COURSE PACKAGE

Part A: Course Specifications

Course Code	:	MDraw						
Course Descriptive Title	:	Maritime Drawing and Diagrams						
Prerequisite	:	None		**Corequisite**	:	None		
Year Level	:	First Year		**Semester Offered**	:	First Semester		
Course Credits	:	2 units	**Theoretical Contact Hours Per Week**	:	1 hour	**Demonstration/ Practical Work Contact Hours Per Week**	:	3 hours
Course Description	:	The Course provides underpinning and introductory knowledge and understanding before the main functional competencies that require technical interpretation of drawings as required by the STCW Code. This course deals with the practice and techniques of graphical communication; application of drafting instruments, lettering scale and units of measure; orthographic projections; auxiliary views; dimensioning; sectional views; pictorial drawings, and requirements of engineering working drawings.						
STCW Reference	:	**STCW Table**	**Function**	**Competence**	**Knowledge, Understanding, and Proficiency**			
		A-III/1	Maintenance and Repair at the Operational Level	Maintenance and repair of shipboard machinery and equipment	Interpretation of machinery drawings and handbooks The interpretation of piping, hydraulic and pneumatic diagrams *(The hydraulic and pneumatic diagrams will be tackled in Auto 1 and 2)*			
Course Outcomes		*PO-E.1* *PO-E.4* *PO-E.5* *PO-E.8* *PO-E.9*	*At the end of the course, the student must be able to:* **CO1.** Represent a component into its isometric and orthographic views with its engineering dimensions **CO2.** Draw sketches of shipboard machinery parts diagram applying the basic concepts of technical drawing. **CO3.** Identify the types of diagrams used on board. **CO4.** Interpret the basic piping symbols, and diagrams based on international standards used onboard ships.						

<table>
<tr><td>Course Intake Limitations</td><td>:</td><td>The number of students that can be accommodated shall not exceed 40 per lecture and 20 for laboratory.</td></tr>
<tr><td>Faculty Requirement</td><td>:</td><td>Instructor
The faculty that will be assigned to handle the course must possess the following qualifications:
• Graduate of Bachelor of Science in Marine Engineering;
• completed Approved Training Course for Instructors (IMO Model Course 6.09);
• completed Approved Training Course on Assessment, Examination and Certification of Seafarers (IMO Model Course 3.12);
OR
• Registered professional holding a bachelor's degree in Engineering with Master's degree in the same discipline;
• with at least one (1) year industrial and/or teaching experience;
• completed Approved Training Course for Instructors (IMO Model Course 6.09);
• completed Approved Training Course on Assessment, Examination and Certification of Seafarers (IMO Model Course 3.12);
OR
• Registered professional holding a bachelor's degree in Engineering;
• completed Approved Training Course for Instructors (IMO Model Course 6.09);
• completed Approved Training Course on Assessment, Examination and Certification of Seafarers (IMO Model Course 3.12);

Assessor
The assessor assigned shall have the same qualifications above.
Note:
1. The instructor shall conduct the formative assessment.
2. Summative assessment shall be conducted by an Assessor not teaching the students (assessee).</td></tr>
<tr><td>Teaching Facilities and Equipment</td><td>:</td><td>CLASSROOM
The standard classroom size shall be a minimum of 48 square meters, and no side shall be less than 6 meters for a class of 40 students. A classroom must be illuminated at 50.76 Lux and well-ventilated. It should contain the following:
• Tables and chairs
• Whiteboards or chalkboards
• Multimedia equipment
• Scientific Calculator (shall be provided by the student)

EQUIPMENT FOR PRACTICAL WORK
<table><tr><th>Facilities and Equipment</th><th>Equipment to Student Ratio</th></tr><tr><td colspan="2">(Shall be provided by the MHEI)</td></tr></table></td></tr>
</table>

1. Drawing table or drawing board (at least 400 mm width x 800 mm length)	1:1
2. Sample copies of manufacturer machinery manuals	1:4
3. Sample of several shipboard piping layouts such as: a. Fresh water cooling system b. Sea water cooling system c. Main engine fuel oil system d. Main engine lube oil system e. Bilge system	1:4
4. Sample of ship's general arrangement plan	1:4
(Shall be provided by the students)	
1. Set of Drawing Instruments	1:1

Note: The MHEIs can use additional teaching facilities and equipment as deemed necessary to meet the learning outcomes of this course.

Teaching Aids	:	**TA1** Linework and Lettering **TA2** First and Third Angle Orthographic Projections **TA3** Isometric Projection **TA4** Sections and Sectional views **TA5** Dimensioning **TA6** Limits and Fits **TA7** Single-part drawings **TA8** Assembly drawings **TA9** Exploded assembly drawings **TA10** Pipes and Piping Symbols *Note: The MHEIs can use alternate and/or additional teaching aids as deemed necessary to meet the learning outcomes of this course.*
References/ Bibliographies	:	**References:** **R1** International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended **R2** Officer in Charge of an Engineering Watch (IMO Model Course 7.04) **R3** ISO 128-1:2020(en) Technical product documentation (TPD) — General principles of representation — Part 1: Introduction and

		fundamental requirements **R4** ISO 128-15:2013 Technical product documentation (TPD) — General principles of presentation — Part 15: Presentation of shipbuilding drawings **R5** International Association of Classification Societies, Requirement concerning pipes and pressure vessels **R6** Simmonds, C.H, Maguire, D.E. Phelps N. E. Manual of Engineering Drawing – British and International Standards 5th edition, Butterworth – Heinemann **R7** Jackson, L. and Morton, T.D., General Engineering Knowledge for Marine Engineers, 5th edition. London, Thomas Reed Publications Ltd. 1990 (ISBN – 09 – 47 – 63776 – 1) **R8** Derett, D.R., Ships Stability for Masters and Mates, 6th edition, Butterworth – Heinemann *Note: The MHEIs can use alternate 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
Note: MHEIs shall determine the number of periods for terms the semester is divided based on their school calendar activities.	1 - 2	**1. Linework and Lettering** 1.1 Types of Lines 1.2 Standard Letter Size	**2**	**6**
	3 - 5	**2. First and Third Angle Orthographic Projection** 2.1 First angle orthographic projection 2.2 Third angle orthographic projection	**3**	**9**
	6 - 7	**3. Three-dimensional Illustrations using Isometric Projection** 3.1 Isometric Projection	**2**	**6**
	8 - 9	**4. Sections and Sectional Views** 4.1 Types of Sections	**2**	**6**
	10 - 14	**5. Dimensioning** 5.1 Standards of dimensioning 5.2 Dimensioning methods **6. Limits and Fits**	**5**	**15**

Term	Week	Topic	Time Allotment (in hours)	
			Theoretical	Demonstration / Practical Work
	15	**7. Drawing Layouts and Simplified Methods**	**1**	**-**
	16 - 17	**8. Basic Pipes and Piping Symbols**	**2**	**9**
		Sub-total (Contact Hours)	**17**	**51**
		Total Contact Hours	**68**	
		Examination and Assessment		

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 CO2	**1. Linework and Lettering** 1.1 Identify the format of presentation of drawing sheets and documents 1.2 Explain the types of lines and their application 1.3 Identify the standard lettering size used in drawing templates 1.4 Draw a drawing template as per specification 1.5 Draw lettering of alphabet letters and numerals as per specification	R3, R4, R6	TA1
	2. First and Third Angle Orthographic Projection 2.1 Explain and illustrate the difference between first and orthographic projection 2.2 Explain and illustrate the symbol used in first and third angle projections 2.3 Explain the general procedure in drawing first and third angle projections 2.4 Draw simple solids in first angle and third angle projection 2.5 Draw sample shipboard machinery component in first angle and third projection applying necessary linework	R3, R4, R6	TA2
	3. Three-dimensional Illustrations using Isometric Projection 3.1 Draw solids in isometric projection 3.2 Draw sample shipboard component in isometric projection applying necessary linework	R3, R4, R6	TA3
	4. Sections and Sectional Views 4.1 Identify the different types of sections 4.2 Draw solids in sectional view applying necessary linework 4.3 Draw sample shipboard component in sectional view applying necessary line work	R3, R4, R6	TA4
	5. Dimensioning 5.1 Explain the purpose of dimensioning in drawing 5.2 Explain standard dimensioning as per ISO rules 5.3 Identify the different dimensioning methods 5.3 Draw and dimension a simple solid in any projection applying necessary linework and correct standards	R3, R4, R6	TA5

CO	Topics Learning Outcomes	References/ Bibliographies	Teaching Aids
	5.4 Draw and dimension a sample shipboard machinery component in any projection applying necessary linework and correct standards 5.5 Draw and dimension a C-clamp in any projection applying necessary linework and correct standards		
	6. Limits and Fits 6.1 Explain the need for limits and fits for drawing 6.2 Explain the difference between, tolerance, actual, basic, and nominal size 6.3 Explain hole-basis and shaft-basis fit	R3, R4, R6	TA6
CO3	**7. Drawing Layouts and Simplified Methods** 7.1 Explain the difference between single-part and assembly drawing	R3, R4, R6	TA7, TA8, TA9
CO4	**8. Basic Pipes and Piping Symbols** 8.1 Identify the following parameter based on a piping technical drawing: a. Pipeline Number b. Continuation isometric number c. Flow direction d. Piping dimensions e. Piping joint types, weld types f. Flange and valve types g. Equipment connection details h. Piping and Component descriptions with size, quantity, and material codes 8.2 Identify and draw the commonly used piping symbols as per standard such as ISO 6412 – 1: 2017 with emphasis on: a. Elbows b. Tees c. Reducers d. Gate Valves e. Globe valves f. Ball valves g. Plug h. Butterfly valves i. Needle valve	R3, R4, R5	T10

CO	Topics Learning Outcomes	References/ Bibliographies	Teaching Aids
	j. Diaphragm k. Flanges l. Blind m.Strainer 8.3 Use electronic manuals as reference for pipes and pipings		

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.