational Watch on seagoing ships of 500 GRT or more;</li> <li>• completed Training Course for Instructors (IMO Model Course 6.09);</li> <li>• completed Training Course on Assessment, Examination and Certification of Seafarers (IMO Model Course 3.12); and</li> <li>• preferably with teaching experience.</li> </ul> <p><b>Assessor</b> The assigned assessor to conduct the assessment for this course shall have the same qualification for the instructor as outlined above.</p>
<b>Teaching Facilities and Equipment</b>	<p><b>CLASSROOM</b> The standard classroom size shall be a minimum of 48 square meters, no side shall be less than 6 meters for a class of 40 students. Classroom must be well-lighted and well-ventilated. It should contain the following:</p> <ul style="list-style-type: none"> <li>• Tables and chairs or armed chairs</li> <li>• Whiteboards or chalkboards</li> <li>• Multimedia equipment</li> </ul> <p><b>EQUIPMENT FOR DEMONSTRATION/PRACTICAL WORK</b></p> <ul style="list-style-type: none"> <li>• Computer-Based Training Program (CBT); or</li> <li>• Ship's Model (showing the arrangement of navigational lights and shapes); or</li> <li>• Aldis lamp/Morse lamp; and</li> <li>• Sound Signalling Apparatus (Bell, Gong, Ship's Whistle/other sound signalling apparatus having the same respective sound characteristics).</li> </ul> <p><i>Note:</i></p> <ol style="list-style-type: none"> <li>1. The MHEIs may use additional teaching facilities and equipment as deemed necessary to meet the learning outcomes of this course.</li> <li>2. If the ship bridge simulator is used, IMO Model Course 6.10 is a required qualification for the instructor and assessor of this course.</li> </ol>
<b>Teaching Aids</b>	<p><b>A1</b> PowerPoint Presentation (PPT)  <b>A2</b> Handouts  <b>A3</b> Case study material  <b>A4</b> Illustrations or posters</p> <p><b>Cases:</b>  C1 Exxon Chester v Regal Sword</p> <ul style="list-style-type: none"> <li>• National Transportation Safety Board [US]. Safety Recommendation M-80-055. Retrieve from</li> </ul>

	<p><a href="https://www.nts.gov/about/employment/ layouts/nts.recsearch/Recommendation.aspx?Rec=M-80-055">https://www.nts.gov/about/employment/ layouts/nts.recsearch/Recommendation.aspx?Rec=M-80-055</a></p> <ul style="list-style-type: none"> <li>• United Press International (UPI). (1979, June 19). Freighters Sink in Tanker Collision. The New York Times, p. A18. Retrieved from <a href="https://www.nytimes.com/1979/06/19/archives/freighters-sinks-in-tanker-collision.html">https://www.nytimes.com/1979/06/19/archives/freighters-sinks-in-tanker-collision.html</a></li> </ul> <p>C2 Huayang Endeavour and oil tanker Seafrontier</p> <ul style="list-style-type: none"> <li>• MAIB [UK]. Collision between bulk carrier Huayang Endeavour and oil tanker Seafrontier. Retrieved from <a href="https://www.gov.uk/maib-reports/collision-between-bulk-carrier-huayang-endeavour-and-oil-tanker-seafrontier">https://www.gov.uk/maib-reports/collision-between-bulk-carrier-huayang-endeavour-and-oil-tanker-seafrontier</a></li> </ul> <p><i>Note:</i></p> <ol style="list-style-type: none"> <li>1. The MHEIs may use additional teaching aids as deemed necessary to meet the learning outcomes of this course.</li> <li>2. The MHEIs may use additional or similar case studies in lieu of cases cited above.</li> </ol>
References / Bibliographies	<p><b>References:</b></p> <p><b>R1</b> International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended</p> <p><b>R2</b> Officer in Charge of a Navigational Watch (IMO Model Course 7.03)</p> <p><b>R3</b> Convention on the International Regulations for Preventing Collisions at Sea COLREGS, 1972, as amended</p> <p><b>Bibliography:</b></p> <p><b>B1</b> Cockcroft, A., &amp; Lameijer, J. (2011). <i>A Guide to the Collision Avoidance Rules</i> (7th ed.). Oxford, UK: Butterworth-Heinemann.</p> <p><b>Website:</b></p> <p><b>W1</b> United States Coast Guard. Amalgamated International &amp; U.S. Inland Navigation Rules. Retrieved from <a href="https://www.navcen.uscg.gov/?pageName=NavRulesAmalgamated">https://www.navcen.uscg.gov/?pageName=NavRulesAmalgamated</a></p> <p><i>Note: The MHEIs may use additional references/bibliographies as deemed necessary to meet the learning outcomes of this course.</i></p>

## Part B: Course Outline and Timetable

Term	Week	Topic	Time Allotment (in hours)	
			Theoretical	Demonstration/ Practical Work
<b>Note:</b>  <i>MHEIs shall determine the number of periods or terms the semester is divided based on their school calendar of activities such as Prelim, Midterm, and Final.</i>	1	<b>1. Course Introduction</b> 1.1 Course introduction and other requirements 1.2 Introduction to Collision Regulations COLREGS, 1972, as amended	3	3
	2	<b>2. Part A – General</b> 2.1 Rules 1 to 3	3	3
	3 – 6	<b>3. Part B – Steering and Sailing Rules</b> 3.1 Section I (Rules 4 to 10) 3.2 Section II (Rules 11 to 18) 3.3 Section III (Rule 19)	12	12
	7 – 8	<b>4. Part C – Lights and Shapes</b> 4.1 Rules 20 to 22 4.2 Annex I – Positioning and Technical Details of Lights and Shapes	6	6
	9 – 10	4.3 Rules 23 to 31 4.4 Annex II – Additional Signals for Fishing Vessels Fishing in Close Proximity	6	6
	11 – 13	<b>5. Part D – Sound and Light Signals</b> 5.1 Rules 32 to 37 5.2 Annex III – Technical Details of Sound Appliances 5.3 Annex IV – Distress Signals 5.4 Considering Part B of COLREGS, 1972, as amended	9	9
	14	<b>6. Part E – Exemptions</b> <b>7. Part F – Verification of compliance with the provision of the convention</b> (As adopted by IMO Resolution A. 1085(28))	3	3

Term	Week	Topic	Time Allotment (in hours)	
			Theoretical	Demonstration/ Practical Work
	15 – 17	<b>8. Application and Reinforcements</b> 8.1 Rule 2 revisited 8.2 Case study – Exxon Chester v. Regal Sword 8.3 Case study – Huayang Endeavor v. Seafrontier 8.4 Practical reinforcement activities  <i>Note: Similar case studies may be used in lieu of cases cited above.</i>	9	9
<b>Sub-total (Contact Hours)</b>			<b>51</b>	<b>51</b>
<b>Total Contact Hours</b>			<b>102</b>	
<b>Examination and Assessment</b>				

Note:

1. The MHEIs are to develop their respective timetable according to their resources but meets with the minimum time allocation for the contact hours.
2. The MHEIs shall determine the time allotment for the conduct of summative assessments.

## Part C: Course Syllabus

COs	Topics Learning Outcomes	References/ Bibliographies	Teaching Aids
CO1	<b>1. Course Introduction</b> 1.1. Explain the course outline and course requirements 1.2. Explain the significance of Collision Regulations in relation to navigational safety	R1, R2, R3	A1, A2
CO1	<b>2. Part A – General</b> 2.1. Explain the applicability of COLREGS, 1972, as amended with regards to the limits of territorial seas 2.2. Outline the responsibilities of the Master, crew and shipowner in complying with COLREGS, 1972, as amended 2.3. Explain the terms used in COLREGS, 1972, as amended as outlined in Rule 3	R3, W1	A1, A2
CO1	<b>3. Part B – Steering and Sailing Rules</b> <b>Section I (Rules 4 to 10)</b> 3.1. Explain how lookout is properly observed for collision avoidance 3.2. Explain safe speed and factors affecting it 3.3. Determine whether risk of collision occurs based on a visual observation 3.4. Explain the actions to be taken when a risk of collision exists  <b>Section II (Rules 11 to 18)</b> 3.5. Explain the conduct of the vessel when in narrow channel or in the traffic separation scheme 3.6. Explain the actions to be taken by sailing vessels when approaching each other 3.7. Explain the actions between two-power driven vessels approaching each other 3.8. Explain the actions and responsibilities between different types of vessels when approaching each other  <b>Section III (Rule 19)</b> 3.9. Explain the actions to be taken by a vessel navigating in restricted visibility  <b>Part B – Steering and Sailing Rules</b> 3.10. Analyse the actions to be taken to avoid collision in overtaking, head-on and crossing situations 3.11. Analyse the actions to be taken to avoid collision when approaching vessels of different type or nature	R3, W1	A1, A2, C1, C2
CO1	<b>4. Part C – Lights and Shapes</b> <b>Rules 20 to 22 and Annex I – Positioning and Technical Details of Lights and Shapes</b> 4.1. Explain the application of Part C of COLREGS, 1972, as amended 4.2. Determine the arc of visibility of the navigational lights prescribed in COLREGS, 1972, as amended 4.3. Determine the minimum ranges of the navigational lights	R3, W1	A1, A2, A4

COs	Topics Learning Outcomes	References/ Bibliographies	Teaching Aids
	<b>Rules 23 to 31 and Annex II – Additional Signals for Fishing Vessels Fishing in Close Proximity</b> 4.4. Determine the navigational lights being observed 4.5. Determine the relative movement of the target ship given observed navigational lights and bearings 4.6. Exhibit the required navigational lights based on a given condition 4.7. Determine the nature of the target ship based on its displayed light and shape 4.8. Analyse the action to be taken to avoid collision based on the displayed light or shape of the target ship		
CO1	<b>5. Part D – Sound and Light Signals</b> <b>Rules 32 to 37, Annex III – Technical Details of Sound Appliances and Annex IV – Distress Signals</b> 5.1. Determine the nature of the target by the sound and light signal it exhibited 5.2. Exhibit the required sound or light signal based on a given scenario or condition  <b>Considering Part B of COLREGS, 1972, as amended</b> 5.3. Analyse the action to be taken to avoid collision based on the exhibited lights and sound signals	R3, W1	A1, A2, A4
CO1	<b>6. Part E – Exemptions</b> 6.1. Explain the exemption rule in COLREGS, 1972, as amended as provided in Rule 38	R3, W1	A1, A2
CO1	<b>7. Part F – Verification of Compliance with the Provisions of the Convention</b> 7.1. Explain the importance and relevance of Part F in COLREGS, 1972, as amended	R3, W1	A1, A2
CO1 CO2	<b>8. Application and Reinforcements</b> <b>Rule 2 revisited</b> 8.1. Explain at what circumstances deviation from the rules is acceptable  <b>Case studies and Practical reinforcement activities</b> 8.2. Discuss applicable Rules in COLREGS, 1972, as amended in order to avoid collision with an approaching target 8.3. Analyse a collision case in order to determine the applicable rules and the appropriate actions based on COLREGS, 1972, as amended	R3, W1	A1, A2, A4

Note: The MHEIs are to develop Part D: Detailed Teaching Syllabus and Instructional Materials (IMs), and Part E: Course Assessment and Assessment Tools (ATs) which satisfactorily meets with the requirements of the course as prescribed in the course outcomes and learning outcomes.



## COURSE PACKAGE

### Part A: Course Specifications

<b>Course Code</b>	:	Mach 1					
<b>Course Descriptive Title</b>	:	Machine Shop Theory					
<b>Prerequisite</b>	:	None			<b>Co requisite</b>	:	None
<b>Year Level</b>	:	First Year			<b>Semester Offered</b>	:	First Semester
<b>Course Credits</b>	:	3 units	<b>Theoretical Contact Hours Per Week</b>	:	3 hours	<b>Demonstration/ Practical Work Contact Hours Per Week</b>	: 0 hour
<b>Course Description</b>	:	This Course provides the students with fundamental knowledge and understanding in safe use of measuring instruments, hand tools, portable power tools, machining tools, sealants and packings, and welding equipment to carry out fabrications, maintenance and repair works on board ships.					
<b>STCW Reference</b>	:	<b>STCW Table</b>	<b>Function</b>	<b>Competence</b>	<b>Knowledge, Understanding, and Proficiency</b>		
		A-III/1	Maintenance and repair at the operational level	Appropriate use of hand tools, machine tools, and measuring instruments for fabrication and repair on board	Characteristics and limitations of materials used in construction and repair of ships and equipment  Characteristics and limitations of process used for fabrication and repair  Properties and parameters considered in the fabrication and repair of systems and components  Methods for carrying out safe emergency/temporary repairs  Safety measures to be taken to ensure a safe working environment and for using hand tools, machine tools, and measuring instruments		



				Use of hand tools, machine tools, and measuring instruments  Use of various types of sealants and packings.
Course Outcome	:	PO-E.8 PO-E.9	<p><i>At the end of the course, the student must be able to:</i></p> <p><b>CO1.</b> Explain the safety measures in the use of hand tools, portable power tools, measuring instruments, machining tools, welding equipment, and sealants and packings based on manufacturer's specifications and industry best practices.</p> <p><b>CO2.</b> Identify the appropriate use of hand tools, portable power tools, measuring instruments, machining tools, sealants and packings, and gas and electric welding equipment in accordance with manuals and/or industry best practices</p>	
Course Intake Limitations	:	The number of students that can be accommodated shall not exceed 40 for lectures and 20 for laboratory.		
Faculty Requirement	:	<p><b>Instructor</b> The faculty that will be assigned to handle the Course must possess the following qualifications:</p> <ul style="list-style-type: none"> <li>• Graduate of Bachelor of Science in Marine Engineering;</li> <li>• Officer-in-charge of an Engineering Watch on seagoing ships powered by propulsion machinery of 750 kW propulsion power or more;</li> <li>• completed Training Course for Instructors (IMO Model Course 6.09);</li> <li>• completed Training Course on Assessment, Examination and Certification of Seafarers (IMO Model Course 3.12);</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Registered professional holding a bachelor's degree in Mechanical Engineering or holder of bachelor's degree in Industrial Technology with major in machine shop technology and/or welding and fabrication technology with Master's Degree in the same discipline;</li> <li>• with at least one (1) year industrial and/or teaching experience;</li> <li>• completed Approved Training Course for Instructors (IMO Model Course 6.09);</li> <li>• completed Approved Training Course on Assessment, Examination and Certification of Seafarers (IMO Model Course 3.12);</li> </ul>		

	<p><b>Assessor</b> The assessor assigned shall have the same qualifications above.</p> <p><b>Note:</b></p> <ol style="list-style-type: none"> <li>1. <i>The instructor shall conduct the <u>formative assessment</u>.</i></li> <li>2. <i><u>Summative assessment</u> shall be conducted by an Assessor not teaching the students (assessee).</i></li> </ol>																																
<p><b>Teaching Facilities and Equipment</b></p>	<p><b>CLASSROOM</b> The standard classroom size shall be a minimum of 48 square meters; no side shall be less than 6 meters for a class of 40 students. The classroom must be illuminated at 50.76 Lux and well-ventilated. It should contain the following:</p> <ul style="list-style-type: none"> <li>• Tables and chairs or armed chairs</li> <li>• Whiteboards or chalkboards</li> <li>• Multimedia equipment</li> </ul> <p style="text-align: center;"><b>EQUIPMENT FOR CLASS DELIVERY / DISCUSSION</b></p> <table border="1"> <thead> <tr> <th>Facilities and Equipment</th><th>Equipment to Student Ratio</th></tr> </thead> <tbody> <tr> <td colspan="2" style="text-align: center;"><b>Measuring Instruments</b> (<i>Shall be provided by the MHEI</i>)</td></tr> <tr> <td>1. Dial micrometer with magnetic base</td><td>1:4</td></tr> <tr> <td>2. Gauge, depth</td><td>1:4</td></tr> <tr> <td>3. Gauge, feeler (metric/inches)</td><td>1:4</td></tr> <tr> <td>4. Gauge, screw pitch (metric/inches)</td><td>1:4</td></tr> <tr> <td>5. Gauge, surface</td><td>1:4</td></tr> <tr> <td>8. Micrometer (inside and outside)</td><td>1:4</td></tr> <tr> <td>9. Steel tape</td><td>1:4</td></tr> <tr> <td>10. Steel ruler</td><td>1:4</td></tr> <tr> <td>11. L-square (steel)</td><td>1:4</td></tr> <tr> <td>12. Vernier caliper (steel)</td><td>1:4</td></tr> <tr> <td>13. Divider</td><td>1:4</td></tr> <tr> <td>14. Scriber</td><td>1:4</td></tr> <tr> <td>15. Level bar</td><td>1:4</td></tr> <tr> <td colspan="2" style="text-align: center;"><b>Basic Hand Tools</b> (<i>Shall be provided by the MHEI</i>)</td></tr> </tbody> </table>	Facilities and Equipment	Equipment to Student Ratio	<b>Measuring Instruments</b> ( <i>Shall be provided by the MHEI</i> )		1. Dial micrometer with magnetic base	1:4	2. Gauge, depth	1:4	3. Gauge, feeler (metric/inches)	1:4	4. Gauge, screw pitch (metric/inches)	1:4	5. Gauge, surface	1:4	8. Micrometer (inside and outside)	1:4	9. Steel tape	1:4	10. Steel ruler	1:4	11. L-square (steel)	1:4	12. Vernier caliper (steel)	1:4	13. Divider	1:4	14. Scriber	1:4	15. Level bar	1:4	<b>Basic Hand Tools</b> ( <i>Shall be provided by the MHEI</i> )	
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1. Screwdriver, philips (various sizes)
2. Screwdriver, flat (various sizes)
3. Pliers, mechanical (lineman's pliers)
4. Vise grips
5. Ball peen hammer
6. Straight peen hammer
7. Sledge hammer
8. Torque wrench
9. Hacksaw
10. Drift punch
11. Center punch 60mm
12. Center punch 90mm
13. Drive pin punch
14. Gasket hole punch set
15. Flaring tools
16. Copper Tube cutters
17. Double-cut rough files
18. Second-cut smooth files
19. Single-cut smooth files
20. Second-cut files
21. Hand wire brush
22. Wheel type brush
23. Cup-type brush
24. Screw/bolt extractor
25. Bearing puller
26. Chain Block (min 0.5-ton capacity)
27. Metal cutting shear (snip)
28. Flat chisel
29. Cross-cut chisel
30. Diamond cut chisel
31. Grease gun
32. Oil applicator
33. Reamer handset (assorted)
34. Wrench, socket type, 10mm – 24mm
35. Wrench, open type (metric), 10mm – 24mm
36. Tap and dies

		<table> <tr><td>37. Drill bit, 13-25mm tapered shank</td></tr> <tr><td>38. Drill bit, 15-30mm cylinder shank</td></tr> <tr><td>39. Pipe wrench (various sizes)</td></tr> <tr><td>40. Pipe Cutter</td></tr> <tr><td>41. Anvil (must be placed accordingly near workbench)</td></tr> <tr><td>42. Hooks, eye bolt and shackles</td></tr> <tr><td>43. Wire rope and polyester slings</td></tr> <tr><td>44. Hand tube bender</td></tr> <tr><td>45. Hydraulic pipe bender</td></tr> <tr><td>46. Portable pneumatic drill</td></tr> <tr><td>47. Portable electric drill</td></tr> <tr><td>48. Portable electric grinder</td></tr> <tr><td>49. Portable electric saw with at least 260mm blade</td></tr> <tr><td><b>Sealant and Packings</b></td></tr> <tr><td><i>(Shall be provided by the MHEI)</i></td></tr> <tr><td>1. Sealants for metal</td></tr> <tr><td>2. Packing</td></tr> </table> <p><i>Note: The MHEIs can use additional teaching facilities and equipment as deemed necessary to meet the learning outcomes of this course.</i></p>	37. Drill bit, 13-25mm tapered shank	38. Drill bit, 15-30mm cylinder shank	39. Pipe wrench (various sizes)	40. Pipe Cutter	41. Anvil (must be placed accordingly near workbench)	42. Hooks, eye bolt and shackles	43. Wire rope and polyester slings	44. Hand tube bender	45. Hydraulic pipe bender	46. Portable pneumatic drill	47. Portable electric drill	48. Portable electric grinder	49. Portable electric saw with at least 260mm blade	<b>Sealant and Packings</b>	<i>(Shall be provided by the MHEI)</i>	1. Sealants for metal	2. Packing
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1. Sealants for metal																			
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Teaching Aids	:	<p> <b>TA1</b> Machine Shop Safety  <b>TA2</b> Measuring Instruments  <b>TA3</b> Hand Tools  <b>TA4</b> Power and Pneumatic Hand Tools  <b>TA5</b> Drilling Machine &amp; Grinding Machine  <b>TA6</b> Lathe Machine  <b>TA7</b> Welding Equipment  <b>TA8</b> Sealants and Packings         </p> <p><i>Note: The MHEIs can use alternative and/or additional teaching aids as deemed necessary to meet the learning outcomes of this course.</i></p>																	
References/ Bibliographies	:	<p><b>References:</b></p> <p> <b>R1</b> Maritime and Coastguard Agency (2011). <i>Code of Safe Working Practices for Merchant Seamen</i>. London: The Stationery Office  <b>R2</b> Flood, C.R. (1981) <i>Fabrication, Welding and Metal Joining Processes</i>. London: Butterworth  <b>R3</b> Kibbe, R. (2010) <i>Machine Tool Practices</i>. Pearson Education         </p>																	

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|--|---|
|  | <p><b>R4</b> Miller, R. (2004) Machine shop tools and operations. Wiley Publishing<br/><b>R5</b> Pritchard, R.T. (1979) Technician Workshop Processes and Materials. London: Hodder and Stoughton<br/><b>R6</b> Manufacturer's manual</p> |
|--|---|

*Note: The MHEIs can use alternative and/or additional references/bibliographies as deemed necessary to meet the learning outcomes of this course.*

## Part B: Course Outline and Timetable

Term	Week	Topic	Time Allotment (in hours)	
			Theoretical	Demonstration / Practical Work
<i>Note: MHEIs shall determine the number of periods for terms the semester is divided based on their school calendar activities</i>	1-2	<b>1. Machine Shop Safety</b> 1.1. Safety Principles 1.2. Risk Assessment and its elements 1.3. Personal Protective Equipment 1.4. Safety Signs 1.5. Fire Precautions 1.6. Safety systems of work 1.7. Permit to Work Systems 1.8. Use of Work Equipment	6	-
	3-4	<b>2. Measuring Instruments</b> 2.1. Reading Measuring Scales 2.2. Measuring and Layout Tools	6	-
	5-8	<b>3. Hand Tools</b> 3.1. Fastening and Prying Tools 3.2. Sawing and Cutting Tools 3.3. Boring and Clamping Tools 3.4. Smoothing Tools 3.5. Brushes 3.6. Tap, Dies, and Extractors 3.7. Benders 3.8. Pullers and chain blocks 3.9. Rigging Tools	9	-

Term	Week	Topic	Time Allotment (in hours)	
			Theoretical	Demonstration / Practical Work
	7-9	<b>4. Power and Pneumatic Hand Tools</b> 4.1. Portable Electric Drills 4.2. Portable Electric Saw 4.3. Grinder	6	-
	10-13	<b>5. Machining Tools</b> 5.1 Drilling Machine 5.2 Grinding Machine 5.3 Lathe Machine	12	-
	14-16	<b>6. Welding Equipment</b> 6.1 Electric Welding Machines 6.2 Gas Electric Welding	9	-
	17	<b>7. Sealants and Packings</b>	3	-
<b>Sub-total (Contact Hours)</b>			<b>51</b>	-
<b>Total Contact Hours</b>			<b>51</b>	
<b>Examination and Assessment</b>				

Note:

1. The MHEIs are to develop their respective timetable according to their resources but meets with the minimum time allocation for the contact hours. OR
2. The MHEIs shall determine the time allotment for the conduct of summative assessments.



## Part C: Course Syllabus

CO	Topics Learning Outcomes	References/ Bibliographies	Teaching Aids
CO1	<b>1. Machine Shop Safety</b> <ol style="list-style-type: none"> <li>1.1. Explain safety practices in the use of hand tools, portable power tools, measuring instruments, machining tools, welding equipment, and sealants and packings following manufacturers recommendation or industry best practices.</li> <li>1.2. Explain the importance of risk assessment before any job on board.</li> <li>1.3. Explain the procedure in wearing personal protective equipment in accordance to shipboard safety practices</li> <li>1.4. Explain the importance of personal hygiene and first aid required when working at ship's workshops.</li> <li>1.5. Identify the different safety signs/posters used onboard ships and its importance.</li> <li>1.6. Explain the safety before, during and after work.</li> <li>1.7. Explain the importance of work permits</li> <li>1.8. Fill up a work permit correctly before starting work.</li> </ol>	R1, R3, R4	TA1
CO2	<b>2. Measuring Instruments</b> <ol style="list-style-type: none"> <li>2.1. Read scales, dials and gauges typically used on board ships</li> <li>2.2. Use dividers to measure, transfer, or mark off distances in a workpiece.</li> <li>2.3. Use an inside and outside steel Vernier caliper to determine the thickness or diameter of a workpiece.</li> <li>2.4. Use an inside and outside micrometer to measure the thickness or diameter of a component.</li> <li>2.5. Use a dial micrometer to measure the difference compared to a reference or correcting parallelism.</li> <li>2.6. Use rules and steels tapes to measure length on of a workpiece</li> <li>2.7. Use a level bar to prove a plane of workpiece its true vertical or horizontal</li> <li>2.8. Use a scribe to mark or score on workpiece</li> <li>2.9. Use steel L-squares to prove a workpiece perpendicular or squared.</li> <li>2.10. Use a depth gauge to measure the depth on a workpiece</li> <li>2.11. Use a feeler gauge to measure the clearance of a component.</li> <li>2.12. Use a screw pitch gauge to determine the pitch of a thread.</li> <li>2.13. Use a surface gauge to transfer a dimension either to or from a work piece.</li> </ol>	R1, R4, R6	TA2

CO	Topics Learning Outcomes	References/ Bibliographies	Teaching Aids
CO2	<p><b>3. Hand Tools</b></p> <p><b>Fastening and Prying Tools</b></p> <p>3.1. Identify and explain the usage of the following types of pliers:</p> <ul style="list-style-type: none"> <li>a. Slip joint pliers</li> <li>b. Diagonal cutting pliers</li> <li>c. Longnose pliers</li> <li>d. Flat nose pliers</li> <li>e. End cutting pliers</li> <li>f. Vise grips</li> <li>g. Tongue and groove pliers</li> </ul> <p>3.2. Identify and explain the usage of the following types of hammers:</p> <ul style="list-style-type: none"> <li>a. Claw hammers</li> <li>b. Ball peen hammer</li> <li>c. Sledgehammer</li> <li>d. Soft face hammer</li> <li>e. Lead or copper hammer</li> <li>f. Inserted face hammer</li> <li>g. Welders hammer</li> <li>h. Mallets</li> </ul> <p>3.3. Identify and explain the usage of the following types of screwdrivers:</p> <ul style="list-style-type: none"> <li>a. Flathead screwdrivers</li> <li>b. Philips head screwdrivers</li> <li>c. Offset screwdrivers</li> <li>d. Ratchet Screw Driver</li> <li>e. Allen Screwdrivers</li> </ul> <p>3.4. Identify and explain the usage of the following types of wrenches:</p>	R3, R4, R6	TA3

CO	Topics Learning Outcomes	References/ Bibliographies	Teaching Aids
	<ul style="list-style-type: none"> <li>a. Open-end wrenches</li> <li>b. Box end wrench</li> <li>c. Split box end wrench</li> <li>d. Combination wrench</li> <li>e. Allen wrench</li> <li>f. Pipe wrenches</li> <li>g. Strap pipe wrench</li> <li>h. Adjustable wrench</li> <li>i. Socket wrenches and adapters</li> <li>j. T handle wrench</li> <li>k. Torque wrenches</li> <li>l. F type Valve Wrench / Valve Spanner</li> </ul> <p><b>Sawing and Cutting Tools</b></p> <p>3.5. Identify and explain the usage of the following type of saw:</p> <ul style="list-style-type: none"> <li>a. Hand saw</li> <li>b. Hacksaw</li> </ul> <p>3.6. Identify and explain the usage of the following types of chisels:</p> <ul style="list-style-type: none"> <li>a. Flat chisel</li> <li>b. Cross-cut chisel</li> <li>c. Diamond point chisel</li> <li>d. Round nose chisel</li> </ul> <p>3.7. Identify and explain the usage of the following types of punches:</p> <ul style="list-style-type: none"> <li>a. Center punches</li> <li>b. Drift punch</li> <li>c. Drive pin punch</li> </ul> <p>3.8. Identify and explain the usage of the following types gasket cutter:</p> <ul style="list-style-type: none"> <li>a. Circle gasket cutter</li> <li>b. Gasket hole punch set</li> </ul>		

CO	Topics Learning Outcomes	References/ Bibliographies	Teaching Aids
	<p>3.9. Identify and explain the usage of the following types of pipes cutting and threading tools:</p> <ol style="list-style-type: none"> <li>a. Pipe cutters</li> <li>b. Pipe threading set</li> </ol> <p>3.10. Identify and explain the usage of the following types tube cutters and flaring tools:</p> <ol style="list-style-type: none"> <li>1. Tube cutters</li> <li>2. Flaring tools</li> </ol> <p>3.11. Identify and explain the usage of the following types of shears and nippers.</p> <p><b>Boring and Clamping Tools</b></p> <p>3.12. Identify and explain the usage of the following types of reamers:</p> <ol style="list-style-type: none"> <li>a. Solid straight hole reamer</li> <li>b. Solid taper pin reamer</li> </ol> <p>3.13. Identify and explain the usage of the following types of vises:</p> <ol style="list-style-type: none"> <li>a. Machinist bench vise</li> <li>b. Round pipe vise</li> </ol> <p>3.14. Identify and explain the usage of the following types clamps:</p> <ol style="list-style-type: none"> <li>a. C – clamps</li> <li>b. Beam block clamp</li> </ol> <p><b>Smoothing Tools</b></p> <p>3.15. Identify and explain the usage of the following types of files according to shape and according to cut:</p> <ol style="list-style-type: none"> <li>a. Flat file</li> <li>b. Triangular file</li> <li>c. Round file</li> </ol>		

CO	Topics Learning Outcomes	References/ Bibliographies	Teaching Aids
	<p>d. Half-round file e. Square file</p> <p><b>Brushes</b></p> <p>3.16. Identify and explain the usage of the following types of brushes:</p> <p>a. Paintbrush b. Wire brush c. Wheel type brush d. Cup type wire brush e. File card brush f. Flap brush</p> <p><b>Tap, Dies, and Extractors</b></p> <p>3.17. Identify and explain the usage of the following types taps, dies, and extractors:</p> <p>a. Taper, plug, and bottoming hand taps b. Rethreading die c. Screw/bolt extractors d. Tap extractors</p> <p>3.18. Demonstrate the use of rethreading die and screw/bolt extractors in a given activity in accordance with manufacturer's manual/recommendation or industry best practices. <i>(Laboratory activity)</i></p> <p><b>Benders</b></p> <p>3.19. Identify and explain the usage of the following types of benders:</p> <p>a. Hand tube bender b. Hydraulic pipe bender</p> <p>3.20. Identify the minimum bend radius with regard to pipe diameter, thickness, material and process to be used.</p> <p><b>Pullers and chain blocks</b></p>		

CO	Topics Learning Outcomes	References/ Bibliographies	Teaching Aids
	<p>3.21. Identify and explain the usage of the following types of pullers:</p> <ol style="list-style-type: none"> <li>Universal gear puller</li> <li>Gear and bearing puller</li> </ol> <p><b>Rigging Tools</b></p> <p>3.22. Identify and explain the usage of the following types of rigging tools:</p> <ol style="list-style-type: none"> <li>Chain blocks</li> <li>Hooks, eye bolt and shackles</li> <li>Wire rope and polyester slings</li> </ol> <p><b>4. Power Drills and Pneumatic Hand Tools</b></p> <p><b>Portable Power Drills</b></p> <ol style="list-style-type: none"> <li>Identify the different types of portable power drills.</li> <li>Explain the safety precautions that apply to portable electric and pneumatic power drills.</li> <li>Explain briefly how drills are held in a machine, emphasizing dangerous practices and the problem when drilling thin plate</li> <li>Explain the procedures for inserting and removing drills with parallel and with tapered shanks</li> </ol> <p><b>Portable Electric Saw</b></p> <ol style="list-style-type: none"> <li>Identify the different types of portable electrical saws.</li> <li>Explain the proper use of portable electrical saws and its corresponding safety precautions.</li> </ol> <p><b>Portable Electric Grinder</b></p> <ol style="list-style-type: none"> <li>Explain the purpose of a grinding machine</li> <li>Identify the different types of grinders</li> <li>Explain the proper use of portable electric grinder and its corresponding safety precautions.</li> </ol>		

CO	Topics Learning Outcomes	References/ Bibliographies	Teaching Aids
CO2	<p><b>5. Machining Tools</b></p> <p><b>Drilling Machine</b></p> <p>5.1 Lists the uses of a drilling machine</p> <p>5.2 Explain briefly how drills are held in a machine</p> <p>5.3 Explain how a work piece is held in place, emphasizing dangerous practice and the particular problem when drilling thin plate</p> <p>5.4 Explain the procedure for inserting and removing drill bit with parallel and with tapered shanks</p> <p>5.5 Explain the necessary care to avoid accidents when using a drilling machine and choosing the appropriate speed for drilling</p> <p>5.6 Explain safe and proper operation of the drill press and portable electric drill</p> <p><b>Grinding Machine</b></p> <p>5.7 Explain the purpose of a grinding machine</p> <p>5.8 Explain how to use a grinding machine such as pedestal grinder and portable electric grinder</p> <p>5.9 Explain the procedure to ensure safety when using a grinding machine with emphasis on:</p> <ol style="list-style-type: none"> <li>Correct distance between the grinding disc and tool rest</li> <li>Use safety glass shield or eye shield</li> </ol> <p>5.10 Explain the procedure for inserting and removing grinding stone and grinding disc</p> <p>5.10 Explain the importance of selecting the correct type of grinding stone and grinding disc</p> <p><b>Lathe Machine</b></p> <p>5.11 Explain the primary purpose of a lathe machine, its construction and functions</p> <p>5.12 Explain the function of chucks, live centres, face plates, dogs, material removal, thread cutting and taper turning</p> <p>5.13 On a given diagram or machine, identify the main features of a modern lathe</p> <p>5.14 Identify the hazards when using lathe machine</p> <p>5.15 Explain the importance of choosing the right speed during operation</p> <p>5.16 Explain how to operate the center lathe machine</p> <p>5.17 Explain the proper care and basic maintenance done on a lathe machine</p> <p>5.18 Explain various cutting tools in terms of materials, figures and functions</p>	R3, R4, R5, R6	TA5, TA6



CO	Topics Learning Outcomes	References/ Bibliographies	Teaching Aids
CO2	<b>4. Welding Equipment</b> <b>Electric Welding</b> 6.1 Explain the basic construction and operating principle of electric welding machine 6.2 Explain the different types of electric welding equipment 6.3 Explain the procedures in using electric welding equipment in accordance with manual and/or best industry practices <b>Gas Welding</b> 6.4 Explain the basic construction and operating principle of gas welding and cutting equipment 6.5 Explain the different types of gas welding equipment 6.6 Explain the procedures in using gas welding equipment in accordance with manual and/or best industry practices	R2, R6	TA7
CO2	<b>5. Sealants and Packings</b> 7.1 Explain the purpose and different uses of sealants and packings 7.2 Explain the safety precautions in handling sealants 7.3 Explain the types and characteristics of sealants and packings 7.4 Explain the procedures in applying sealant during repair in accordance with manufacturer's recommendation and/or best industry practices 7.5 Explain the consequences of not installing new packing properly 7.6 Explain the procedures in installing packing on pumps, valves and other rotating equipment with manufacturer's manual and/or best industry practices	R6	TA8

*Note: The MHEIs are to develop Part D: Detailed Teaching Syllabus and Instructional Materials (IMs), and Part E: Course Assessment and Assessment Tools (ATs) which satisfactorily meets with the requirements of the course as prescribed in the course outcomes and learning outcomes.*