

**CHED MEMORANDUM ORDER (CMO)**

No. \_\_\_\_\_

**Series 2021**

**SUBJECT: REVISED POLICIES, STANDARDS AND GUIDELINES FOR THE BACHELOR OF SCIENCE IN NAVAL ARCHITECTURE AND MARINE ENGINEERING (BSNAME) PROGRAM**

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In accordance with the pertinent provisions of Republic Act (RA) No. 7722, otherwise known as the "Higher Education Act of 1994"; RA 10698 and Its Implementing Rules and Guidelines, which regulates and modernizes the practice of naval architecture in the Philippines; and RA 10647 or the "Ladderized Education Act of 2014" and its IRR, which strengthens the ladderized interface between Technical-Vocational Education and Training (TVET) and Higher Education, and in view of Commission en Banc Resolution Number \_\_\_\_\_ dated \_\_\_\_\_, the following policies, standards, and guidelines (PSG) for the Bachelor of Science in Naval Architecture and Marine Engineering (BSNAME) program are hereby adopted and promulgated by the Commission.

**ARTICLE I  
INTRODUCTION**

**SECTION 1. Rationale**

These Policies, Standards and Guidelines (PSG) were developed in pursuit of the educational reforms that include the enhanced basic education curriculum through K to 12, the New General Education Curriculum, and the ongoing quality assurance system for the development, recognition and award of qualification of the BSNAME graduates based on the Philippine Qualifications Framework (PQF) Level 6 and International Standards.

Further, this PSG offers both straight BSNAME and ladderized BSNAME programs. A ladderized BSNAME program creates a platform where students may opt to exit and work with the opportunity to come back and move to the next year level. Furthermore, the ladderized BSNAME intends to promote and increase human capital to fill the demand of local and international shipyards and other marine-related entities and produce competent and responsible Filipino naval architects.

In addition, to ensure that education continues in times of conflicts, disasters caused by natural calamities, and health crises, this PSG adopts flexible learning strategies to make teaching and learning more resilient and responsive thus builds social cohesion across communities.

The herein PSG has been reviewed in accordance with recently approved CMOs, industry needs, latest and future technology trends in the field of naval architecture and marine engineering and simultaneously harmonizing with other professional programs. This PSG emerged as a result of consolidated efforts of the professional organization, academe, industry, and other concerned agencies. The PSG shall

enable graduates to have entry level competencies after finishing the prescribed number of units.

## **ARTICLE II DEFINITION OF TERMS**

**SECTION 2.** The following definitions shall be adopted in the application of these guidelines:

**Assessment:** the process of measuring the knowledge, skills, or competences of individual learners;

**Competence:** the combination of knowledge, skills, experience and attitude, that enables an individual to perform a certain function or task. It includes: 1) the cognitive competence involving the use of theory and concepts as well as informal tacit experiential knowledge; 2) functional competence, which involves knowledge, understanding and skills necessary for the proper performance of functions, tasks, duties, and responsibilities in a workplace; and, 3) personal competence involving ethical, personal, and professional values;

**Course:** an integral component of a degree program with a specific title and description of coverage, learning context and goals, and the learner's responsibilities;

**Course Specifications:** the minimum requirement for the design, development and delivery of the course. It includes the course code, course descriptive title, credit units, number of lecture and laboratory hours per week, prerequisites/ corequisites, competencies addressed, course outcomes, laboratory equipment, and references;

**Course Syllabus:** a collection of elements that shows the plan for the delivery of the course which include competence; topics; intended learning outcomes; teaching and learning activities (TLA); equipment, materials, and teaching aids; references; assessment; allocated number of hours;

**Curriculum:** the aggregate of courses indicating the systematic sequence of courses – i.e., what students expect to know, understand, and be able to do after completing the program – that shows minimum number of units required to attain them; a summary of required courses, electives, major courses among others, and the minimum acceptable level of demonstrated achievement (evaluated against assessment criteria) for awarding credits;

**Curriculum Mapping:** the process of indexing or diagramming a curriculum to identify and address academic gaps, redundancies, and misalignments for purposes of improving the overall coherence of a course of study and by extension and its effectiveness;

**Diploma:** a certificate issued by a higher education institution to a student who has fulfilled all the requirements of a Bachelor's degree;

**Evaluation:** the process of judging the educational quality of higher education institution or program by using assessment results to determine its fitness with the accepted/declared set of standards;

**Embedment curricula:** the scheme by which the TVET content in the relevant higher education or bachelor degree program are mapped or identified and the curriculum is restructured to provide exit points;

**Government Recognition:** a certificate issued on the basis of the higher education institution's full compliance with at least the minimum requirements as mandated by the pertinent policies and standards of the CHED for each course;

**Learner Outcomes:** clear statements of what the learner expects to know, understand, and do as a result of a learning experience;

**Model ladderized curricula:** shall be, as defined in these guidelines, the sole basis by which the TVET qualifications in the relevant higher education or bachelor degree program are mapped or identified and the curriculum is restructured to provide competencies and qualifications leading to jobs. Minimum requirements such as faculty/trainer's qualification, facilities and equipment are also identified;

**Outcomes-Based Assessment:** the measure of students' demonstration of their learning based on explicit criteria for assessing each outcome;

**Outcomes-Based Education:** an educational approach that implies the best way to learn is to first determine what needs to be achieved. Once the desired results or "exit outcomes" have been determined, the strategies, processes, techniques, and means are put in place to achieve predetermined goals. In essence, it is working backward with students as the center of the learning –teaching milieu;

**Program Educational Objectives (PEOs):** broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve (ABET, 2016).

**Program Outcomes (POs):** sets of competencies (related knowledge, skills, and attitudes) that all learners are expected to demonstrate after the completion of the curriculum or program.

**Program of Study:** an academic plan towards the attainment of a BSNAME degree. An articulation of courses from 1<sup>st</sup> year to 4<sup>th</sup> year level.

**Recognized Higher Education Programs:** refers to programs that have been granted "Government Recognition (GR)"

**TVET Exit Points:** refers to a level in a ladderized program wherein a student can earn a TVET qualification (e.g., NC I, NC II) and may opt to exit and work.

**Unit:** one credit unit is equivalent to one (1) hour lecture or two (2) or three (3) hours laboratory.

### **ARTICLE III AUTHORITY TO OPERATE**

#### **SECTION 3. Government Authority**

All Private Higher Education Institutions (PHEIs) intending to offer Bachelor of Science in Naval Architecture and Marine Engineering must first secure proper authority from the Commission in accordance with existing rules and regulations. State Universities and Colleges (SUCs), and Local Colleges and Universities (LCUs) should likewise strictly adhere to the provisions in this PSG.

**SECTION 4.** Advertisement shall be made only after its authority to operate has been issued by the CHED.

### **ARTICLE IV GENERAL PROVISIONS**

**SECTION 5.** The succeeding Articles provide minimum standards, and other requirements and prescriptions. The standards are expressed as the minimum set of desired Program Outcomes, which are given in **Article V Section 8**. The sample curriculum for straight BSNAME program is shown in **Article VI Section 13**. The curriculum map in **Annex I** was used in designing the curriculum.

Using a learner-centered and outcomes-based approach, the appropriate curriculum delivery methods shown in **Article VI Section 17** were also determined.

Based on the curriculum and the means of its delivery, the physical resource requirements for the library, laboratories and other facilities; and the human resource requirements in terms of administration and faculty were determined.

**SECTION 6.** The HEIs are allowed to enhance the curricula beyond the minimum standards suited to their own contexts and missions provided that they can demonstrate that the same leads to the attainment of the required minimum set of outcomes, albeit by a different route. In the same vein, they have latitude in terms of curriculum delivery and in terms of specification and deployment of human and physical resources as long as they can show that the attainment of the program outcomes and satisfaction of program educational objectives can be assured by the alternative means they propose and provided further that the **sequencing of the courses according to pre-requisites and co-requisites are observed.**

The HEIs can use the *CHED Implementation Handbook for Outcomes-Based Education (OBE) and the Institutional Sustainability Assessment (ISA)* as a guide in making their submissions for Sections 27 to 32 of Article IX.

## **ARTICLE V PROGRAM SPECIFICATIONS**

### **SECTION 7. Program Description**

#### **7.1 Degree Name**

The degree program described herein shall be called Bachelor of Science in Naval Architecture and Marine Engineering (BSNAME).

#### **7.2 Nature of the Field of Study**

Naval architects are professional engineers who possess a Bachelor of Science Degree in Naval Architecture and Marine Engineering, an engineering discipline that deals with the design, construction, maintenance, and operation of marine vessels and structures as well as its machinery and engineering systems.

Naval architecture primarily is concerned with the hydrodynamic and hull form characteristics of the ship, the structural design of the hull, its maneuverability characteristics, and its ability to operate in the marine environment.

Marine engineering primarily is concerned with the engineering systems including the main propulsion plant, the powering and mechanical aspects of ship functions such as steering, anchoring, cargo handling, heating, ventilation, air conditioning, electrical power generation and distribution and communications.

#### **7.3 Program Educational Objectives**

Program Educational Objectives (PEOs) are broad statements that describe what graduates are expected to attain a few years after graduation. Program educational objectives need to be measurable and are based on the needs of ship owners, shipyards and ship repairers, ship recyclers, ship management companies, insurance companies, salvage operators, classification societies, higher education institutions, government agencies and the general public.

The program education objectives must be consistent with the mission and vision of the institution and must be regularly reviewed.

#### **7.4 Specific Professions/Careers/Occupations for graduates**

##### **7.4.1 Fields of Specialization**

1. Ship Design
2. Ship Propulsion
3. Contracts and Specifications
4. Regulatory and Classification
5. Ship Construction
6. Ship Preservation
7. Ship Management

### 7.4.2 Career Options

1. Ship Owner
2. Ship Designer
3. Ship and Leisure Craft Builder
4. Shipyard manager
5. Classification and Marine Surveyor
6. Ship Manager
7. Offshore Designer and Builder
8. Educator
9. Marine adjusters and assessors
10. Salvage Operators
11. Marine Consultancy

### 7.5 Allied Fields

The following programs and fields of study are allied to BSNAME: Civil Engineering, Structural Engineering, Marine Engineering, Ocean Engineering, Electrical Engineering, Metallurgy, Welding Technology, Computer-Aided Design & Production.

## SECTION 8. Program Outcomes

A graduate of the Bachelor of Science in Naval Architecture and Marine Engineering (BSNAME) program must have attained, as a minimum, the following minimum set of learning outcomes:

### 8.1 Common to all programs in all types of schools

- a) An ability to function in multi-disciplinary and multi-cultural teams;
- b) Act in recognition of professional, social and ethical responsibility;
- c) An ability to communicate effectively using both English and Filipino languages;
- d) An ability to engage in life-long learning and a recognition of the need to keep current with the latest development in the specific field of specialization;
- e) A knowledge on contemporary issues, and;
- f) Preserve and promote “Filipino historical and cultural heritage” based on RA 7722.

### 8.2 Common to a horizontal type as defined in CMO46 s. 2012

- a) Graduates of professional institutions demonstrate a service orientation in one's profession.
- b) Graduates of colleges participate in various types of employment, development activities and public discourses, particularly in response to the needs of the communities one serves.
- c) Graduates of universities participate in the generation of new knowledge or in research and development projects.
- d) Graduates of State Universities and Colleges (SUC's) must, in addition, have the competencies to support “national, regional and local development plans” (RA 7722).

A PHEI, at its option, may adopt mission-related program outcomes that are not included in the minimum set.

### 8.3 Specific to BSNAME

- a) An ability to apply knowledge of mathematics, science, naval architectural and marine engineering design to solve engineering problems;
- b) An ability to design and conduct experiments, as well as to analyze and interpret data;
- c) An ability to design floating vessels, its fittings and powering to meet the required specifications within realistic constraints;
- d) An ability to identify, formulate and solve naval architectural and marine engineering problems;
- e) An understanding of the impact of naval architectural and marine engineering solutions in a global, economic, environmental and societal context;
- f) An ability to use techniques, skills and modern engineering tools necessary for naval architecture and marine engineering practice; and
- g) A knowledge and understanding of engineering and management principles as a member and leader in a team

## SECTION 9. Sample Performance Indicators

Performance Indicators are specific, measurable statements identifying the performance(s) required to meet the outcome and can be validated by evidence.

Program Outcomes	Performance Indicators
a. An ability to design floating vessels, its fittings and powering to meet the required specifications within realistic constraints	1. Design floating vessels with adequate intact stability compliant with specifications
	2. Design floating vessels with adequate powering using basic and experimental methods in marine hydrodynamics
	3. Design floating vessels with auxiliary systems supporting the marine power plant and essential to vessel operations

## SECTION 10. Program Assessment and Evaluation

In the case of Program Outcomes Assessment, the defined Performance Indicators shall be connected to Key Courses (usually the Demonstrating or “D” courses in the Curriculum Map), and appropriate Assessment Methods (AM) may be applied. These methods may be direct or indirect depending on whether the demonstration of learning was measured by actual observation and authentic work of the student or through gathered opinions from the student or his peers. Refer to sample matrix below.

<b>Performance Indicators</b>	<b>Key Courses</b>	<b>Assessment Methods</b>
1. Design floating vessels with adequate intact stability compliant with specifications	Intact Stability	Design Project/Thesis
2. Design floating vessels with auxiliary systems supporting the marine power plant and essential to vessel operations	Marine Auxiliary Systems	Final Examination
3. Design floating vessels with adequate powering using basic and experimental methods in marine hydrodynamics	Ship Resistance	Design Project/Thesis

For the Assessment of Program Educational Objectives, the stakeholders of the program have to be contacted through surveys or focus group discussion to obtain feedback data on the extent of the achievement of the PEOs.

Program Evaluation pertains to one or more processes for interpreting the data and evidence accumulated from the assessment. Evaluation determines the extent at which the Program Outcomes and the Program Educational Objectives are achieved by comparing actual achievement versus set targets and standards. Evaluation results in decisions and actions regarding the continuous improvement of the program.

#### *Sample Matrix Connecting Assessment Methods with Set Targets and Standards*

<b>Key Courses</b>	<b>Assessment Methods</b>	<b>Targets and Standards</b>
Intact Stability	Design Project/Thesis	70% of students get a rating of at least 70%
Marine Auxiliary Systems	Final Examination	70% of students get a rating of at least 70%
Ship Resistance	Design Project/Thesis	70% of students get a rating of at least 70%

Other Methods of Program Assessment and Evaluation may be found in the *CHED Implementation Handbook for Outcomes-Based Education (OBE) and Institutional Sustainability Assessment (ISA)*.

## **SECTION 11. Continuous Quality Improvement**

**11.1** The program shall have documented process for assessing and evaluating the extent to which the program educational objectives and student outcomes are being attained.

**11.2** Results of such evaluations shall be systematically utilized as inputs for the continuous quality improvement of the program such as changes in course syllabi, curricula and any other aspects of the program which shall improve the program educational objectives and student outcomes.

**11.3** Feedback to and from all concerned stakeholders shall be maintained as well as adequate supporting resources to ensure the continuous quality improvement of the program.

**11.4** HEIs shall also provide systems and procedures in terms of shifting/converting to flexible learning.

## **ARTICLE VI CURRICULUM**

### **SECTION 12 Curriculum Description**

The BSNAME program shall consist of a minimum total of 192 credit units. The program consists of the general education component following CMO No. 20, series of 2013 the General Education Curriculum: Holistic Understandings, Intellectual and Civic Competencies; professional courses; Physical Education (PE); and the National Service Training Program (NSTP). The Practicum/OJT Course is required to be taken preferably after 2nd or 3rd year.

### **SECTION 13 Sample Curriculum**

#### **13.1 Diploma in Ship Drafting Technology (100 units)**

General Education Courses – 33 units

Professional Courses – 48 units

Physical Education – 8 units

National Training Service Program – 6 units

On-the-Job Training – 5 units

#### **13.2 Bachelor of Science in Naval Architecture and Marine Engineering (197 units)**

General Education Courses – 36 units

Professional Courses – 142 units

Physical Education – 8 units

National Training Service Program – 6 units

On-the-Job Training – 5 units

<b>Courses</b>	<b>No. of Courses</b>	<b>Equivalent Units per Course</b>	<b>Total Units</b>	<b>Prereq/ Coreq</b>
<b>GENERAL EDUCATION COURSES</b>	<b>18</b>		<b>50</b>	
<b>a) Core Courses</b>	8	3	24	

NGEC 1 - Understanding the Self				
NGEC 2 - Readings in Philippine History				
NGEC 3 - The Contemporary World				
NGEC 4 - Mathematics in the Modern World				
NGEC 5 - Purposive communication				
NGEC 6 - Art Appreciation				
NGEC 7 - Science, Technology, and Society				
NGEC 8 – Ethics				
<b>b) Elective</b>	3	3	9	
*** NGEC 9 – Math, Science, & Technology				
*** NGEC 10 – Social Sciences & Philosophy				
*** NGEC 11 – Arts and Humanities				
<b>c) Mandated Course/s</b>	7		17	
Rizal - The Life & Works of Dr. Jose Rizal	1	3	3	
Physical Education (PE) (1, 2, 3, 4)	4	2	8	
National Service Training Program (NSTP) 1 and 2	2	3	6	
<b>PROFESSIONAL COURSES</b>	<b>42</b>		<b>142</b>	
<b>CALC 1</b> - Differential Calculus		3 (3-0)		
<b>CALC 2</b> - Integral Calculus		3 (3-0)		CALC 1
<b>CALC 3</b> - Differential Equation		3 (3-0)		CALC 2
<b>DRAW 1</b> - Ship Drafting 1		2 (0-6)		
<b>DRAW 2</b> - Ship Drafting 2 (Computer-aided Drafting)		2 (0-6)		DRAW1
<b>DRAW 3</b> - Ship Modeling (Computer-aided Design)		3 (2-3)		DRAW 2
<b>ECON</b> - Engineering Economics		3 (3-0)		
<b>EE 1</b> - Basic Electrical Engineering		3 (2-3)		
<b>EE 2</b> - DC and AC Machinery		4 (3-3)		EE 1
<b>ELECTRO</b> - Basic Electronics		3 (2-3)		
<b>ELEC 1</b> - General Engineering Elective		3 (3-0)		
<b>EMAT 1</b> - Engineering Materials		3 (0-3)		
<b>ENVI</b> - Environmental Engineering		2 (2-0)		
<b>FMECH</b> - Fluid Mechanics		3 (3-0)		THERMO 2
<b>KMATICS</b> - Kinematics & Dynamics of Machines		3 (2-3)		
<b>MARE 1</b> - Marine Engineering 1		4 (3-3)		
<b>MARE 2</b> - Marine Engineering 2		4 (3-3)		MARE 1
<b>MARE 3</b> - Marine Generating Auxiliary System		5 (4-3)		MARE 2
<b>MARE 4</b> - Marine Power Plant Engineering		3 (3-0)		MARE 3
<b>MARE 5</b> - Ship Propulsion		4 (3-3)		MARE 4
<b>MARLAW</b> - Maritime Laws, Rules & Regulations and Code of Ethics		3 (3-0)		NGEC 8
<b>MECH 1</b> - Static of Rigid Bodies		3 (3-0)		
<b>MECH 2</b> - Dynamics of Rigid Bodies		3 (3-0)		MECH 1
<b>MECH 3</b> - Mechanics of Deformable Bodies		3 (3-0)		MECH 2
<b>NA 1</b> - Introduction to Naval Architecture and Marine Engineering		4 (3-3)		

<b>NA 2</b> - Ship Hydrostatics		3 (3-3)		NA 1
<b>NA 3</b> - Ship Resistance		4 (3-3)		NA 2
<b>NA 4</b> - Intact Stability		4(3-3)		NA 3
<b>NA 5</b> - Damage Stability		5 (3-6)		NA 4
<b>NA 6</b> - Ship Structural Analysis		5 (3-6)		NA 2 MECH 3
<b>NA 7</b> - Ship Structural Design		4 (3-3)		
<b>NA 8</b> - Motion in Waves		3 (2-3)		NA 3
<b>NA 9</b> - Ship Design 1		5 (2-9)		Prereq: NA 1, 2, 3 & 4  Coreq: NA 5, 6 and MarE 5
<b>NA 10</b> - Ship Design 2		5 (2-9)		NA 8
<b>NA 11</b> - Shipyard Management		3 (3-0)		
<b>NA 12</b> - Shipyard Processes		3 (2-3)		NA 6
<b>NA 13</b> - Contracts and Specifications		3 (3-0)		
<b>NA 14</b> - Marine Inspections & Surveys		3 (2-3)		
<b>SHOP</b> - Workshop Theory and Practices		3 (2-3)		
<b>SHIP</b> – Ship Building Process		5 (3-6)		NA 1
<b>THERMO 1</b> - Thermodynamics 1		3 (3-0)		
<b>THERMO 2</b> - Thermodynamics 2		3 (3-0)		THERMO 1
<b>On the Job Training</b>		5		

**Notes:**

- \*\*\* NGEC 9 - recommended to include topics in Solid Mensuration, Spherical Trigonometry and Integral Calculus
- \*\*\* NGEC 10 – recommended to include topics in Occupational Health and Safety (include PADAMS, common health problems of seafarers, proper nutrition, lifestyle, and exercise)
- \*\*\* NGEC 11 – recommended to include World Geography and Intercultural Relationship<sup>1</sup>

**Suggested Elective Courses:**

Elective Courses	Minimum Hours/week		Minimum Credit Units
	Lecture	Laboratory	
Welding Technology	3		3
Marine Inspections and Surveys	3		3
Computer Aided Design and Construction	3		3

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<sup>1</sup>

**SECTION 14 Program of Study**

The Higher Education Institutions (HEIs) may enrich the model program of study depending on the needs of the industry, provided that all prescribed courses/competencies required in the curriculum outlines are offered and pre-requisites and co-requisites are observed.

**FIRST YEAR**  
**First Semester**

<b>Subj. Code</b>	<b>Descriptive Title</b>	<b>Hours</b>			<b>Pre-requisite</b>
		<b>LEC</b>	<b>LAB</b>	<b>UNITS</b>	
CALC1	Differential Calculus	3	0	3	None
DRAW1	Ship Drafting 1	0	6	2	None
NA1	Introduction to Naval Architecture and Marine Engineering	3	3	4	None
NGEC1	Understanding the Self	3	0	3	None
NGEC2	Readings in Philippine History	3	0	3	None
NGEC3	The Contemporary world	3	0	3	None
PE1	Team Sports	1	3	2	None
NSTP1	NSTP	—	—	3	None
<b>Sub-Total:</b>		<b>16</b>	<b>12</b>	<b>23</b>	

**FIRST YEAR**  
**Second Semester**

<b>Subj. Code</b>	<b>Descriptive Title</b>	<b>Hours</b>			<b>Pre-requisite</b>
		<b>LEC</b>	<b>LAB</b>	<b>UNITS</b>	
CALC2	Integral Calculus	3	0	3	CALC1
DRAW2	Ship Drafting 2 (Computer-Aided Drafting)	0	6	2	Draw 1
NGEC4	Mathematics in the Modern World	3	0	3	None
NGEC5	Purposive Communication	3	0	3	None
NGEC6	Art Appreciation	3	0	3	None
NGEC7	Science, Technology and Society	3	0	3	None
NGEC9	Math, Science, & Technology	3	0	3	None
PE2	Team Sports	2	0	2	None
NSTP2	National Service TP 2	—	—	3	None
<b>Sub-Total:</b>		<b>20</b>	<b>6</b>	<b>25</b>	

**SECOND YEAR**  
**First Semester**

<b>Course Code</b>	<b>Descriptive Title</b>	<b>Hours</b>			<b>Pre-requisite</b>
		<b>LEC</b>	<b>LAB</b>	<b>UNITS</b>	
EE1	Basic Electrical Engineering	2	3	3	None

EMAT1	Engineering Materials	3	0	3	None
MARE1	Marine Engineering 1	3	3	4	None
NGEC10	Social Sciences & Philosophy	3	0	3	None
SHIP	Ship Building Processes	3	6	5	NA 1
SHOP	Workshop Theory and Practices	2	3	3	None
PE3	Physical Fitness	2	0	2	None
<b>Sub-Total:</b>		<b>18</b>	<b>15</b>	<b>23</b>	

**SECOND YEAR**  
**Second Semester**

<u>Course Code</u>	<u>Descriptive Title</u>	<u>Hours</u>			<u>Pre-requisite</u>
		<u>LEC</u>	<u>LAB</u>	<u>UNITS</u>	
NGEC 11	Arts and Humanities	3	0	3	NGEC10
RIZAL	The Life and Works of Dr. Jose Rizal	3	0	3	
MARE 2	Marine Engineering 2	3	3	4	MARE 1
MECH 1	Static of Rigid Bodies	3	0	3	None
NA 2	Ship Hydrostatics	3	0	3	NA 1
DRAW 3	Ship Modeling (Computer-aided Design)	2	3	3	DRAW 2
THERMO1	Thermodynamics 1	3	0	3	None
PE4	Physical Fitness	2	0	2	None
<b>Sub-Total:</b>		<b>22</b>	<b>6</b>	<b>24</b>	

**Practicum/OJT\* : Total of 320 Hours**

**\* To be taken preferably after the 2<sup>nd</sup> and/or 3<sup>rd</sup> year, and supported by duly accomplished and approved NAME Training Record Booklet.**

All students who satisfactorily completed the first two (2) years and 5 units of OJT, with a total of 100 units, shall be awarded the Diploma in Ship Drafting Technology, which the students may use for immediate employment as Ship Draftsman in shipyards and other facilities.

**THIRD YEAR**  
**First Semester**

<u>Course Code</u>	<u>Descriptive Title</u>	<u>Hours</u>			<u>Pre-requisites</u>
		<u>LEC</u>	<u>LAB</u>	<u>UNITS</u>	
CALC 3	Differential Equation	3	0	3	CALC 2
MARE 3	Marine Auxiliary Generating System	4	3	5	MARE 2
MECH2	Mechanics of Deformable Bodies	3	0	3	MECH 1
NA3	Ship Resistance	3	3	4	NA2
ELECTRO	Basic Electronics	2	3	3	None
THERMO 2	Thermodynamics 2	3	0	3	THERMO 1
NGEC 8	Ethics	3	0	3	None
<b>Sub-Total:</b>		<b>21</b>	<b>9</b>	<b>24</b>	

**THIRD YEAR**

**Second Semester**

<u>Course Code</u>	<u>Descriptive Title</u>	<u>Hours</u>			<u>Pre-requisites</u>
		<u>LEC</u>	<u>LAB</u>	<u>UNITS</u>	
KMATICS	Kinematics and Dynamics of Machines	2	3	3	NONE
EE2	DC and AC Machinery	3	3	4	EE1
ELEC 1	General Engineering Elective	3	0	3	
ENVI	Environmental Engineering	2	0	2	None
FMECH	Fluid Mechanics	3	0	3	THERMO 2
MARE 4	Marine Power Plant Engineering	3	0	3	MARE3
MECH 3	Mechanics of Deformable Bodies	2	0	2	MECH2
NA 4	Intact Stability	3	3	4	NA3
<b>Sub-Total:</b>		<b>21</b>	<b>9</b>	<b>24</b>	

**FOURTH YEAR****First Semester**

<u>Course Code</u>	<u>Descriptive Title</u>	<u>Hours</u>			<u>Pre-requisite</u>
		<u>LEC</u>	<u>LAB</u>	<u>UNITS</u>	
MARE5	Ship Propulsion	3	3	4	MARE 4
NA 5	Damage Stability	3	6	5	NA4
NA 6	Ship Structural Analysis	3	6	5	NA 2 MECH 3
NA 7	Ship Structural Design	3	3	4	
NA 8	Motion in Waves	2	3	3	Prereq: NA 1, 2, 3 and 4 Coreq: NA 5, 6 and MarE5
NA 9	Ship Design 1	2	9	5	NA 8
<b>Sub-Total:</b>		<b>16</b>	<b>30</b>	<b>26</b>	

**FOURTH YEAR****Second Semester**

<u>Course Code</u>	<u>Descriptive Title</u>	<u>Hours</u>			<u>Pre-requisite</u>
		<u>LEC</u>	<u>LAB</u>	<u>UNITS</u>	
MARLAW	Maritime Laws, Rules & Regulations and Code of Ethics	3	0	3	NGEC8
NA 10	Ship Design 2	2	9	5	NA 8
NA 11	Shipyards Management	3	0	3	None
NA 12	Shipyards Processes	2	3	3	None
NA 13	Contracts and Specifications	3	0	3	None
NA 14	Marine Inspections & Surveys	2	3	3	None
ECON	Engineering Economics	3	0	3	None
<b>Sub-Total:</b>		<b>18</b>	<b>15</b>	<b>23</b>	

**SECTION 15 Practicum/On-the-Job-Training**

Practicum/OJT is an immersion program wherein the students will have the chance and opportunity to work with the industry. This program is important because the students will have the chance to apply the skills, knowledge and attitude learned in school and at the same time the opportunity to experience the working environment. Learning expectations in the naval architecture and marine engineering field should be established between the HEIs and the industry.

The Practicum/OJT is comprised of 320 hours and is required to be taken preferably after the second year or third year, but prior to his graduation.

### **SECTION 16 Sample Curriculum Map and Course Specification**

Refer to **Annex I** for the minimum Program Outcome Mapping. HEIs may develop their own Curriculum Map. The course specifications for the BSNAME program are contained in **Annex II** of this PSG.

### **SECTION 17 Sample Means of Curriculum Delivery**

Appropriate use of teaching-learning strategies through a constructivist and learner-centered paradigm to facilitate the acquisition of the required competencies. Under this paradigm, the student is the subject of the learning process enabling the learner to achieve his/her full potentials.

The teaching-learning process is interactive, participatory, collaborative and experiential emphasizing the connection among courses to achieve a seamless integration towards holistic learning.

Curriculum delivery may vary on the classroom level. Hence, it shall show contribution of the courses/topics to the attainment of program and learning outcomes. The following teaching and learning activities may be utilized in the course delivery, but not limited to:

1. Peer/Team Teaching
2. Micro-teaching
3. Film/Video Viewing
4. Interactive Learning
5. Reporting
6. Brainstorming
7. Class Discussion/Question and Answer Technique
8. Panel Discussion
9. Focused Group Discussion
10. Workshop Activity
11. Buzz Session
12. Concept/Mind Mapping
13. Gallery Walk
14. Research Project
15. Seminar/Symposium

16. Debate
17. Study Tour

However, when unprecedented situations necessitate conversion of teaching and learning modes of delivery from traditional face to face to flexible learning, HEIs shall adopt flexible learning strategies following existing and/or current applicable CHED memorandum orders/guidelines.

## **SECTION 18 Components of the Course Syllabus**

The course syllabus must contain at least the following components:

1. General Course Information (Title, Description, Credit Units, Prerequisites)
2. Links to Program Outcomes
3. Course Outcomes
4. Course Outline (Including Unit Outcomes)
5. Teaching and Learning Activities
6. Assessment Methods
7. Grading System
8. Learning Resources

## **SECTION 19. Grading System**

### **19.1 Bases for Grading**

The final grade or rating given to students shall be based solely on his/her scholarly performance in any course. Any adjustment diminution to the final grade for co-curricular activities, attendance or misconduct shall not be allowed. Any final grade given to a student may be reviewed in accordance with institutional academic processes.

Scholarly performance shall be measured by any of the following:

1. Lecture Component
  - a) Written Examinations
  - b) Oral Examinations
  - c) Research works
  - d) Outputs such as project, portfolio, and others
2. Laboratory Component
  - a) Scientific and Technical Experiments
  - b) Demonstration of competences acquired

### **19.2. Requirements for promotion**

The promotion of a student from any curricular or component course towards graduation shall strictly comply with the conditions or requirements as follows:

1. A student shall be given the necessary academic credits towards the completion of, or graduation from BSNAME program, provided that he/she has enrolled in the program; has satisfactorily complied with the admission

requirements, has faithfully and regularly attended classes, and has acquired the expected proficiency required in the curricular or component subject of the program.

2. A student shall be promoted or permitted to enroll in advanced or specialized courses provided that, he/she has satisfactorily passed the basic and pre-requisite course(s), except otherwise provided in this CMO, MORPHE or by the Commission.
3. A student shall earn academic credits for promotion towards graduation, provided he/she garners a final grade of at least fifty percent (50%) or its equivalent in curricular or component course, as determined by proper institution authorities on academics.
4. The scholastic records of every student shall be filed with the institution until the close of the next academic term, for reference or examination in case of any grievance or complaint.

### 19.3 Requirements for Grading

The grading system for a student in curricular or component courses shall strictly comply with the conditions or requirements as follows:

1. No provisional, conditional or temporary final grade for any curricular or component course shall be given to a student.
2. In case a student fails to take a final examination or submit an academic requirement for completion of a course and that his/her scholastic performance is not sufficient to merit a final passing grade, an institution may, consistent with its academic policies, give the student final grade which does not earn any academic credit nor indicates failure such as "NC" for "No Credit" or "NG" for "No Grade". Such a grade is permanent and cannot be subsequently changed. Provided however, that where the requirements, is due to excusable grounds, such as sickness, emergency, or accident, the student may be given an incomplete mark or "INC". Provided further, that the institution allows special or completion examinations, or additional time for compliance of the requirements. In no case shall an incomplete or "INC" mark remain for more than one (1) academic year.
3. The passing standard shall be the grade of 50%. However, the institution may raise the passing standard. To get the percentile grade, the number of correct answers called raw score shall be divided by the total number of test points and multiplied by 100.

Percentage (%) is used in determining and expressing a student's raw scores in every examination. The table below shows a sample of the range of percentage marks and their corresponding equivalents.

Percentage Grade	Letter Grade	Descriptive Rating	Five Point Grading	Remarks
90 – 100 %	A	Excellent	1	Meets minimum competence with exceptional score

80 – 89 %	B	Very Good	1.5	Meets minimum competence with over and above average score
70 – 79 %	C	Good	2	Meets minimum competence with the above average
60 – 69 %	D	Satisfactory	2.5	Meets minimum competence with the average score
50 – 59 %	E	Pass	3	Meets minimum competence
0 – 49 %	F	Fail	5	Does not meet the minimum competence

4. The transmutation of grades shall NOT be allowed.

## ARTICLE VII REQUIRED RESOURCES

### SECTION 20. Leadership and Institutional Support

Leadership and institutional support must be adequate to ensure the quality and continuity of the program. Resources like institutional services, financial support and staff shall be provided to the program in order:

- 20.1** to attract, retain and provide for the continued professional development of qualified faculty;
- 20.2** to acquire, maintain and operate infrastructures, facilities and equipment that provide an environment in which student outcomes can be attained.

### SECTION 21. Program Administration

- 21.1 Composition** - A well-organized and competent faculty and staff shall administer the implementation of BSNAME program and should meet the requirements set by the Commission. There shall be sufficient number of competent faculty to cover all of the curricular areas of the program as well as to assure adequate levels of student-faculty interaction and student advising and counseling.
- 21.2** A Higher Education Institution (HEI) offering BSNAME program shall have a full-time administrator that will administer the program. This administrator can be a Dean, Department Head, Director, Coordinator or equivalent depending on the organizational structure of the HEI. Faculty involvement in the implementation of the program shall also be encouraged.
- 21.3 Qualifications of the Dean** - A Dean/Head shall be appointed to provide general administration, leadership and direction to the BSNAME program of the institution.

**21.3.1 Minimum Qualifications:**

- a. Holder of a Bachelor of Science degree in Naval Architecture and Marine Engineering and holder of a Master's degree preferably in academic management or in any related field.
- b. Must be a registered naval architect and marine engineer with valid license and a bonafide member of a professional organization duly accredited by the Professional Regulation Commission.
- c. Must have at least two (2) years experience in professional practice with at least two (2) years teaching experience.

**SECTION 22. Faculty and Staff**

**22.1 General Requirements**

**22.1.1 Qualifications**

- a. Faculty teaching naval architecture and marine engineering courses must be a holder of BSNAME degree. He/she must be a registered naval architect and marine engineer with valid license and a bonafide member of a professional organization duly accredited by the Professional Regulation Commission.
- b. Faculty teaching general education courses and core courses must be a holder of a related professional degree. He/she must be registered professional with valid license and a bonafide member of a professional organization duly accredited by the Professional Regulation Commission as appropriate.
- c. For both cases above faculty must have at least two (2) year's experience in professional practice.
- d. Technical, laboratory and support staff should be sufficient in number and must have adequate qualifications and experience to ensure that there is satisfactory level of support in shops, maintenance of equipment, management of laboratories and general administration of the program.

**22.1.2 Teaching Load** - The teaching load and responsibility of each faculty member shall be limited only within the area of his/her specific training and /or professional experience.

**22.1.3 Faculty and Staff Development.**

The institution must have a system of staff development according to IRR of 10698. It should encourage the faculty to shift from a teaching to a learning-centered education paradigm. It should also motivate the faculty to:

1. Pursue graduate studies
2. Attend seminars, symposia and conferences for continuing education and industrial interaction
3. Undertake research activities and to publish their research output
4. Give lectures and present papers in national/ international conferences, symposia and seminars.

The institution must provide opportunities and incentives such as:

1. Orientation/competency enhancement for paradigm shift of the teacher as facilitator of learning.
2. Tuition fee subsidy for graduate studies
3. Study leave with pay
4. De-loading to finish a thesis or carry out research activities
5. Travel grants for academic development activities such as special skills training and attendance in national/ international conferences, symposia and seminars.
6. Awards and recognition

## **22.2 Evaluation of Faculty Educational Contributions**

The institutions must establish an evaluation method to determine the educational contributions of each faculty member and which shall provide an opportunity for faculty members to be involved in the program. This evaluation shall be implemented in accordance with the established method(s).

## **SECTION 23. Library**

The personnel, facilities and holdings shall conform to existing CHED requirements for libraries which are embodied in a separate CHED issuance.

The institution is likewise encouraged to maintain periodicals and other non-print materials relevant to the BSNAME program to aid the faculty and students in their academic work.

Further, libraries shall participate in inter-institutional activities and cooperative programs whereby resource sharing is encouraged.

## **SECTION 24. Facilities and Equipment**

- a. Laboratory requirements (See **Annex III**, BSNAME Professional Laboratory Equipment).

Laboratories should conform to existing requirements as specified by law (RA 6541, "The National Building Code of the Philippines" and Presidential Decree 856, "Code of Sanitation of the Philippines").

- b. Class Size
  1. For lecture classes, the ideal size is 35 students per class, maximum is 50.
  2. For laboratory and research classes, class size shall be specific to the discipline to be stated in the policies and standards.
  3. Special lectures with class size more than 50 may be allowed as long as the attendant facilities are provided.

- c. Educational Technology Centers

The institution should provide facilities to allow preparation, presentation and viewing of multimedia materials to support instruction.

## **SECTION 25. Student Admission, Progress Monitoring, and Graduation**

The basic requirement for eligibility for admission of a student to any tertiary level degree program shall be graduation from the secondary level recognized by the Department of Education HEI's must specify admission, transfers, progression, student progress monitoring and performance evaluation requirements. They should ensure and document that all students are advised on curricular and career matters, academic exchange, promotion and graduation to ensure that students continually achieve desired learning outcomes and that they meet all the requirements for promotion and graduation.

## **SECTION 26. Extension, Community-Oriented Programs and Industry Linkage**

**26.1 Extension Service** – the program shall provide for non-degree educational services such as short courses on new technologies and new professional topics to assist students in keeping abreast of new developments in the industry. Such short courses may provide summaries of findings from research of faculty and developed in collaboration among industry and engineering societies.

**26.2 Community-Oriented Programs** – students and/or student organizations shall have programs to assist communities like assistance to high school students on science fairs, contributing to local communities by assisting to design low-cost projects for their benefit, utilizing their technological expertise. The community needs should be determined first.

**26.3 Industry-Academe Linkage** – the institution shall organize regular and active participation of the industry in planning, defining and improving program educational objectives, student outcomes and curricula to ensure that these remain relevant and up-to-date with the society and professional requirements. Faculty and student should have industry exposure like internships, visits, collaborative projects supervised by industry professionals or industry-based final year projects.

## **ARTICLE IX COMPLIANCE OF HEIs**

**Section 27.** Using the ***CHED Implementation Handbook for OBE and ISA*** as reference, a HEI shall develop the following items which will be submitted to CHED when they apply for a permit:

1. The complete set of **program outcomes**, including its proposed additional program outcomes.
2. Its proposed **curriculum**, and its justification including a curriculum map.
3. Proposed **performance indicators** for each outcome. Proposed measurement system for the level of attainment of each indicator.

4. Proposed **outcomes-based syllabus** for each course.
5. Proposed system of **program assessment and evaluation**.
6. Proposed system of program **Continuous Quality Improvement (CQI)**

## **ARTICLE X MODEL EMBEDMENT OF TVET COMPETENCIES/QUALIFICATIONS IN THE LADDERIZED BSNAME PROGRAM**

### **Section 28. Authority to Operate Ladderized BSNAME**

All Private Higher Education Institutions with recognized BSNAME program granted by the CHED and by the respective Governing Boards in the case of chartered State Universities and Colleges (SUCs), and Local Colleges and Universities (LCUs) intending to offer the ladderized BSNAME shall submit to CHED the necessary documents required by CMO No. 43, series of 2008 - "Implementing Guidelines of Executive Order No. 694 entitled "Enabling Higher Education Institutions to Opt to Ladderize their Education Programs Without Need for Issuance of Permit from the Commission on Higher Education and the Technical Education and Skills Development Authority."

### **Section 29. Model Curriculum**

The model BSNAME curriculum with embedded TVET qualifications shall be adopted as the minimum requirement and shall be built as prescribed in **Section 13** of this PSG for the completion of the ladderized BSNAME program. The TVET qualifications embedded in this curriculum include, but are not limited to, the following:

1. Mechanical Drafting NC I
2. CAM/CAD Operation NC III

The HEI intending to offer the ladderized BSNAME program may enrich the sample/model program of study depending on the needs of the industry, provided that all prescribed courses with corresponding prerequisites/corequisites in the curriculum are complied with. Refer to **Annex IV** of this PSG.

### **Section 30. Faculty Qualifications and Other Requirements**

Any HEI intending to offer the ladderized BSNAME program should satisfy the faculty and other requirements as prescribed in **Section 22** of this PSG, and the TESDA Training standards, requirements (curriculum design, training delivery, laboratory facilities, equipment and tools, faculty/trainer qualifications, as indicated in the specific Training regulations and institutional assessment and national certification procedures) as prescribed in CMO No. 43, s. 2008.

### **Section 31. Recognition of TESDA National Certificates**

HEIs may admit a holder with valid relevant TESDA National Certificate/s who wishes to pursue BSNAME program. Such certificates may be given credit units upon

verification by the concerned HEIs. Further, the Transcript of records shall reflect the grade of "Passed" and the TESDA NC level.

### **Section 32. Monitoring and Evaluation**

Upon effectivity of this Memorandum Order, the CHED will initially conduct an evaluation of the HEIs that will offer the ladderized program prior to implementation. Thereafter, CHED and TESDA representatives shall jointly monitor and evaluate or do compliance audit to ensure adherence with the minimum requirements. Compliance audit shall be done at least once every two years.

### **ARTICLE XI TRANSITORY PROVISION**

All HEIs with existing permit or recognition to offer are hereby given a non-extendible period of three (3) years from the date of effectivity hereof, within which to fully comply with this PSG.

### **ARTICLE XII SANCTION**

For violations of this Order, the Commission may impose such administrative sanction, as it may deem appropriate pursuant to the pertinent provisions of RA 7722, in relation to Section 69 of BP 232 otherwise known as Education Act of 1982, Manual of Regulations for Private Higher Education of 2008 (MORPHE) and other related laws.

### **ARTICLE XIII SEPARABILITY AND REPEALING CLAUSES**

Any provision of this Order, which may thereafter be held invalid, shall not affect the remaining provisions.

All CHED issuances or part thereof inconsistent with the provision in this CMO shall be deemed modified or repealed.

### **ARTICLE XIV EFFECTIVITY**

This order shall take effect starting AY 2021 -202\_ after its publication in the official Gazette or Newspaper of General Circulation.

Quezon City, Philippines \_\_\_\_\_.

For the Commission:

**J. PROSPERO E. DE VERA III, DPA**  
Chairman