DEPARTMENT OF NAVAL ARCHITECTURE AND MARINE ENGINEERING
SONARGAON UNIVERSITY (SU), DHAKA

FACULTY: SCIENCE AND ENGINEERING

PROGRAM: B. Sc. in Naval Architecture and Marine Engineering
PROPOSED REVISED OBE SYLLABUS

By Departmental Syllabus Committee and recommended by
24th Academic Council (dated: 16-06-2022) for the approval of UGC

Duration (minimum): 4-Year (8 Semesters)
Maximum Period of Completion for the Program: 6 (six) Years
Admission Requirements: SU-rules or as suggested by UGC
Academic Calendar:

The academic year shall be divided into two regular Semesters (1st/Spring and 2nd/Fall Semesters), each ordinarily having duration of not less than 14 (fourteen) weeks of classes. There shall be a Mid-Semester Examination at about middle of each Semester and a Semester Final Examination at the end of each Semester. The examination will be conducted as per Academic regulations.

Guide line for Classes and Examinations in a Semester:

Total Class in a Semester = 14 weeks
Recess before Mid-Semester and Semester Final Exams. = 2 weeks
Time for Mid-Semester and Semester Final Exams. = about 4 weeks
Publication of Results + Inter-Semester Recess = 2 weeks

Minimum Requirements for the Degree:

(i) Completion of 161.00 credits.
(ii) Passing all courses individually and maintaining minimum CGPA of 2.25 out of 4.00.

Evaluation System: Continuous Assessment = 30%
Mid-Semester Exam. = 30%
Semester Final Exam. = 40%

***Continuous Assessment* = Class Tests+ Assignments/Quiz + Attendance and Class Performance.**

Grade System:

Numerical grade	Letter Grade	Grade point
80% or above	A+ (A plus)	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A- (A minus)	3.50
65% to less than 70%	B+ (B plus)	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B- (B minus)	2.75
50% to less than 55%	C+ (C plus)	2.50
45% to less than 50%	C	2.25
40% to less than 45 %	D	2.00
Less than 40%	F	0.00

Course Designation and Course Code Numbering Systems:

Each course is designated by a two to four letter code (e.g. NAME, EEE, ME, CSE, Hum, Math, Chem, Phy, Ban, etc.) identifying the course offering department or course related department followed by a four - digit number with the following criteria:

(i) NAME defines the Departmental identification code (Naval Architecture and Marine Engineering).

(ii) The first digit will correspond to the Year (e.g. 1 for 1st year, 2 for 2nd year, etc.) in which the students normally take the course.

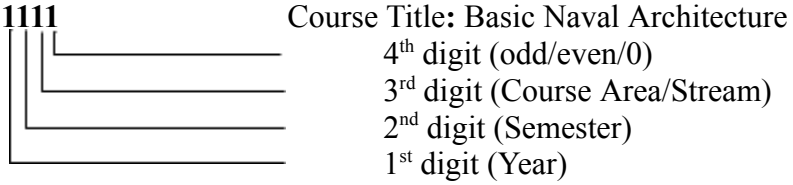
(iii) The second digit will correspond to the Semester (1 for 1st semester and 2 for 2nd semester) in which the course is normally taken by the students.

(iv) The third digit will correspond the departmental course of any area/stream.

(v) The fourth or last digit designates the course type (odd digit for theory, even digit for sessional/design studio and 0 digit for the sessional course without theory course. If there are no sessional courses, then both odd and even digits are used for theory courses)

(vi) There is a blank space between departmental code NAME and first digit.

Example for a Typical Course Code No.:



N.B.:

(1) Project & Thesis/Thesis/Dissertation course shall be designated by the departmental identification code followed by 4000 (viz. NAME 4000) for 4-year Engineering Programs applicable for last two semesters (minimum one-year duration) as per rules of UGC/BAC (Bangladesh Accreditation Council). For other Programs, the course code no. and placement of this course in syllabus should be fixed as per rules of UGC/BAC.

(2) Teaching for the courses is reckoned in credits and the credits allotted to various courses will be determined by the ACUG (Academic Committee of Undergraduate) with the following guidelines:

Sl.	Type of Course	Contact Hour/week	Credit
(i)	Theory/Lecture (Taught)/ Seminar (Discussion)	1.0	1.00
(ii)	Tutorial/ Practice/Technical Systems	1.0	1.00
(iii)	Independent Lab/Sessional/Design/ Special Study Elective (Studio)	1.5 2.0	0.75 1.00
(iv)	Project & Thesis/Thesis/ Dissertation	2.0	1.00
(v)	Design Studio	1.5	1.00
(vi)	Field Work/Field Survey	2 weeks of field work	1.00
(vii)	Industrial Attachment (after completed all courses)	One to Three months	As per approved by UGC
(viii)	Internship (after completed all courses)	As per approved by UGC	As per approved by UGC
(ix)	Internship (within study period) #	As per approved by UGC	Non-credit (For **B.** Arch)

N.B.: 1.0 contact hour = Lecture of 50 minutes.

 # For B. Arch.: Internship will start only after successful completion of 3rd year under a full IAB member or one recognized by the national architectural professional body in a foreign nation. Here total 40 contact hours = 7.5 weeks.

Outcome-Based Curriculum

Part A

1. **Title of the Academic Program:** B. Sc. in Naval Architecture and Marine Engineering
2. **Name of the University:** Sonargaon University
3. **Vision of the University:**

To become a Center of Excellence comparable to the best in the world for producing professionals who shall be leaders in technology, innovation, entrepreneurship and management.

4. **Mission of the University:**

Mission 1: The Sonargaon University's mission as a young research university is to achieve the highest standards of international excellence in research and teaching, while also fully meeting its distinctive responsibilities as the country's sole private institution of higher education.

Mission 2: The University students and staff have the opportunity to develop the skills, judgement and independence necessary to be engaged citizens and to assume active leadership roles in societal and economic life.

Mission 3: The production of knowledge, which will always remain the prime mission of a university, implies creativity enhancing conditions allowing a focus on the essentials, as it needs the freedom to experiment and to devise innovative, special and disruptive solutions.

Mission 4: It provides a unique forum for the development of the cultural, political and social dialogues that are the lifeblood of a mature democracy.

Mission 5: The University develops activities in fields that contribute to priority areas of national, social and economic development, for the benefit of the competitiveness of Bangladesh.

5. **Name of the Program Offering Entity:** Department of Naval Architecture and Marine Engineering, Faculty of Science and Engineering, Sonargaon University (SU), Dhaka.
6. **Vision of the Program Offering Entity:**

- To recruit, educate and support exceptional, diverse students and engage them in lifelong learning and achievement while preparing them for a sustained career of engineering leadership in the marine-related industries, government service, and academia.
- To maintain and enhance the leading undergraduate program in the world in naval architecture and marine engineering; one which provides rigorous and effective preparation for a lifelong career of engineering leadership and service.

7. **Mission of the Program Offering Entity: To** produce engineers and researchers with sound knowledge on fundamentals of traditional, modern and emerging areas of Naval Architecture and Marine Engineering together with innovative design abilities and managerial skills to achieve sustainable national development.

The Department is committed to preparing its students for immediate entry into the engineering profession as well as into graduate programs of study. The Department is also committed to research in order to place its faculty and students at the forefront of development in the profession of civil engineering at the local and national levels. The latest advances are brought into classroom through continued research, thereby positioning the students to lead the profession into the twenty-first century. The Department reflects the university scope and mission by offering opportunities to students with previous limited access to education to be trained to make professional contributions to the civil engineering enterprise.

8. Objectives of the Program Offering Entity:

- Introducing students to identify, formulate, and solve complex engineering problems with principles of engineering, science, and mathematics.
- Ensuring students are able to communicate effectively with a range of audiences.
- Introducing students to develop and conduct experiments, analyze and interpret data, and use engineering judgment to draw conclusions.
- Ensuring students are able to function effectively in a team that provides leadership, creates a collaborative and inclusive environment, establishes goals, plans tasks, and meets objectives.
- Ensuring that students become familiar with the appropriate instrumentation for naval architecture and marine engineering.

9. **Name of Degree:** B. Sc. in Naval Architecture and Marine Engineering

10. Description of the Program

The department of Naval Architecture and Marine Engineering offers four-year undergraduate program titled Bachelor of Science (B. Sc.) in Naval Architecture and Marine Engineering. The NAME undergraduate program provides an excellent technical background for people who would like to work in the field of shipbuilding and marine engineering. A career in naval architecture and marine engineering is very exciting, challenging and rewarding. It includes shipbuilding industry (commercial, private and defense related), Passenger transportation, Navy and Coastguard activities (offshore oil, gas and mineral protection) and Recreational boating and sailboat industry.

11. Graduate Attributes

Graduate Attributes related to core knowledge:

- Engineering knowledge
- Problem analysis
- Design/development of solutions
- Conduct investigations of complex problems

Graduate Attributes related to Skills:

- Modern tool usage
- Environment and sustainability
- Communication
- Project management and finance

Graduate Attributes related to behavior

- Ethics
- Engineering and society
- Individual and team work
- Lifelong learning

12. Program Educational Objectives (PEOs)

PEO 1: Graduates of Naval Architecture and Marine Engineering will develop a sound knowledge on mathematical, scientific and engineering fundamentals and advanced knowledge of understanding in the sector of ship design, ship building and marine engineering including analysis techniques, developments and implementation methodologies to solve critical technical problems related to this field.

PEO 2: Graduates of Naval Architecture and Marine Engineering will acquire technical and communicative knowledge with professional and industry-based education to build up successful professional careers in shipbuilding and maritime industries, government organizations and academia.

PEO 3: Graduates of Naval Architecture and Marine Engineering will understand sustainable engineering practice, socio-ethical values and life-long continuous learning to adapt the innovation and changes in this sector.

PEO 4: Graduates of Naval Architecture and Marine Engineering will be capable of working in the broader area of technology having the capability and responsibility of leadership and teamwork.

PEO 5: Graduates of Naval Architecture and Marine Engineering will be able to positively contribute in national and global cultural, social, technological, economic and educational development of society through the ethical application of their knowledge and skills.

13. Program Learning Outcomes (PLOs)

PLO 1: Ability to gather and apply knowledge of mathematics, science, and engineering

PLO 2: Ability to design, analyze and develop computing systems within realistic constraints

PLO 3: Ability to conduct, evaluate, and interpret experiments

PLO 4: Ability to work on multidisciplinary teams and develop leadership

PLO 5: Ability to identify, create, and solve engineering problems

PLO 6: Practice behaving professionally and ethically

PLO 7: Ability to communicate effectively on complex engineering activities

PLO 8: Ability to understand the impact of engineering solutions

PLO 9: Apply contextual knowledge to assess societal, health, safety, legal, and cultural issues

PLO 10: Apply appropriate techniques, resources, modern engineering and IT tools

PLO 11: Demonstrate knowledge and understand principles of engineering and management to manage projects

PLO 12: Able to engage in Lifelong learning

14. Mapping mission of the university with PEOs

PEOs	Mission 1	Mission 2	Mission 3	Mission 4	Mission 5
PEO 1	√			√	
PEO 2	√	√	√		√
PEO 3			√		√
PEO 4		√		√	
PEO 5				√	√

15. Mapping PLOs with PEOs

PLOs	PEO1	PEO2	PEO3	PEO4	PEO5
PLO 1	√	√			
PLO 2	√		√	√	
PLO 3		√	√		
PLO 4	√			√	
PLO 5		√	√		
PLO 6		√			√
PLO 7	√		√		
PLO 8		√			
PLO 9			√		√
PLO 10	√	√		√	
PLO 11		√	√	√	
PLO 12	√	√			

Course Code	Course Title	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
NAME 1111	Basic Naval Architecture	√						√				√	√
Chem 1101	Chemistry			√						√	√		√
Phy 1101	Physics	√	√	√						√			√
Math 1101	Mathematics I	√				√			√				
NAME 1171	Marine Engineering I	√				√		√					√
NAME 1172	Marine Engineering I Sessional			√						√		√	
Chem 1102	Chemistry Sessional	√		√						√			√
Phy 1102	Physics Sessional	√		√							√		
NAME 1211	Hydrostatic and Stability of Ships	√				√			√				√
EEE 1201	Electrical Engineering Principles	√	√									√	√
Math 1201	Mathematics II	√				√		√					
Ban 1201	বাংলা ভাষা ও সাহিত্য (Bengali Literature and Language)				√		√			√			√
Hum 1201	Advanced English Skills				√		√			√		√	√
NAME 1242	Basic Engineering Drawings	√	√										√
EEE 1202	Electrical Engineering Principles Sessional		√	√		√					√		
NAME 1200	Computer Aided Drawing							√			√		√
ME 1200	Workshop Practices Sessional			√	√	√					√		√
NAME 2101	Theoretical Ship Design	√	√			√							√
NAME 2121	Fluid Mechanics	√	√						√				√
NAME 2151	Mechanics of Structures					√		√	√		√		√
NAME 2171	Marine Engineering II	√		√		√		√			√		√
Ban 2101	বাংলাদেদের অভয যেদের ইহত্িাস (History of Bangladesh Independence)				√		√			√			√
NAME 2122	Fluid Mechanics Sessional			√					√	√	√		

NAME 2142	Ship Drawings & Calculations I		√			√			√				√
NAME 2152	Mechanics of Structures Sessional	√				√			√		√		
Math 2201	Mathematics III			√		√			√				

EEE 2201	Electrical and Electronic Engineering for Marine Engineers		√					√			√		
Hum 2201	Economics	√					√			√			
NAME 2273	Heat Transfer	√							√	√			
NAME 2291	Shipbuilding Materials						√			√	√		√
NAME 2292	Shipbuilding Materials Sessional			√		√					√		
NAME 2242	Ship Drawings & Calculations II		√			√		√		√			√
EEE 2202	Electrical and Electronic Engineering for Marine Engineers Sessional			√				√			√		
NAME 3101	Shipbuilding Technology I						√			√	√		
NAME 3103	Principles of Ship Design	√							√			√	√
NAME 3105	Theory of Machines	√	√					√			√	√	
Hum 3101	Sociology				√		√			√			
NAME 3121	Marine Hydrodynamics	√						√				√	√
NAME 3122	Marine Hydrodynamics Sessional			√		√			√			√	
NAME 3142	Ship Drawings & Calculations III		√			√		√	√			√	√
NAME 3136	Computer Programming in Ship Design I	√		√				√	√		√		√
NAME 3100	Shipyard Training (4 weeks)				√		√		√	√	√	√	√
NAME 3201	Shipbuilding Technology II		√		√					√		√	
NAME 3203	Numerical Methods for Engineers	√	√			√			√			√	√
NAME 3205	Maneuvering & Control of ships					√		√		√	√		
Hum 3201	Principles of Accounting	√							√	√			
NAME 3223	Resistance & Propulsion of Ships	√						√			√	√	√
NAME 3224	Resistance & Propulsion of Ships Sessional			√		√			√		√		
NAME 3236	Computer Programming in Ship Design II		√					√			√		√
NAME 3242	Ship Drawings & Calculations IV		√						√			√	√

NAME 4101	Engineering Economics in Ship Design	√						√		√			
NAME 4103	Navigation and Shipping Laws				√				√	√		√	√

NAME 4105	Dynamics of Marine Vehicles	√						√	√			√	
NAME 4121	Computational Fluid Dynamics	√		√				√	√		√		
NAME 4151	Ship Structures		√			√		√				√	
NAME 4152	Ship Structures Sessional		√			√			√		√		
NAME 4106	Dynamics of Marine Vehicles Sessional	√				√		√	√				
NAME 4201	Shipyard Management				√		√			√		√	
NAME 4203	Ship Hull Vibration	√						√	√				√
NAME 4221	Finite Element Method in Ship Structures	√						√			√		√
NAME 4271	Marine Engineering III						√		√			√	√
NAME 4272	Marine Engineering III Sessional			√		√		√			√		
NAME 4000	Projects & Thesis	√		√	√	√	√	√			√		

Part B

17. Structure of the curriculum:

a) Duration of the program: Years: 4 Semester: 8

b) Admission Requirements:

(i) A student should have at least second division or minimum GPA 2.50 in both SSC/O-Level or equivalent and HSC/A-Level or equivalent examinations. If minimum GPA is 2.00 in any of the examinations, then total GPA of both SSC/O-Level or equivalent and HSC/A-Level or equivalent examinations must be 6.00.

(**OR)** A diploma student should have minimum GPA of 2.50 in both SSC/O-Level or equivalent and Diploma examinations. If minimum GPA is 2.00 in either SSC/O-Level or Diploma, then total GPA of both SSC and Diploma examinations must be 6.00.

(OR) A student should have 5 (Five) subjects in "O" Level and 2 (Two) subjects in "A" Level. Out of these seven subjects in these two examinations, Grade B or GPA 4.0 in any four subjects and Grade C or GPA 3.50 in other three subjects (using scale of A = 5, B = 4, C = 3, D = 2, E= 1).

(OR) Minimum CGPA of 2.5 in O-Level in five subjects and A-Level in two subjects separately, according to the scale (A=5, B=4, C =3 and D = 2). Subjects with E-grades will not be considered.

(OR) In case of freedom fighter's Quota total GPA in both SSC/O-Level or equivalent and HSC/A-Level or equivalent examinations must be 5.00.

(OR) In case of Music, Fashion Design, Fine Arts, Graphic Design, Library Science and Information program/courses minimum GPA in both SSC/O-Level or equivalent and HSC/A-Level or equivalent examinations must be 2.00.

(ii) Any candidate of Humanities or Business Studies in HSC/A-level or equivalent will not be allowed to submit application for Engineering and Architecture departments/programs.

(iii) For the programs of Eng. and Arch, the candidates must pass in Physics, Chemistry and Mathematics at HSC/A-level/Diploma or equivalent examinations; but at SSC/O-Level they may be students of Humanities or Business Studies.

(iv) Candidates of GED diploma holders will not be allowed for admission. However, the candidate must also fulfill all other requirements as may be prescribed by the Academic Council on the recommendation of the Admission Committee. In case of confusion regarding the equivalence the case may be referred to by the Central Equivalence Committee.

c) Total minimum credit requirement to complete the program: 161.00

d) Total class weeks in a semester: 14

e) **Minimum CGPA requirements for graduation:** 2.25

f) Maximum academic years of completion: 6

g) Category of Courses:

Summary of Course Plan

Year-Semester	Theory (T)			Sessional (S)			Total Credits
	No. of Courses	Contact hours	Credits	No. of Courses	Contact hours	Credits	
1 - 1	5	15.0	15.00	3	09.0	4.50	19.50
1 - 2	5	14.0	14.00	4	11.0	5.50	19.50
2 - 1	5	16.0	16.00	3	09.0	4.50	20.50
2 - 2	5	15.0	15.00	3	09.0	4.50	19.50

3 - 1	5	14.0	14.00	4	15.0	7.50	21.50
3 - 2	5	16.0	16.00	3	09.0	4.50	20.50
4 - 1	5	17.0	17.00	3	09.0	4.50	21.50
4 - 2	4	14.0	14.00	2	09.0	4.50	18.50
Total	**39**	**121.0**	**121.00**	**25**	**80.0**	**40.00**	**161.00**

Basic Structure of NAME Program

Categories of Courses	Required Credits
A. Language and General Education	14.00
B. Mathematics	10.00
C. Basic Science	09.00
D. Allied Engineering	10.00
E. Naval Architecture & Marine Engineering (Core Courses)	113.50
F. Project & Thesis	04.50
Total	**161.00**

18. Semester-wise summary of courses to be offered

1st Year 1st Semester							
Sl.	**Course Code**	**Course Title**	**Theory (T)**		**Sessional (S)**		**Total Credits**
			Contact hrs./week	**Credits**	**Contact hrs./week**	**Credits**	
1.	NAME 1111	Basic Naval Architecture	3.0	3.00	--	--	3.00
2.	Chem 1101	Chemistry	3.0	3.00	--	--	3.00
3.	Phy 1101	Physics	3.0	3.00	--	--	3.00
4.	Math 1101	Mathematics I	3.0	3.00	--	--	3.00
5.	NAME 1171	Marine Engineering I	3.0	3.00	--	--	3.00
6.	NAME 1172	Marine Engineering I Sessional	--	--	3.0	1.50	1.50
7.	Chem 1102	Chemistry Sessional	--	--	3.0	1.50	1.50
8.	Phy 1102	Physics Sessional	--	--	3.0	1.50	1.50
		Total	**15.0**	**15.00**	**9.0**	**4.50**	**19.50**

Contact hours : 15.0(T) + 9.0(S) = 24.0 hrs./week

No. of theory courses 5

Total Credits : 19.50

No. of sessional courses : 3

N.B.: Any student of a 4-year diploma in engineering, willing to obtain exemption of the courses of 1st Year 1st Semester, will have to submit an application to the Head of the concerned department for approval.

1st Year 2nd Semester

Sl.	Course Code	Course Title	Theory (T)		Sessional (S)		Total Credits
			Contact hrs./ week	Credits	Contact hrs./ week	Credits	
1.	NAME 1211 *Preq: NAME 1111	Hydrostatic and Stability of Ships	3.0	3.00	--	--	3.00
2.	EEE 1201	Electrical Engineering Principles	3.0	3.00	--	--	3.00
3.	Math 1201	Mathematics II	3.0	3.00	--	--	3.00
4.	Ban 1201	বাংলা ভাষা ও সাহিত্য (Bengali Literature and Language)	3.0	3.00	--	--	3.00
5.	Hum 1201	Advanced English Skills	2.0	2.00	--	--	2.00
6.	NAME 1242	Basic Engineering Drawings	--	--	3.0	1.50	1.50
7.	EEE 1202	Electrical Engineering Principles Sessional	--	--	2.0	1.00	1.00
8.	NAME 1200	Computer Aided Drawing	--	--	3.0	1.50	1.50
9.	ME 1200	Workshop Practices Sessional	--	--	3.0	1.50	1.50
		Total	**14.0**	**14.00**	**11.0**	**5.50**	**19.50**

Contact hours : 14.0(T) + 11.0(S) = 25.0 hrs./week

No. of theory courses 5

No. of sessional courses : 4

Total Credits : 19.50

*Preq = Pre-requisite course.

2nd Year 1st Semester

Sl.	Course Code	Course Title	Theory (T)		Sessional (S)		Total Credits
			Contact hrs./ week	Credits	Contact hrs./ week	Credits	
1.	NAME 2101	Theoretical Ship Design	3.0	3.00	--	--	3.00
2.	NAME 2121	Fluid Mechanics	3.0	3.00	--	--	3.00
3.	NAME 2151	Mechanics of Structures	3.0	3.00	--	--	3.00
4.	NAME 2171 **Preq**: NAME 1171	Marine Engineering II	4.0	4.00	--	--	4.00
5.	Ban 2101	বাংলাদেদের অভয যেদের ইহত্িাস (History of Bangladesh Independence)	3.0	3.00	--	--	3.00
6.	NAME 2122	Fluid Mechanics Sessional	--	--	3.0	1.50	1.50
7.	NAME 2142 **Preq**: NAME 1242	Ship Drawings & Calculations I	--	--	3.0	1.50	1.50
8.	NAME 2152	Mechanics of Structures Sessional	--	--	3.0	1.50	1.50
		Total	**16.0**	**16.00**	**9.0**	**4.50**	**20.50**

Contact hours : 16.0(T) + 9.0(S) = 25.0 hrs./week

Total Credits : 20.50

No. of theory courses 5

No. of sessional courses 3

2nd Year 2nd Semester

Sl.	Course Code	Course Title	Theory (T)		Sessional (S)		Total Credits
			Contact hrs./ week	Credits	Contact hrs./ week	Credits	
1.	Math 2201	Mathematics III	4.0	4.00	--	--	4.00
2.	EEE 2201	Electrical and Electronic Engineering for Marine Engineers	3.0	3.00	--	--	3.00
3.	Hum 2201	Economics	2.0	2.00	--	--	2.00
4.	NAM E 2273	Heat Transfer	3.0	3.00	--	--	3.00
5.	NAM E 2291	Shipbuilding Materials	3.0	3.00	--	--	3.00
6.	NAM E 2292	Shipbuilding Materials Sessional	--	--	3.0	1.50	1.50
7.	NAM E 2242 **Preq**: NAM E 2142	Ship Drawings & Calculations II	--	--	3.0	1.50	1.50
8.	EEE 2202	Electrical and Electronic Engineering for Marine Engineers Sessional	--	--	3.0	1.50	1.50
		Total	**15.0**	**15.00**	**9.0**	**4.50**	**19.50**

Contact hours : 15.0(T) + 9.0(S) = 24.0 hrs./week

Total Credits : 19.50

No. of theory courses 5

No. of sessional courses 3

3rd Year 1st Semester

Sl.	Course Code	Course Title	Theory (T)		Sessional (S)		Total Credits
			Contact hrs./week	Credits	Contact hrs./week	Credits	
1.	NAME 3101	Shipbuilding Technology I	3.0	3.00	--	--	3.00
2.	NAME 3103	Principles of Ship Design	3.0	3.00	--	--	3.00
3.	NAME 3105	Theory of Machines	3.0	3.00	--	--	3.00
4.	Hum 3101	Sociology	2.0	2.00	--	--	2.00
5.	NAM E 3121 **Preq**: NAM E 2121	Marine Hydrodynamics	3.0	3.00	--	--	3.00
6.	NAM E 3122 **Preq**: NAM E 2122	Marine Hydrodynamics Sessional	--	--	3.0	1.50	1.50
7.	NAM E 3142 **Preq**: NAM E 2242	Ship Drawings & Calculations III	--	--	3.0	1.50	1.50
8.	NAM E 3136	Computer Programming in Ship Design I	--	--	3.0	1.50	1.50
9.	NAME 3100	Shipyard Training (4 weeks)	--	--	6.0	3.00	3.00
		Total	**14.0**	**14.00**	**15.0**	**7.50**	**21.50**

Contact hours : 14.0(T) + 15.0(S) = 29.0 hrs./week
Total Credits : 21.50

No. of theory courses 5
No. of sessional courses 4

3rd Year 2nd Semester

Sl.	Course Code	Course Title	Theory (T)		Sessional (S)		Total Credits
			Contact hrs./ week	Credits	Contact hrs./ week	Credits	
1.	NAM E 3201 **Preq**: NAM E 3101	Shipbuilding Technology II	3.0	3.00	--	--	3.00
2.	NAM E 3203	Numerical Methods for Engineers	4.0	4.00	--	--	4.00
3.	NAM E 3205	Maneuvering & Control of ships	3.0	3.00	--	--	3.00
4.	Hum 3201	Principles of Accounting	2.0	2.00	--	--	2.00
5.	NAM E 3223	Resistance & Propulsion of Ships	4.0	4.00	--	--	4.00
6.	NAM E 3224	Resistance & Propulsion of Ships Sessional	--	--	3.0	1.50	1.50
7.	NAM E 3236	Computer Programming in Ship Design II	--	--	3.0	1.50	1.50
8.	NAM E 3242 **Preq**: NAM E 3142	Ship Drawings & Calculations IV	--	--	3.0	1.50	1.50
		Total	**16.0**	**16.00**	**9.0**	**4.50**	**20.50**

Contact hours : 16.0(T) + 9.0(S) = 25.0 hrs./week

Total Credits : 20.50

No. of theory courses 5

No. of sessional courses 3

4th Year 1st Semester

Sl.	Course Code	Course Title	Theory (T)		Sessional (S)		Total Credits
			Contact hrs./ week	Credits	Contact hrs./ week	Credits	
1.	NAM E 4101	Engineering Economics in Ship Design	3.0	3.00	--	--	3.00
2.	NAM E 4103	Navigation and Shipping Laws	3.0	3.00	--	--	3.00
3.	NAM E 4105	Dynamics of Marine Vehicles	4.0	4.00	--	--	4.00
4.	NAM E 4121 Preq: NAM E 3121	Computational Fluid Dynamics	4.0	4.00	--	--	4.00
5.	NAM E 4151 Preq: NAM E 2151	Ship Structures	3.0	3.00	--	--	3.00
6.	NAM E 4152	Ship Structures Sessional	--	--	3.0	1.50	1.50
7.	NAM E 4106	Dynamics of Marine Vehicles Sessional	--	--	3.0	1.50	1.50
8.	NAM E 4000	Project & Thesis	--	--	3.0	1.50	*1.50
		Total	**17.0**	**17.00**	**9.0**	**4.50**	**21.50**

Contact hours : 17.0(T) + 9.0(S) = 26.0 hrs./week

Total Credits : 21.50

No. of theory courses 5

No. of sessional courses 3

*This credit in addition to 3.00 credits of 4th year 2nd semester for project & thesis will be assessed at the end of 4th year 2nd semester.

4th Year 2nd Semester

Sl.	Course Code	Course Title	Theory (T)		Sessional (S)		Total Credits
			Contact hrs./week	Credits	Contact hrs./week	Credits	
1.	NAM E 4201	Shipyard Management	3.0	3.00	--	--	3.00
2.	NAM E 4203	Ship Hull Vibration	3.0	3.00	--	--	3.00
3.	NAM E 4221 Preq: NAM E 3201	Finite Element Method in Ship Structures	4.0	4.00	--	--	4.00
4.	NAM E 4271 Preq: NAM E 2171	Marine Engineering III	4.0	4.00	--	--	4.00
5.	NAM E 4272	Marine Engineering III Sessional	--	--	3.0	1.50	1.50
6.	NAM E 4000	Project & Thesis	--	--	6.0	3.00	3.00
		Total	**14.0**	**14.00**	**9.0**	**4.50**	**18.50**

Contact hours : 14.0(T) + 9.0(S) = 23.0 hrs./week

Total Credits : 18.50

No. of theory courses 4

No. of sessional courses 2

Part C

19. Description of all courses of the program

NAME 1111: Basic Naval Architecture	
Credits: 3.00	**Contact hours: 3.0 hrs. /week.**
Rationale of the Course:	
This course focuses on the basic naval architecture terms and calculations used to develop and deploy applications in the real world.	
Course Content:	
Naval Architecture and its scope; Ship definitions and nomenclature; Ship geometry and lines; Ship types and offshore vehicles; Numerical integration: calculation of area, volume, moment, displacements, buoyancy, center of gravity, moment of inertia etc. Approximate formulae and rules; Light weight & deadweight; Capacity & Tonnage measurements; Initial stability of ships; Metacentric diagram.	
CLO1: Understand the ship design process and main terms and definitions used. **CLO2:** Know the basic concepts of intact & damage stability. **CLO3**: Apply basic numerical integration methods in ship calculations. **CLO4**: Get familiar with shipbuilding technology process.	

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO 1	√				√					√		√
CLO 2	√	√	√									
CLO 3		√										
CLO 4			√		√					√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**
CLO 1	Lecture discussion with multimedia, White board(WB), Handout	Assignment, Class Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, White board, Handout	Class Test, Spot Test, Mid Semester Exam

CLO 3	Reference Book, Lecture discussion with multimedia, PPT, White board, Handout	Assignment, Class Test, Quiz, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, White board, Handout	Quiz, Assignment, Class Test, Spot Test, Semester Final Exam

Chem 1101: Chemistry

Credits: 3.00 | **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This course offers students the theoretical understanding and study of materials and substances and the transformations they undergo through interactions and the transfer of energy. The course develops students' understanding of the key chemical concepts and models of structure, bonding, and chemical change, including the role of chemical, electrical and thermal energy. Students learn how models of structure and bonding enable chemists to predict properties and reactions and to adapt these for particular purposes. The knowledge of corrosion engineering and polymer is essential to engineers for practical purposes.

Course Content:

Atomic structure and quantum theory: Bohr's theory, Heisenberg's uncertainty principle, Schrödinger's wave equation, electronic configurations and properties of atoms; electronic configurations and properties of molecules: chemical bond, valence bond theory biomolecular orbital theory, shape of molecules, bond length, bond energy; chemistry of halogen, alkali metals, alkaline earth metals, non-metals and heavy metals. modern concepts of acids and bases; different types of solutions; properties of dilute solution; thermo chemistry; electrochemistry: voltaic cells, electrolytic cells; colloids and colloidal solution; chemical and ionic equilibrium; chemistry of water; chemistry of water pollution; chemistry of cements, silicates and limes.

CLO 1: Understand Atomic structure, electronic configurations and properties of molecules, acid and base.
CLO 2: Analyze chemical bonding, thermochemistry and electrochemistry
CLO 3: Understand water, water pollution and reaction kinetics.
CLO 4: Apply principle of Chemistry for determination of environment pollution
CLO 5: Execute the preparation of composite materials and polymer

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO 1	√								√		√	
CLO 2	√											

CLO 3	√	√										
CLO 4		√	√						√			
CLO 5		√	√								√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lecture discussion with multimedia, White board(WB), Handout	Assignment, Class Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, White board, Handout	Class Test, Spot Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, White board, Handout	Assignment, Class Test, Quiz, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, White board, Handout	Quiz, Assignment, Class Test, Spot Test, Semester Final Exam

Phy 1101: Physics	
Credits: 3.00	**Contact hours: 3.0 hrs. /week.**
Rationale of the Course:	
This is a high-level physics course focuses on the underlying of structure of matter, modern physics and also on the method of principles of electricity and magnetism used to develop and deploy pattern recognition applications in the real world.	
Course Content:	
Structure of Matter: Crystalline & non crystalline solids, Single crystal and polycrystal solids, Unit cell, Crystal systems, Co-ordinations number, Crystal planes & directions, NaCl & CsCl structure, Packing factor, Miller indices, Relation between interplanar spacing from diffraction patterns; Defects in solids: Point defects, Line Defects; Bonds in solids, Interatomic distances, Calculation of cohesive & Bonding energy; Introduction to band theory: Distinction between Metal, Semiconductor and Insulator. Electricity and Magnetism: Coulomb's law, Electric field (E), Gauss's law & its application, Electric potential (V), Capacitors and Capacitance, Capacitors with dielectrics, Dielectrics an atomic view, Charging and discharging of a capacitor, Ohms law, Kirchoff's law; Magnetic field: Magnetic induction, Magnetic force on a current carrying conductor, Torque on a current carrying loop, Hall effect, Faradys law of electromagnetic induction, Lenz's law, Self-induction, Mutual induction; Magnetic properties of Matter**:**	

Hysteresis curve; Electromagnetic Oscillation: L-C Oscillations & its analogy to simple harmonic motion. Modern Physics: Michelson-Morley's experiment, Galilean transformation, Special theory of relativity & its consequences; Quantum theory of radiation: Photo-electric effect, Compton effect, wave particle duality, Interpretation of Bohr's postulates, radioactive disintegration, Properties of nucleus, Nuclear reactions, Fission, Fusion, Chain reaction, Nuclear reactor.

CLO1: Understand the concepts of structure of matter, crystalline & non crystalline solids, defects in solids and atomic bond of solid.
CLO2: Analyze the properties of electric charge and electricity.
CLO3: Use the classification of the different types of magnetic materials and their applications.
CLO4: Knowledge about relativity, nuclear structure, and low energy particle.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√										√	
CLO 2	√	√										
CLO 3	√		√									
CLO 4	√										√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lecture discussion with multimedia, White board (WB), Handout	Assignment, Class Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, White board, Handout	Class Test, Spot Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, White board, Handout	Assignment, Class Test, Quiz, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, White board, Handout	Quiz, Assignment, Class Test, Spot Test, Semester Final Exam

Math 1101: Mathematics I

Credits: 3.00	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This is an entry level Mathematics course for higher study in Naval Architecture and Marine Engineering designed to teach students the basic concepts of differential calculus and integral calculus.

Course Content:

Differential Calculus & Integral Calculus:

Functions, New Functions from Old, Limits, Continuity, the derivative function, The Chain Rule, Implicit Differentiation, Successive differentiation, Related Rates, L'Hôpital's Rule, Indeterminate Forms, Analysis of Functions: Increase, Decrease, Concavity, Relative Extrema, Absolute Maxima and Minima. Leibnitz's theorem, Rolle's Theorem; Mean-Value Theorem. Infinite Series, Maclaurin and Taylor Series; Power Series. Parametric and polar curves. Functions of Two or More Variables, Partial derivatives.

The Indefinite Integral, Integration by Substitution, The Definite Integral, Fundamental Theorem of Calculus, Definite Integrals by Substitution, Integration by Parts, Area Between Two Curves, Length of a Plane Curve, Volume, Trapezoidal rule and Simpson's rule. Arc lengths of curves in Cartesian and polar coordinates. Walli's formula, Improper Integrals, Double Integrals, Triple Integrals. Beta function and gamma function.

CLO1: Remember and Understand the basic concepts and principles of differential and integral calculus of real functions.
CLO2: Apply the concept and principles of differential and integral calculus to solve mathematical problems.
CLO3: Apply differentiation to determine maxima and minima of functions.
CLO4: Integrate any algebraic or transcendental function either by algebraic methods, or by the use of tables.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO 1	√											
CLO 2	√				√							
CLO 3	√				√							
CLO 4	√				√							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**
CLO 1	Textbook, WB, Solving Exercise	Assignment, Class Test, Mid Semester Exam, Semester Final Exam

CLO 2	Textbook, WB, Solving Exercise	Class Test, Mid Semester Exam

CLO 3	Textbook, WB, Solving Exercise	Class Test, Mid Semester Exam
CLO 4	Textbook, WB, Solving Exercise	Assignment, Class Test, Semester Final Exam

NAME 1171: Marine Engineering I

Credits: 3.00 | **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This course focuses on the marine machines and machineries and practical learning approaches and also on the different types of calculations used to develop and deploy the applications in the real world.

Course Content:

Fundamental concepts of thermodynamics, it's laws and their corollaries; Non-flow process and flow processes; Thermodynamic cycles and processes; Properties of pure substances; Mixture of gas and vapor.

Internal combustion engines: Petrol engines, Diesel engines and Gas turbines with their cycles and accessories, Steam generation units with accessories and mountings, Steam turbines.

CLO1: Understand the basic principles of engine and the way in which it works.
CLO2: Applications on various learning methods on real world problems.
CLO3: Applications of machinery in various sector.
CLO4: Competent in functions of parts to operate machines.
CLO5: Applications of marine engine/diesel/nuclear power-plant in power sector

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√				√							√
CLO 2	√	√	√		√		√			√		
CLO 3			√		√			√				√
CLO 4			√		√							
CLO 5	√	√			√	√					√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy

CLO 1	Lecture discussion with multimedia, White board(WB), Handout	Assignment, Class Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, White board, Handout	Class Test, Spot Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, White board, Handout	Class Test, Spot Test, Mid Semester Exam
CLO 4	Reference Book, Lecture discussion with multimedia, White board, Handout	Assignment, Class Test, Quiz, Semester Final Exam
CLO 5	Class Test, Spot Test, Mid Semester Exam	Quiz, Assignment, Class Test, Spot Test, Semester Final Exam

NAME 1172: Marine Engineering I Sessional

Credits: 1.5 **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This course focuses on marine machines and machineries and practical learning approaches and also on the different types of calculations used to develop and deploy the applications in the real world. Through this, students will be able to meet the potential to be competent in real workplace.

Course Content:

Sessional based on Marine Engineering I (NAME 1172)

CLO1: Understand the basic principles of engine and the way in which it works.
CLO2: Applications on various learning methods on real world problems.
CLO3: Applications of machinery in various sectors.
CLO4: Competent in functions of parts to operate machines.
CLO5: Applications of marine engine/diesel/nuclear power-plant in power sector

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√				√							√

CLO 2	√	√	√		√		√			√		
CLO 3			√		√			√				√
CLO 4			√		√							
CLO 5	√	√			√	√					√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lecture discussion with multimedia, White board(WB), Handout	Assignment, Class Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, White board, Handout	Class Test, Spot Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, White board, Handout	Class Test, Spot Test, Mid Semester Exam
CLO 4	Reference Book, Lecture discussion with multimedia, White board, Handout	Assignment, Class Test, Quiz, Semester Final Exam
CLO 5	Class Test, Spot Test, Mid Semester Exam	Quiz, Assignment, Class Test, Spot Test, Semester Final Exam

Chem 1102: Chemistry Sessional	
Credits: 1.5	**Contact hours: 3.0 hrs. /week.**
Rationale of the Course:	
The purpose of this course is several-fold. It reinforces the topics the students have learned in class and it gives them a chance to apply knowledge. Students will learn some important experimental techniques that are necessary for them to become effective in professional life. The lab allows them to delve more deeply in some topics and perhaps to cover others that might not have time to touch upon during class. It will require them to learn how to deal with complexity, both in experimentation and data analysis, which is an important component of any engineer's expertise.	

Course Content:
Sessional based on Chemistry (Chem 1101).
CLO 1: Understand volumetric analysis & standardization and carry out titration experiments **CLO 2:** Analyze molarity, normality, molality & acidimetry- alkalimetry. **CLO 3:** Evaluate complex metric and precipitation titration.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√	√		√								
CLO 2	√							√	√			
CLO 3		√		√					√			

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lecture discussion with multimedia, White board (WB), Handout	Assignment, Quiz.
CLO 2	Reference Book, Lecture discussion with multimedia, White board, Handout	Assignment, Oral Test
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, White board, Handout	Assignment, Quiz Test, Semester Final Exam

Phy 1102: Physics Sessional	
Credits: 1.5	**Contact hours: 3.0 hrs. /week.**
Rationale of the Course:	
This is a high-level physics course focuses on the underlying of methods of oscillation, experimental knowledge about optical behavior, circuit design and analysis and also on the method of principles of conservation of energy used to develop and deploy pattern recognition applications in the real world.	
Course Content:	
Sessional based on Physics (Phy 1101).	

CLO1: Analyze the gravitational acceleration, modulus of rigidity, spring constant and effective mass by method of oscillation.
CLO2: Explain working method of flywheel.
CLO3: Design circuits based on Ohm's law using meter bridge, potentiometer, galvanometer, and ammeter.
CLO4: Identify conservation of energy and optical behavior.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√		√					√				
CLO 2	√							√				
CLO 3	√		√									
CLO 4	√				√							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lecture discussion with multimedia, White board (WB), Handout	Assignment, Oral Test, Semester Final Exam
CLO 2	Reference Book, Lecture discussion with multimedia, White board, Handout	Assignment, Oral Test, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, White board, Handout	Assignment, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, White board, Handout	Group Test, Semester Final Exam

NAME 1211: Hydrostatics and Stability of Ships

Credits: 3.0	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This course focuses on the hydrostatic and stability of ships and calculations used to develop and deploy the applications in the real world.

Course Content:

Large angle stability, Inclining experiments, Heeling trials and still tests, Effects of freely suspended weight and free liquid surface, Trim and hydrostatic calculations, Stability curves and their applications, Influence of ship form on stability, Stability of completely submerged bodies, Dynamic stability,

Damage stability: flooding and collision, Stability criteria, Freeboard calculations, Launching calculations.

CLO1: Comprehend the hydrostatic and stability of ships
CLO2: Apply knowledge for evaluation of ship's stability and trim
CLO3: Analyze ship's stability in damaged conditions
CLO4: Determine the layout of slipway during launching

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO1	√				√					√		√
CLO 2	√	√								√		
CLO 3		√										√
CLO 4			√		√							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**
CLO 1	Lecture discussion with multimedia, White board (WB), Handout	Assignment, Oral Test, Semester Final Exam
CLO 2	Reference Book, Lecture discussion with multimedia, White board, Handout	Assignment, Oral Test, Semester Final Exam

CLO 3	Reference Book, Lecture discussion with multimedia, PPT, White board, Handout	Assignment, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, White board, Handout	Group Test, Semester Final Exam

EEE 1201: Electrical Engineering Principles

Credits: 3.00	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

It is necessary to develop a thorough understanding on fundamental concepts and principles of electrical circuits focused with a heavy laboratory component for the freshmen and sophomores of electrical engineering discipline. This understanding will in turn enhance the student's skills that are important part of design process at a later stage. Therefore, this course is targeted to cover the laws, technics and theorems of dc & Ac electrical circuits those are essential for the students to develop appropriate problem-solving strategy related to simplification of complex electrical circuits. In addition to linear circuits, modest exposure to first and second order dc circuits along with their transient and steady state response has also been focused.

Course Content:

Direct Current: Theorems of electric circuit, electrical network analysis, measuring instruments. Alternating current: AC quantities and waveforms, phasor algebra, AC circuit analysis, three phase circuits. Transformers: Single phase and three phase, auto transformer. Fundamentals of DC generators, DC motors: principle and operation.

CLO1: **Apply** basic circuit laws and **conclude** which is the most effective analysis technic to **analyze** and solve a simplified linear circuit.

CLO2: **Reorganize** a large-scale linear electrical network into a simplified circuit.

CLO3: **Able** to analyze first-order and second-order circuits both in presence and absence of DC sources and

evaluate the transient and steady-state response of the circuits.

CLO4: **Design** and create application-specific linear/first order/second-order circuits in order to **solve** a real-life problem.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO1	√											

CLO 2			√									
CLO 3	√									√		
CLO 4			√								√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Class Test, Semester Final Exam

Math 1201: Mathematics II	
Credits: 3.00	**Contact hours: 3.0 hrs. /week.**
Rationale of the Course:	
This is an entry-level Mathematics course for higher study in Naval Architecture and Marine Engineering designed to teach students the basic concepts of Linear Algebra and Coordinate Geometry.	
Course Content:	
Linear algebra: Systems of Linear Equations, Gaussian Elimination, Matrices and Matrix Operations, Inverse Matrix, Algebraic Properties of Matrices, Elementary Matrices, Diagonal, Triangular, and Symmetric Matrices, Inverse Matrix by Gauss-Jordan Elimination, Matrix Transformations, Determinants, Determinants by Cofactor Expansion, Properties of Determinants, Cramer's Rule, Euclidean Vector Spaces, General Vector Spaces, Linear Independence, Coordinates and Basis, Change of Basis, Row Space, Column Space, and Null Space, Rank, Nullity, and the Fundamental Matrix Spaces, Basic Matrix Transformations, Eigenvalues and Eigenvectors. Inner Product Spaces, Diagonalization and Quadratic Forms, General Linear Transformations, Applications: Markov Chains, Graph Theory, Games of Strategy, Chaos, Internet Search Engines.	

Coordinate Geometry: Coordinates. Lengths of Straight Lines and Areas of Triangles, Polar Coordinates. The Straight Line, Equations representing two or more Straight Lines. Transformation of Coordinates. Results of The Circle, The Parabola, The Ellipse, The Hyperbola. Equations of planes and lines.

CLO1: Understand the basic concept of different topics in Linear Algebra and Coordinate Geometry.
CLO2: Solve various Linear systems and calculate Eigenvalues & Eigenvectors.
CLO3: Solve various problems related to Coordinate Geometry.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO 1	√											
CLO 2	√				√							
CLO 3	√				√							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Textbook, WB, Solving Exercise	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 2	Textbook, WB, Solving Exercise	Class Test, Mid Semester Exam, Semester Final Exam
CLO 3	Textbook, WB, Solving Exercise	Assignment, Class Test, Semester Final Exam

Ban 1201: বাংলা ভাষা ও সাহিত্য (Bengali Language and Literature)

Credits: 2.00 | **Contact hours: 2.0 hrs. /week**

Rationale of the Course:

This Course is for all classes of student. Because as a Bengali Student it is necessary to acquire knowledge about Bengali Language and Literature. Not only that, Bengali Language and Literature occupies one of the most important places in the world. As a result, we have to have an idea about Bengali Language and Literature.

Course Content:

প্রথম খণ্ড: ভাষা (First Part: Language)

বাংলা ধ্বনি/বাগধ্বনি (Phone/Speech Sound); বর্ণ (Letter); অক্ষর (Syllable); বাংলা ধ্বনির উচ্চারণ স্থান ও রীতি (Point of Articulation and Manner of Articulation), বাংলা উচ্চারণ-প্রমিত (Standard); আঞ্চলিক (Dialectal); বৈচিত্র (Variation), অপিনিহিতি, অভিশ্রুতি, স্বরসংগতি, শ্বাসাঘাত (Stress Accent) স্বরভঙ্গি/সুরতরঙ্গ (Intonation), বাংলা ও ইংরেজির তুলনা, বাংলা লিখন দক্ষতা: সাধু/চলিত রীতি; বিরাম চিহ্ন প্রয়োগ। প্রমিত বাংলা বানানের নিয়ম (বাংলা একাডেমি), ব্যবহারিক বাংলা সম্পর্কিত আলোচনা, একুশে ফেব্রুয়ারী, মুক্তিযুদ্ধ, বাংলাভাষা, বিশ্বায়ন বিষয়ে উৎসব, ষড়যন্ত্র, বাংলা নববর্ষ, আধুনিক তথ্য-প্রযুক্তি, বাংলার লোক সংস্কৃতি, মানবতা ও নৈতিকতা।

দ্বিতীয় খণ্ড: সাহিত্য (Second Part: Literature)

কবিতা:

আবদুল হাকিম-নুরনামা, মাইকেল মধুসূদন দত্ত - বঙ্গভাষা, লালন সাঁই - খাঁচার ভেতর অচিন পাখি, রবীন্দ্রনাথ ঠাকুর- নির্ঝরের স্বপ্নভঙ্গ, কাজী নজরুল ইসলাম- আজ সৃষ্টি সুখের উল্লাসে, জীবনানন্দ দাশ- রূপসী বাংলা, হাসান হাফিজুর রহমান - অমর একুশে, আলাউদ্দিন আল আজাদ - স্মৃতি স্তম্ভ, শামসুর রাহমান- তোমাকে পাওয়ার জন্য হে স্বাধীনতা, সৈয়দ শামসুল হক - পরিচয়

প্রবন্ধ:

বঙ্কিম চন্দ্র চট্টোপাধ্যায়- বাঙ্গালা ভাষা, রবীন্দ্রনাথ ঠাকুর- সভ্যতার সংকট, হরপ্রসাদ শাস্ত্রী- তৈল, প্রমথ চৌধুরী- যৌবনে দাও রাজটিকা, কাজী নজরুল ইসলাম- বর্তমান বিশ্বসাহিত্য, মুহম্মদ আবদুল হাই - আমাদের বাংলা উচ্চারণ, কবীর চৌধুরী - আমাদের আত্মপরিচয়

ছোটগল্প/অন্যান্য রচনা:

রবীন্দ্রনাথ ঠাকুর- পোস্ট মাস্টার, রোকেয়া সাখাওয়াত হোসেন - অবরোধবাসিনী, বিভূতিভূষণ বন্দ্যোপাধ্যায় - পুঁইমাচা, সৈয়দ ওয়ালীউল্লাহ- নয়নচারা, জাহানারা ইমাম - একাত্তরের দিনগুলি, হাসান আজিজুল হক - ঘরগেরস্তি, আখতারুজ্জামান ইলিয়াস - অপঘাত

নাটক:

কবর - মুনীর চৌধুরী

CLO1: Analyze skills in Bengali language and literature.

CLO2: Ability of speech sound, letter, syllable, standard, dialectal and variation linguistic literature.

CLO3: Ability of reading, writing and critique poetry.

CLO4: To develop the skills to analyze essay, novels, plays and short stories.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO 1							√					√
CLO 2							√					√
CLO 3							√					√
CLO 4							√					√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lecture discussion with multimedia, White board (WB), Handout	Assignment, Oral Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Semester Final Exam

Hum 2103: Advanced English Skills	
Credits: 2.00	**Contact hours: 2.0 hrs. /week.**
Rationale of the Course:	
The English Skill Practice course is designed to prepare students to use English in a present or future work situation. Students will develop speaking and writing skills with a focus on business contexts, and they will learn particular terms and strategies that are applied regularly in the business world. This course will help practice and forward communication skills by using English in specific business settings and situations.	
Course Content:	
Describe the basic terminology used in Business English. Greetings and getting introduced in the Business Context. Preview of basic grammar: Formation of words, Formation of sentences, Syntax. Learn basic strategies for reading, reading various passages on business topics and learning Business Terminology. Grammar: Use the basic auxiliary verbs (am/is/are/was/were/can) and a range of regular and irregular verbs. Demonstrate awareness of the essential grammatical features and functions including questions, Positives/ Negatives. Demonstrate main features of Cover letter and Resume writing and highlight the prime differences in CV types for various professions. How to write Business Letter, Business Email and Notice writing. Making requests and offers, Conducting Telephone Conversation, how to take appointments. **Speaking:** Learn norms of interview, Hard skill and Soft skill. **Writing:** How to write a report, how to write a paragraph with topic sentences.	

CLO1: Learn how to greet and introduce someone from a business perspective.
CLO2: Learn how to use formal vocabulary and expressions in a professional environment both spoken and in written form.
CLO3: Identify key ideas and details in a text, summarize information from listening or reading and also skim and scan an article
CLO4: Use of grammar and syntactic rules for effective writing skills such as letters, emails, proposals, reports and CV with cover letter.
CLO5: Demonstrate the types and effective skills of communication including public speaking.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1						√	√					√
CLO 2						√	√					√
CLO 3							√					√
CLO 4							√					√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	White board (WB), Handout	Assignment, Oral Test, Mid Semester Exam
CLO 2	Reference Book, WB, Handout	Assignment, Class Test, Mid Semester Exam
CLO 3	Reference Book, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, WB, Handout	Oral Test, Semester Final Exam

NAME 1242: Basic Engineering Drawings

Credits: 1.50	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This course enables the students to learn the techniques and standard practices of technical graphics used to develop and deploy the applications in the real world.

Course Content:

Introduction, Instruments and their uses, First and third angle projections, Orthographic drawings, Isometric views, Missing lines and views, Sectional views and conventional practices, Auxiliary views.

CLO1: Use common drafting tools to construct engineering drawings.
CLO2: Apply dimensions on engineering drawings.
CLO3: Justify the need for sectional views and Auxiliary views.
CLO4: Create 2D drawings, construct and Interpret views and sectional views.
CLO5: Build orthographic projections using three view drawings.
CLO6: Create isometric and oblique sketches
CLO7: Produce simple assembly drawings and produce freehand sketch.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√									√		√
CLO 2	√	√								√		
CLO 3			√		√							
CLO 4			√		√					√		
CLO 5					√							√
CLO 6		√						√				
CLO 7	√	√					√					√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lab sheet discussion with multimedia, White board (WB)	Assignment, Oral Test, Semester Final Exam
CLO 2	Lab sheet discussion with multimedia, White board (WB)	Assignment, Oral Test, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Semester Final Exam
CLO 4L	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Oral Test, Semester Final Exam

CLO 5	Lab sheet discussion with multimedia, White board (WB)	Assignment, Semester Final Exam
CLO 6	Lab sheet discussion with multimedia, White board (WB)	Group Test, Semester Final Exam
CLO 7	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Semester Final Exam

EEE 1202: Electrical Engineering Principles Sessional	
Credits: 1.50	**Contact hours: 3.0 hrs. /week.**
Rationale of the Course:	
Engineering profession aims at implementing technology driven knowledge and applications to solve advanced problems at all aspects of human life. Therefore, this laboratory course aims to train students to employ basic understanding of electrical knowledge in solving real life engineering problems at hardware domain. Designed for freshman students, experiments of this laboratory course will enable them to construct beginner-level circuits with understanding of established circuit laws, theorems and parametric applications along with introducing them to transient and steady state DC analysis. The basic understanding developed from these experiments will further enable them to analyze more complex electrical networks in future and design their own energy-efficient circuits adapting to specific optimized requirements.	
Course Content:	
Sessional based on Electrical Engineering and Circuit Analysis (EEE 1201).	
CLO1: **Construct** electrical circuits using different types of active and passive components and follow safe electrical practices during experimentation **CLO2**: **Design** and **solve** real life electrical problems by adapting to the specified requirements using both simulating tools and hardware.	

CLO3: **Capable** of applying basic circuit theorems to analyze large scale complex networks by simplifying them.

CLO4: **Able** to practically design transient and steady stated dc circuit parameters in order to achieve optimized circuit operation.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√											
CLO 2	√						√					
CLO 3			√								√	
CLO 4			√				√				√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Quiz
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Quiz, Class Test, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Quiz, Class Test, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Quiz, Class Test, Semester Final Exam

NAME 1200: Computer Aided Drawing	
Credits: 1.50	**Contact hours: 3.0 hrs. /week.**
Rationale of the Course:	

This course enables the students to learn the techniques and standard practices of technical graphics used to develop and deploy the applications in the real world.

Course Content:

Introduction to CAD, Drawing unit and scale, 2-D drawing tools, modification tools, layers, hatching and dimensioning. Working in 3-D space, 3-D coordinate systems, drawing sheet layout, viewpoints, 3-D drawing tools, 3-D wire frame modeling, surface modeling, solid modeling and rendering. Application of CAD in ship design, Introduction to computer aided manufacture (CAM).

CLO1: Understand the commands and applications of AutoCAD.

CLO2: Understand the process of creating an engineering design from scratch.

CLO3: Applications of computer aided design software for real life implication.

CLO4: Communicate with other engineering professionals regardless of their spoken language through design.

CLO5: Understand the applications design in automobile, design house and marine industry.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1		√			√					√		
CLO 2	√	√								√		
CLO 3			√					√			√	√
CLO 4			√			√	√					
CLO 5			√	√	√			√				√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Quiz

CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Quiz, Class Test, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Quiz, Class Test, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Quiz, Class Test
CLO 5	Reference Book, Lecture discussion with multimedia, WB, Handout	Semester Final Exam

ME 1200: Workshop Practices Sessional	
Credits: 1.50	**Contact hours: 3.0 hrs. /week.**
Rationale of the Course:	
This course enables the students to learn the techniques and standard practices of welding technology & machine tools used to develop and deploy the applications in the real world.	
Course Content:	
Machine Shop: Kinds of tools, Common bench and hand tools, Marking and layout tools, Measuring tools, Cutting tools, Machine tools, Bench work with job, Drilling Machine, Practice: Types of drilling machine, use and application, Shaper machine practice: Types of shaper machine, Size and capacity, use and application. Lathe machine practice: Types of lathes, Size and capacity, use and application, Milling Machine practice: Types of milling machine, use and application. **Welding shop:** Methods of metal joints: Riveting, Grooving, Soldering, Welding, Types of welding joint and welding practice, Position of Welding: Flat, Vertical, Horizontal, Overhead, Polarity of welding, Electric arc welding and the necessary accessories, Welding of different types of materials: Low carbon steel, cast iron, Brass, Copper, Stainless Steel, Aluminum, Types of Electrode, Fluxes and their composition, Arc welding defects, Test of arc welding: Visual, Destructive and Nondestructive. Types of gas welding and gas welding equipment; Gases and types of flame; Welding of different types of materials; Gas welding defects; Test of gas welding.	
CLO1: Identify common shop hand tools, drill press, lathe machine, and welding machine. **CLO2:** Read different instruments related to welding & machine shop. **CLO3**: Design and fabricate project using various machines stated above. **CLO4**: Work harmoniously with team members playing different roles.	
Mapping Course Learning Outcomes (CLOs) with PLOs	

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√							√		√		√
CLO 2	√	√								√		
CLO 3			√		√		√					
CLO 4			√		√							√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Quiz
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Quiz, Class Test, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Quiz, Class Test, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Quiz, Class Test, Semester Final Exam

NAME 2101: Theoretical Ship Design	
Credits: 3.00	**Contact hours: 3.0 hrs. /week**
Rationale of the Course:	
This course focuses on the basic ship design steps and calculations used to develop and deploy applications in the real world.	
Course Content:	
Engineering design philosophy. Various design stages: concept designs, basic designs, preliminary designs, contract designs, detailed designs. Design spiral: cargo routes, estimation of dimensions and hull form and displacement, preliminary G. A. plan, calculation of freeboard, depth and volume, calculation of longitudinal strength and powering, selection of machinery and outfit, checking for trim and stability, estimation of lightweight and cargo deadweight, economic criteria and evaluation. Case studies of typical merchant studies.	
CLO1: Be familiar with the concepts of ship design and relevant maritime regulations	

CLO2: Perform a preliminary ship design calculation, weight calculations, economic performance estimation.
CLO3: Understand technical and economic issues
CLO4: Develop leadership characteristics and able to carry on research on the given design assignments.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO 1	√				√					√		√
CLO 2	√	√	√									
CLO 3		√										
CLO 4			√		√					√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lecture discussion with multimedia, White board (WB), Handout	Assignment, Oral Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Semester Final Exam

NAME 2121: Fluid Mechanics	
Credits: 3.00	**Contact hours: 3.0 hrs. /week**
Rationale of the Course:	
This course focuses on the basic fluid mechanics, behavior of fluid-structure simulation, design steps and calculation used to develop and deploy the applications in the real world.	

Course Content:

Fluid properties, fluid statics and kinematics, continuity, energy and momentum principles, energy and hydraulic grade-lines, laminar and turbulent flows, introduction to boundary layers, drags and wakes, friction and flow through pipes, impact of jets, dimensional analysis, principles of similitude and model testing. Aero foil and its application.

Hydraulic machines: reciprocating and centrifugal pumps, Cavitations.

CLO1: Be familiar with the concepts of fluid properties.

CLO2: Perform an economic performance estimation.

CLO3: Understand technical and economic issues related to fluid mechanics

CLO4: Develop leadership characteristics and able to carry on research on the given design assignments.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO 1	√				√					√		√
CLO 2	√	√					√					
CLO 3		√										
CLO 4			√		√					√		√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lecture discussion with multimedia, White board (WB), Handout	Assignment, Oral Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Semester Final Exam

NAME 2151: Mechanics of Structures

Credits: 3.00	**Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This course focuses on the mechanics, design of structure, design steps and calculation used to develop and deploy the applications in the real world.

Course Content:

Fundamental stress analysis. Mechanical properties of materials. Normal, shear and combined stresses. Joint and beam analyses: continuous beam, beam on elastic foundation, curved beam. Column and buckling analyses. Thick cylinder and pressure vessel. Torsion and shaft design. Theories of failure.

CLO1: Be familiar with the concepts design and relevant maritime structures.

CLO2: Perform a preliminary calculation, structural load calculations, economic performance of a structure.

CLO3: Understand the technical and economic issues of any design.

CLO4: Develop leadership characteristics and able to carry on research on the given design assignments.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO 1	√				√			√		√		√
CLO 2	√	√	√									
CLO 3		√					√					
CLO 4			√		√					√		√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**
CLO 1	Lecture discussion with multimedia, White board (WB), Handout	Assignment, Oral Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam

CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Semester Final Exam

NAME 2171: Marine Engineering II

Credits: 4.00	**Contact hours: 4.0 hrs. /week**

Rationale of the Course:

The objective of Marine Engineering-II is to introduce with the basic knowledge of engines, theoretical knowledge and power generation as well. To introduce the behavior of problems, power related work, problem in choosing engine. This course focuses on marine machines and machinery and practical learning approaches and on the different types of calculations used to develop and deploy the applications in the real world.

Course Content:

Performance study of internal combustion engines. Fuels and combustion. Internal combustion engine systems: introduction, fuel oil, injection, intake, exhaust etc. Engine components: crankshaft, bearings, connecting rod, piston, liner, ring, thrust bearing etc. Marine fuel: types, grading, testing, treatment methods, blending, catalytic cracking etc. HSD, IFO and heavy fuel engines. Gas turbines. Nuclear power plants.

CLO1: Understand the basic principles of engine and the way in which it works.
CLO2: Applications on various learning methods on real world problems.
CLO3: Applications of machinery in various sectors.
CLO4: Competent in functions of parts to operate machines.
CLO5: Applications of marine engine/diesel/nuclear power-plant in power sector

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO 1	√				√							√
CLO 2	√	√	√		√		√			√		
CLO 3			√		√			√				√
CLO 4			√		√							

CLO 5	√	√			√	√					√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lecture discussion with multimedia, White board (WB), Handout	Assignment, Oral Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Semester Final Exam

Ban 2101: বাংলাদেশের অভ্যুদয়ের ইতিহাস (History of Bangladesh Independence)	
Credits: 3.00	**Contact hours: 3.0 hrs. /week**
Rationale of the Course:	
This course has been designed to help the students in obtaining comprehensive idea about the history, culture and heritage of Bangladesh. It will introduce students with economy, society, politics, diplomacy and foreign policy of Bangladesh. Students will learn about the challenges and potentials of Bangladesh in shaping its peaceful and sustainable future. It will also assist the students in assessing roles and contribution of Bangladesh in the regional and international bodies which are dedicated to establishing world peace.	
Course Content:	
Ancient period and Muslim period of Bengal, British period, Pakistan period: an overview (1952–1971), The problem of national integration under Ayub regime, Elite in crisis during Pakistan rule, nation-building in the new state, The ideals and philosophy of constitution-making of Bangladesh, Study on the coup and assassination of Mujib, Philosophy and fundamental changes of Zia regime, Constitutional amendments of Bangladesh, Corruption and good governance in Bangladesh, Issues of governance of Bangladesh, Bangladesh economy, Ideas on political and ethnic conflict in Bangladesh, Geographical setting of Bangladesh, Environmental challenges of Bangladesh, Bangladesh foreign policy: realities and challenges, Foreign policy-decision-making process in Bangladesh, Bangladesh–Soviet Union relations.	

CLO1: Achieve the capability to get a complete idea of the social, cultural and political transformation of Bengal during the British and Pakistani rule.
CLO2: To develop a clear idea about the history of Bangladesh from nationalist movement, language movement, six-point movement to great liberation war fluently.
CLO3: Enable students to understand that culture is a broad concept so that they can develop a clear idea about the cultural identity, religion, philosophy and literature of Bengalis perfectly.

CLO4: Remember and understand the history of the rise of Bangladesh.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO 1												√
CLO 2												√
CLO 3												√
CLO 4												√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lecture discussion with multimedia, White board (WB), Handout	Assignment, Oral Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Semester Final Exam

NAME 2122: Fluid Mechanics Sessional	
Credits: 1.50	**Contact hours: 3.0 hrs. /week**
Rationale of the Course:	
This course focuses on the basic fluid mechanics, behavior of fluid-structure simulation, design steps and calculation used to develop and deploy the applications in the real world. This course will enhance the practical knowledge of the learners.	
Course Content:	
Experiments based on NAME 2121.	

CLO1: Be familiar with the concepts of fluid properties.
CLO2: Perform an economic performance estimation.
CLO3: Understand technical and economic issues related to fluid mechanics
CLO4: Develop leadership characteristics and able to carry on research on the given design assignments.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO 1	√		√		√					√		√
CLO 2	√	√					√					√
CLO 3		√							√			
CLO 4			√		√					√		√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**
CLO 1	Lecture discussion with multimedia, White board (WB), Handout	Laboratory work out
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Laboratory work out
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Laboratory work out

CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Semester Final Exam

NAME 2142: Ship Drawings and Calculations I

Credits: 1.50	**Contact hours: 3.0 hrs. /week**

Rationale of the Course:

The above-mentioned course mainly focuses on the Ship's General Arrangement (GA), Lines Plan, Offset Table & Bonjean Curves with various Naval Architectural & Marine Engineering terminologies, those used to develop & implement in the real world.

Course Content:

Reproduction of general arrangement (GA) plan, lines plan, offset table and Bonjean curves.

CLO1: Understand the basic calculations of ship's form & terminologies.
CLO2: Understand to know the various ships' software such as Rhino & AutoCad.
CLO3: Understand to know the ship's drawings & calculations.
CLO4: Understand to know the ship's hull optimization.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO 1	√											√
CLO 2	√	√	√		√		√			√	√	
CLO 3		√			√						√	
CLO 4			√								√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Design Software (Rhino & AutoCAD), Computer Lab.	Laboratory work out
CLO 2	Design Software (Rhino & AutoCAD), Computer Lab.	Laboratory work out

CLO 3	Design Software (Rhino & AutoCAD), Computer Lab.	Laboratory work out
CLO 4	Design Software (Rhino & AutoCAD), Computer Lab.	Oral Test, Semester Final Exam

NAME 2152: Mechanics of Structures Sessional

Credits: 1.50 | **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This course focuses on the mechanics, design of structure, design steps and calculation used to develop and deploy the applications in the real world. This course will enhance the practical knowledge of the learners.

Course Content:

Experiments based on NAME 2151.

CLO1: Be familiar with the concepts design and relevant maritime structures.

CLO2: Perform a preliminary calculation, structural load calculations, economic performance of a structure.

CLO3: Understand the technical and economic issues of any design.

CLO4: Develop leadership characteristics and able to carry on research on the given design assignments.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO 1	√				√			√		√		√
CLO 2	√	√	√									
CLO 3		√					√					
CLO 4			√		√				√	√		√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion in Civil Lab, PPT, WB, Handout	Assignment

CLO 2	Reference Book, Lecture discussion in Civil Lab, PPT, WB, Handout	Assignment
CLO 3	Reference Book, Lecture discussion in Civil Lab, PPT, WB, Handout	Assignment

CLO 4	Reference Book, Lecture discussion in Civil Lab, PPT, WB, Handout	Oral Test, Semester Final Exam

Math 2201: Mathematics III

Credits: 4.00	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This is a mid-level Mathematics course for higher study in Naval Architecture and Marine Engineering designed to teach students the basic concepts of Ordinary differential equations, partial differential equations, and Vector Analysis.

Course Content:

Ordinary Differential Equations: Introduction to Differential Equations, Solutions, Initial-Value Problems, Differential Equations as Mathematical Models, First-Order Differential Equations: Separable Equations, Linear Equations, Exact Equations, Solutions by Substitutions. Modeling with First-Order Differential Equations. Boundary-Value Problems, Homogeneous and Nonhomogeneous Equations.
Higher-Order Differential Equations: Reduction of Order, Homogeneous Linear Equations with Constant Coefficients, Undetermined Coefficients (Superposition and Annihilator Approach), Variation of Parameters, Cauchy-Euler Equations, Green's Functions. Nonlinear Differential Equations. Modeling with Higher-Order Differential Equations. Systems of Linear First-Order Differential Equations.
Partial Differential Equations: Introduction. Partial Differential equations of linear and nonlinear first order. Standard forms. Linear differential equations of higher order. Differential equations of second order with variable coefficients.
Vector Analysis: Definition of vectors, equality of vectors. Addition and multiplication of vectors. Vector differentiation, gradient, divergence and curl. Physical significance of gradient, divergence and curl. Vector integration, ordinary integrals of vectors, line integrals, surface integrals, and volume integrals. The divergence theorem, Stokes' theorem, Green's theorem.

CLO1: Solve first-order differential equations using appropriate methods.
CLO2: Find solutions to higher-order linear differential equations.
CLO3: Solve linear partial differential equations of both first and second order.
CLO4: Apply the concept and principles of vector analysis to solve mathematical problems.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO 1	√				√							
CLO 2	√				√							
CLO 3	√											
CLO4	√				√							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy		
CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**
CLO 1	Textbook, WB, Solving Exercise	Class Test, Mid Semester Exam
CLO 2	Textbook, WB, Solving Exercise	Class Test, Mid Semester Exam
CLO 3	Textbook, WB, Solving Exercise	Assignment, Class Test, Semester Final Exam
CLO 4	Textbook, WB, Solving Exercise	Assignment, Class Test, Semester Final Exam

EEE 2101: Electronic and Electronic Engineering for Marine Engineers	
Credits: 3.00	**Contact hours: 3.0 hrs. /week.**
Rationale of the Course:	
To teach the students the concepts, principles and working of basic electronic circuits (Diodes, BJTs, JFETs and MOSFETs). It is targeted to provide a foundation for technology areas like electronics devices (rectifiers, voltage regulators and amplifiers), communication systems, industrial electronics as well as instrumentation, control systems and various electronic circuit design. Finally, this course is designed to develop a design capability involving real life practical problems.	
Course Content:	
Introduction to semiconductors, p-type and n-type semiconductors; p-n junction diode characteristics; Diode applications: half and full wave rectifiers, clipping and clamping circuits, regulated power supply using Zener diode. Bipolar Junction Transistor (BJT): principle of operation, I-V characteristics; Transistor circuit configurations (CE, CB, CC), BJT biasing, load lines; BJTs at low frequencies; Hybrid model, h parameters, simplified hybrid model; Small-signal analysis of single and multi-stage amplifiers, frequency response of BJT amplifier. Field Effect Transistors (FET): principle of operation of JFET and MOSFET; Depletion and enhancement type NMOS and PMOS; biasing of FETs; Low and high frequency models of FETs, switching circuits using FETs; Introduction to CMOS. Operational Amplifiers (OPAMP): linear applications of OPAMPs, gain, input and output impedances, active filters, frequency response and noise. Introduction to feedback, Oscillators, Silicon Controlled Rectifiers (SCR), TRIAC, DIAC and UJT: characteristics and applications; Introduction to IC fabrication processes.	
CLO1: **Able** to **recall** and **infer** the physics of semiconductor devices and the operation of different electronic components for strengthening fundamental ideas about basic electronics. **CLO2**: **Expert** in comparing the input and output characteristics of different electronic components. **CLO3**: **Analyze** basic electronic circuits considering existing system models to explore practical complex engineering problems	

CLO4: **Design** various electronic circuits using both passive and active components to **solve** real-life engineering problems.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√		√									
CLO 2	√									√		
CLO 3										√		
CLO 4			√		√			√				

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam, Class Test
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Class Test, Semester Final Exam

Hum 2201: Economics	
Credits: 2.00	**Contact hours: 2.0 hrs. /week.**
Rationale of the Course:	
Engineering economics is concerned with the use and application of economic principles in the analysis of engineering decisions. Engineering economics is a kind of applied economic technique that helps to evaluate design and engineering alternatives. Moreover, it plays an important role in assessing the appropriateness of a given project, estimation of its value and justify it from an engineering standpoint.	
Course Content:	
Definition of Economics, Economics and Engineering, Microeconomics: The theory of demand and supply and their elasticity's, Price determination, Nature of an economic theory, Applicability of economic theories to the problem of developing countries, Indifference curve technique, Marginal analysis, Optimization,	

Market production, Production function, Types of productivity, Rational region of production of an engineering firm, The short run and the long run, Fixed cost and variable cost, Internal and external economies and diseconomies. Macro-Economics: Savings, investment, National Income Analysis, Inflation, Monetary policy, Fiscal policy and Trade policy with reference to Bangladesh, Planning in Bangladesh.

CLO1: Help develop a thorough understanding of engineering decision making.

CLO2: Gain the ability to understand the principles of economic analysis of design processes of different engineering projects.

CLO3: Enable to learn the fundamental knowledge about investment planning and compare alternative investment decisions.

CLO4: Help to interpret Engineering related demand and supply in the context of Economics.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO 1	√				√						√	
CLO 2					√			√			√	
CLO 3	√							√			√	
CLO 4	√								√			

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	PPT, reference book study, case study analysis, market survey report analysis, Handout	Quiz, assignment, class test, Mid Semester Exam
CLO 2	Reference book, PPT, word file, report analysis, Handout	discussion, open book exam, spot test, Mid Semester Exam
CLO 3	Reference book, PPT, case study analysis, contemporary case study analysis	Presentation, Class Test, Semester Final Exam
CLO 4	Reference book, PPT, graphical analysis and data interpretation on a specific topic, country report analysis, Handout	Presentation, class performance and response, viva, Semester Final Exam

NAME 2273: Heat Transfer

Credits: 3.00	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

1. This course focuses on the basic knowledge of heat transfer principles and related applications to ship. Learners will develop knowledge of heat transfer principles and apply knowledge of heat transfer in insulation of ship's bulkhead and refrigerated spaces.

Course Content:

Introduction: steady and unsteady state conduction in one dimension: cases of single and composite walls, cylinders and spheres, fins of uniform cross section. Transient heat transfer: system with negligible internal resistance. Hiesler charts, Introduction to two and three-dimensional heat conduction. Convection: forced and natural, basic mechanism, methods of evaluation, non-dimensional parameters, empirical and semi-empirical methods. Radiation: fundamental laws, black and gray bodies, form factors, evaluation of form factors. Heat exchangers: parallel flow and counter flow. LMTD relationship. Heat transfer cases in ship design: insulation
in bulkheads, refrigerated spaces, fish holds in trawlers.

CLO1: Able to know the causes of heat transfer and the related basic theories.

CLO2: Understand the application of heat transfer in engineering practices.

CLO3: Develop an intuitive understanding of heat transfer by emphasizing physics and physical arguments.

CLO4: Analyze different problems with the help of numerical manipulation of different heat related parameters.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO 1							√		√	√		√
CLO 2			√				√		√	√		
CLO 3		√			√					√		
CLO 4	√	√	√					√				

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	PPT, reference book study, case study analysis, market survey report analysis, Handout	Quiz, assignment, class test, Mid Semester Exam
CLO 2	Reference book, PPT, word file, report analysis, Handout	discussion, open book exam, spot test, Mid Semester Exam
CLO 3	Reference book, PPT, case study analysis, contemporary case study analysis	Presentation, Class Test, Semester Final Exam

CLO 4	Reference book, PPT, graphical analysis and data interpretation on a specific topic, country report analysis, Handout	Presentation, class performance and response, viva, Semester Final Exam

EEE 2291: Shipbuilding Materials

Credits: 3.00 **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

The knowledge of Shipbuilding Materials and Metallurgy course is intended to provide an integrated approach, utilizing the materials science, and structural integrity principles as they apply to offshore structures and ships. Students will be able to select appropriate materials for ships and marine structure and components. It is expected that students will develop critical thinking to select optimum material for marine structure on the basis of engineering and environment points of view.

Course Content:

Metals as materials of construction; Industrially significant properties of metallic materials; Production, properties and uses of Pig Iron, Cast Iron and Carbon Steels; Nonferrous alloys; Protective Coatings; Ferrous alloys: Plain carbon, alloy, tool, stainless, heat-resisting and creep- resisting steels etc.; The Fe-Fe_3C equilibrium; Different types of heat-treatment operations; Case hardening of steels, Cement, Ferro-cement,
Timber, Rubber, Glass and Plastics.

CLO1: Select Materials for a particular application and different environment.

CLO2: Interpret the design criteria of materials.

CLO3: Apply appropriate technology on different materials, their processing and heat treatments in suitable application in marine engineering fields.

CLO4: Compare the materials And their properties used in the marine industry.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√		√			√						
CLO 2	√					√				√		√
CLO 3				√						√		
CLO 4			√		√			√				

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam, Class Test
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Class Test, Semester Final Exam

NAME 2292: Shipbuilding Materials Sessional

Credits: 1.50 | **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

Performance or application of material depends on synthesis, composition and properties of material. Like the other engineering field, structural performance of a ship is governed by proper selection of material. This is a compulsory sessional course based on experiment, inspection and composition analysis of materials for a better understanding of structure-material properties correlation. Shipbuilding Materials Sessional is designed to introduce the students to metallography and the influence of metallographic structure on material properties.

Course Content:

Experiments based on NAME 2291

CLO1: Recognize the structure-material properties correlation
CLO2: Distinguish the variation in material composition.
CLO3: Relate theoretical knowledge with the practical experiment results.
CLO4: Select suitable materials in ship construction.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√	√										√
CLO 2	√		√		√		√			√		

CLO 3		√			√				√			
CLO 4			√				√				√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Material Lab, Lecture sheet, Lab sheet	Laboratory work out
CLO 2	Material Lab, Lecture sheet, Lab sheet	Laboratory work out
CLO 3	Material Lab, Lecture sheet, Lab sheet	Assignment, Quiz,
CLO 4	Material Lab, Lecture sheet, Lab sheet	Semester Final Exam

NAME 2242: Ship Drawings & Calculations II	
Credits: 1.50	**Contact hours: 3.0 hrs. /week.**
Rationale of the Course:	
The mentioned course mainly focuses on the Ship's hull form design, Hydrostatic calculation, Stability and cross curves, Checking compliance with standard stability criteria & Trim calculations with various Naval Architectural & Marine Engineering terminologies, those used to develop & implement in the real world.	
Course Content:	
Hull form design, Space allocation and general arrangement (GA), Hydrostatic calculation, stability and cross curves, checking compliance with standard stability criteria, trim calculations.	
CLO1: Understand the basic calculations of ship's stability & terminologies. **CLO2**: Understand to know the various ships' software such as Rhino, AutoCAD & Maxsurf / GHS. **CLO3**: Understand to know the ship's drawings & calculations. **CLO4**: Understand to know analyze of ship's stability.	

Mapping Course Learning Outcomes (CLOs) with PLOs												
Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO1	√	√										√
CLO 2	√	√	√		√		√			√		
CLO 3		√			√							
CLO 4		√	√								√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy		
CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**
CLO 1	Design Software (Rhino, AutoCAD & Maxsurf), Computer Lab.	Laboratory work out
CLO 2	Design Software (Rhino, AutoCAD & Maxsurf), Computer Lab.	Laboratory work out
CLO 3	Design Software (Rhino, AutoCAD & Maxsurf), Computer Lab.	Assignment, Quiz,
CLO 4	Design Software (Rhino, AutoCAD & Maxsurf), Computer Lab.	Semester Final Exam

EEE 2202: Electronic and Electronic Engineering for Marine Engineers Sessional	
Credits: 1.50	**Contact hours: 3.0 hrs. /week.**
Rationale of the Course:	
Electronic Engineering Sessional is designed to teach the students about the concepts, principles and working of basic electronic devices and circuits by hand-held experiments. With the completion of each experiment, students will gradually develop the ability to analyze and design electronic circuits. It is expected that students will formulate the expertise obtained from these laboratory tasks not only for upcoming higher laboratory courses but also in their future professional engineering practice.	
Course Content:	
Sessional based on Electronic and Electronic Engineering for Marine Engineers (EEE 2201).	
CLO1: **Construct** simple electronic circuits using various types of passive and active components	

CLO2: **Compare** the input and output characteristics of different electronic components obtained by both simulations and hand-held experiments
CLO3: **Proficient** in **interpreting** the behavior of FET with different configurations and **design** electronic circuits

CLO4: **Performing** as a group and **organizing** project tasks maintaining solidarity during the group projects and presentations.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√				√							
CLO 2	√									√		
CLO 3					√					√		
CLO 4			√								√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Quiz
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Quiz, Class Test, Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Quiz, Class Test, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Quiz, Class Test, Semester Final Exam

NAME 3101: Shipbuilding Technology I	
Credits: 3.00	**Contact hours: 3.0 hrs. /week.**
Rationale of the Course:	

This course focuses on the basic welding and welding technology and practical learning approaches and also different types of welding symbols used to develop and deploy applications in the real world.

Course Content:

Development of ship welding; Different types of welding and their equipment; Welding principle; types of power sources and their characteristics.

Welding methods: MMAW, GMAW, SAW, Electro-slag welding, TIG; Types of welding joints; Welding symbols; Welding sequence in shipbuilding.

Common defects in ship welding: welding distortion monitoring and control, inspection and testing of welded specimen; Nondestructive testing; Methods and principles of cutting; cutting equipment; Steel surface preparation, shot blasting, acid pickling, etc.

CLO1: Reach their full potential in the welding field

CLO2: Use correct procedure in setting up equipment and the skills used in welding.

CLO3: Achieve a complete understanding of welding symbols and print drawing and reading.

CLO4: Apply methods for testing welding specimen and steel surface preparation.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√				√					√		√
CLO 2	√	√	√							√		
CLO 3		√										
CLO 4			√		√					√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam, Class Test
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Class Test, Semester Final Exam

NAME 3103: Principles of Ship Design

Credits: 3.00	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This course focuses on the basic knowledge to design a ship and practical learning approaches and on the different types of calculations used to measure ship related parameters.

Course Content:

Introduction; General design characteristics; Determination of principal parameters and dimensions; Mass equation and estimation of masses and capacities; Body plan design; Choice of form and modification to form; General arrangement and layout of the ship; Strength, powering, maneuvering, seakeeping and safety; Computer Aided Design (CAD).

CLO1: Able to design a ship with limited information supplied by shipowners.
CLO2: Understand different basic components of a ship.
CLO3: Measure the required power to operate a ship.
CLO4: Analyze possible structural failures with its maneuvering and seakeeping performance.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO1	√	√			√			√	√			√
CLO 2			√				√		√	√		
CLO 3	√	√			√					√		
CLO 4		√	√					√				

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam, Class Test
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam

CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Class Test, Semester Final Exam

NAME 3105: Theory of Machines

Credits: 3.00 | **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

Compulsory Theoretical course based on machine functions and mechanisms to design machine elements for efficient operations

Course Content:

Introduction, Kinematics and Kinetics of motion, Simple harmonic motion, Simple mechanism, Velocity in mechanisms (instantaneous center methods and relative velocity methods), Accelerations in mechanisms, Mechanisms with lower pairs, Friction, Belt, rope and chain drive. Toothed gearing, Gear trains, Gyroscopic couple and precision motion, Design of marine shafts, stern tube and bearing.

CLO1: Analyze stress, stress concentration and suitable types of fits.
CLO2: Understand and analyze fatigue strength and strength of material.
CLO3: Design screws, springs, welded and riveted joints and belt and chain drives.
CLO4: Design various types of gears.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√	√			√			√	√			√
CLO 2			√				√		√	√		
CLO 3	√				√					√		
CLO 4			√			√		√			√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy

CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam, Class Test
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Class Test, Semester Final Exam

NAME : Sociology

Credits: 2.00 | **Contact hours: 2.0 hrs. /week.**

Rationale of the Course:

This course has been designed to understand the human inter-personal relationship and human psychology in the society and to apply this knowledge in the practical field as an engineer through the study of varied societies and cultures

Course Content:

Scope, Some basic concepts, Social evaluation and techniques of production, Culture and civilization, Social structure of Bangladesh, Population and world Resources, Oriental and Occidental societies, Industrial revolution, Family-urbanization and industrialization, Urban Ecology, Co-operative and socialist movements,
Rural Sociology.

CLO1: Understand the basic nature, scope and perspective of sociology and the criteria of social research process and methodologies

CLO2: Apply contextual knowledge to assess societal and cultural issues in national and global context and environmental context for sustainable development.

CLO3: Analyze social problems, social stratifications, socialism, capitalism and economic life and political issues.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√	√			√				√			√
CLO 2							√		√	√		

CLO 3	√			√	√			√				√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam, Class Test
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Oral Test, Class Test, Semester Final Exam

NAME 3121: Marine Hydrodynamics

Credits: 3.00 **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This course is intended to give students the skills to analyse the flow of fluid around shapes commonly in the design of marine vehicles, such as the vessel‟s hull, hydrofoils, propeller blades, etc. It is a compulsory theoretical course designed on the basis to understand the characteristics of fluid flow and its implication in the design of Marine Vehicles.

Course Content:

Flow of an ideal fluid: equation of continuity, streamlines, streak lines and path lines, two-dimensional flow patterns, rotational and irrotational flows, vorticity, velocity potential functions, stream functions, Euler's equation of motion, Bernoulli's equation, velocity and pressure distribution.

Uniform flow; irrotational vortex; circulation, source, sink and doublet, flow past a half body, cylinder and rankine body, virtual mass and Magnus effect.

Conformal transformation: analytic functions, singularities, Cauchy- Riemann equations, complex potential, application of conformal transformation to some flow cases, Joukowski's hypothesis, lift of an infinite aerofoil, Theorems of Green, Stokes, Cauchy and Blasius and their application to some hydrodynamic problems.

Flow of a real fluid: Navier-Stokes equations, displacement, momentum and energy thickness of the boundary layer, and characteristics of flow around a ship hull.

CLO1: Describe the hydrodynamic flow pattern around ship & calculate flow velocity at different points on the flow.
CLO2: Compute the pressure distribution and wake field around a submerged body like ship
CLO3: Assess the forces applied by the flow to submerged bodies in fluid by applying knowledge of fluid flow principles
CLO4: Estimate the wave-induced loads on geometric shapes of floating structures and be able to apply the knowledge in Ship design

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√				√					√		√
CLO 2	√	√	√				√					
CLO 3		√						√				
CLO 4			√		√					√		√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam, Class Test
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Class Test, Semester Final Exam

NAME 3122: Marine Hydrodynamics Sessional	
Credits: 1.50	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

Marine Hydrodynamics Sessional course is designed to teach students about the hydrodynamic application is ship and machinery design retrospect, namely types of floating structures, marine machinery parts etc. Students will be able to perform necessary calculations related to the basic design, assess performance calculations once the course is completed

Course Content:

Experiments based on NAME 3121.

CLO1: Explain different hydrodynamic features of various types of fluid flows.
CLO2: Identify different kinds of fluid flow patterns.
CLO3: Demonstrate and Manipulate the flow past different shapes and structure for observing laminar and turbulent flows.
CLO4: Develop collaborative nature by discussing and performing as a group and organize project tasks maintaining solidarity during the group projects and presentations.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√						√					√
CLO 2		√	√								√	
CLO 3	√			√		√		√				
CLO 4			√		√					√		√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion in lab, PPT, WB, Handout	Quiz
CLO 2	Reference Book, Lecture discussion in lab, PPT, WB, Handout	Assignment, Quiz, Class Test, Semester Final Exam
CLO 3	Reference Book, Lecture discussion in lab, PPT, WB, Handout	Assignment, Quiz, Class Test, Semester Final Exam
CLO 4	Reference Book, Lecture discussion in lab, PPT, WB, Handout	Oral Test, Quiz, Class Test, Semester Final Exam

NAME 3142: Ship Drawings & Calculations-III	
Credits: 1.50	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

The mentioned course mainly focuses on the Scantling of ship's structural members, Mid-ship section, Longitudinal construction, Shell expansion drawings & Capacity plan with various Naval Architectural & Marine Engineering terminologies used to develop & implement in the real world.

Course Content:

Scantling of structural members, Mid-ship section, longitudinal construction and shell expansion drawings. Capacity plan.

CLO1: Understand the basic scantling calculations of ship's structural members.
CLO2: Understand to know the various ships' software such as Rhino, AutoCad & shipconstructor.
CLO3: Understand to know the ship's drawings & calculations.
CLO4: Understand to know evaluate strength of ship's structural members.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√	√										√
CLO 2	√	√	√		√		√			√		
CLO 3		√			√							
CLO 4		√	√								√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Design Software (Rhino, AutoCAD & Maxsurf), Computer Lab.	Laboratory work out
CLO 2	Design Software (Rhino, AutoCAD & Maxsurf), Computer Lab.	Laboratory work out
CLO 3	Design Software (Rhino, AutoCAD & Maxsurf), Computer Lab.	Assignment, Quiz,
CLO 4	Design Software (Rhino, AutoCAD & Maxsurf), Computer Lab.	Semester Final Exam

NAME 3136: Computer Programming in Ship Design I

Credits: 1.50	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This course focuses on the structured programming language named Fortran and practical learning approaches and also implements a different type of ship-related problem used to develop and deploy the applications in the real world.

Course Content:

Introduction to computer hardware, software and operating systems. Algorithms and flowcharts. Introduction to programming languages. FORTRAN 77 and FORTRAN 90: variables, statements, format directed input and output, nesting, arrays and pointers, subprograms and modules, graphics programming, using library functions, dynamic link library (DLL), dynamic memory allocation, creating multi-thread applications, programming with mixed languages, debugging. Computer applications to naval architecture problems
especially hydrostatic calculations of marine vehicles.

CLO1: Understand the basics of a program and the way it works. **CLO2**:
Understand the various terminology of a programming language. **CLO3**:
Applications for structure programming in various sectors.
CLO4: Understanding the communication between compiler, program, and computer.
CLO5: Applications for naval architecture problems especially hydrostatic calculations of marine vehicles.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO1	√				√			√		√		√
CLO 2		√	√		√				√	√	√	
CLO 3		√	√					√				√
CLO 4					√					√	√	
CLO 5	√	√			√	√		√				√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**
CLO 1	Software (FORTRAN), Computer Lab.	Laboratory work out

CLO 2	Software (FORTRAN), Computer Lab.	Laboratory work out
CLO 3	Software (FORTRAN), Computer Lab.	Assignment, Quiz,
CLO 4	Software (FORTRAN), Computer Lab.	Semester Final Exam

NAME 3100: Shipyard Training

Credits: 3.00 | **Contact hours: 6.0 hrs. /week.**

Rationale of the Course:

Compulsory sessional course based on practical industrial attachment.

Course Content:

Ship design: basic design, estimation, hull design, piping and equipment design, shell expansion, detailed construction drawings. Ship construction: mould loft, gas cutting, CNC cutting, welding, fabrication, sub-assembly, assembly, field assembly, erection, launching, outfitting, delivery trial, Diesel engine workshop practice.

CLO1: Explain the overall management and operation of a shipyard/dockyard
CLO2: Identify required skills for shipbuilding industries
CLO3: Identify required skills for shipbuilding industries
CLO4: Manage the crisis and resolve the conflicts amongst subordinates.
CLO5: Carry out construction and repair work for a ship.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√				√			√		√		
CLO 2	√	√	√		√		√				√	
CLO 3				√								√
CLO 4					√					√		
CLO 5		√			√	√		√	√			√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy		
CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**
CLO 1	Industrial Visit	Assignment, Quiz,
CLO 2	Industrial Visit	Assignment, Quiz,
CLO 3	Industrial Visit	Assignment, Quiz,
CLO 4	Industrial Visit	Booklet Submission

NAME 3201: Shipbuilding Technology II

Credits: 3.00	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This course focuses on ship structures, damage control, structural approaches and practical learning approaches and also different types of welding symbols used to develop and deploy applications in the real world.

Course Content:

Development of ship structure, Details of structural member: structural discontinuity, stress concentration, remedial measures. Cathodic protection, surface preparation and painting. Shipyard facilities: various shops and production facilities and their layout. Process of ship construction, Numerical control, Boat building by materials other than steel. Introduction to the rules of Classification Societies.

CLO1: Reach their full potential in shipbuilding design.
CLO2: Use correct procedure to calculate necessary preparation.
CLO3: Achieve a complete understanding structural element, discontinuity etc.
CLO4: Apply methods for different production methods.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO1	√				√					√		√
CLO 2	√	√	√							√		
CLO 3		√										
CLO 4			√		√					√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy		
CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam, Class Test
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Class Test, Semester Final Exam

NAME 3203: Numerical Methods for Engineers	
Credits: 4.00	**Contact hours: 3.0 hrs. /week.**
Rationale of the Course:	
Compulsory Theoretical Course based on different numerical methods applied to solve various problems in the field of engineering.	
Course Content:	
Interpolation: Polynomial interpolation, Cubic spline interpolation, B-spline interpolation. **Curve fitting:** Fitting linear equation, Fitting transcendental equation, Fitting polynomial equation, Multi linear regression. **Solution of nonlinear equations:** The Bisection method, False position method, Newton-Raphson method, Secant method. **Solution of simultaneous linear equation:** Gaussian elimination with pivoting, Matrix inversion, LU decomposition method, Iterative methods- Jacobi iteration & Gauss-Seidel iteration. **Numerical differentiation & integration:** Numerical differentiation, Errors in numerical differentiation, The cubic spline method, Romberg integration, Gaussian quadrature. **Solution of ordinary differential equation:** The Taylor's series method, Euler's method, Runge-Kutta method.	
CLO1: Explain the consequences of finite precision and the inherent limits of the numerical methods considered. **CLO2:** Select appropriate numerical methods to apply to various types of problems in engineering	

and science considering the mathematical operations involved, accuracy requirements and available computational resources.
CLO3: Demonstrate understanding and implementation of mathematical concepts and algorithms underlying the numerical methods considered.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1			√		√				√	√		
CLO 2						√						
CLO 3	√	√								√		√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam, Class Test
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Class Test, Semester Final Exam

NAME 3205: Maneuvering & Control of Ships

Credits: 3.00 | **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

The course presents a unified approach to two seemingly different fields of Ship Theory; that is maneuvering and seakeeping. Motion dynamics of a ship regarded as a rigid body in a general motion with six-degree-of-freedom are considered. The effects of non-linearities of the applied sub- models on the physical phenomena associated with ship behavior are discussed

Course Content:

Maneuvering equations of motions and hydrodynamic derivatives, Different types of ship maneuvering, Various motion stability.

Determination of hydrodynamic derivatives: rotating arm test, planer motion mechanism test, Controls fixed straight line stability, Full scale trails, Estimating turning circle parameters, Rudder design.

CLO1: Describe the underlying principle of linear wave theory and its induced motions and Loads on a ship.
CLO2: Demonstrate the application of analytical methods for calculating ship motion in the regular and irregular seaways
CLO3: Describe the concepts of dynamic stability, motion reduction devices, added resistance in waves and methods to predict the likelihood of seasickness.
CLO4 : Apply techniques to predict and assess the maneuvering behavior of a vessel.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1			√		√		√		√	√		
CLO 2						√						
CLO 3	√	√								√		√
CLO 4		√						√				

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam, Class Test
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Class Test, Semester Final Exam

Hum 3201: Principles of Accounting

Credits: 2.00	**Contact hours: 2.0 hrs. /week.**

Rationale of the Course:

The course provides students with a basic grounding in topics such as assets and liabilities, financial analysis, planning and budgeting and investment appraisal with specific reference to unique aspects of finance and accounting in the realm of engineering, all of which are important in understanding accounting and finance. It is comprised of a variety of different learning resources including case studies of financial decision making in business and examples of when things go wrong and how this can be avoided.

Course Content:

Principles of accounting: Accounts, Transactions, The accounting procedures and financial statements, Cost in general: Objectives and classifications, Overhead costing, Cost sheet under job costing, Operating costing and process costing,

Marginal costing: Tools and techniques, Cost-volume-profit analysis, Relevant costing: Analyzing the profitability within the firm, Guidelines for decision making, Long-run planning and control, Capital budgeting.

CLO1: Understand the cost principle, monetary unit assumption and the economic entity assumption and ethics in financial reporting for each project..
CLO2: Understand worksheet, preparation of financial statements, cost benefit analysis of different projects.
CLO3: Acquire knowledge of Management Accounting and apply it for preparing and presenting information for management decision-making and control purposes.
CLO4: Apply and analyze the cost-volume profit, budgeting, standard costing and variance analysis for any project.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√	√			√			√	√			√
CLO 2			√			√	√		√	√		
CLO 3										√		
CLO 4	√	√	√		√			√				

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam, Class Test

CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Class Test, Semester Final Exam

NAME 3223: Resistance & Propulsion of Ships

Credits: 4.00 | **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This course discusses the selection and evaluation of commercial and naval ship power and propulsion systems. It provides fundamental aspects as well as practical considerations for ship resistance and associated powering requirements, propeller design and engine selection.

Course Content:

Phenomena resisting the motion of ships, Resistance due to friction, wave making, form, appendage, wind and waves, squat, blockage and shallow water effects, Estimation of powering using methodical series and statistical methods. Advantageous effects of hull form changes- bulbous bows. Asymmetric sterns and optimum trim for ships in ballast.
Screw propeller geometry, Momentum and blade element theories, Propellers in open water, propeller coefficients and design charts, Hull propeller interaction- wake, thrust deduction and relative rotative efficiency, Propeller cavitations, Propeller blade strength. Screw design according to circulation theory for uniform and non-uniform wake. Speed trials and service performance analysis.

CLO1: Demonstrate knowledge and understanding on components and estimation methods of the resistance of a ship or marine vehicle.
CLO2: Apply the principles of propeller design in developing suitable propulsion system for a marine vehicle.
CLO3: Analyze the powering requirements to select engine for fulfilling service requirements of a marine vehicle.
CLO4: Evaluate cavitation related problems and minimize it for propulsion systems.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1			√						√	√		√

CLO 2		√		√		√	√	√	√			
CLO 3	√									√		
CLO 4	√	√	√		√			√			√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam, Class Test
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Class Test, Semester Final Exam

NAME 3224: Resistance and Propulsion of Ships Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

Resistance and Propulsion Sessional course is designed to teach students how to calculate the different components of ship resistances. Students will be able to perform necessary calculations related to propulsion power and cavitation. It is expected that students can develop critical thinking behind propeller design features, able to check their effects using calculations and finally choose the appropriate feature

Course Content:

Experiments based on NAME 3223

CLO1: Identify the components of ship resistance.on

CLO2: Calculate frictional and residual resistance. Perform 2D and 3D extrapolation using ITTC methods.

CLO3: Identify geometric parameters of a propeller

CLO4: Calculate cavitation and relevant characteristics.

Mapping Course Learning Outcomes (CLOs) with PLOs												
Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO1	√	√										√
CLO 2	√		√		√		√			√		
CLO 3		√			√				√			
CLO 4			√				√				√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy		
CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**
CLO 1	Hydrodynamics Lab, Lecture sheet, Lab sheet	Laboratory work out
CLO 2	Hydrodynamics Lab, Lecture sheet, Lab sheet	Laboratory work out
CLO 3	Hydrodynamics Lab, Lecture sheet, Lab sheet	Assignment, Quiz,
CLO 4	Hydrodynamics Lab, Lecture sheet, Lab sheet	Semester Final Exam

NAME 3236: Computer Programming in Ship Design II	
Credits: 1.50	**Contact hours: 3.0 hrs. /week.**
Rationale of the Course:	
This course focuses on the object-oriented programming language named C plus plus and practical learning approaches and implements a different type of ship-related problem used to develop and deploy the applications in the real world.	
Course Content:	
Introduction to C and C++ programming languages. C and C++ fundamentals - data types and expressions. Operators. Libraries. Statements. Arrays and strings. Functions. Function overloading. Control statements. Pointers. Input and output systems. Object oriented programming (OOP). Application to the computations of stability, trim and structural strength of marine vehicles.	

CLO1: Understand the basics of a program and the way it works.
CLO2: Understand the various terminology and concepts of object-oriented programming.
CLO3: Applications of object-oriented programming in various sectors.
CLO4: Understanding the complex structure of a OOP.
CLO5: Applications of OOP on naval architecture problems especially hydrostatic calculations of marine vehicles

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√				√			√		√		√
CLO 2		√	√		√					√	√	√
CLO 3		√	√					√				√
CLO 4	√	√			√		√			√		
CLO 5	√	√			√	√		√				√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Software (C/C++/OOP), Computer Lab.	Laboratory work out
CLO 2	Software (C/C++/OOP), Computer Lab.	Laboratory work out
CLO 3	Software (C/C++/OOP), Computer Lab.	Assignment, Quiz,
CLO 4	Software (C/C++/OOP), Computer Lab.	Laboratory work out
CLO 5	Software (C/C++/OOP), Computer Lab.	Semester Final Exam

NAME 3242: Ship Drawings & Calculations IV	
Credits: 1.50	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

The mentioned course mainly focuses on ship's Rudder design and drawing, Steering gear arrangement, Shafting, propeller arrangement & Main engine foundation with various Naval Architectural & Marine Engineering terminologies, those used to develop & implement in the real world.

Course Content:

Rudder design and drawing. Steering arrangement. Shafting and propeller arrangement. Main engine foundation.

CLO1: Understand the basic calculations of ship's rudder, propeller, shafting and gear arrangement.
CLO2: Understand to know the various ships' software such as Rhino, AutoCad, NavCad & propCad. **CLO3**: Understand to know the design and drawing of rudder, propeller, shafting and steering gear arrangement.
CLO4: Understand to know the ship's maneuverability.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√	√										√
CLO 2	√	√	√		√		√			√		
CLO 3		√			√							
CLO 4		√	√								√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Design Software (Rhino, AutoCAD, PropCad & Excel), Computer Lab.	Laboratory work out
CLO 2	Design Software (Rhino, AutoCAD, PropCad & Excel), Computer Lab.	Laboratory work out
CLO 3	Design Software (Rhino, AutoCAD, PropCad & Excel), Computer Lab.	Assignment, Quiz,
CLO 4	Design Software (Rhino, AutoCAD, PropCad & Excel), Computer Lab.	Semester Final Exam

NAME 4101: Engineering Economics in Ship Design

Credits: 3.00	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

The maritime economics and management is a concept as well as application based theoretical course which is essential for all undergraduate students in the field of Naval Architecture & Marine Engineering. This course enhances the competency of students to work and make decisions on ship design and financial estimation in shipyard, dockyard and maritime shipping industries after their graduation.

Course Content:

Supply and demand for marine transport, Freight markets and operating economics, Economic criteria, Practical cash flows, Economic complexities, General approach of ship design, Tendering and specification, Cost estimation, Comparison of alternative ship design, The optimum ship from economic point of view.

CLO1: Get knowledge of the organization of a shipping market along with the economic history of maritime business.
CLO2: Analyze theoretical supply demand curve.
CLO3: Develop an understanding of the microeconomics of the shipping industry.
CLO4: Get idea of the geography of the physical world in which shipping operates.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO1							√		√		√	√
CLO 2		√	√				√		√	√		
CLO 3	√	√			√					√		
CLO 4			√					√	√			

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam, Class Test
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam

CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Class Test, Semester Final Exam

NAME 4103: Navigation and Shipping Laws

Credits: 3.00	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

Marine Safety and Pollution course is designed to teach students about maritime regulations, marine safety rules, pollution regulations theory, namely types of ship and floating structures. Students will be able to perform necessary calculations related to the basic design, freeboard, trim and stability calculations using established formulas once the course is completed.

Course Content:

Outline of navigation. Navigational aids and aids to navigation. Shipping laws and safety rules. Inland shipping ordinance (ISO) of Bangladesh. Lifesaving appliances and fire-fighting equipment. Safety of life at sea (SOLAS). International load line convention (ILLC). Role of IMO. Registration and survey of ships. Marine personnel. Accident enquiries. International marine conventions. Collision regulations. Legislations of marine
pollution. Outline of laws at sea.

CLO1: Describe the concept of freeboard calculation and Identify different factors and navigational aids for safe operation of the vessel.
CLO2: Construct a regulatory database and apply safety regulations in vessel design calculation.
CLO3: Explain tide and tidal formation as well as justify a vessel design in tidal application
CLO4: Assist marine industry for surveying and registration of ships based on life saving appliances.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO1		√				√	√				√	√
CLO 2			√				√		√	√		
CLO 3	√	√		√	√				√	√		
CLO 4						√		√	√			√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**

CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam, Class Test
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Class Test, Semester Final Exam

NAME 4105: Dynamics of Marine Vehicles	
Credits: 4.00	**Contact hours: 3.0 hrs. /week**
Rationale of the Course:	
The course presents a unified approach to two seemingly different fields of Ship Theory; that is maneuvering and seakeeping. Motion dynamics of a ship regarded as a rigid body in a general motion with six-degree-of-freedom are considered. The effects of non-linearities of the applied sub- models on the physical phenomena associated with ship behavior are discussed	
Course Content:	
Recapitulation of gravity waves, Fundamental forms of ship motions, Ship motions in waves: uncoupled heaving, pitching and rolling motions, coupled pitching and heaving motions. General information on ocean waves. Application of statistics and probability theory: the random seaway. Ship motion response to regular and irregular waves, Dynamic effects.	
CLO1: Describe the underlying principle of linear wave theory and it‟s induced motions and Loads on a ship. **CLO2:** Demonstrate the application of analytical methods for calculating ship motion in the regular and irregular seaways. **CLO3**: Describe the concepts of dynamic stability, motion reduction devices, added resistance in waves and methods to predict the likelihood of seasickness. **CLO4**: Apply techniques to predict and assess the manoeuvring behaviour of a vessel.	
Mapping Course Learning Outcomes (CLOs) with PLOs	

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO 1	√				√				√	√		√
CLO 2		√	√					√				
CLO 3		√					√					
CLO 4					√	√				√		√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lecture discussion with multimedia, White board (WB), Handout	Assignment, Oral Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Semester Final Exam

NAME 4121 : Computational Fluid Dynamics

Credits: 4.00 | **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This course introduces the beginning graduate and advanced undergraduate students to finite difference methods as a means of solving different types of differential equations that arise in fluid dynamics. Fundamentals of numerical analysis, ordinary differential equations and partial differential equations related to fluid mechanics and heat transfer will be reviewed. Error control and stability considerations are discussed and demonstrated. The Navier Stokes equations will be solved using commercial software.

Course Content:

Introduction. Governing equations of fluid flow. Green's theorem, Boundary integral methods and its application to radiation and diffraction problems, Discretization schemes: finite difference methods, finite

volume methods, finite element methods, spectral methods etc. Grid generation. Flow visualization and frictional resistance computation for double body flows using Navier Stokes equations

CLO1: Solve PDE

CLO2: Use finite difference and finite volume methods in CFD modeling.

CLO3: Understand different numerical/ computational methods applied for fluid flow analysis.

CLO4: Apply knowledge of CFD in flow past ship hull.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO 1	√				√				√	√		√
CLO 2	√	√								√		
CLO 3		√					√					√
CLO 4			√		√							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lecture discussion with multimedia, White board (WB), Handout	Assignment, Oral Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Semester Final Exam

NAME 4151: Ship Structures	
Credits: 3.00	**Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This compulsory theoretical course is intended to provide students with a thorough understanding of the theory and application of structural analysis as it applies to the ship‟s columns, beams and frames. Emphasis is placed on developing the student's ability to calculate the deflection, buckling, shear force and bending moment of ship structural elements

Course Content:

Forces on the ship. Ship strength calculation, longitudinal and transverse strength of ship. Dynamic effects. Structural discontinuities, stress concentration, superstructure theory. Plate and shell analyses: grillages, buckling of plates. Composite construction. Introduction to Finite Element Methods (FEM).

CLO1: Explain structural elements of ships and crafts.

CLO2: Perform calculation of stress, strain, displacement, shear force, bending moment and light weight of ship.

CLO3: Analyze the longitudinal and transverse strength of ship structure at different loading conditions.

CLO4: Evaluate the deflection, bending and buckling of ship structure subjected to dynamic loads

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO 1	√				√			√		√		√
CLO 2	√	√	√									
CLO 3		√					√					
CLO 4			√		√					√		√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lecture discussion with multimedia, White board (WB), Handout	Assignment, Oral Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam

CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Semester Final Exam

NAME 4152: Ship Structures Sessional

Credits: 1.50 | **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This course is the third stage of Ship Design and Drawing which is a compulsory sessional course for future naval architects. Students will learn design and drawings of the principal propulsion and steering machinery of a ship which includes rudder, steering, shafting, propeller and main engine foundation. By understanding the complex propulsion system of a ship from this course, it is expected that students will be able to design a complete propulsion system along with proper drawings.

Course Content:

Study of asymmetric bending. Determination of shear center. Analysis of truss. Compression test of helical spring. Tension test of plastic specimen. Solving problems using finite element package.

CLO1: Be familiar with the concepts design and relevant maritime structures.

CLO2: Perform a preliminary calculation, structural load calculations, economic performance of a structure.

CLO3: Understand the technical and economic issues of any design.

CLO4: Develop leadership characteristics and able to carry on research on the given design assignments.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO 1	√	√					√	√		√		√
CLO 2			√		√							
CLO 3		√					√			√		
CLO 4	√		√		√				√	√		√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy

CLO 1	Reference Book, Lecture discussion in Computer Lab, PPT, WB, Handout	Assignment
CLO 2	Reference Book, Lecture discussion in Computer Lab, PPT, WB, Handout	Assignment
CLO 3	Reference Book, Lecture discussion in Computer Lab, PPT, WB, Handout	Assignment
CLO 4	Reference Book, Lecture discussion in Computer Lab, PPT, WB, Handout	Oral Test, Semester Final Exam

NAME 4106: Dynamics of Marine Vehicles Sessional

Credits: 1.50 | **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

Dynamics of Marine Vehicles Sessional course is designed to teach students about the hydrodynamic application is ship and machinery design retrospect, namely types of floating structures, marine machinery parts etc. Students will be able to perform necessary calculations related to the basic design, assess performance calculations once the course is completed

Course Content:

Recapitulation of gravity waves, Fundamental forms of ship motions, Ship motions in waves: uncoupled heaving, pitching and rolling motions, coupled pitching and heaving motions. General information on ocean waves. Application of statistics and probability theory: the random seaway. Ship motion response to regular and irregular waves, Dynamic effects.

CLO1: Explain about different dynamic features of various types of vehicles

CLO2: Identify different kinds of fluid flow patterns.

CLO3: Demonstrate and Manipulate the flow past different shapes and structure for observing laminar and turbulent flows.

CLO4: Develop collaborative nature by discussing and performing as a group and organizing project tasks maintaining solidarity during the group projects and presentations.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12

CLO1	√						√					√
CLO 2		√	√								√	
CLO 3	√			√		√		√				
CLO 4			√		√					√		√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion in lab, PPT, WB, Handout	Quiz
CLO 2	Reference Book, Lecture discussion in lab, PPT, WB, Handout	Assignment, Quiz, Class Test, Semester Final Exam
CLO 3	Reference Book, Lecture discussion in lab, PPT, WB, Handout	Assignment, Quiz, Class Test, Semester Final Exam
CLO 4	Reference Book, Lecture discussion in lab, PPT, WB, Handout	Oral Test, Quiz, Class Test, Semester Final Exam

NAME 4201: Shipyard Management	
Credits: 3.00	**Contact hours: 6.0 hrs. /week.**
Rationale of the Course:	
Compulsory sessional course based on practical industrial attachment.	
Course Content:	
Organogram, Responsibility and accountability chain, Management: structure and style. **Trade union:** legal rights and collective bargaining, Factors related to job satisfaction and dissatisfaction, Performance appraisal. **Shipbuilding:** phase-wise work contents, initial estimation procedures and practice, information flow, agreements, tendering and its evaluation, material flow. **Designer's roles:** owner's requirements, builder's profit and society's rules, Material and technological constraints: alternative designs and acceptance of a compromise design, Post-production assessment for future guidance.	
CLO1: Plan shipbuilding processes to maximize results **CLO2**: Evaluate design and process alternatives for selection of appropriate one	

CLO3: Comprehend various processes of shipbuilding at different stages. **CLO4:** Manage the crisis and resolve the conflicts amongst subordinates. **CLO5**: Carry out construction and repair work for a ship.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√				√			√		√		
CLO 2	√	√	√		√		√				√	
CLO 3				√								√
CLO 4					√					√		
CLO 5		√			√	√		√	√			√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion PPT, WB, Handout	Assignment, Oral Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 5	Reference Book, Lecture discussion PPT, WB, Handout	Oral Test, Semester Final Exam

NAME 4203: Ship Hull Vibration	
Credits: 3.00	**Contact hours: 6.0 hrs. /week.**

Rationale of the Course:

This course focuses on the basic knowledge of different types of vibration applied on a ship and practical learning approaches and on the different types of calculations used to measure the vibration and to reduce the effect of vibration.

Course Content:

Vibration induced in ship structure due to wave, propeller and machinery. Free and forced vibration of single, two and multi-degree of freedom systems. Transverse vibration of beams. Added mass of hull girder vibration. Empirical formulae for calculating hull frequencies. Torsional, flexural and longitudinal vibrations of propeller shafting system. Measurement of ship vibration. Allowable limits of vibration in a ship. Consequences of vibration in different types of vessels. Reduction of vibration by propeller and machinery selection,
suppression, isolation and insulation.

CLO1: Understand the Types of Vibration, their sources, and effects in a ship.

CLO2: Able to apply knowledge of mathematics and science to solve engineering vibration problems.

CLO3: Estimate hull frequencies by detailed calculation and empirical formulae.

CLO4: Apply different ways to prevent and cure hull vibration.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1									√		√	√
CLO 2	√	√			√					√		
CLO 3	√				√						√	
CLO 4					√		√	√	√			√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Reference Book, Lecture discussion PPT, WB, Handout	Assignment, Oral Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion PPT, WB, Handout	Oral Test, Semester Final Exam

NAME 4221: Finite Element Method in Ship Design

Credits: 4.00	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This optional theoretical course is intended to provide students with the necessary fundamental knowledge about the implementation of Finite Element Method for Engineering Analysis. The students should be able to Understand the fundamentals of Finite Element Method and stiffness method to solve engineering problems. Furthermore, after successful completion of this course students will develop skills to solve ship structure problems using finite element analysis.

Course Content:

Basic concept of finite element method (FEM) and its application to ship structure, transformations of local and global coordinate system, stiffness matrices, assembly of global stiffness matrix, boundary conditions, plane strain and plane stress analysis, convergence requirements. Isoparametric elements in two and three dimensions. Formulation of stiffness matrix for beam and shell elements, linear static analysis. Problems involving non-linear material behavior. Introduction to Finite Element software's and analysis of frame structures.

CLO1: Comprehend the fundamentals of finite element analysis and finite element formulations.
CLO2: Solve ship structure problems using finite element analysis
CLO3: Interpret results obtained from a finite element analysis.
CLO4: Apply methods for different production methods.

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**
CLO1	√				√					√		√
CLO 2	√	√	√							√		
CLO 3		√										
CLO 4			√		√					√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**
CLO 1	Reference Book, Lecture discussion with multimedia, White board (WB), Handout	Mid Semester Exam, Class Test

CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Class Test, Semester Final Exam

NAME 4271 : Marine Engineering III	
Credits: 4.00	**Contact hours: 4.0 hrs. /week**
Rationale of the Course:	
Marine Engineering-II course is designed to teach students about the basic concepts of ships auxiliaries used in ships like Pump, Blower & Compressor, Refrigeration & Air conditioning System, Deck Fittings, Centrifuge, Lifesaving Apparatus and Firefighting equipment etc. Students will be able to select the suitable marine auxiliaries, Refrigeration & AC plant, and Lifesaving apparatus including firefighting appliances. It is expected that students will be able to analyze critically for the selection of correct auxiliary machinery and system for the designed ship. Students will also be able to analyze the defects of different systems while working as Marine engineers on board.	
Course Content:	
Pumps: types: characteristics, head calculation, NPSH, blowers and compressors. **Refrigeration and air-conditioning:** thermodynamics principles. Air conditioning system for ships. Heating and ventilating systems. Air treatment in cargo spaces. Marine auxiliary machinery: windlasses, winches, cargo access equipment for dry, unitized, liquid and cryogenic cargoes **Steering gear:** types and characteristics, drives, design criteria, testing, commissioning. **Pipes:** pipe materials, piping systems and valves, steam traps, anchors, anchors, anchors, anchor hawse, chains, etc. Emergency systems.	
CLO1: Describe the characteristics of all ship fitted auxiliary machinery **CLO2**: Evaluate different design parameters and performance to select auxiliary machinery **CLO3**: Compare the characteristics of construction of different auxiliary machinery **CLO4**: Apply the knowledge of firefighting and lifesaving equipment and to decide about suitable auxiliary machinery for different vessels as a naval architect	
Mapping Course Learning Outcomes (CLOs) with PLOs	

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO 1	√				√							√
CLO 2	√	√	√		√		√			√		
CLO 3			√		√			√				√
CLO 4	√	√			√	√					√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lecture discussion with multimedia, White board (WB), Handout	Assignment, Oral Test, Mid Semester Exam
CLO 2	Reference Book, Lecture discussion with multimedia, WB, Handout	Assignment, Class Test, Mid Semester Exam
CLO 3	Reference Book, Lecture discussion with multimedia, PPT, WB, Handout	Assignment, Class Test, Mid Semester Exam, Semester Final Exam
CLO 4	Reference Book, Lecture discussion with multimedia, WB, Handout	Oral Test, Semester Final Exam

NAME 4272: Marine Engineering III Sessional

Credits: 1.50 | **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

Marine Engineering Sessional III course is designed to teach students different kinds of marine engine & auxiliary components and prepare technical specifications of those components or machineries. Students will be able to perform necessary calculations related to machines and prepare technical specifications once the course is completed. It is expected that students will develop critical thinking about how to calculate various machinery parameters thus preparing technical specifications.

Course Content:

Sessional based on NAME 4271.

CLO1: Explain about the different features of marine machineries.
CLO2: Identify different specifications of a tender.
CLO3: Demonstrate and manipulate the technical specifications of different machineries.
CLO4: Competent in functions of parts to operate machines.
CLO5: Applications of marine engine/diesel/nuclear power-plant in power sector

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√				√							√
CLO 2	√	√	√		√		√			√		
CLO 3			√		√			√				√
CLO 4			√		√							
CLO 5	√	√			√	√					√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO 1	Lecture discussion in Marine Lab, White board(WB), Lab sheet	Assignment
CLO 2	Lecture discussion in Marine Lab, White board(WB), Lab sheet	Assignment
CLO 3	Lecture discussion in Marine Lab, White board(WB), Lab sheet	Assignment
CLO 4	Lecture discussion in Marine Lab, White board(WB), Lab sheet	Quiz
CLO 5	Lecture discussion in Marine Lab, White board(WB), Lab sheet	Semester Final Exam

NAME 4000: Project and Thesis	
Credits: 6.00	**Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This course is designed to form a basic understanding of research methodology, that is what are the important components to look for while conducting research, how to conduct research and what to expect from the done work in the process. This course will expose the students to the promising career in various research fields and make them understand the importance of research methodologies in science and engineering.

Course Content:

1. Foundations of Research: Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method – Understanding the language of research – Concept, Construct, Definition, Variable. Research Process.

2. Problem Identification & Formulation – Research Question – Investigation Question – Measurement Issues – Hypothesis – Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing – Logic & Importance.

3. Research Design: Concept and Importance in Research – Features of a good research Design- Exploratory Research Design – concept, types and uses, Descriptive Research Designs – concept, types and uses. Experimental Design: Concept of Independent & Dependent variables.

4. Qualitative and Quantitative Research: Qualitative research – Quantitative research

– Concept of measurement, causality, generalization, replication. Merging the two

approaches.

5. Use of tools / techniques for Research and Interpretation of Data

6. Report Writing – Layout of a Research Paper
7. Ethical issues related to publishing, Plagiarism and Self-Plagiarism.

CLO1: Describe quantitative, qualitative and mixed methods approaches to research.
CLO2: Identify the components of a literature review process
CLO3: Appraise the reliability and validity of experiments.
CLO4: Comprehend the ethical principles of research, ethical challenges and approval processes.
CLO5: Use parametric and non-parametric hypothesis tests and write good thesis paper
ClO6: Apply writing skill of research report/ paper

Mapping Course Learning Outcomes (CLOs) with PLOs

Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	√				√							√
CLO 2	√						√			√		
CLO 3			√					√				√
CLO 4			√									

CLO 5	√	√			√						√	
CLO 6							√					

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy

CLOs	**Teaching-Learning Strategy**	**Assessment Strategy**
CLO 1	Face-to-Face Learning	Research Progress
CLO 2	Lecture	Research Progress
CLO 3	Consultation with Supervisor + Experiment/Quantitative Research Work	Research Progress
CLO 4	Self-Directed Learning	Research Progress
CLO 5	Preparation of Progress Presentation	Research Progress
CLO 6	Preparation of Final Presentation	Research Progress

Part D

20. Grading/Evaluation

1) Grading Scale and Grades

Grading System

The letter grade system shall be used to assess the performance of the student and shall be as follows:

Numerical grade	Letter Grade	Grade point	Assessment
80% or above	A+ (A plus)	4	Outstanding
75% to less than 80%	A	3.75	Excellent
70% to less than 75%	A- (A minus)	3.5	Very Good
65% to less than 70%	B+ (B plus)	3.25	Good 60%
to less than 65%	B	3	Above Average
55% to less than 60%	B- (B minus)	2.75	Average
50% to less than 55%	C+ (C plus)	2.5	Below Average
45% to less than 50%	C	2.25	Poor
40% to less than 45 %	D	2	Very Poor/Pass
Less than 40%	F	0	Fail
Continuous assessment	Cont		

("Cont" is used for a course extended over two regular Semesters, such as project/thesis/design, etc.)

Withdrawal	W
Withheld	Wh
Incomplete	I
Self-Study	SS
Repeat	Rt
Supplementary	Sp
Improvement	IM
Retake	R (X in result will denote absent in both Mid-Semester and Semester Final Exam.)
Non-Credit Course	S/U (Satisfactory/Unsatisfactory)

2) Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA)

Grade point average (GPA) is the weighted average of the grade points obtained in all the courses passed/completed by a student in a Semester. 'F' grades will not be counted for GPA calculation. GPA of a Semester will be calculated as follows:

$$GPA = \sum_{i=1}^{n} C_i G_i \Big/ \sum_{i=1}^{n} C_i$$

where n is the total number of courses passed by the student, Ci is the number of credits allotted to a particular course *i* and Gi is the grade point corresponding to the grade awarded for *i*-th course. Cumulative Grade Point Average (CGPA) gives the cumulative

performance of the student from first Semester up to any other $\sum C_i G_i$ ter to which it refers and is $\sum C_i$puted by dividing the total weighted grade points ( ) accumulated up to the date by the total credit hours ( )

3) Course Withdrawal

The courses, which are withdrawn by a student due to some reasons as mentioned below is defined by 'W' (The grade W (Withdrawal) is also assigned when a student officially drops/withdraw course(s) within the date mentioned in the academic calendar for the semester)-

If a student is unable to complete the Semester Final Examination due to illness, accident or any other valid reason, etc. he/she may apply in prescribed form to the Registrar through his/her Adviser and Head of the Department for total withdrawal from the Semester within 5 days after the end of the Semester final examination. However, he/she may choose not to withdraw any laboratory/sessional/design course if the grade obtained in such a course is 'D' or better and that he/she has to indicate clearly in his/her withdrawal application. In case of illness the withdrawal application must be supported by a medical certificate from Registered Expert Medical Officer. The Academic Council will take final decision about such an application. To continue studying at SU they will be required to take readmission within two succeeding semesters by paying all dues (as per SU rule) in addition to the regular semester fees. This facility in case of withdrawal and readmission can be availed once during the study period.

4) Incomplete (I) Course

If a student does not register any offered course of a regular semester, then this course is defined as "incomplete course" and he/she can register this course when offered by the department in the subsequent semesters.

5) Retake

(i) If a student fails in either Supplementary Examination or he/she does not attend in Supplementary Examination on a course, then he/she can register this course with the regular offered courses of a semester as a Retake course.

(ii) If any student does not appear either in Mid-Semester Examination and Semester Final Examination on any course, then he/she cannot register for the course for supplementary

examination: but he/she can register this course with the regular courses offered of a semester as a Retake course.

(iii) If any student does not attend in classes without withdrawal within the time limit (normally up to the time of drop of a course from any semester) will be given the grade "F" in the course and can register as Retake courses.

(iv) All the Retake courses are of grade "F" and are denoted by "R".

6) Grade Improvement

For Grade Improvement we expect students to do well in their regular examinations. It is considered a privilege, not the right. That is why the improvement fee has been kept at regular rate. The reason for charging such fee is not to consider it as a revenue generation source but to discourage any abuse. However, if a student wishes to improve the grade of any theory course, he/she must register the required course with regular offered courses of any semester within two consecutive semesters after publishing result of the course, provided there is opportunity to attend the classes regularly but no improvement courses can be registered after 4th year 2nd semester or 5th year 2nd semester for 4-year and 5-year degree programs. It will be remembered that a student can register only one improvement course with the courses offered in a regular semester. However, for 4-year and 5-year degree programs, a student may appear in the Improvement Examination on improvement courses (whose grade is below B+) in maximum 7 (seven) and 8 (eight) courses respectively in his/her study period. For improvement courses the student will earn the marks of continuous assessments in classes and other marks will earn from Mid-Semester and Semester Final Examinations. In this case the transcript of the student will show the higher grade between previous and present grades. For the improvement of any grade of a course up to A- (A minus), the incumbent student may be allowed to repeat only one time for a particular course, which must be registered within next two consecutive semesters after the publication of the results of the course. If any student wishes to take this privilege, he/she has to take written permission from the Head of the department through coordinator within five days from the date of publication of results and a copy of permission must be attached with the prescribed registration form. Then a student will register for the course with regular courses following the rules of SU. It is mentioned that a student cannot register the course(s) for grade improvement, which he/she registered any time as repeat/retake/self-study course(s).

(i) A student can register only one improvement course in a regular semester. However, for 4-year and 5-year degree programs a student will appear in Improvement Examinations for grade improvement (whose grade is below B+) in maximum 7 and 8 courses respectively in his/her study period and every course will be repeated one time only. (ii) No improvement examination can be allowed for sessional or sessional related courses. (iii) A student cannot register the course(s) for grade improvement that he/she registered any time as repeat/retake/self-study course(s). (iv) For grade improvement of any course the student must register the course with regular offered courses of any semester within two consecutive semesters after publishing result of the course, but no improvement courses can be registered after 4/5-year 2nd semester for 4/5- year degree programs.

- The End-