NIGER DELATA UNIVERSITY

WILBERFORCE ISLAND, BAYELSA STATE.

DEPARTMENT OF MARINE ENGINEERING

FACULTY OF ENGINEERING

STUDENT HANDBOOK

FOR

B.ENG. DEGREE PROGRAMME

2023-2024

TABLE OF CONTENTS

1.0 GENERAL INFORMATION

1.1 Vision

Our vision is to be one of the foremost Marine Engineering Department globally where the frontiers of Engineering and Technology are being advanced.

1.2 Mission

To produce modern high-Tech Marine Engineers for national development and provide enabling environment for staff to develop enduring scientific and engineering knowledge to solve problems.

1.3 Forward

The Marine Engineering Programme was established in the Faculty of Engineering of Niger Delta University in the 2003/2004 academic session to run a five-year Bachelor of Engineering (B. Eng.) degree in Marine Engineering as a programme in the Department of Mechanical/Marine Engineering. The Marine Engineering programme started with academic staff strength of 8 and a student population of 13. By the 2021/2022 academic year the academic staff strength increased to 27 while the student population increased to 222. The technical staff strength is 11 in addition to support staff from the works department.

Following the vice chancellors nod, Senate Business Committee has recently approved the separation of the Marine Engineering programme to assume the status of a full-fledged department from the Mechanical/Marine Engineering Department has been achieved.

The Marine Engineering programme has had a number of National Universities Commission (NUC) and one Council for the Regulation of Engineering in Nigeria (COREN) accreditation visitations. The last NUC visitation to the Marine Engineering programme was in the month of November 2018 and the programme had interim accreditation while the last COREN visit to the Marine Engineering programme was in October 2018 and the programme was granted full accreditation. With the improvement in the quality of academics staffing, infrastructure and departmental laboratories/workshops, and equipment, the Department is better positioned to train Marine Engineers to cope with nation's needs.

This prospectus is intended to give an overall view of the programmes in the Department of Marine Engineering.

Engr Prof. Ezenwa A. Ogbonnaya
HOD
May, 2024

1.4 Philosophy

To produce Marine Engineering graduates having high academic standards with adequate practical experience that would function immediately and effectively in government and industry.

1.5 Objectives

The primary objectives of the Marine Engineering programme in the Department are:

(i) To give a balanced engineering training suitable for developed and developing country.

(ii) To enable the student to master the basics in engineering analysis and design

(iii) To have close association with industries in the region to enhance practical application of engineering principles and manufacturing processes.

(iv) To take full advantage of the global information network through the Internet, and using the concept of the "virtual" university.

2.0 ADMISSION PROCESS

2.1 Admission Requirements for B.Eng. Degree programme

a. University Requirement

Joint Matriculation Examination (JME) (Year I) SSCE/GCE O' level/NECO with credit passes in 5 appropriate subjects including English Language, Mathematics obtained in not more than two (2) sittings.

b Faculty/Department Requirements

(i) Admission could be granted either through University Matriculation Examination (UME) or Direct Entry. The admission requirements for entry into year one of the University are the University Matriculation Examination (UME) and a minimum of five (5) Credits, including English Language, Chemistry, Physics and Mathematics or Further Mathematics, in the SSCE/NECO/GCE 'O' level. In a bid to reduce malpractices to a minimum, the University also conducts Internal Screening to admit candidates.

(ii) The Direct Entry Requirements are at least three (3) 'A' level passes at GCE or its equivalent including Physics, Chemistry and Mathematic or Further Mathematics. Candidate must also have at least two (2) credits level passes at SSCE/NECO/GCE 'O' level including English Language and Further Mathematics. Candidates who satisfy the direct entry requirements may be given admission into the second year.

2.2 General Guideline

Students are expected to take and pass the NUC required ten (10) units of Mathematics, ten (10) units of Physics and ten (10) units of Chemistry at the first year (100 level). Any deficiency on this requirement must be remedied before the student would be allowed to register for Courses in the third year (300 level). The student deficiency will, may be advised to withdraw from the Faculty of Engineering.

2.3 Duration of Programme

The B.Eng. programme in Mechanical /Marine Engineering runs for five years (10 semesters) comprising of classroom studies, workshop/ laboratory, fieldwork and supervised industrial work experience (SIWE) attachment as follows:

- Year I, II and III Classroom, Workshop/laboratory Work
- Year II long vacation 3 months SIWES to be done within the University
- Year III long vacation 3 months SIWES to be done either within or outside the University as may be indicated by the student's Head of Department.
- First Semester of Year IV Classroom, Workshop/ laboratory.
- Second Semester and long vacation of Year IV 6 months SIWES to be done in any Firm/Industry/ Establishment anywhere.
- Year V Classroom, Workshop/laboratory Work and Final year Project.

3.0 CURRICULUM AND LEARNING PROCESS

3.1 Programme Structure

The B.Eng. Marine Engineering Programme is structured to run for five (5) academic sessions (10 Semesters) for candidates coming in through the UME. An academic year consists of two semesters of eighteen (18) weeks duration each. The first two years of the 5-year programme are common to all Departments in the Faculty of Engineering and are devoted to advance courses in the basic sciences and fundamental Engineering principles and concepts. Lectures, tutorials and laboratory works are rooted in a broad-based, strong scientific background to enable students acquire the necessary skills in analysing and solving complex engineering problems. At the 3rd year, relevant courses from the Department of Marine Engineering are taken in addition to some general Engineering courses. The fourth and fifth years exposes the students to the core areas of Marine Engineering. The students undertake 12 months supervised industrial experience work

scheme (SIWES) programme consisting of 6 months during the second semester period of year four and 3 months each during the long vacation periods of years two and three. During the SIWES period, students are attached to industries to gain experience in research, design, manufacture, industrial processes, social and environmental services with the operation of engine maintenance. Thus, the different level of the programme is as follows:

i. Years I, II and III Classroom/workshop/laboratory work
ii. Year II long vacation 3 months SIWES
iii. Year III long vacation 3 months SIWES
iv. Year IV First semester classroom, workshop/laboratory work then six (6) months SIWES
v. Year V Classroom, workshop/laboratory work and final year project.

Uniform alphabetical and numerical formats are adopted to code Departmental and Faculty courses. The Faculty courses are numbered according to the Senate Curriculum and Instruction Committee recommendation on Course numeration. The course number starts with FCE followed by a three digits' number. The first digit represents the year and the third digit represents the semester, where odd numbers represent first semester and even numbers represent the second semester. The centre number represents Faculty or Department where the course is domicile and is given as follows:

Faculty of Engineering General Courses	0
Agric/Environmental Engineering	1
Chemical Engineering	2
Civil Engineering	3
Electrical/Electronic Engineering	4
Marine Engineering	5
Mechanical Engineering	6
Petroleum Engineering	7

Following the prescribed coding style and connotation, the entire Faculty courses are listed below with their corresponding codes. The courses are drawn to, as much as possible, meet with and generally go beyond the guidelines of COREN minimum Standard for Engineering.

S/N	COURSE TITLE	COURSE CODE
1	Engineering Graphics I	FCE 131
2	Engineering Graphics II	FCE 132
3	Engineering Graphics III	FCE 261
4	Engineering Analysis I	FCE 201
5	Engineering Analysis II	FCE 202
6	Computer Programming	FCE 246
7	Workshop/Manufacturing Technology	FCE 263
8	Engineering Statics	FCE 265
9	Engineering Thermodynamics I	FCE 267
10	Fundamentals of Fluid Mechanics I	FCE 232
11	Strength of Materials I	FCE 212
12	Fundamentals of Electrical Engineering	FCE 244
13	Engineering Dynamics I	FCE 262
14	Engineering Analysis III	FCE 301
15	Engineering Analysis IV	FCE 302
16	Engineering Practice & Research Presentation	FCE 411
17	SIWES I	FCE 200
18	SIWES I	FCE 300
19	SIWES III	FCE 402
20	Engineering Economics & Management	FCE 571
21	Engineering Law & Industry	FCE 532

3.2 Course Content Specifications
(a) Group of Departmental Courses

The departmental course numbers start with MAE indicating Marine Engineering Course, followed by three digits which have the following connotations.

(b) Group Title/Course Years/Semester

i. The first digit indicates the year in which the course is offered;

ii. The second digit indicates the course group; the following groups are employed:

Group 1: Ship Power plant

Group 2: Naval Architecture

Group 3: Ship Building

Group 4: Ship Auxiliary Systems

Group 5: Ship Automation

Group 6: Nautical Science

Group 7: Offshore Technology

Group 8: Marine Electrical

Group 9: General Marine Engineering

iii The third digit indicates the semester the course is taught

3.3 Marine Engineering Programme/Course Description

Marine Engineering is the application of scientific principles to the design, production, planning, operation, management and maintenance of engineering systems and equipment which works in marine environment, such as ships, offshore platforms and rigs. The B. Eng programme is therefore, designed to impart some knowledge to students on the related principles.

The first two ears of the 5-year programme are common to all Departments in the Faculty of Engineering and are devoted to advance courses in the basic sciences and fundamental engineering principles and concepts. Lectures, tutorials and laboratory works are rooted in a broad-based, strong scientific background to enable students acquire the necessary skills in analyzing and solving complex engineering problems. At the 3rd year, relevant courses from the Department of Mechanical and Electrical/Electronic Engineering are taken. In addition, some Marine Engineering courses and Economics for Engineers are taught. In the 4th and 5th years, the emphasis is on the teaching of specialized courses in Marine Engineering.

3.4 B.Eng. Marine Engineering Programme Structure

1. **Ship Power Plants**

COURSE CODE	COURSE TITLE	YEAR	SEMESTER
MEE 314	Mechanics of Machines	300 Level	Second
MEE 392	Mechanical Engineering Design I	300 Level	Second
MEE 322	Thermodynamics II,	300 Level	Second
MEE 351	Metallurgy I	300 Level	First
MEE 311	Engineering Dynamics II	300 Level	First
MEE 432	Thermodynamics III	400 Level	First
MAE 411	Marine Diesel Engine I	400 Level	First
MAE 413	Ship Power Plants I	400 Level	First
MAE 417	Marine Steam and Gas Turbines	400 Level	First
MAE 511	Marine Diesel Engines II	500 Level	First
MAE 513	Ship Power Plants II	500 Level	First
MAE 561	Running and Maintenance of Ship Power Plants	500 Level	First
MEE 511	Mechanical Vibrations	500 Level	First
MAE 523	Thermodynamics IV	500 Level	First

2. Naval Architecture

COURSE CODE	COURSE TITLE	YEAR	SEMESTER
MAE 320	Naval Architecture	300 Level	Second
MAE 521	Ship Propulsion	500 Level	First

3. Ship Building

COURSE CODE	COURSE TITLE	YEAR	SEMESTER
MEE 341	Strength of Material	300 Level	First
MEE 491	Mechanical Engineering Design II	400 Level	First
MAE 536	Ship Design and Construction	500 Level	Second

4. Ship Auxiliary Systems

COURSE CODE	COURSE TITLE	YEAR	SEMESTER
MEE 331	Fluid Mechanics II	300 Level	First
MAE 441	Marine Auxiliary Machinery	400 Level	First
MAE 443	Heat Transfer and Exchangers	400 Level	Second
MAE 544	Refrigeration and air-conditioning	500 Level	Second

5. Ship Automation

COURSE CODE	COURSE TITLE	YEAR	SEMESTER
MAE 550	Ship Automation	500 Level	Second

6. Nautical Science

COURSE CODE	COURSE TITLE	YEAR	SEMESTER
MAE 361	Navigation and Meteorology	300 Level	First

7. Offshore

COURSE CODE	COURSE TITLE	YEAR	SEMESTER
MAE 561	Introduction to Offshore Technology	500 Level	First

8. Marine Electrical

COURSE CODE	COURSE TITLE	YEAR	SEMESTER
MAE 381	Marine Electronic Instrumentation	300 Level	First
MAE 382	Marine Electrical Technology	300 Level	Second

9. General Marine Engineering

COURSE CODE	COURSE TITLE	YEAR	SEMESTER
FEC 202	SIWES I (Long Vacation)	200 Level	Second
FEC 302	SIWES II (Long Vacation)	300 Level	Second
FEC 402	SIWES III	400 Level	Second
MAE 570	Marine Operations	500 Level	Second
MAE 572	Project	500 Level	Second

STUDENT WORK LOAD

100-LEVEL **SEMESTER I**

S/N	Course Code	Course title	L	P	T	U
1	GST 101	Use of English I	2	0	3	3
2	MTH 105	Engineering Mathematics I	3	0	3	5
3	PHY 105	General Physics I	2	2	3	5
4	CHM 101	General Chemistry I	2	2	3	5
5	FCE 131	Engineering Graphics I	1	2	0	2
6	GST 101	Computer Introduction and Application	3	0	0	3
		TOTAL	13	6	12	23

100-LEVEL **SEMESTER II**

S/N	Course Code	Course title	L	P	T	U
1	GST 102	Use of English II	2	0	3	3
2	GST 110	Nigerian Peoples and Culture	3	0	0	3
3	FCE 132	Engineering Graphics II	2	2	0	2
4	MTH 106	Engineering Mathematics II	3	0	3	5
5	PHY 106	General Physics II	2	2	3	5
6	CHM 102	General Chemistry II	2	2	3	5
		TOTAL	14	6	12	23

200-LEVEL **SEMESTER I**

S/N	Course Code	Course title	L	P	T	U
1	FCE 201	Engineering Analysis I	2	0	3	3
2	FCE 261	Engineering Graphics III	1	2	0	2
3	FCE 263	Workshop/Manufacturing Technology	1	2	0	2
4	FCE 265	Engineering Statics	2	0	3	3
5	FCE 221	Material Science	2	2	0	3
6	FCE 267	Engineering Thermodynamics	2	0	3	3
7	GST 222	Peace and Conflict Resolution Studies	2	0	0	2
		TOTAL	12	6	9	18

200-LEVEL **SEMESTER II**

S/N	Course Code	Course title	L	P	T	U
1	FCE 202	Engineering Analysis II	2	0	3	3
2	FCE 246	Computer Engineering II	2	0	2	2
3	FCE 232	Fundamentals of Fluid Mechanics	2	0	3	3
4	FCE 212	Strength of Materials I	2	2	3	4
5	FCE 244	Fundamentals of Electrical Engineering	1	2	3	2
6	FCE 262	Engineering Dynamics I	2	0	3	3
7	GST 212	Introduction to Philosophy and Logic	3	0	0	3
		TOTAL	14	4	17	20

S/N	Course Code	Course title				U
1	**FCE 200**	**SIWES (DURING LONG VACATION)**				**0**

300-LEVEL **SEMESTER I**

S/N	Course Code	Course title	L	P	T	U
1	FCE 301	Engineering Analysis III	2	0	2	3
2	MEE 311	Engineering Dynamics II	2	2	0	3
3	MEE 331	Fluids Mechanics II	2	2	0	3
4	MEE 341	Strength of Materials II	2	2	0	3
5	MEE 351	Metallurgy I	2	2	0	3
6	MAE 361	Navigation and Meteorology	3	3	0	4
7	MAE 381	Marine Electronic and Instrumentation	2	2	0	3
		TOTAL	15	13	2	22

300-LEVEL **SEMESTER II**

S/N	Course Code	Course title	L	P	T	U
1	FCE 302	Engineering Analysis IV	2	0	2	3
2	GST 300	Entrepreneurship Development and Industry	2	0	0	2
3	MEE 314	Mechanics of Machines	3	2	2	4
4	MEE 392	Mechanical Engineering Design I	2	0	2	3
5	MEE 322	Thermodynamics II	2	2	0	3
6	MAE 320	Naval Architecture I	3	0	2	4
7	MAE 382	Marine Electrical Technology	2	2	0	3
		TOTAL	16	6	8	22

400-LEVEL **SEMESTER I**

S/N	Course Code	Course title	L	P	T	U
1	FCE 411	Engrg Practice and Research Presentation	2	0	2	3
2	MAE 411	Marine Diesel Engines I	2	0	2	3
3	MAE 413	Ship Power Plant I	2	2	0	3
4	MAE 417	Marine Steam and Gas Turbines	2	2	0	3
5	MAE 441	Marine Auxiliary Machinery	2	0	2	3
6	MAE 443	Heat Transfer and Exchangers	2	0	2	3
7	MEE 423	Engineering Thermodynamics III	2	0	0	2
8	MEE 491	Mechanical Engineering Design II	2	0	3	3
		TOTAL	16	4	11	23

400-LEVEL **SEMESTER II**

S/N	Course Code	Course title	L	P	T	U
1	FCE 400	**SIWES (DURING LONG VACATION)**				9

500-LEVEL **SEMESTER I**

S/N	Course Code	Course title	L	P	T	U
1	MAE 511	Marine Diesel Engines II	3	0	2	4
2	MAE 513	Ship Power Plant II	3	0	2	4
3	MAE 521	Ship Propulsion	2	0	3	3
4	MAE 561	Introduction to Offshore Technology	3	0	0	3
5	MEE 511	Mechanical Vibration	2	2	0	3
6	MEE 531	Thermodynamics IV	2	0	2	3
7	FCE 571	Engineering Economics & Management	2	0	0	2
8	MAE 572	Project	0	0	0	0
		TOTAL	**17**	**2**	**9**	**22**

500-LEVEL **SEMESTER II**

S/N	Course code	Course title	L	P	T	U
1	MAE 516	Running & Maintenance of Ship Power Plants	1	0	3	2
2	MAE 536	Ship Design & Construction	3	0	2	4
3	MAE 544	Refrigeration & Air Conditioning	2	0	2	3
4	MAE 550	Ship Automation	2	2	0	3
5	MAE 570	Marine Operations	2	2	0	3
6	FCE 532	Engineering Law & Relations	2	0	0	2
7	MAE 572	Project				6
		TOTAL	12	4	7	23

3.5 Description of Courses

MTH 105 Basic Functions and Series (5 Units)

Sets, mapping, functions inequalities, graphs, quadratic equations, Remainder theorem, surds and indices, AP, GP, logarithmic and exponential functions, permutations and combinations and binomial theorem. Trigonometry: Trigonometric and hyperbolic functions, solution of trigonometric equations in three unknowns. Complex numbers. Analytical Geometry: Equations of lines, circles, conic sections, generalized to three-dimensional space lines, planes, spheres. Review of Calculus; Limit of a sequence derivatives and differentials, L'hospital rule, methods of integration, definite integrals. Infinite Series: Infinite series Taylor's and Maclaurin's series.

MTH 106 Linear Algebra and Ordinary Differential Equation (5 Units)

Scalars and Vectors, vector algebra, vector calculus differentiation and integration. The gradient of a scalar field, the divergence and curl of a vector field, application to co-ordinate system. Eigen values & Eigen vectors. More Matrices: Adjoins and inverse, elementary transformations. The rank of a metric, system of linear equations. Differential Equation: First order differential equation and its geometric interpretation. Second order differential equations with constant coefficients. Exact equations, separable variables, Homogenous integrating factor. Improper integrals, Gamma, Delta, Seta and Errol and other functions, geometric and physical applications. Linear Programming: Problem formulation, method of solution.

PHY 105 Physics I (5 Units)

Physical quantities; units, vectors, particle. Kinematics and dynamics. Oscillations. Work. Energy, Momentum. Angular momentum. Motion of rigid bodies. Collisions Hooke's Law. Sound waves. Calorimetric. Gas Laws and Kinetic Theory. Heat and work. Laws of Thermodynamics and applications. Surface tensions.

PHY 106 Physics II (5 Units)

Electrostatics. Electric intensity. Coulomb's and Gauss laws. Capacitors. D.C. Current circuits. Electrolytic cells. Magnetic fields of currents, Electro-magnetic induction generators. Induction. Electric motors. A.C. circuit theory-theories of magnetism. Optical instruments. Quantum theory.

Photoelectric effect. Bohr's atom model of Energy levels and lines spectra. Matter waves. Band spectra. Semiconductors.

CHM 101 General Chemistry I (5 Units)

Atomic and molecular structure. Electronic configuration and periodicity. Metals and Non-metals. Chemical Bonding. The Mole concept. Chemical equations and stoichemistry. Acids. Bases and salts. Chemical equilibrium. Lionization of water. Indicators etc. the pH scale, Buffer solutions. Hydrolysis of salts. Redox reactions. Electro-chemical cells and electrode potentials. Electrolysis. Chemical Energetic. Thermodynamics. Chemical Kinetics chemical reaction rates; homogeneous and heterogeneous catalysis.

CHM 102 General Chemistry II (5 Units)

Colligative Properties. Ideal solution. Osmotic Pressure and determination of molecular mass. Raoult's law. Henry's Law. Phase rule and phase diagrams. Emulsions and suspensions. Transport phenomena Diffusion and viscosity. Sources of organic compounds. Aliphatic and Aromatic Hydrocarbons Nomenclature, Homologous series, Isomerism, Functional groups; Alcohols, carbonyls, carboxylic acids, esters and Ethers. Introduction to spectroscopy-basic principles.

GST 101: Use of English I (3 Units)

An overview of the concept of Language, Importance of the English Language in Nigeria. The sentence, the phrase/clause, parts of speech, rule of concord, direct and indirect speech. The paragraph, punctuation, figure of speech, oral communication (Vowels and consonants).

GST 102: Use of English II (3 Units)

Vocabulary, root and affixes; idioms. Figures of speech (part II); summary. Essay writing, letter writing, minute writing, speech writing.

GST 110: Nigerian Peoples and Culture (3 Units)

Introduction to man and society, the history of Nigerian society and people (Hausa/Fulani, Yoruba, Ibos, Niger Delta, etc). Structural components of Nigerian people and culture. Cultural similarities and variations of the Nigerian people. Culture, environment and health practices in Nigeria.

Nigerian heritage. Nature and culture of traditional religion, rites of passage, systems of marriage, decent, kinship and family. Systems of social stratification. The Evolution of Nigeria; politics and democracy. Ethnic relations, prejudice, discrimination and inter-ethnic conflicts and resolution. Traditional economic system and sustaining the economic profile in Nigeria.

GST 100 Computer Introduction and Application (2 Units)

Introduction to Computers, Computer and uses; Computer Logic soft wares and hard wares. Basics of computer language FORTRAN, BASIC, COBOL, etc. Basic Computer appreciation MS word, MS DOS, etc. Flow Charting and computer algorithm design. Extensive exercises in solution .to engineering problems using computer algorithms, flow charts and/or other pseudo codes. Introduction to advanced programming languages. Application of Computer BASICS, FORTRAN. Flow Charting/Pseudo Codes to simple engineering problems. Basic computer appreciation and overview in MS Word, Excel, CorelDraw.

FCE 131 Engineering Graphics I (2 Units)

Use of drawing instruments, lettering, dimensioning, layouts. Constructions of geometrical figures, conies, etc. Graphical calculus and applications. Development, intersection of curves and solids, tangents, etc. Projections orthographic and isometric, sectional views.

FCE 132 Engineering Graphics II (2 Units)

Pictorial/Freehand sketching, Conventional practices. Architectural drawings. Advanced topics in auxiliary and sectional views, developments, intersection of surfaces, Projections.

GST 212: Introduction to Philosophy and Logic (3 Units)

The nature and scope of philosophy; Misconceptions popular notions, etymological definition of philosophy. Branches of philosophy metaphysics, epistemology, ethics, logic, aesthetics. Ancient, medieval, modern and contemporary periods of philosophy. The problems of knowledge, appearance, reality, mind and body, freedom and necessity. Distinction between logic and other disciplines. Argument and its components (preposition, premise, conclusion), detailed discussion on proposition, its distinction with a sentence. Categorical proposition and its features, disjunctive and hypothetical propositions.

GST 222: Peace and Conflict Resolution (3 Units)

Basic concepts of peace and conflicts, types, sources and causes of conflict and violence. Conflict management strategies Traditional approaches, Alternative dispute resolution and third window in Judiciary. Case studies and Group discussions, comparative study of ethic militia and youth's insurgency in Nigeria. Models of Conflict resolution and peace building. Peace keeping efforts. Excursion -visits and group empirical studies.

FCE 201 Engineering Analysis I (3 Units) Pre-Requisite: MTH 105 & MTH106

General engineering systems, Rate systems and their relationships, General principles of optimization. Use of functions of several variables, partial derivatives, total differentials in component design and optimization. Taylor's formula and its extension to functions of several variables, maxima and minima, LaGrange multipliers and their engineering applications. Functions of a complex variables, analytic functions, integration in the complex plane and phase systems, infinite series in the complex plane and mapping. Taylor's and Laurent's expansions, the theory of residues, conformal mappings and application of Fourier series integrals, Laplace transform. Method of solving linear differential equations with constant coefficients with structural illustrations. Convolution and Duhamel formulae and applications.

FCE202 Engineering Analysis II: (3 Units)

The concept of uncertainties and in engineering productions. Basic system engineering minimization, maximization principles, simplex and queuing principles. Engineering experimentations, field surveys, predictions and reports. Probability Models: Frequency distribution, Central tendency and dispersion, moments, discrete random variables, binomial distribution, Poisson normal distribution, sampling and sampling distributions, estimation of population parameters, hypothesis testing, correlation and regression, analysis of variance, experimental design. Statistical quality control.

FCE 203/204 Laboratory Practical's 1 & 11: (2 Units each)

All-embracing practical works as to enable students to obtain relevant practical experience preparatory to SIWES.

FCE 244 Fundamentals of Electrical Engineering: (2 Units)

The electric circuit. DC and AC analysis technique. Measurement of basic electrical quantities. Electrical machines. Alternating voltage and electric devices. Installation techniques.

FCE 261 Engineering Graphics III (Pre-requisite FEC 162) (2 Units)

Introduction to limits, fits and tolerance. Surface roughness determinations. Drawing methods for Cam-profiles.

Presentation and drawing of various types of gears. Assembly and sub-assembly drawing of elements, workshop drawings correction and modification of drawings, general Engineering drawing symbols. Reading of blueprints.

FCE 263 Workshop/Manufacturing Technology (2 Units)

Safety and safe working practices in the Workshop. Carpentry and Joinery process. Forging furnace and forging operations. Fitting and plumbing; hand-drilling and tapping, measuring instruments such as micrometers, venire labeling, height gauges, bevel protector, sine-bar, gauge blocks, etc. Checking surface for flatness, square ness etc. Types of patterns and pattern making, moldings sand, molding process: machine molding. Ferrous and non-ferrous castings, various casting methods and casting defects. Arc and gas welding processes, soldering and brazing. Introduction to the lathe; milling, shaping and drilling machines. Cutting fluid types and applications.

FCE265 Engineering Statics (Pre-requisite: MTH 106) (3 Units)

Basic Concepts; Newton's Laws of Motion, mathematical modeling and analysis. Statics; force systems, resultant of Coplanar and Spatial Force systems, equilibrium conditions. Shear forces and bending moments in beams and shafts, analysis of trusses and frames. Friction between dry surfaces. Moment of Inertia, plane figures and Composite bodies.

FCE267 Engineering Thermodynamics (Pre-requisite: MTH 105) (3 Units)

Fundamental concepts; systems, properties and processes, Heat and work. First law; closed system, open systems, model applications. Working fluids, liquid, vapour and perfect gases. Steam tables and charges. Second law, cycle efficiency. Reversibility. Entropy simple cycles; Carnot, Ranking, air standard.

FCE 262 Engineering Dynamics (Prerequisite: MTH 106) (3 Units)

Plane kinematics and kinetics of particles. Kinetics of particle; Newton's second law. Work and energy, conservation of energy and momentum, fields of forces, impact coefficient of restitution. Kinetics of system of particles. Generalized Newton's second law, steady mass flow and variable mass rocket motion. Plane kinematics and kinetics of rigid bodies. 3D dynamics of rigid bodies, gyroscopic motion and gyroscopic stabilization.

FCE 221 Material Science (Pre-requisite: CHM 102) (3 Units)

The atomic structure. Crystal Structure and material bonding Physical properties of materials. Dislocation theory. Metals-Ferrous and non-ferrous. Polymers, thermosetting and thermoplastic materials. Wood-Natural and modified. Rubber. Ceramics and composite materials.

FCE 232 Fundamentals of Fluid Mechanics (3 Units)

Fundamental concepts: Characteristics of fluids, fluid properties, dimensions and units. Nature of fluid Flow-Newtonian and Non-Newtonian fluids. Fluid statics: pressure, buoyancy, force on submerged body, stability of bodies in fluids. Fundamentals of fluid motion. Conservation Laws of mass, momentum and energy. Euler's equation; Bernoulli's equation; applications; incompressible viscous flow; ideal and real fluids, friction loss, Laminar flow in pipes and between parallel plates. Flow measurements, pressure, velocity, rate measurement techniques.

FCE 246 Computer Programming (Pre-requisite: GST 100) (2 Units)

Application of computer language, systems and software to the solution of problems in the various fields of engineering. High-level computer appreciation in Excel, CorelDraw, Equation Editor. Introduction to AutoCAD and Matlab software.

FCE 212 Strength of Material (3 Units)

Force equilibrium free body and forces diagrams; Concept of stress and strain, generalized stress-strain relationship, Young's Modulus and other strength factors, Tensile test; Axial and Triaxial states of stresses and trains, axially loaded bars, composite bars, temperature stresses and simple indeterminate problems; Hoop stress; Cylinders and rings. Bending moment, shear force and axial force diagrams; Torsion und applications. Stress transformations, Failure theories, and the Mohr's

circle. Theories of bending of beams, Asymmetrical and unsymmetrical bending and the concept of Mohr center. Strain energy and applications.

FCE 200 SIWEI (0 Unit)

Introduction to practices and skills in general engineering through engineering instructions in the operation of hand tools, power tools for wood and metal works. Safety practices and other hands on experience in safe usage of tools and machine. Statement of experience in any selected practical task. (Course to be taken during long vacation following 200 level)

GST 300: Principles and Theories of Entrepreneurship (2 Units)

Factors of production, supply and demand. Price, household behaviour theories. Business organisation, production, the market. Income. Employment- classical, non-classical and keynessian approaches. Money, expenditure. Taxation, budget, international trade.

FCE 301 Engineering Analysis III (Pre-Requisite MTH 105 & MTH 106, FCE 201) (3 Units)

Overview of general engineering responses to mathematical applications in problem solving. General second order differential equations, systems of linear differential equations and applications in theories of failure. Partial differential equations, Laplace's equation, the wave equation, the heat equation, Bessel functions and Legendre polynomials. The line integral, surface integrals. Double and triple integrals, simply and multiply connected domains and applications Green's stokes and Divergence theorems with applications. Laplacian operator: Co-ordinate transformation. The line integral, surface integrals. Double and triple integrals, simply and multiply connected domains and applications Green's stokes and Divergence theorems with diverse engineering applications.

FCE 302 Engineering Analysis IV (Pre-Requisites: FCE 201) (3 Units)

The recovery techniques, mathematical applications in system discretization processes, the finite difference, interpolation formulae, numerical integration and differentiation their uses in the system analysis and discretization. The numerical solution of linear and nonlinear equation,

differential equations and applications to Engineering problems. Finite Element method and Boundary element and its applications.

MAE 361: Navigation and Meteorology (4 Units)

Introduction to seaman's skill, Ship nomenclature, Ship Equipment: deck gear and Machinery, hold ceiling, bulk heading. Cargo protection, Anchor arrangements, Mooring and Towing arrangements, Small boat handling with Oars or Engine. Mooring, anchoring, lowering and lifting of life boats. Use of life saving equipment. First Aid, Personal survival. Merchant ship departmental organization and station bills. Bridge equipment. Navigational Aids. Signaling and communications. International convention. Weather: types, impact and predication. Climatology. Meteorological equipment and application in Navigation. Marine ecology. Practical: Seamanship practice.

MEE 392 Mechanical Engineering Design I (Prerequisite: MEE 241) (4 Units)

Basic concepts: introduction and review of strength of materials. Theories of failures and factor of safety. Stress concentration. Factors affecting fatigue strength. Component Design: designs of various machine components including shafts, axles, springs, keys, pins and splines, bolts with pre-loading, couplings, clutches and brakes; welded, riveted and threaded joints.

MEE 351 Metallurgy I, 3 Units ([Prerequisite: to FCE 221)

Binary, equilibrium-phase rule and phase diagrams. Crystallization process. Crystallography and microstructure. Diffusion in metals. Heat treatment. Hardening Processes and hardenability (end quench) tests. Corrosion and Oxidation, Non-destructive testing and mechanical testing.

MEE 314 Mechanics of Machines (Prerequisite: MEE 311) (3 Units)

Introduction and classification of mechanisms, definition and terminology. Kinematics inversion and 4R-Bar mechanism. Kinematics of mechanisms, gear and geared systems, cams, analytical and Dynamic analysis, inertia forces and couples. Kinetic energy method, fluctuation of energy and speed. Balancing of rotating and reciprocating masses. Governors types controlling forces and stability.

MEE 322 Thermodynamics II (Prerequisite: FCE 267) (3 Units)

Vapour power cycles: Carnot Rankin with modification. Mixtures of gases, psychiometry, simple air-conditioning systems, cooling tower condensers. Thermodynamic relations and exact definitions. Maxwell relations. Entropy and second law.

MEE 331 Fluid Mechanics II (Prerequisite: FCE 232) (3 Units)

Dimensional analysis and Similitude: analysis methods, types of similarity. Curved flow, invicid curved flow, vortices. Introduction to turbulence; mixing length theories, effects of roughness. Flow in pipes; friction, empirical relations, effects of pipe shape, bend and fittings, pipe networks. Water hammer, flow in open channels; steady uniform flow, non-uniform flow, gradual and rapid varying flow.

MEE 341 Strength of Materials II (Prerequisite: FCE 214) (3 Units)

Statically indeterminate systems; review of superposition method, moment area method; Castliano's theorem and application. 3-D stress systems; principle stresses, strain energy methods. Theories of failure. Theory of columns; Euler's column formulae, the secant, Rankin-Gordon and empirical formulae. Thick-walled cylinders, stresses in simple and compound cylinders, rating discs. Failure mechanics; creep failure, fatiogue failure, ductile and brittle failure.

MEE 311 Engineering Dynamics II (Prerequiste: FCE 262) (3 Units)

3D kinematics of particles and rigid bodies. Mass and products of inertia. Inertia transformations and the eigen-value problem. 3D kinetics of rigid bodies, Newton second law of motion, energy methods, impulse and momentum method. Eulerian angles and gyroscopic motion. Introduction to vibration analysis the spring-mass system, damped and undamped single degree of freedom free vibrations.

MAE 320: Naval Architecture I (3 Units)

Function of a ship; ship types: Principal terms; Layout and profile of ships. Hydrostatic curves; ship calculations; Areas, volumes, moments, displacement, TPC, Form; coefficient and Bonjean curves; centre of gravity, buoyancy; stability; transverse and dynamical Inclining experiment, calculations; GZ, GM and BM; Curves of stability; Free surface effect. Trim: Change in trim a d

draughts. Statutory Regulations; Classification societies' requirements; IMO Regulations. Ships rolling; the sea and ship motion. Practical: Drawing and Laboratory.

MAE 381: Marine Electronic Instrumentation (3 Units)

Basic Electronics; Electronic theory of matter. Thermionic devices, transistors and their characteristics. Electro-chemical, electrostrictive and Electro – thermal effects and devices. Transducers; velocity, force, temperature, pressure displacement and position sensors. Sensor circuits. Transmission and signal conditioning; Signal modifying circuits, bridge circuits, amplifiers and fitter circuits. Output devices: The CRO, Oscillograph and X-Y plotter.
Applications; Feedback circuits and applications.

MAE 382: Marine Electrical Technology (3 Units)

Electrical installation on ship. Dc and AC systems. Main and standby generators. Principles of electric drives. Torque –speed. Characteristics of various types of electric motors and their main application. Solid state control device and systems. Principles of remote measurements of non – electric quantities. Illumination. Emergency lights. Wiring. Cable ratings. Over – current protection of electric circuits. Earth current protection.

FCE 300 SIWE II (0 Unit)

Continuation of FEC 200 during long vacation following 300 level.

FCE 411 Engineering Practice and Research Presentation (2 Units)

Philosophy of science and engineering. History of engineering and technology. The Engineering profession engineering literacy, professional bodies and Engineering Societies' code of conduct and ethics. Safety in engineering. Professional use of English Language for letters, specification distributions, presentation of charts, graphs, tables, writing of proposals and case studies, etc. Research methodology and presentation, Use of MS Power Point.

MAE 411: Marine Diesel Engines I (3 Units)

Theoretical and actual cycles. Types of engines. Cylinder arrangements. Fuels and combustion. Performance characteristics. Engine ratings. Efficiency. Design and Construction. Fuel oil

injection pumps, injectors. Ship propulsion engine types: direct and geared drive. Practical: laboratory exercises.

MAE 413: Ship Power Plants I (3 Units)

Choice and factors affecting the choice of Power Plant type. Types of Plants. Ship main engines: types, configurations. Shaft-line arrangement. Marine Steam Boilers: Principles of operation, Classifications. Heat transfer: water tube, auxiliary, donkey and forced circulation boilers, controlled superheat and Reheat boilers. Components of a boiler, control, corrosion. Boiler materials, Instrumentation and automatic control of Boilers, Application on ships, Boiler surveys. Classification Society rules, Waste heat recovery systems. Main engine systems: Sea fresh water and Lubrication Oil systems. General layout. Heat balance of Power Plants. General purposes systems: bilge, ballast, water; firefighting. Marine Gear Boxes.

MAE 415: Ship Engines and Power Plants (3 Units)

Classification of ship power plants, application on various ships. Power plant in motor ships, Main engines, types, propulsion systems (direct coupled, geared electrical transmission). The main engine auxiliary machines and systems. Electric generating sets. Exhaust gas boiler. Evaporating plant. Steam turbines power plants steam-water Cycles: Rankin, superheat, reheat, regenerative. Steam boilers, steam turbines, condensers, steam extraction, feed-water heaters, feed pump, dearators. Evaporators. Actual cycles of power plants. Gas turbine power plants: Basic cycles. Turbine types, construction. Combined power plants. Firefighting, bilge, ballast and other systems.

MAE 417: Marine Steam and Gas Turbines (3 Units)

Principle of operation and classification, Rankin Cycle, Reheat cycle; Regenerative cycle, Reheat/Regenerative cycle, cycle efficiencies. Theory of steam expansion in cascade. Gas Turbine; Principles of operation and classification, Brayton cycle, Heat exchange cycle, Reheat cycle, Intercooler cycle, Intercooler/Reheat/Heat Exchange cycle, cycle efficiencies, combined steam and Gas turbine cycles. Turbo machinery theory: Expansion of fluids in nozzles. Expansion process in turbine stator blades, work done in turbine rotors, velocity distribution across compressor and turbine, pressure, velocity and pressure-velocity compounding. Steam turbine construction: Governors, safety devices, glands, coupling, Astern turbine, Blades, rotors, Blade

fixing, seals, casings, condensers. Gas turbine construction. Rotors, compressor blades, Intakes, combustors, turbines, exhausts.

MAE 431: Ship Structures (3 Units)

Loads acting on ship structure. Types of ship structures. Framing systems. Classification Rules. Function of ship structural components. Double bottom. Single bottom, Shell planting. Frames. Decks. Bulkheads. Pillars. Girders. Hatch coatings. Machinery casings Superstructures. Bossing and struts. Bilge Keels and fenders.

MAE 433: Ship Strength (3 Units)

Longitudinal bending moment and shear forces in still water. Wave bending moment. Total bending moment. Hogging and sagging. Dynamic forces. Local stresses. Torsion. Function of ship structure. Girder section modules and stress. Deflection of ships. Transversal strength. Thermal effects. Strength of structure components. Local strength. Fatigue. Local vibrations. Reducing of hull vibration.

MAE 435: Shipyard Technology I (3 Units)

Shipyard layout. Planning and scheduling of ship production. Shipyard management. Hull materials. Materials storage. Hull material fabrication. Lofting. Steel fabrication processes. Prefabrication of erection units. Cranes and transportation devices. Welding and welding machines. Inspection. Measurement methods and instruments. Classification society requirements.

MAE 441: Marine Auxiliary Machinery (3 Units)

Auxiliary systems. Pipes, fittings, valves. Flow resistance in systems. Pumps- classification. Impeller, reciprocating and rotary types, principles of operation, velocity triangles, pump head, efficiency performance curves construction. Priming, cavitation. Steam ejectors. Compressors reciprocating, rotary and centrifugal: Operation, performance curves, construction and maintenance principle. Blowers types, performance. Distilling plants; types, components, efficiency, sealing, cleaning. Steam condensers; construction. Centrifugal separators: operation, ordinary and self- cleaning, rated and service capacity Sewage treatment, Practical: Laboratory exercises.

MAE 443: Heat Transfer and Exchanger (3 Units)

Heat transfer relationship: Convection, conduction and radiation. Laminar and turbulent flows. Heat transfer in shell-tube heat exchangers. Modes of heat flow. Log mean temperature difference. Pressure drop. Design calculations. Constructional details. Water and lubricating oil coolers. Water, fuel oil and lubrication oil heaters. Feed water heaters: Low and high pressure. Steam surface condensers. Performance characteristics. Design considerations. Evaporation materials and maintenance. Heat transfer coefficients, pressure drops. Applications. Mass transfer: modes. **(Prereq. FEC 265, MEE 322.)**

MEE 491 Mechanical Engineering Design II(Prerequisite: MEE 312)(4 Units)

Further Component Design: Further design of machine components including bearings (roller, journal and thrust bearings), seals and application. Hydrodynamic lubrication and gears Belt and chain drives. Standards and selection. Design concept: concept of optimum design. Creative process in design, creativity, review of various methods of reseach for best solution. Material selection. Use of hand book sand standards. Assembly drawings. Final technical documentation. Analitical and experimental verification. Feedback in project: student will be required to carry out project involving design of a suitable equipment to fulfill given specification, selection of appropriate layout, detailed and assembly drawings.

MEE 423 Thermodynamics III (Prerequisite: FCE 322) (2 Units)

Gas power cycles, Brayton cycle with modifications, air standard cycle. Reciprocating expanders and compressors, indicated and hypothetical diagrams. Refrigerating cycle, Reversed Carnot, vapour compression and absorption cycles.

FCE 402 SIWE III (3 Units)

On the job training to acquire industrial experience and acts of responsibility to be obtained from the industry relevant to the student's chosen field/specialization. This is to be taken Semester 2 in the 400 level and during the long vacation following 400 Level.

FCE 571 Engineering Economics and Management (3 Units)

The nature and scope of economics. Basic concepts in engineering economics. The interest formulae, discounted cash flow, present worth, equivalent annual growth and rate of return

comparisons. Break even analysis, Replacement analysis, Cost Benefit analysis, concept of management tasks. Leadership Patterns. The abelingti, motivation, control and delegation of authority. Organization theories and concepts. Industrial relations. Introduction and sources of Law. Industrial/Engineering law and practices, Liabilities in torts: assaults, negligence and strict liability. Law of Contract: independent contractors, workmen compensation. Property Law: Partnerships, intellectual property copyright, trademarks, design, patents. Incorporation of company and registration. Arbitration.

FCE 532 Engineering Law, Entrepreneurship and Industry (2 Units)

Organizational structure of manufacturing outfits. Definition of and starting a small and. medium scale enterprise (SME). Market surveys, Feasibility studies, Projects and Contract documentation and handling, BOQs, Specifications, Planning and scheduling, Funding and fund sourcing, Product quality control, safety procedures.

MAE 561: Introduction to Offshore Technology (3 Units)

Historical development of offshore structures; novel and small field offshore structures; health and safety in context: learning from incidents, hazards inherent in oil and gas industry, risk management techniques used in oil and gas industries, safety cases and safety report; hydrocarbon process safety 1: contract management, process safety management (PSM), role and purpose of permit-to-work, key principles of shift handover, plant operation and maintenance health and safety policy; hydrocarbon process safety 2: failure modes, safety critical equipment controls safe storage of hydrocarbons, furnace and boiler operations; fire protection and emergency response; logistics and transport operations: marine transport and land transport.

MAE 511: Marine Diesel Engines II (4 Units)

Engine performance: indicator, types of indicator diagrams, Scavenging and supercharging Turbo charging and turbochargers. Dual fuel systems. Operation of low-speed engines starting air system, Reversing mechanism. Control stand and instrumentation. Starting normal and stopping operations Overload operation. Maneuvering. Minimum speed Operation in specific conditions. Typical operating troubles. Running in service Safety devices. Dynamics of crank gear. Vibration: Simple system, torsion, multi-cylinder crankshaft system: Balancing. Dampers, crankcase explosion. Scavenge fire, precautions, Practical: Laboratory. **(Prerequisites: MAE 411).**

MAE 513: Ship Power Plants II (4 Units)

Propulsion system: General configurations of conventional propulsion systems, Direct drive diesel engine system turbine system, Direct gas turbine system, combined propulsion systems such as CODAG, CODOG, COGAS etc, Electric drives for Modem Ship Power Plant Efficiency. Enhancement and Analysis; Energy balance analysis, Energy balance diagrams, flow diagrams of various types of power plants, overall efficiency determination, comparison of power plants types. Selection of main Engines and propeller performance of main engines, Graphical presentation of engine performance, performance of propellers, graphical presentation of propeller performance, Main Engine/Propeller Matching. Design of Power Plant systems: Fuel oil systems, sea water cooling systems lubricating oil systems, compressed air systems, steam systems, Exhaust gas system, Fresh water systems, Automatic control and alarm systems. Rules and Regulations guiding design of ship power plants: Lloyds register rules and regulations, American bureau of shipping rules and regulations, Environmental protection required, power plants for special ship; Fishing vessels, tugs/pushers tankers and passenger ships. **(Prerequisite: MAE 413)**

MAE 516: Running and Maintenance of Ship Power Plants (2 Units)

Running, maintenance and repairs of main and auxiliary diesel engines. Operations, fault detection, overhauling, dismantling, measurements, checking, assembly. Defects, war and damage. Repair Methods. Testing of injectors, fuel pumps and valves. Adjustments overhauling of turbochargers. Inspection. Maintenance. Replacement of parts. Bolt tightening. Watch keeping. General safety in machinery spaces.

MAE 521: Naval Architecture II (2 Units)

Ship body line design and calculation: ship's body plan drawing, Bo jeans diagram and hydrostatic curves calculations and plotting. Ship stability: Calculation and plotting of cross curves of stability by conventional and computer methods. Ship subdivision and damaged stability: Calculation and plotting of floodable length curves. SOLAS convention. **(Prerequisite MAE 320)**

MAE 522: Nav1 Architecture III (4 Units)

Resistance of ship. Components of resistance. Laws of comparison. Model tests. Resistance in restricted water, Resistance of small, fast ships. Methods of ship resistance calculations: Determination of engine power. Steering of ships. Types of rudders. Turning ability. End and side

launching of a ship. Seaworthiness of a ship. Practical: Laboratory Tests for stability and resistance. **(Prerequisites: MAE 320, MAE 521)**

MAE 521: Ship Propulsion (3 Units)

Fundamentals of ship; propulsion. Ship resistance. Methods of ship Resistance calculations, the effect of hull form and water path. Propulsion devices. Geometry of screw propeller. Momentum theory of the screw. Axial and tangential losses. The propulsion coefficients. The influence of after body on wake distribution. Model tests and laws of comparison. Systematic screw-series. Hydrodynamic characteristics. Matching of propeller to the hull. Cavitations. Design of screw propellers. Performance curves. The screw propellers performance in different load conditions. Controllable pitch propellers. Calculations, design and drawing of screw propeller.

MAE 533: Shipyard Technology II (3 Units)

Hull assembly on slipway. Slipway types and launching methods. Deflection of hull. Cutting, welding and riveting. Shipway arrangements. Machinery installation. Shafting and screw assembly. Boilers and auxiliary machines installation. Masts, booms and cranes. Steer covers. Mooring arrangements. Life Container fitting. Surface preparation and painting. Corrosion prevention. Superstructure outfitting. Firefighting arrangements. Inspection, test and trials. Classification society requirements and certificates. Dry-docking. Hull cracks and crack arresting methods.

MAE 534: Ship Design I (4 Units)

Function of a ship. Designing process-criteria requirements, classification societies rules, Government rules and regulations; load line safety, ship proportions, light ship mass power estimation. Estimation of ship capacity; GRT, NW, Grain, bale, and measurement. Hydrostatic and stability. Hull form design. Layout of the ship, Crew and passenger accommodation. General arrangement. Specification, survey contracts.

MAE 535: Ship Design II (4 Units)

Specific characteristics and design of different types of ships; general cargo carriers, container ships, hulk carriers, tankers, fishing vessels, inland vessels small crafts.

MAE 536: Ship Design and Construction (4 Units)

Basic concepts in ship design: Rules base on design principles, classification societies rules and regulations, ship design processes. Introduction: classification of ships: Function cargo type Propulsion system. Characteristics of various types of ships. Determination of areas, moments, moments of inertia, volumes, intact and damaged stability, determination of floodable length, Dynamic stability inclining experiment ship geometry, Hydrostatic curves. Ship structures: Structural arrangement of ships, Fundamentals of hull vibration. Displacement and form coefficients; Principal dimensions, Estimates of dead weight and light ship weights, light ship weights and speed. Load lines: International convention of load liens and amendments. Computation: Free boards, load line parameters. Ship construction; structural arrangements, framing systems, functions of ship structural components, double bottom, single bottom, shell plating, frames, Decks, Bulkheads, Pillars, Girders, Hatch Coamings, machinery Casings, superstructure Deck houses, foundation laws and stern structure , Bossing and struts, Bilge Keels and fenders, Hull assembly on shipway, shipway types and launching methods, shipway arrangements, surface preparation and painting corrosion prevention, superstructure outfitting arrangements, inspection, tests, and trial , classification society requirements, and certification.

MAE 544: Refrigeration and Air-Conditioning (3 Units)

Refrigeration cycles and media. Systems, Compressors, evaporators, condensers, receivers, expansion valves. Brine system. Cold stores, refrigerated cargo holds, freezers. Design methods. Thermal insulation. Instrumentation. Heating systems. Humidification. Ventilation of crew accommodation, cargo holds, engine and boiler rooms. Distribution and circulation of air, Air-conditioning systems. Types: Analysis using psychometric chart. Air Distribution layouts. Air-conditioning design. Maintenance procedure.

MAE 550: Ship Automation (3 Units)

Introduction, definitions. Regulation and automatic control, remote control. Control systems: Open-loop and close-loop. Components; Sensors, measuring instruments, controllers, correctors and actuators. Controller actions. Digital systems. Time delays and system lags. Type of control medium. Mathematical model of control systems. Response of control system to step, Ramp and sine inputs. Automatic control of diesel engine. Speed governors. Alarm and protective systems.

Steam boiler combustion control. Boiler water level control: single, two and three element systems. Data logging. Centralized - control. Bridge control. Control system of tankers.

MAE 570: Marine Operations (3 Units)

Fuel, lubricant and water on ships: Classification, types, physical and chemical properties, characteristics, tests and treatment. Confined space precaution, corrosion: General consideration; stimulating and inhibiting factors; corrosion due to electrolysis; Corrosion and oxidation of metal, pipes, boilers, structural work; season cracking of brass; minimizing methods. Marine pollution; Sources; effect on environment; preventive methods, IMO and Local regulations. Coastal Engineering: Dredging and sand filling mechanism and piping system maintenance; design of breakwaters and jetties.

MAE 572: Project (6 Units)

Students take individual or group projects of different ship power plants according to their interest and future employment. The work on project includes the elements of calculation, computation experimentation, design and manufacturing under the supervision of member(s) of staff.

MEE 511 Mechanical Vibrations (Prerequisite: MEE311) (3 Units)

The phenomenon of vibration. 'Free and forced vibration of single degree of freedom systems, natural frequency, damping, damping ratio and log decrement. Base excitation. Free and forced vibration of two degree of freedom systems, vibration absorber. Numerical method for multi-degree of freedom systems. Lateral vibration of continuous media; energy method, whirling of shafts. Introduction to transient vibration theory, vibration measuring instruments, Transmissibility and vibration isolation.

MEE 523: Thermodynamics IV (Prerequisite: MEE 423) (3 Units)

Thermodynamic relations and exact differentials, Maxwell relations. Combustion; fuels, air fuel ratios, first and second laws applied to combustion. Reciprocating I.C engines; indicator diagrams, performance criteria. One-dimensional steady flow, Isentropic flow in compressors; axial flow turbines and compressors.

MEE 542: Theory of Elasticity and Plasticity (Prerequisite: MEE 341) (3 Units)

Equations o equilibrium of stresses, compatibility of strains. Formulation of the general elastic problems; generation and application of stress functions, circular plate theory, membrane shells, energy and numerical methods. Experimental stress analysis using various techniques. Theory of plasticity; formulation of the elasto-plastic problem, various approximation methods of solution. Electrical Engineering Department.

4.0 ACADEMIC REGULATIONS

Introduction

A number of academic regulations are in place for the conduct and guidance of students in academic matter.

1. Eligibility for registration for courses

A student admitted into the university is eligible to register for specific programme for which he/she was offered admission if he/she possess the necessary required or relevant qualifications.

2. Enrolment for courses

During registration at the beginning of every session, all student shall register in person all courses for which they are eligible by singing the course register for each course.

3. Concurrent enrollment

Student are not permitted to enroll concurrently in programmes of study in the Niger Delta University or in other educational institutions.

4. Class attendance

Attendance at lectures, tutorials, studio, laboratory, workshop and practical sessions, etc. is compulsory and **five (5) marks of the continuous assessment (CA) may be attributed to class attendance.** Every student is required to meet a minimum of 75% class attendance in order to qualify to write examination in a given course. A student who has not meet 75% attendance is disqualified from writing the final examination and will be deemed to have failed examination.

5. Attendance registers

All registered students of the University are expected to attend all scheduled classes, including tutorials, laboratory work, and field trips. Student attendance at scheduled classes/tutorials shall

be taken at every class/tutorials session and counter-signed by the Lecturer in charge. Attendance register for every course will be cross-checked by the Head of Department from time to time.

6. Duration of semester

The duration of a semester shall normally be eighteen (18) weeks, of which three weeks (3) weeks shall be reserved for the conduct of the end of semester examinations.

7. Suspension of studies

A registered student may for good cause (e.g. ill healthy, financial constraints) seek the approval of senate for suspension of studies through his/her faculty/department. **Suspension of studies when granted shall be for one (1) academic session only. An extension of suspension of studies beyond one academic session shall require the further consideration of senate**. A suspension of studies without senate's approval shall be null and void.

8. Resumption of studies

A student who wishes to resume studies after a period of suspension of studies **shall apply not later than two months before the beginning of the session by completing and submitting a resumption of studies form.** The evidence of the senate's approval for suspension of studies should be attached to the complete resumption of studies form obtained at the departmental offices.

9. Continuous assessment

Final assessment of students' work includes continuous assessment and this shall constitute not more than 30% of the total course. Every student must partake in the continuous assessment.

10. Final examination

There shall be a final examination for each registered course at the end of every semester. The final Examination shall constitute 70% of the total score in the course. Failure to write the final examination without senate approval shall attract an "F" grade

11. Absence from Examination(s)

A student, who absents himself/herself from schedule examination(s), will be deemed to have failed the examination(s).

A student may however be absent from examination(s) with permission from the senate. Such permission can only be granted by the senate following a formal application by the student to the senate through his/her Dean of faculty and Head of Department.

If a student is absent from examination(s) on permission, he/she will be allowed to write the examination(s) at the next available opportunity. The units of the course(s) shall not be used to compute the student CGPA in the semester in question.

12. Requests for Reassessment

A student may request for a reassessment of the quality of his/her work in a course examination during the semester not later than two weeks after publication of provisional Results by faculties. When a student makes such a request, he/she shall pay a reassessment fee of two thousand (N2,000.00) naira which is subject to review from time to time. The application for reassessment shall begin only after presentation of evidence of payment. The report of the reassessment should be forwarded to Senate through the Faculty Board for consideration.

13. Student Academic Workload

All full-time student shall take a minimum of 15 credit units and a maximum 24 credit units per semester.

A Student may apply to the faculty Board through the Head of Department to take less or more than the prescribed limits (provided it is not less than 9 units and not more than 30 units). In cases where the total units to be taken is less than 9 units or more than 30 units, the approval of Senate must be obtained.

N/B where the requested unit is above 30 units the added unit must not translate into more than one (1) course.

14. Academic counseling

Students will be assigned Academic advisor in their departments who shall counsel them on academic matters and other university requirements and regulations. It is the responsibility of the student to take full advantage of this service.

15. Definition of a Credit Unit

A course credit unit is defined as one hour of lecture and one to two hours of tutorial/discussion, or two to three hours or practical (workshop, laboratory, or field work) per week per semester.

16. Grading system

Students' academic work shall be assessed at the end of ever semester using the following numerical scores and letter grades. The final classification of degrees shall also be in accordance with the students' final CGPA.

I

MARK%	LETTER GRADE	POINTS
70-100	A	5
60-69	B	4
50-59	D	3
45-49	C	2
40-44	E	1
0-39	F	0

II. For students admitted into the university from the 2013/2018 academic session, the following grading system shall apply:

MARK%	LETTER GRADE	POINTS
70-100	A	5
60-69	B	4
50-59	C	3
45-49	D	2
40-44	F	0

III. Incomplete Grade (I)

A student may earn an incomplete Grade in a course if all the requirement of the course has not been met. If the incomplete grade is not remedied at the next examination for the course, the student shall be assigned an "F" grade.

IV. Point for Letter Grades

For the purpose of computing the academic standing of students at the end of every semester, the letter grades by students shall have the following points: A=5; B=4; D=2; E=1 and F=0.

For students admitted into the university from the 2013/2014 academic session, the Points for Letter Grades are: A=5; B=4; C=3; D=2 and F=0.

V. Grade point (GP)

A Grade point for each course is the product of the point associated with a letter grade and the course unit. E.g. a student who has a B grade in a 3-unit course has a grade point of 4 x 3= 12 because the letter grade for b is 4 and being a 3 unit course the product is 12 i.e., (4 x 3)

Units of courses in which a grade of 'I' is earned are excluded from-point computation for the semester in which the 'I' or if 'I' changes into an 'F" grade, the units are included in the subsequent cumulated grade point averages.

VI. Total Grade Point

The total grade point is the sum of all the grade points in all the courses in given semester.

VII. Grade Point Average (GPA)

The Grade point average is calculated by dividing the sum of the grade points for every course in the semester by the total units attempted in a given semester.

$$GPA = \frac{\text{Total Grade Points in a semester}}{\text{Total units attempted in the semester}}$$

$$= \frac{\Sigma \text{ Grade point in a semester}}{\Sigma \text{ Units attempted in the semester}}$$

VIII. Cumulative Grade Point Average (CGPA)

The Cumulative Grade Point Average (CGPA) is the sum of the total grade points earned in all the semesters divided by the sum of the total number of units attempted in all the semesters.

$$CGPA = \frac{\Sigma \text{ Grade point in a semester in all semesters}}{\Sigma \text{ units attempted in the semester in all semesters}}$$

IX. Repeat Course Grade

When a student re-registers for and actually repeats a failed course and takes the examination in the course, he/she should be credited with the actual grade scored in the repeated examination. The new grade earned in a repeat course does not replace the 'F' grade in the student's record.

17. Clear Standing

A student is said to be on a clear academic standing, if he/she has at least a D grade (for students admitted into the University from the 2013/2014 academic session) in all courses attempted in the University.

18. Academic Probation

A student shall be placed on academic probation if he/she fails to maintain a minimum CGPA of 1.50 at the end of the session in his/her 100 level of student or at the end of the session in his/her 100 level of student or at the end of the 1st semester in subsequent levels. The probationary status of a student shall be reversed if the student maintains a CGPA of at least 1.50 (for students admitted into the University from the 2013/2014 academic session) in any subsequent semester after the first year. The responsibility to reverse the probationary status rests with the student.

A preliminary notice of poor academic standing shall be given to a student on academic probation in writing by the University.

19. Withdrawal for Academic Failure (WAF)

A student shall be required to withdraw from the University for Academic Failure if he/she at the end of any session fails to maintain a CGPA of at least 1.50 (for students admitted into the University from the 2013/2014 academic session). However, this rule shall not apply to 100 level students.

A student in his/her final year of study who also fails to make a minimum CGPA of 1.50 (for students admitted into the University from the 2013/2014 academic session) may be allowed to continue studentship and register for courses in the following year on concessional grounds only. Such student who fails to make a minimum CGPA of 1.50 (for students admitted into the University from the 2013/2014 academic session) in the concessional year shall be asked to withdraw from the University.

A student who also fails to obtain a pass grade in a minimum of 40% of courses registered in the session shall also qualify for withdrawal from the University for Academic Failure. This rule applies to students at all levels including 100 level students.

However, a student in his/her final year of study who fails to obtain a pass grade in a minimum of 40% of courses registered in a session shall be allowed to continue studentship and register for courses in the following session on concessional grounds only. A student who fails to obtain a pass

grade in a minimum of 40% of course registered in the concessional year shall be asked to withdraw from the University for Academic Failure.

20. Inter-Faculty Transfer

Students currently registered in any programme of study in the University and have a minimum CGPA of 2.00 may apply for transfer to another Department or Faculty.

A student seeking to transfer shall complete the Inter-Faculty Transfer Form and submit same to the Head of the Department from which the student is seeking transfer.

Any student who desires to change his/her programme of study may be permitted to do so under the following conditions:

i. A vacancy exists in the course of study in to which he/she seeks a change;
ii. He/she satisfies all entry requirements for admission into the desired course of study at the time the change is sought;
iii. Such change of course of study shall be subject to approval of Senate after due consideration by faculties and departments concerned.

21. Transfers from other Institutions

Student currently registered in any full-time programme in other Universities may transfer their programme of study to a related programme in the Niger Delta University at the beginning of a new academic session, provided that they have a minimum of CGPA of 3.00.

Duly completed application forms along with the applicants' transcripts shall be submitted to the Registrar at least two (2) months before the commencement of the session. There shall also be an attestation that the applicant was not dismissed for misconduct from other Universities. Inter-University Admissions shall be considered by the Committee of Provost and Deans (CPD) based on the recommendations of the appropriate Faculty Boards and students from other institutions would not be placed beyond the 200 level in the Niger Delta University.

22. Transfer of Credit Units from other Institutions

Students transferring from other recognized universities may be credited with units for courses successfully completed and which satisfy the course requirements of the programme for which the student is registered for at the Niger Delta University. The units and grades awarded shall be applied appropriately in the relevant desired degree.

23. Publication of results

The faculty boards shall publish the results of all examinations after approval by senate. However, faculty board may publish the provisional results of student after faculty board's consideration. Senate approved students result may be made available to parents/guardians at the end of every academic session.

24. Duration programmnes

A student of four-year degree programme shall normally be expected to complete the programme in eight (8) semester, but may be allowed to continue for a total of twelve (12) semester and shall qualify for a classified degree provided he/she maintains a CGPA of 1.50 (for student admitted into the university from the 2013/2014 academic session) and above. **However, a student who is unable to complete the programme in twelve (12) semesters may be allowed to continue for an additional two (2) semester but shall be eligible for a pass degree only** in respective of student's CGPA. Note all students admitted into the university from the 2013/2014 session to pursue four-year degree programmes are required to complete their programmes in a maximum twelve (12) semesters. Student who cannot complete their programme of study within the maximum allowed period would be w2ithdrawn from the University for Academic Failure.

A student in a five-year degree programme shall normally be expected to complete the programme in ten (10) semesters, but may be allowed to continue for a total of fourteen (14) semesters and still qualify for a classified degree provided he/she maintains a CGPA of 1.50 (for student admitted into the University from the 2013/2014 academic session) and above. **However, a student who is unable to complete the programme in fourteen (14) semesters may be allowed to continue for an additional two (2) semesters but shall be eligible for a pass degree only** irrespective of student's CGPA.

Note: All students admitted into the University from the 2013/2014 session to pursue five-year degree programmes are required to complete their programmes in a maximum of fourteen semesters.

Students who cannot complete their programme of study within the maximum allowed period would be withdrawn from the University for Academic Failure.

25. Status of Courses

All courses in the various degree programmes of the Niger Delta University are classified as follow:

i) Compulsory Courses
ii) Required Courses
iii) Elective Courses

i. Compulsory Courses:

These are courses that must be registered for in a given programme of study and for which the student must earn a pass grade to meet graduation requirements.

ii. Required Courses:

These are prescribing and specific courses that students in specific disciplines must register for and may not have to earn a pass grade but must earn a minimum score of 30% to meet graduation requirements.

iii. Elective courses

Elective courses are usually optional in nature. These are courses that broaden the students' understanding in particular aspects of specific disciplines. These courses also enable students to make up graduation requirements in term of credit unit and pass grade must be earned in them.

26. Graduation Requirements for Bachelor's Degree

In order to qualify for Bachelor's degree of the Niger Delta University, student must:

i. Earn a pass grade in supervised industrial work experience (SIWES) where applicable;
ii. Earn a minimum CGPA of 1.50 (for student admitted into the university from 2013/2014)
iii. Earn a minimum of 150 units including SIWES for a five year programme or 120 units for a four year programme.

iv. A transfer student must earn a minimum of 60 units for a four year programme in Niger Delta University

v. A passing grade is required in all compulsory courses of a progarmme

vi. A minimum score of 30% must be obtained in required courses, and

vii. A student may take some elective courses to meet graduation requirements in which pass grades must be obtained.

27. Final Classification of Degrees

For the purpose of final classification of degrees, a student should have achieved one of the following CGPAs:

CGPA		**CLASS OF DEGREE**
4.50-5.00	-	First Class
3.50-4.49	-	Second Class (upper division)
2.40-3.49	-	Second class (lower division)
1.50-2.39	-	Third class
1.00-1.49	-	Pass

For students admitted into the University from the 2013/2014 academic session the CGPAs are as follows:

CGPA		**CLASS OF DEGREE**
4.50-5.00	-	First Class
3.50-4.49	-	Second Class (upper division)
2.40-3.49	-	Second class (lower division)
1.50-2.39	-	Third class

5.0 LIST OF ACADEMIC STAFF

S/N	Name	COREN No	Rank	Date of First Appointment	Detailed of Qualifications			Specialization	Years of Teaching Experience	Dedicated/Shared	Credit Hours taught in the Current & last Semester	
					Degree	Year	Institution				1st	2nd
1.	OgbonanyaA. Ezenwa	R9535	Professor	14/2/2012	PhD	2004	RSU, Port Harcourt	Ship Power Plant	11	Dedicated	10	5
					MEng	1998	RSU, Port Harcourt					
					B.Eng	1982	University Of Ife					
2.	Alexander N. Okpala	R7735	Professor	20/8/2008	PhD	2003	RSU, Port Harcourt	Metallurgical and Maine Corrosion Engineering	15	Dedicated	5	Nil
					MEng	1997	FUTA					
					B.Eng	1991	FUTA					
3.	Stephen C. Duru	R24568	Associate Professor	16/11/2009	PhD	1989	Technical Uni. of Gdnask	Naval Architecture	13	Dedicated	3	4
					M.Tech	1984	RSU, Port Harcourt					
					HND	1981	RSU, Port Harcourt					
4.	Tolumoye J. Ajoko	R26809	Senior Lecturer	18/5/2010	PhD	2021	NDU	Ship Power Plant	13	Dedicated	14	7
					MSc	2009	Cranfield					
					B.Eng	2007	NDU					
5.	Yemi Philip Olisa	R20281	Senior Lecturer	21/11/06	PhD	2017	UNIBEN	Ship Power Plant	17	Dedicated	6	6
					MEng	2002	UNILAG					
					B.Eng	1998	FUTY					
6.	Bebeteidoh Oyinkepreye Lucky	R13438	Senior Lecturer	21/08/2008	PhD	2022	Newcastle University	Ship Power Plant	10	Dedicated	7	2
					M.Eng	2013	Coventry University					
					B.Tech	1998	RSUST					
7.	Robert Poku	R24844	Lecturer I	2/11/2005	PhD	2023	University of Birmingham	Ship Power Plant	18	Dedicated	3	3
					MEng	2011	WMU					
					B.Tech	2003	RSU, Port Harcourt					
8.	Ebizimor A. Kiridi	R15475	Senior Lecturer	26/3/2009	PhD	2013	UNI Ilorin	Marine Pollution Engineering	14	Dedicated	3	3
					MEng	2006	UNI Ilorin					
					B.Eng	1998	RSU, Port Harcourt					

9.	Igwe Icho S.	R	Lecturer I	30/04/2013	PhD	In View	NDU	Ship Power Plant	10	Dedicated	7	3
					M.Sc	2011	WMU					
					B.Tech	1995	RSU, Port Harcourt					
10.	Charles Agbeju N. Johnson	R24669	Lecturer I	01/12/2006	PhD	In View	Universiti Teknologi Malasia	Ship Power Plant	17	Dedicated	7	4
					M.Tech	1984	RSU, Port Harcourt					
					HND	1982	RSU, Port Harcourt					
11.	Amula Emomotimi	R12634	Lecturer I	05/12/1996	PhD	2021	NDU	Material/Marine Corrosion Engineering	27	Dedicated	6	Nil
					MEng	2005	RSU, Port Harcourt					
					B.Tech	1993	RSU, Port Harcourt					
12.	Amos E. Angela	R22799	Lecturer I	18/5/2010	PhD	2021	NDU	Ship Power Plant	13	Dedicated	6	3
					MEng	2007	RSU, Port Harcourt					
					B.Tech	1995	RSU, Port Harcourt					
13.	Yabefa Branly Eric	R41494	Lecturer I	1/08/2017	PhD	2023	Univ. of Ibadan	Marine Structural Engineering	6	Dedicated	4	2
					MTech	2015	Univ. of Ibadan					
					B.Tech	2011	RSU, Port Harcourt					
14.	Sibete Godfrey Ayeabu	R38427	Senior Lecturer	2/10/2019	PhD	2019	UNIBEN	Maritime/Industrial Engineering Production	4	Dedicated	3	6
					MEng	2013	UNIBEN					
					B.Eng	2004	Ambrose Alli Uni					
15.	Reward Kokah Douglas	R23532	Senior Lecturer	2/10/2019	PhD	2018	Cranfield Uni	Marine Pollution/Environmental Engineering	4	Dedicated	6	3

6.0 LIST OF LABORATORY STAFF

S/N	Name	COREN No	Rank	Details of Qualifications			Specialization	Date of First Appointment	Laboratory Works Conducted (Contact Hours)	
				Degree	Year	Institution			Current Semester	Last Semester
1.	Uwokiri A. Combler		Chief Tgt.	PGD HND	2002 1997	Uniport Uniport	Solid Mechanics	August, 2008	6	8
2.	Odogu M.T. Baden		Chief Tgt.	HTD	2004	Polytechnic Ibadan	Marine Corrosion	October, 2008	8	4
3.	Tekinkio Meni		Chief Tgt.	HND	2003	Bori	Marine Electrical/ Electronics Instrumentation	August, 2008	6	8
4.	Enaizigha Waidi		Assit. Chief Tgt	HND	2005	IAR&T	Diesel Technologist	2011		
5.	Akene Woyengidini pre		Principal Tgt.	HND ND	2002 1996	PTI Bori	Power Plant	June, 2004	6	6
6.	Kilakeme A. Tari	R55880	Senior Tgt.	M.Eng B.Eng	2021 2011	NDU NDU	Power Plant	July, 2004	8	8
7.	Patrick Augustina		Senior Tgt.	HND	2008	FPI	Corrosion	January, 2011	4	6
8.	Miebine S. Mabinton		Tgt. I	B.Eng	2010	NDU	Thermodynamics	2004	4	4
9	Benson J. Boyelayefa		Tgt. I	B.Eng	2014	NDU	Power Plant	3rd April, 2023		
10.	Timbiri ThankGod	R1870C	Snr. Techical Officer	NABTEB	2014		Craftman	30th August, 1981	4	4
11.	Peter G. Omavie		Auto Technician	Trade Test	2014		Automobile Technician	2014	4	4

7.0 LIST OF ADMINISTRATIVE STAFF

S/N	**Name of Staff**	**Present Rank/Designation and date of first appointment**	**Employment Status**	**Qualification /Dates obtained**	**Specialization**	**Duty Performed**	**Date of Promotion and Rank**
1.	Naingba, Timothy	Senior Assistant Register 14/06/2004	Tenure	BSc (NDU) (2009)	Admin Staff	Administrative Activities	1/10/2021 (Senior Assistant Register)
2.	Teiwei, S. Peremobowei	Assistant Register 14/06/2004	Tenure	BSc	Admin Staff	Administrative Activities	1/10/2021 (Assistant Register)
3.	Maxwell E. A. Ebikabowei	Administrative Assistant/ 5/07/2004	Tenure	NECO (2006)	Admin Staff	Administrative Activities	1/10/2013 (Asst. Executive Off),