NIGER DELTA UNIVERSITY
WILBERFORCE ISLAND
BAYELSA STATE

INSTITUTE OF MARITIME STUDIES

POST GRADUATE DIPLOMA PROGRAMMES
IN

I. MARINE ENGINEERING

II. MARINE SCIENCE

III. MARITIME STUDIES

IV. PORT AND HARBOUR TECHNOLOGY

V. NAVAL ARCHITECTURE

VI. RADIO AND TELECOMMUNICATION ENGINEERING

VII. TRANSPORT, OIL AND GAS

SEPTEMBER, 2013

CONTENTS

FOREWORD

This booklet contains information on the academic programmes of the Post Graduate Diploma (PGD) in Marine Engineering, Marine Science, Maritime Studies, Port and Harbour Technology, Naval Architecture, Radio and Telecommunication Engineering & Transport, Oil and Gas offered in the Institute of Maritime Studies. These programmes are also appropriately tailored to provide the academic need of graduates of other programmes who wish to undertake the Bachelor of Technology degree studies in Marine Engineering, , Marine Science, Maritime Studies, Port and Harbour Technology, Naval Architecture, Radio and Telecommunication Engineering & Transport, Oil and Gas at PGD Level.

Specific information contained in the handbook include: admission requirements, academic regulations, career opportunities, course outline/contents, teaching staff list, laboratory equipment / facilities. Other important information in the department is also included.

The handbook is intended to be a useful guide to the PGD programmes. It is therefore recommended that students undertake the programmes and also those intending to do so, go through it to be properly guided. The advantages of a programme like this to the nation, Niger Delta University and the graduates from the Department of Marine Engineering of Niger Delta University cannot however be over-emphasised.

STAFF LIST

ACADEMIC STAFF

S/NO.	NAME OF STAFF	RANK/ DESIGNATION, DATE OF FIRST APPOINTMENT	QUALIFICATION, DATES OBTAINED AND SPECIALIZATION, MEMBERSHIP OF PROFESSIONAL ASSOCIATION

NON – ACADEMIC STAFF

LABORATORY STAFF

S/NO.	NAME OF STAFF	QUALIFICATION, DATES OBTAINED AND SPEC' ION,

ADMINISTRATIVE STAFF

S/NO.	NAME OF STAFF	RANK/ DESIGNATION, DATE OF FIRST APPOINTMENT	QUALIFICATION, DATE OBTAINED AND SPECIALISATION,

A. POST GRADUATE DIPLOMA PROGRAMMES

1.0 PROGRAMME PHILOSOPHY

I. The PGD programme enables candidates to remedy certain deficiency courses in their subjects of first degree in preparation for higher degree in those subject areas. It is designed for holders of Bachelor's degree (with third class or lower passes). Holders of Higher National Diploma (HND) and its equivalent obtain further training in Marine Engineering, Marine Science, Maritime Studies, Port and Harbour Technology, Naval Architecture, Radio and Telecommunication Engineering & Transport, Oil and Gas to enhance their opportunity for registration with professional bodies and sometimes further studies. Successful completion of the programme will also enable them become eligible to register for Master's degree programmes in Marine Engineering,Marine Science, Maritime Studies, Port and Harbour Technology, Naval Architecture, Radio and Telecommunication Engineering & Transport, Oil and Gas etc.

2.0 PROGRAMME OBJECTIVES

On completion of any of the programmes, the PGD graduate will be able to:

- Actively participate in the analysis and design of any infrastructural facility.
- Plan, organize, control and coordinate the execution of Projects.
- Actively participate in construction of projects.
- Lead in studies for the purpose of producing technical and feasibility reports.
- Undertake further postgraduate (PG) studies.
- Deepen the PGD holder's grasp in a chosen field of knowledge.
- Introduce the student to technique and tools of research.

3.0 CAREER OPPORTUNITIES

The PGD graduate has a wide range of employment opportunities in establishments such as the following:

(i) Ship and boatyards where new vessels are built or repaired.

(ii) Dockyards, ports and harbour.

(iii) Shipping companies

(iv) Fishing companies

(v) Marine Engineering and Naval Architecture consultancy.

(vi) Higher institutions, Maritime Academy, Research Institutes such as oceanography or Marine Pollution studies.

(vii) Oil and gas or oil and gas servicing companies.

(viii) Government Ministries or Corporation.

(ix) The Nigerian Navy

(x) Etc.

4.0 DURATION OF PROGRAMME

The programme shall run for three semesters (one academic years) without industrial training for candidates who posses Higher National Diploma and

Bachelor Degree (pass or third class) in Marine Engineering, Marine Science, Maritime Studies, Port and Harbour Technology, Naval Architecture, Radio and Telecommunication Engineering & Transport, Oil and Gas, etc. Therefore, applicants shall be persons suitably qualified and engaged in the practice of Science, Engineering and Technology. Each semester shall consist of fifteen (15) weeks of lectures and tutorials, one week for registration and two weeks of examinations.

5.0 ADMISSION REQUIREMENTS

A. NDU REQUIREMENTS

Candidates shall satisfy the Joint Matriculation Examination (JME) requirements for admission into the HND programme in Marine Engineering,Marine Science, Maritime Studies, Port and Harbour Technology, Naval Architecture, Radio and Telecommunication Engineering & Transport, Oil and Gas Candidates shall specifically possess the following qualifications:

(i) School certificate/GCE/SSCE/NECO 'O' level with credit or better passes in five appropriate subjects including English Language and Mathematics obtained in not more than two sittings.

(ii) HSC/GCE 'A' level passes in at least two (2) relevant subjects plus school certificate/GCE/SSCE/NECO 'O' level credit or better passes in three (3) other subjects including English Language obtained at not more than two (2) sittings.

(iii) HSC/GCE 'A' level passes in three (3) relevant subjects plus school certificate /GCE/SSCE/NECO 'O' level credit or better passes in two (2) other subjects including English Language obtained at not more than two (2) sittings.

B. DEPARTMENTAL/INSTITUTE REQUIREMENTS

Admission into PGD Programmes

applications are invited from interested candidates who are already stakeholders in the maritime sector by virtue of their disciplines. The Maritime Studies programme is also designed as a bridging course for those whose disciplines are not maritime related, but are desiring a platform to gain knowledge in the maritime field for employment or do business in this sector.

Applicants eligible for admission into the PGD programme shall possess the following entry requirements:

- B.Sc/B.Eng/B.Tech etc. with at least 3rd Class Honours in the relevant disciplines
- Higher National Diploma (HND) with at least Lower Credit in the relevant disciplines
- Any other professional qualifications approved from any recognized institution for the discipline of choice.
- Five (5) credits in the relevant subjects including English Language and Mathematics at WASSCE/ NECO/ NABTEB at not more than two (2) sittings.

6.0 GENERAL INFORMATION AND VITAL ACADEMIC REGULATIONS

6.1 Registration

The PGD is a **Full-time Programme**. A full-time student shall be a person who has been registered as such in order to follow a prescribed programme of study. The minimum course load for a full-time student shall be that prescribed by the PG school. The course work must be completed in approved duration of the programme. The registration of a candidate shall lapse if after the maximum duration of the programme, the student has not presented himself/herself for examination.

Returning Students shall complete the process of registration within two weeks of commencement of the new session. Any late registration attracts a penalty of prescribed fee by the PG school. Any student who fails to register at the end of the fourth week shall be deemed to have withdrawn form the programme

(i) Students must pay the NDU/INSTITUTE authorized fees and register at the beginning of every session. Where a student fails to register in any semester, he/she is deemed to have withdrawn voluntarily from the programme.

(ii) A lapsed Registration may be reactivated if a good reason acceptable to the Board of PG School and Senate.

(iii) A candidate who is unable to take up an offer of admission may apply through his Head of Department to the PG school and Senate for deferment of his admission.

Applications for deferment are normally considered on their merit. Where a candidate's application for deferment is granted he will be duly informed in writing.

6.2 Re-Registration

Students may withdraw from the NDU/INSTITUTE with the permission of the PG School Board and Senate through an application to the School PG Committee, but may apply for re-registration within one year of withdrawal. A student who wishes to re-register shall apply two months before the beginning of the semester.

6.3 Definition of a Course Unit

The NDU/INSTITUTE operates a course unit system in which one course unit is defined as one hour lecture or two to three hour tutorial/ practical/ workshop per week per semester. All PGD students are required to register for a minimum of 15 credit units and a maximum of 25 credit units.

6.4 Grading System:

Each course shall be assessed on the basis of written or practical tests conducted at the end of each semester on Five Grade Points System. The five point grade awarded to the student shall be as follows:

Letter Grade	Marks	Grade Point
A	70 – 100	5.00
B	60 – 69	4.00
C	50 – 59	3.00
D	45 – 49	2.00
E	40 – 44	1.00
F	Below 39	0.00

Grade Point Average (GPA) shall be computed, correct to two decimal places, as the sum of the product of the grade point and the course unit assigned to each course divided by the total number of all course units in a semester.

6.5 Clear Standing

A candidate shall be deemed to be on clear standing if he passes all courses with a grade of C, or better and also maintains a GPA of at least 2.50 in the first semester examination and a Cumulative Grade Point Average (CGPA) of at least 3.00 in all subsequent semester examinations based on the 5 point scale.

6.6 Supplementary Examinations

A candidate who fails at most two courses but has a CGPA of at least 3.00 at the end of a semester is permitted to take supplementary examination(s) in the failed course(s) at the next available opportunity. Such a candidate shall be awarded a grade of C if he/she passes the examination with a grade of C or better. This grade will then be substituted for the grade obtained in the main examination and the CGPA. re-calculated.

6.7 Repetition of a Course: A candidate shall not be permitted to repeat a course.

6.8 Withdrawal from the Programme: A candidate who fails to be on clear standing at the end of the main or supplementary examination will be asked to withdraw from the programme. A candidate may also withdraw voluntarily from the programme for reasons other than academic failure only after having obtained permission from the School PG committee, PG School Board and Senate.

6.9 Re-Admission: A candidate who withdraws from the PG programme voluntarily for reasons other than academic failure may be re-admitted to continue with the programme after a lapse of one year. A candidate who has been asked to withdraw due to academic failure may only re-apply for admission after a lapse of two academic years.

6.10 Financial Obligation

i. The candidates admitted by the NDU/INSTITUTE for the programme will be required to pay ₦30,000.00 per semester in addition to other registration fees.

ii. Being on consultancy basis the adjunct lecturers will be paid either (a) 40% of monthly salary per semester per course or subject to negotiation with the individual lecturer (b) ₦100,000.00 per course/semester.

iii. The NDU/INSTITUTE lecturers are recommended to be paid accordingly to management decision.

6.11 Calendar of the Course

The PGD programmes are recommended to commence in September – December i.e. 15weeks for 1st Semester and January– April for 2nd Semester, 9am to 12pm – 2pm – 5pm with a lunch break. The lecturers will cover the theoretical and practical aspects applied to the ship, shipyard etc problems.

6.12 Method of Application

Request for application forms in PGD programmes of this NDU/INSTITUTE are normally made available before August or as the Academic Board may decide from time to time and should be addressed to:

The Registrar,
NDU,
Wliberforce Island

6.13 Guideline for Filling Application Form

This will be in line with guidelines provided by Academic Registry from time to time.

7.0 PROGRAMME STRUCTURE

7.1 Course Numbering

School Courses: The School course numbers start with SEC followed by three digits which have the following connotation:

(i) The first digit indicates course level, i.e.

6 – First year in PG programme.

The second digit indicates a Diploma Programme

(ii) The third digit indicates the number of course offered by the particular Department.

7.2 DEPARTMENTAL COURSES

The Departmental course numbers start with MAR, indicating MARitime Engineering, MSC, indicating Marine Science, MHT, indicating Maritime and Harbour Technology & TOG, indicating Transport, Oil and Gas followed by three digits, which have the following connotation:

The first digit indicates course level

The second digit indicates PGD while the third digit indicates the number of the courses.

7.3 COURSES OFFERED IN MARINE ENGINEERING (SHIP POWER PLANTS)

Year I Semester 1

S/N	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	FCE 601	Engineer in Society	3	0	0	2
2	FCE 603	Engineering Analysis and Applications I	2	2	0	3
3	FCE 605	Elements of Computer Programming I	2	2	0	3
4	MAE 631	Naval Architecture I	2	0	0	2
5	MEE 601	Thermodynamics I	2	2	0	3
6	MAE 613	Ship Power Plant I	3	0	0	3
7	MAE 611	Marine Diesel Engine I	2	2	0	3
8	MAE 693	Ship Propulsion	3	2	0	3
9	MAE 681	Research Methodology	2	0	0	1
		TOTAL	**20**	**12**	**0**	**23**

Year I Semester 2

S/N	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	MEE 672	Industrial Management & Accounting	3	0	0	2
2	FCE 604	Engineering Analysis and Applications II	2	2	0	3
3	FCE 606	Elements of Computer Programming II	2	2	0	3
4	MAE 631	Ship Design construction	2	0	0	2
5	MEE 602	Thermodynamics II	3	2	0	3
6	MAE 614	Ship Power Plant II	3	0	0	3
7	MAE 612	Marine Diesel Engine II	2	2	0	3
8	MAE 671	Heat Transfer	2	2	0	3
9	MAE 698	Marine Operations	2	0	0	2
		TOTAL	**21**	**12**	**0**	**21**

Year II Semester 3

C	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	MAE 617	Marine Steam & Gas Turbines	2	2	0	3
2	MAE 641	Marine Auxiliary Machinery	2	2	0	3
3	MLP 601	Maritime Law & Practice	2	2	0	2
4	MAE 610	Marine Environmental Pollution	3	2	0	2
5	MEE 604	Control Systems Engineering	2	0	0	3
6	FCE 605	Dynamics of Mechanical Systems	3	0	0	3
7	MAE 600	PROJECT	0	0	0	6
		TOTAL	**18**	**8**	**0**	**22**

COURSES OFFERED IN NAVAL ARCHITECTURE AND SHIPBUILDING

Year I Semester 1

S/N	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	FCE 601	Engineer in Society	3	0	0	2
2	FCE 603	Engineering Analysis and Applications I	2	2	0	3
3	FCE 605	Elements of Computer Programming I	2	2	0	3
4	MAE 631	Naval Architecture I	2	0	0	2
5	MEE 601	Thermodynamics I	2	2	0	3
6	MAE 613	Ship Power Plant I	3	0	0	3
7	MAE 693	Ship Propulsion	3	2	0	3
8	MAE 681	Research Methodology	2	0	0	1
		TOTAL	**20**	**12**	**0**	**23**

Year I Semester 2

S/N	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	FCE 604	Engineering Analysis and Applications II	3	0	0	3
2	FCE 602	Naval Architecture II	2	2	0	3
3	FCE 606	Elements of Computer Programming II	2	2	0	3
4	MLP 601	Ship Structure	2	0	0	2
5	MEE 601	Ship Strength	2	2	0	3
6	MEE 602	Industrial Management & Accounting	3	0	0	3
7	MAE 601	Ship Design	2	2	0	3
8	MAE 602	Theory of Elasticity and Plasticity	2	2	0	3
9	MAE 671	Marine Operations	2	0	0	2
		TOTAL	**18**	**10**	**0**	**22**

Year II Semester 3

S/N	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	MAE 617	Ship Construction	2	2	0	3
2	MAE 641	Shipyard Technology	2	2	0	3
3	MLP 601	Maritime Law & Practice	2	2	0	2
4	MAE 610	Marine Environmental Pollution	3	2	0	2
5	FCE 605	Marine Auxiliary Machinery	3	0	0	3
6	MAE 600	PROJECT	0	0	0	6
		TOTAL	**18**	**8**	**0**	**22**

COURSES OFFERED IN RADIO AND TELECOMMUNICATION ENGINEERING

Year I Semester 1

S/N	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	FCE 601	Engineer in Society	3	0	0	2
2	FCE 603	Engineering Analysis and Applications I	2	2	0	3
3	FCE 605	Elements of Computer Programming I	2	2	0	3
4	MAE 661	Ship Knowledge	2	0	0	3
5	IME 621	Circuit Analysis & Electromagnetism	2	2	0	3
6	IME 661	Signals & Systems	2	0	0	3
7	IME 681	Marine Data Networks	2	2	0	3
8	MAE 681	Research Methodology	2	0	0	1
		TOTAL	**17**	**12**	**0**	**22**

Year I Semester 2

S/N	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	FCE 604	Engineering Analysis and Applications II	3	0	0	3
2	IME 682	Marine Electrical Design & Installation	2	2	0	3
3	FCE 606	Elements of Computer Programming II	2	2	0	3
4	IME662	Global Maritime Distress and Safety System	2	0	0	2
5	IME 684	Marine Instrumentation	2	2	0	3
6	MEE 602	Industrial Management & Accounting	3	0	0	3
7	IME 642	Marine Electrical Propulsion	2	2	0	3
8	IME 644	Marine power Systems	2	2	0	3
9	IME 686	Programmable Controller and SCADA System	2	0	0	2
		TOTAL	**18**	**10**	**0**	**22**

Year II Semester 3

C	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	IME 688	Marine Electrical Diagnostics	3	2	0	3

2	IME 689	Ship Automation	2	2	0	3
3	MLP 601	Maritime Law & Practice	2	2	0	2
4	MAE 610	Marine Environmental Pollution	3	2	0	2
5	IME 691	Radar & Communication System	2	0	0	3
6	IME 671	Marine Navigation & Communication System	2	0	0	3
7	IME 600	PROJECT	0	0	0	6
		TOTAL	**14**	**8**	**0**	**22**

COURSES OFFERED IN MARITIME STUDIES Year I Semester 1

S/N	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	MST 601	Marine Environmental Science	3	0	0	3
2	MST 602	Maritime Law & International Maritime Conventions	3	2	0	3
3	MST 603	Maritime Administration & Management	4	2	0	4
4	MST 631	Maritime Economics	3	0	0	3
5	MST 633	Quantitative Methods	3	2	0	3
6	MST 606	Computer Applications in the Maritime Industry	2	0	0	2
7	MST 600	Seminar	2	2	0	2
8	MST 605	Research Methodology	1	0	0	1
		TOTAL	**21**	**12**	**0**	**21**

Year I Semester 2

S/N	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	MST 611	Technological Innovations in the Shipping Industry	2	0	0	2
2	MST 604	Maritime Technology	4	2	0	4
3	MST 607	Seminar on Contemporary Issuues in the Maritime Industry I	2	2	0	2
4	MST 611	Maritime Safety & Environmental Protection	3	0	0	3
5	MST 621	Law of the Sea and Maritime Security	3	2	0	3
6	MST 632	Ship and Port Management	3	0	0	3
7	MST 634	Maritime Logistics	3	2	0	3
8	MST 610	Project Management	3	2	0	3
9	MST 680	Project (Seminar)	0	0	0	0
		TOTAL	**21**	**10**	**0**	**21**

Year II Semester 3

C	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	MMS 636	Leadership & Human Resource Management	3	2	0	3
2	MST 608	Seminar on Contemporary Issues in the Maritime Industry II	2	2	0	2
3	MLP 622	Law & Policy Related to the Marine Environment	3	2	0	3
4	MMS 641	Transportation	3	2	0	3
5	MMS 635	Marine Risk Management & Insurance	3	0	0	3
6	MST 680	PROJECT	0	0	0	6
		TOTAL	**14**	**8**	**0**	**20**

COURSES OFFERED IN TRANSPORT, OIL AND GAS

Year I Semester 1

S/N	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	MST 606	Computer Application in the Maritime Industry	3	0	0	2
2	FFP 605	Freight Forwarding Practice	3	2	0	3
3	OAG 614	Oil and Gas Downstream	2	2	0	3
4	STT 601	Shipping Technology	2	0	0	3
5	SPO 602	Port Operation and Planning	2	2	0	3
6	RMS 605	Research Methodology	2	2	0	1
		TOTAL	**14**	**8**	**0**	**15**

Year I Semester 2

S/N	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	MSC 622	Maritime Law and Insurance	3	2	0	3
2	MSC 624	Environmental Protection and Safety	2	2	0	3
3	MSC 628	Oil and Gas Upstream	2	2	0	3
4	MSC 630	Ship Broking and Chartering Practice	3	2	0	3
5	MSC 610	Logistics and Transport Technology	2	2	0	3
6	MSC 647	Project (Seminar)	0	0	0	0
		TOTAL	**15**	**10**	**0**	**14**

Year II Semester 3

S/N	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	MSC 643	Student Industrial Attachment (SIWES)	0	0	0	1
2	MSC 647	PROJECT	0	0	0	6
		TOTAL	**0**	**0**	**0**	**6**

COURSES OFFERED IN MARITIME AND HARBOUR TECHNOLOGY

Year I Semester 1

S/N	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	STT 601	Shipping Technology	3	0	0	3
2	MST 602	Maritime Law & International Maritime Conventions	3	2	0	3
3	MST 603	Maritime Administration & Management	4	2	0	4
4	MST 631	Maritime Economics	3	0	0	3
5	MMS 691	Statistics	3	2	0	3
6	MST 606	Computer Applications in the Maritime Industry	2	0	0	2
7	MST 600	Seminar	2	2	0	2
8	MST 605	Research Methodology	1	0	0	1
		TOTAL	**21**	**12**	**0**	**21**

Year I Semester 2

S/N	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	MMS 601	Management	3	0	0	3
2	MGS 610	Geography	3	2	0	3
3	MHT 603	Introduction to Shipping	3	2	0	3
4	MHT 613	Introduction to Traffic Engineering	3	0	0	3
5	MHT 611	Introduction to Maritime Terminal Operation	3	2	0	3
6	MST 608	Seminar on Contemporary Issues in the Maritime Industry II	2	2	0	2
7	MST 606	Maritime Environmental Protection & Port Safety	3	0	0	3
8	MHT 617	Ocean Technology	2		0	2
9	MST 656	Port Logistics	3	0	0	2
		TOTAL	**23**	**12**	**0**	**24**

Year II Semester 3

C	COURSE NO.	COURSE TITLE	LEC	TUT	PRAC	UNITS
1	MMS 636	Leadership & Human Resource Management	3	2	0	3
2	MST 608	Seminar on Contemporary Issues in the Maritime Industry II	2	2	0	2
3	MLP 622	Law & Policy Related to the Marine Environment	3	2	0	3
4	MMS 641	Transportation	3	2	0	3
5	MMS 635	Marine Risk Management & Insurance	3	0	0	3
6	MHT 600	PROJECT	0	0	0	6
		TOTAL	**14**	**8**	**0**	**20**

DESCRIPTION OF COURSES

A. FACULTY OF ENGINEERING COURSES

FCE 601: The Engineer in Society

Technology in Society: Growth and Effects of Technology on the Society: A Historical Development of Modern Society from Early Days through Industrial Revolution to the Present; Impact of Technological Communication etc.; A Review of the Nigerian Situation. Roles and Responsibilities of the Engineer in Society: Community Responsibilities of the Engineer – Social, Moral and Legal Responsibilities giving Evidence before Public Committees, Courts of Law and Arbitration Panels; National Development Plans of Nigeria – Outline of Development and in National Defense. The Professional Bodies and Engineering Societies – Aims and Objectives, Structures Functions. The Role of Engineering Societies in Maintaining Professional Discipline and Standards.

FCE 602: Engineering Mathematics I

Matrices Algebra: Arithmetic Operations of Matrices, Matrix Inversion, System of Linear Equations, Eigen Values and Eigen Vectors, Canonical Transformations and Applications. **Vector Analysis** Vectors Algebra, Vector Differentiation, Gradient,

Divergence and Curl, Vector Integration, Theorems of Vectors Calculus. **Complex Analysis:** Complex Numbers and Algebra, Complex Functions and Integration, Residue Integration, Conformal Mapping, Applications of Complex Analysis.

FCE 603: Elements of Computer Programming I

Introduction to Computer Programming: Computer Programming Languages, Flow Charts, Components of a Computer Program. **Scientific Programming:** Development of programs for Algebraic Problems – Functions Evaluation, Polynomial Equations, Statistical Problems, Sorting Problems.

FCE 604: Elements of Computer Programming II

Development Of Computer Programs: Matrices Multiplication, Calculation of Determinants, Matrices Inversion, Solution of System of Linear Equations, Calculation of Eigen Values and Eigen Vectors, General Numerical Analysis Problems.

FCE 605: Engineering Mathematics II

Linear Algebra: Spaces, Transformations, Orthogonality, Polynomial Matrices, Derivation of Equations, System of Linear Equation with Constant Coefficient, The Convolution Integral, System of Linear Equations with Time Varying Coefficients, The Superposition Integral. **Non-Linear Equations:** Types of Solutions essentially related to Non-Linearities, Limit Cycles, Jumps; **Probability and Statistics:** Basic Theorems for Probability Distributions, Mean and Variance of a Distribution, Distribution of Several Variables, Discrete and Continuous Distributions, Random Sampling, Parameters Estimation, Confidence Intervals, Hypotheses Testing, Standard Deviation, Regression Analysis and Curves Fitting.

FCE 606: Engineering Mathematics III

Ordinary Differential Equations: First and second Order Homogenous Differential Equations, Higher Order Homogenous Differential Equations, Non-Homogenous Differential Equations, System of Differential Equations, Series Solution of Differential Equations. **Partial Differential Equations:** Elliptic, Hyperbolic, Parabolic and Laplace Equations. **Numerical Methods:**Numerical Integration, Interpolation Methods, Numerical Solution of Linear and Non- Linear Systems of Equations, Numerical Solution of Ordinary Differential Equations.

B SERVICE COURSES

MEE 601: Thermodynamics I

Law of Thermodynamics: Review of the Zeroth, First and Second Laws, Their Corollaries and Applications; Third Law of Thermodynamics. **Availability:** Availability and Unavailable Energy of Systems, Free Energy, Effectiveness. **Power Cycles**: Review of the Carnot and Rankine Cycles; Binary, Reheat and Regenerative Cycles; Deviation of Actual Cycles From Ideal; Air Standard Power Cycles.

MEE 602: Industrial Management and Accounting

Management; meaning, principles and practice. **Organization;** principles, span of controls, delegation of authority, structure, formal and informal. Industrial and joint stock company. **Personal management;** objective and functions, recruitment and selection, personal development. **Financial management;** sources of finance, financial accounting and book keeping cost planning and control. **Operational research;** linear programming, queuing theory, network analysis.

MEE 603: Thermodynamics II

Reversed Power Cycles: Vapour Compression, Carnot and Absorption Refrigeration Cycles; Steam Jet Refrigeration. Combustion: Combustion Process, Combustion Efficiency, Dissociation, Flames, Ignition, Quenching. Combustion - Generated Air Pollution: Measurement and Control of Pollutants (NOX, CO, SO2, Hydrocarbon, Particulates); Orsat Analyzer; Gas Chromatograph; Smoker Meters; Catalytic & Converters, Exhaust Gas Recirculation. **Gas Dynamics**: One – Dimensional Flow with Area Change, with Friction and or without Heat Transfer, Isentropic Flow, Critical and Stagnation of Conditions; Sonic Velocity and 3-Mach Number. Shock Waves and Flow through Nozzles and Diffusers. Elements of Jet Propulsion. (Laboratory Experiments of Pollution Measurement, Free and Enclosed Flames, Gas Jets Reciprocating Expanders, Sonic Velocity and Refrigeration).

MEE 604: Control System Engineering

Introduction - Concept of Automatic Controls: a Brief Survey of Mechanical, Pneumatic, and Hydraulic Control Systems; Control Systems Terminology (Close-Loop, Servo Mechanism). **Basic Relationships**: Basic Laws and Relationships for Mechanical, Thermal, and Fluid Pressure Component. Derivation and Solution of System Equations for 1^{st} And 2^{nd} Order Systems; Transfer Function (Block Diagrams, System Equation, System Response to Step, Pulse and Sinusoidal Inputs). D Operators and Laplace Methods of Solution. Systems Dynamics. Frequency Response. Bode, Nyquist, Nicola, Root-Locus Plots And Stability Criteria (Routh-Hurwitz, Liapnunov). Simulation by Analogue Computer. State Space Analysis. **Improving System Performance:** Design Of Systems Using Bode, Nyquist, Root – Locus And Nichola Techniques. System Compensation: Parallel and Series Valves, Pumps, Actuators, Spool Valves, Single and Two Stage, Overlap and Underlap, Baffle And Nozzle Systems). **Transducers:** Electro-Pneumatic, Pneumo-Electric, Pneumo Mechanical, Force Transducers Pressure Transducers, Variable Resistance,

Capacitance and Inductance Types; Non-Linear Control Systems and Numerical Control Systems.

MEE 605: Dynamics of Mechanical Systems

Gyroscopes: Review of Principle of the Gyroscope; Gyroscopic Couple and Acceleration for a Plane Disc. Effects of Gyroscopic Couple on the Whirling of Shafts; Application in Automobiles, Ships, Aero Planes, and Locomotives. **Power Transmission:** Methods of Power Transmission Available. Analysis of Positive, Friction and Electro-Mechanical Drives. Hydrodynamic and Hydrostatic Fluid Drives; Fluid Couplings. **Friction and Lubrication:** Review of Friction in Sliding and Rolling; Analytical Treatment of Boundary and Film Lubrication. One-Dimensional Reynolds's Equation in case of Triting Thrust Bearing and Externally Pressurized Bearings. Lubrication as applied to Slider and Journal Bearings. **Vibrations:** Description of General Nature of Free, Forced and Self-Excited Vibrations. The Lumped One-Degree-Of-Freedom Linear System, Free Motion, Natural Mode; Linear (Viscous) Damping. Forced Vibration of a Uniform Beam by Harmonic Loading; Elements of the Analysis of Multi-Body and Distributed-Mass Linear Systems. Raleigh's Holzer's Method. Application of Tensional Vibration, Flexural Vibration of Beams, Whirling of a Single Disc on Shaft; Dampers and Absorbers.

MLP 601: Maritime Law and Practice

Intoduction to Commercial Maritime Law and Policy: Marine Insurance and General Average; Carriage of Goods by Sea Under Charter Parties and Bill of Lading; International Trade Law/Treaty. Laws on Cargo, Navigation and Ship Stability. Introductory Law of Sea and Maritime Security: Regimes of Maritime Zones – UNCLOS from Perspective of Maritime and Envirnomental Administrations and their particular interests. Broad overview of the current importance of Maritime

Security and a clear understanding of IMO instruments and UNCLOS. GUIDELINES ON FLAG STATE REGISTRATION: Persons qualified to own registered Nigerian Ships; Procedure for registration;Attention: Registrar of Ships;Flag State Registration Requirements: Full Registration,Provisional Registration,Consent to Sale or Mortgage,Registration of Mortgage,Change of Ownership,Search,Change of Vessel Name,Extracts of Register,Insurance of Certified True Copy; Revalidation of Registration;Closure or Delection of Registry;Requirements for Deletion.

C. DEPARTMENTAL COURSES

MAE 601: Marine Diesel Engines I

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 Engines Types: Direct and Geared Drive. Practical: Laboratory Exercises.

MAE 602: Ship Power Plants I

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, Classification. Heat Transfer: Water Tube, Auxiliary, Donkey and Forced Circulation Boilers, Controlled Superheat and Reheat Boilers. Components of a Boiler, Control, Corrosion. Boiler Surveys. Classification Society Rule, Waste Heat Recovery Systems. Main Engine Systems: Sea, Fresh Water and Lub. Oil Systems. General Layout. Heat Balance of Power Plants. General Purpose Systems: Bilge, Ballast, Water, Fire Fighting. Marine Gear Boxes.

MAE 603: Naval Architecture

Function of a Ship; Ship Types; Principal Terms; Layout and Profile of Ships. Hydrostatic Curves; Ship Calculations: Areas, Volumes, Moments, Displacement, TCP, Form; Coefficient and Bonjean Curves; Centre of Gravity. Buoyancy; Stability; Transverse and Dynamical-Inclining Equipment, Calculations; GZ, GM and BM; Curves of Stability; Free Surface Effects. Trim: Change in Trim And Draughts. Statutory Regulations; Classification Societies Requirements; IMO Regulations. Ship Rolling; the Sea and the Ship Motion. Practicals: Drawing and Laboratory.

MAE 604: Marine Diesel Engines II

Engine Performance: Indicator, Types of Indicator Diagrams, Scavenging and Supercharging. 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, Torsional, Multi-Cylinder Crankshaft System; Balancing. Dampers, Crankcase Explosion. Scavenge Fire, Precautions. Practicals: Laboratory.

MAE 605: Ship Power Plants II

Propulsion System; General Configuration of Conventional Propulsion Systems, Direct Drive Diesel Engine System. Diesel Steam Turbine System, Direct Gas Turbine System, Combined Propulsion Systems Such As CODAG, CODOG, COGS Etc., Electric Drives For Modern Ships. Power Plant Efficiency. Enhancement and Analysis: Energy Balance Analysis: Engine 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, 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, Tug/Pushers Tankers and Passenger Ship.

MAE 606: Ship Propulsion

Fundamentals of Ship Propulsion. Ship Resistance. Methods of Ship Resistance Calculations, the Effectss 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. Cavitation. 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 607: Marine Steam and Gas Turbines

Principles of Operation and Classifications, Rankine Cycle, Reheat Cycle, Regenerative Cycle, Reheat/Regenerative Cycle, Cycle Efficiencies. Theory of Steam Expansion in Cascade. Gas Turbines; Principles Of Operation And Classification, Brayton Cycle, Heat Exchange Cycle, Reheat Cycle, Intercooled Cycle, Intercooler/Reheat/Heat Exchange Cycle, Cycle Efficiencies, Combined Steam And Gas Turbines Cycles. Turbo Machinery Theory: Expansion of Fluids in Nozzles.

Expansion Process in Turbine Stator Blades, Work done in Turbine Rotors, Velocity Triangles, Impulse and Reaction Stages, Pressure and Velocity Distribution across Compressor and Turbine, Pressure, Velocity and Pressure-Velocity Compounding. Steam Turbine Construction: Governors, Safety Devices, Glands, Coupling, Astern Turbines, Blades, Rotors, Blade Fixing, Seals, Casings, Condensers. Gas Turbine Construction: Rotors, Compressors Blades, Intakes, Combustors, Turbines, Exhausts.

MAE 608: Marine Auxiliary Machinery

Auxiliary Systems. Pipes, Fittings, Valves. Flow Resistance in Systems. Pumps – Classification. Impeller, Reciprocating and Rotary Types, Principles of Operation, Velocity Triangles, Pumphead, Efficiency Performance Curves, Construction. Priming, Cavitation. Steam Ejectors. Compressors – Reciprocating, Rotary and Centrifugal: Operation, Performance Curves, Construction and Maintenance Principle. Blower – 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. Practicals: Laboratory Exercises.

MAE 609: Ship Design and Construction

Basic Concepts in Ship Design: Rules Based on Design Principles, Classification Societies Rules and Regulations, Ship Design Processes. Introduction; Classification of Ships: Functions, 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 Lines and Amendments. Computation: Free Boards, Load Line Parameters. Ship Construction; Structural Arrangements, Framing Systems, Function of Ship Structural Components, Double Bottom, Single Bottom, Shell Plating, Frames, Decks, Bulkheads, Pillars, Girders, Hatch Coamings, Machinery Casings, Superstructures Decks Houses, Foundations Laws and Stern Structures, 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 Trials, Classification Society Requirements, and Certification.

MAE 610: Heat Transfer

Heat Transfer Relationship: Conversion, Conduction and Radiation. Laminar and Turbulent Flows. Heat Transfer in Shell-Tube Heat Exchangers. Modes of Heal 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, Pressures Drops. Applications. Mass Transfer: Modes.

MAE 611: Marine Environmental Pollution

Marine Environmental Issues and Principles. Fate of Marine Oil Spills, Properties of Oil and Weathering Process. Impact of Oil on Coastal Activities Recreational Activities and Industries Biological Effects of Oil. Impact on Specific Marine Habitats Open Water an

d Sea Bed. Shoreline, Corals and Birds. Impact on Fisheries and Marine culture. Sources of Pollution from Ships, Control and Preventive Measures. National and International Regulations.

D MARINE SCIENCE COURSES

MSC 601 Marine Sedimentation (3 units)

Marine Environment, Physical chemical and biological processes of marine sedimentation from the coast to the deep ocean. Textural characteristics and deposition of marine facies, fluvial deltaic estuarine sedimentation. Models and farcies. Microfossils in marine environment composition and morphology of deep sea marine organism. Application and significance of marine fossils.

MST 602 - Maritime Law & International Maritime Conventions (2 units)

State and Federal laws governing maritime activities. International laws on maritime services and co-operations. Maritime organizations and their responsibilities at state, national and international levels. Concept of territorial and international waters- historical background, the rules and regulations. Maritime insurance . Federal and International policies on marine resources exploration and exploitation. National and International regulations on usage of marine environment, eg for waste disposal, industrial and recreational activities, etc. UN law of the sea convention (UNCLOS)

MSC 605; Marine Resources and Coastal Geology (3 units)

A cursory look at the marine environment including physical, biological and geological resources; emphasis on marine fisheries and maricultural resources like molluscs, crustaceans, etc. Marine minerals fossil derived, chemically precipitated and minerals within the ocean crust. Energy resources of sea water, chemical and fossil derived, wave and tide energies and other sources of kinetics in the ocean. The use of coastal lands and waste disposal in the sea. Basic water quality parameters and standards. Groundwater exploration and coastal subsidence sea level rise and coastal aquifer quality. Hydrogeology of the coast in Nigeria.

RMS 611; Research Methodology. (2 units)

Meaning and definition of research methodology. Sampling problems and sampling techniques. Principles and method of qualitative and qualitative measures of marine geologic laboratory materials. Laboratory problems including such methods of analysis in systematic order of a typical marine problem

MSC 609; Marine Geophysics. (3 units)

Background theory and applications of various Marine geophysical techniques. Eco-sounders, Magnetic methods, Seismic method, electromagnetic method. Data acquisition, reduction, interpretation technique. Case historical geophysical events in marine environment.

MSC 613; Marine Hydrology (3 units)

Definition and movement of water resources. Hydro geological cycles, nature and hydrodynamics of water movement in rivers and sea. Recharge and discharge of sea water. Water cycles analysis of hydrographs. Precipitation, evapotranspiration. Water law, surface storage, wells and small earth dams, conjunctive use of water budget.

SECOND SEMESTER

MST 622; Marine Environmental Pollution Management (3 units)

Definition, Human use of marine environment. Categories of sources and types of marine pollution. Origin consistency and effects of pollution on marine aquatic lives. Abating pollutants, Geophysical and geochemical processes in environmental regeneration. Management of resources in the marine world and its control measures.

MSC 628; Marine Geochemistry (3 units)

Introduction to geochemistry of earth with emphasis on processes controlling elemental cycling between the earth's crust, oceanic crust and sediment. Controls on the geochemical composition of sea water and its geological history. Occurrence and transformation of organic substances in the marine environment-the processes involved. The role of marine microbes in geological and geochemical processes. Geochemical cycle in the ocean.

MST 610; Global Change. (2 units)

Historical aspect of global change. Principal components of global change- the types, genesis and intensities. Impacts of the components on the marine environment-physical, chemical, biological and climatic aspects. Interdisciplinary nature of global change and interrelationship to biological, physical, anthropological, economic, and political concepts. Current trends in monitoring of global change.

MST 624; GIS Application in Marine Environment. (2 units)

The focus of the course is on the application of remote sensing and GIS in the investigation of tropical marine and maritime issues. The content will include image processing for information extraction and generation of terrain data.

Selected tropical issues will focus on the marine environment of the Niger Delta and other marine port environment.

MST 626; Port Resources Management (2 units)

Meaning and activities of a typical port environment. Ports in Nigeria and their Development. Freight forwarding practice in the port environment. Meaning and historical development of marine vessels. Vessels types and their specifications. Vessels capacity and structure and/materials. Marine routes and vessels. Ship building and anchoring methods. Different types of ships and their capacity. Case histories of ship in the Nigerian maritime sector .Economic potentials of ship and vessels in the maritime sector.

MSC 630; Marine Geomathematics (2 units)

Basic programming review of essential commands, programming techniques. Elemental simple algebra. Application of simple statistical test solving problems in a maritime sector/ and or marine environment. Z-test, t-test, F-test chi-square average. Auto-correlation, cross-correlation, regression analysis. Map analysis, contouring, trend surface analysis, factor analysis, cluster analysis. Case histories in typical port/ and marine environment.

THIRD SEMESTER

MST 643; (SIWES) STUDENT INDUSTIAL ATTACHEMENT (1units)

The duration of the SIWES will be three weeks .Students will be attached to the centre of marine geosciences Niger Delta University, Wilberforce Island. Students can also be attached to maritime sector. Students are expected to submit a written report of the experience and the knowledge gained during the period of their exposure. This will be graded by an instructor.

MSC 641; FIELD WORK (1 units)

Two weeks field work and map of the Marine environment. Inspection of Port and vessels sighting, Inspections Oceans brackish water, beaches etc

E **RADIO AND TELECOMMUNICATION ENGINEERING** COURSES

IME 681: MARINE DATA NETWORKS COURSE UNITS: 3

Description: This course focuses on providing, the skills and knowledge necessary to install and test network cabled installation, operate, and troubleshoot marine data communication elements, including configuring a switch, a router, setup a long distance wireless bridges connecting to a WAN including Satellite connection and implementing network security in a shipboard environment. A strong emphasis is given on the basics of data communication in maritime environment. All Lab sessions will include setup of real equipment such as physical routers, IP cameras.

On successful completion of this module the learner will be able to describe how networks function, including packets, components, protocols and the Open System Interconnect (OSI) reference model.
Identify switched LAN technology solutions to Ethernet networking issues, key nodes on a LAN with a view to using command-line interface to configure a router in a WAN environment. Explain the reasons for connecting networks with routers both wired and wireless; build a LAN using hardware components, produce as part of a group a network or network component to demonstrate an understanding of network operation and/or data analysis.

IME 682: MARINE ELECTRICAL DESIGN AND INSTALLATION COURSE UNITS: 3

This course will familiarize the student with techniques, procedures and methods used in the installation, commissioning and testing of electrical installations.
On successful completion of this course the student should be able to:

1. Understand and implement safe working practices in an electrical installation environment.
2. Implement functional wiring for a range of practical circuits and equipment, working both as an individual and as part of a team
3. Interpret industrial plant specifications and develop suitable control scheme.
4. Demonstrate safe and efficient methods of carrying out electrical testing.
5. Develop and make use of safe means for carrying out fault finding procedures.

IME 691: RADAR AND COMMUNICATIONS SYSTEMS COURSE UNITS: 3

Description: This module provides the learner with the knowledge and skills needed to provide first and second line maintenance of all modern X-band and S-band radar systems and Radio communications systems found on large ocean going ships. While no prior knowledge of radio systems is assumed, it is a requirement that the learner would already have completed a basic course in electrical and electronic engineering.

Learning Outcomes:
On successful completion of this module the learner will be able to
Demonstrate an understanding of the basic principles and features of radio & radar systems from the generation and transmission of radio & radar signals to the propagation, detection/reception, processing of radio and radar signals, display and plotting of targets of radar signals.

1. Draw block diagrams and explain the function and operation of all the major sub-systems of X-band and S-band radars found on board ocean going ships.
2. Draw block diagrams and explain the function of all major terrestrial and satellite radio systems found on board deep-sea ships
3. Source and use technical documentation and manufacturers service manuals for interpretation and understanding of system operation and performance, for preventative and corrective maintenance procedures and for implementation of, and compliance with relevant safety protocols and practices.
4. Work alone and in teams to carry out inspections, tests, measurements, repair and re-calibration of a representative range of systems.
5. Compile technical reports and logs of system performance and fault conditions, liaise with shore-based engineering personnel, maintain an appropriate inventory of spare parts and source and order replacement modules/components in accordance with manufacturer's specifications.

IME 662: GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM, COURSE UNITS: 3

Description: This module is a regulatory requirement for all Merchant Marine Electro Technical Officers, who due to the nature of their employment will be required to operate vessels GMDSS radio equipment for testing and maintenance purposes. The focus of this module is to gain the GMDSS General Operators Certificate for the successful candidate. However, the module has a secondary objective of giving a greater technical understanding of marine communications systems and equipment.

Learning Outcomes:

On successful completion of this module the learner will be able to demonstrate proficiency in the operation and testing of marine communications equipment and ancillary equipment.

1. Demonstrate knowledge of marine radio communications regulations including testing and maintenance requirements.
2. Demonstrate knowledge of and the use of instruction manuals used in search and rescue and routine operations.
3. Explain how radio communications systems work and show an understanding of theoretical fault finding at a modular level.

IME 692: MARINE NAVIGATION AND COMMUNICATIONS SYSTEMS COURSE UNITS: 3

Description: This module provides the learner with the knowledge and skills to understand the theory and operation of common marine navigation and communications equipment and identify faults and perform rudimentary maintenance.

Learning Outcomes:

On successful completion of this module the learner will be able to

Show an understanding of the operational theory of common marine navigation systems used on board deep sea ships.

1. Source and use technical documentation and manufacturers manuals for interpretation and understanding of system performance, for corrective maintenance procedures and for implementation of, and compliance with relevant safety protocols.
2. Work alone or in teams to carry out inspections, tests measurements and rudimentary repair of marine navigation and satellite communications systems
3. Compare the characteristics of different marine satellite communications systems Describe the use of digital communications techniques within marine satellite communications and its effects on communications channel efficiency

IME 684: MARINE INSTRUMENTATION COURSE UNITS: 3

Description: Measurement Instrumentation tailored for Marine Engineers. Covers the key areas relevant to this environment of Flow, Temperature, Pressure, Level and Vibration monitoring.

Learning Outcomes:

On successful completion of this module the learner will be able to

1. Outline the importance of calibration and traceability as applied to instrumentation. Explain and apply the procedures required to achieve reliable calibration data and identify inherent errors.
2. Describe the physical principles underlying the instruments and sensors used to measure Pressure, Temperature, Flow, Level and Vibration.
3. Identify and select instrumentation for basic marine application environments.
4. Perform calibrations on pressure, temperature, level and flow measurement instruments.

IME 644: MARINE POWER SYSTEMS COURSE UNITS: 3

Description: This module provides the student with an understanding of the broad range of principles and practices used in the distribution of electrical power on land and in a marine environment.

On successful completion of this module the learner will be able to

1. Perform calculations involving Power in electrical circuits.
2. Describe the construction and principle of operation of Power protection equipment.
3. Demonstrate a familiarity with relevant Rules, Standards, Codes of Practice, Factory and Safety Acts.
4. Apply knowledge of materials, equipment and processes to the design of electrical systems

Consideration of materials as conductors, insulators, mechanical protection and cable management.Applications in cables, wiring systems, accessories, appliances, switchgear.IP classification system.Wiring systems Cables for domestic and similar installations.Metalic and non-metalic sheathed cables, armoured cables.Conduit and trunking systems, cable management systems, Specialised cables, MICC, FP, LSOH. Enclosure capacity determination.Economic, asthetic and environmental considerations. Distribution practice MV radial, ring and parallel systems. Switching, earthing and protection.LV distribution networks.Switchboards.Conditional manoeuvres.Interlocks.Distribution board Switchgear and Protection Systems.MV circuit breakers.Air, vacuum, SF6.LV ACBs and MCCBs. Fixed/withdrawable.Ratings. Make, break and withstand capacities. Characteristics. Cutoff.Faultlimitation.Coordination,discrimination/cascading.CablesandInstallationPractice.MV power cables.LV cables/bus-bar systems.Environmental conditions. PFC withstand calculations. Cable management systems, enhanced performance, Voltage drop. Distribution Earthed and insulated systems, earth leakage protection, indication and location, protective systems for power distribution, preference tripping, selection of cables for marine applications, bus-bar systems, shore connection, circuit breakers, MCB, fuses, control, electric shock, insulation resistance and circuit testing, use of test instruments. Hazardous zones and categories of protection.

IME 686: PROGRAMMABLE CONTROLLERS AND SCADA SYSTEMS
COURSE UNITS: 3

Description: This module covers the essentials of SCADA and PLC systems, which are often used in close association with each other.

Learning Outcomes:

On successful completion of this module the learner will be able to

1. Understand PLC and SCADA terminology and its evolution within the industry.
2. Evaluate methods of data handling and conversion.

3. Understand the principles for control systems designing using programmable controllers.
4. Design and implement a programmable controller based control system.
5. Design and implement a SCADA application.

IME 642: MARINE ELECTRICAL PROPULSION COURSE UNITS: 3

Description: Aimed at students who require an introduction into key electrical technologies applicable to marine engineering. Areas covered will include electric propulsion systems and modern marine power and automation systems.

Learning Outcomes:

On successful completion of this module the learner will be able to

1. Describe the working principles and drive characteristics of AC and DC electric motors and generators.
2. Perform calculations involving electric power demands of a vessel.
3. Specify and assess the impact of power conversion techniques on marine power systems.
4. Assess the operational characteristics of common power electronic devices,their main characteristics and their fields of application in power conversion.

IME 687: MARINE ELECTRICAL DIAGNOSTICS COURSE UNITS: 3

Description: This module will familiarize the student with techniques, procedures and methods used in the installation,commissioning and testing of electrical installations.

Learning Outcomes:

On successful completion of this module the learner will be able to

1. Understand and implement safe working practices in an electrical installation environment.
2. Implement functional wiring for a range of practical circuits and equipment, working both as an individual and as part of a team
3. Interpret industrial plant specifications and develop suitable control scheme.
4. Demonstrate safe and efficient methods of carrying out electrical testing.
5. Develop and make use of safe means for carrying out fault finding procedures.

IME 689: SHIP AUTOMATION COURSE UNITS: 3

Description: This module introduces students to Programmable Logic Controllers applications to automation control circuits. On completing the module, the student will have developed a clearer understanding of the application of PLC's and will also

be aware of safety requirements and the peripherals associated with PLC's in automated plants.

Learning Outcomes:

On successful completion of this module the learner will be able to

1. Describe and explain the construction and operating specification of a PLC.
2. Describe types of proximity devices, photoelectric sensors, and other switching devices associated with PLC inputs.
3. Develop ladder diagrams and instruction lists for simple circuits.
4. Complete simple control projects/assignments using programmable controllers.

F MARITIME STUDIES COURSES

Marine Environmental Science

Course Code: MST 601

Course Type: Lecture

Credit Units: 3

Aims: This course will be able:

- to provide an understanding of the basic concepts, principles and processes characterizing physical, chemical and biological oceanography.
- to provide an understanding how ocean processes shape the environment and affects human life and maritime activities such as shipping, fisheries etc.
- to provide a basic understanding how human activities, in particular maritime activities, affects the marine environment and what can be done to avoid or mitigate impacts.

Learning Outcomes: The student will be able to have:

- A better understanding of the physical, chemical and biological processes that characterize the oceans and coastal areas.
- A better understanding of the dynamics of the ocean and coastal environments and how they influence human maritime activities.
- A better understanding of how different human activities influence the ocean and coastal environment.

Syllabus Content:

- An introduction to physical oceanography, plate tectonics and the geological history oceans, currents and winds, tides and waves, large scale ocean circulation, oceans and climate, climate change
- An introduction to chemical oceanography, the water molecule, chemistry of seawater, salinity, the hydrological cycle, the carbon cycle, nutrients and the calcium cycle.
- An introduction to biological oceanography, the evolution of life, organisms of the sea, reproduction, dispersal and migration, primary production, food webs and food chains. The ecosystems of the coast to the deep sea, biodiversity and conservation.
- An introduction to fish, fisheries and aquaculture, their impacts on the marine ecosystem.
- Human uses/users and interactions in coastal/marine areas, pollution and environmental degradation, management of marine and coastal environments and resources, ICZM, marine environmental impact assessments.

Maritime Law and International Maritime Conventions

Course Code: MST 602
Course Type: Lecture
Credit Units: 4

Aims: To provide a foundation for the appreciation of the complex body of maritime law, and knowledge of the major international conventions.

Learning Outcomes: The student will be able to describe/identify/explain/discuss/analyse:

1. The basic principles of maritime law within the wider context of law and legal systems
2. The basics of public international law, including law of the sea and the law of treaties
3. The legal framework of regulatory and private maritime law including the general law of contract, tort, property and remedies, and commercial maritime law, ship acquisitions, ownership and mortgages

Syllabus Content:

- Introductory and preliminary
- Law and legal systems
- Public and private law
- International and municipal law

- Public law
- Principles of public international law
- Principles of treaty law
- International law of the sea
- Regulatory law
- SOLAS
- MARPOL
- STCW
- Private law
- Introduction to contracts, torts and property law
- Ship acquisitions, ownership and mortgages
- Commercial maritime law: charter parties and bills of lading
- Marine insurance

Principles of Maritime Administration and Management
Course Code: MST 603
Course Type: Lecture
Credit Units: 4

Aims: To provide a broad overview and appreciation of the role of government in policy formulation and the administration of maritime affairs. To define and examine "maritime administration" conceptually and in terms of governance and organizational structure using modern management methodologies and techniques, such as management by objectives (MBO), rational planning and new public management (NPM) in the maritime context. To provide an overview of the various international institutions involved in shipping and maritime affairs, including UN agencies and inter-governmental and non-governmental organizations and their interrelationships.

Learning Outcomes: After attending this course students will be able to:

1. Understand the role of the government in policy formulation and the administration of maritime affairs;
2. Appreciate the concept of maritime administration, organization and governance; and
3. Apply modern management methodologies including rational planning and new public management.
4. Introduction to maritime safety and tasks of maritime and public administration including risk management;
5. An overview of Flag State administration issues and activities;

6. Introductory seminar on contemporary issues in maritime administration.

Syllabus Content:

Public Administration

- What Is Public Administration?
- Are Public and Private Managerial Roles Different?
- Power and Authority in Public Affairs
- New Public Management: Reinvention and Privatization
- Management Styles among Public Leaders
- Leadership in Public Organizations
- Rational Tools for Public Administration & Public Policy
    - Problem Orientation
    - Value Analysis
    - Social Process
    - Decision Process
    - Tag Clouds for Policy Analysis.

Maritime Administration

- The legal framework for maritime administration
- The concept of maritime administration
- National Governance and model maritime Administrations
- The roles of Government in maritime matters
- Tasks of Maritime Administrations:
    - Introduction - need for risk management - problems of maritime administrations prior to decisions - stakeholder influences – social implication of risk framework (SARF).
    - A framework to deal with risks-traditional model of public administration
- Maritime administration/management in developed/developing countries.
- Range of Contemporary Issues in Maritime Administrations.
- Case Studies in National Maritime Administrations (Group research).

Flag State Administration:

- The IMO auditing scheme – benchmarks of maritime administrations
- Effectiveness at implementing international conventions
- Factors affecting flag state performance
- Evaluating and accepting Recognized Organizations to act on their behalf
- Continuous quality management and performance improvement

- Established practices for ensuring the competencies of seafarers and adequate manning to reduce risk of occupational injuries/marine casualties
- Well-established process for investigating marine casualties along with an effective mechanism for incorporating lessons learned and recommendations.
- Participation in IMO, ILO and other initiatives to improve global maritime safety, security and environmental protection
- Interaction between ship owners and regulatory bodies.

Maritime Administration Seminar (2013): International Ballast Water Management Convention

- The seminar highlights the methodology that IMO has utilized to promote the implementation of the International Ballast Water Management Convention will be used as a practical case study.
- The following elements will be addressed:
    - High level Policy and Governance,
    - The Coordination Role of IMO,
    - Creation of a Global Partnership(including Shipping Industry),
    - Global activities to Promote the Convention(Regional/National Seminars),
    - Follow-up Actions

Maritime Economics
Course Code: MMS 631
Course Type: Lecture
Credit Units: 4

Aims: To review the fundamentals of economics, to present the basic concerns and special features of transport and maritime transport, and to apply economic principles to maritime transport.

Learning outcomes: The student will be able to:
1. Discuss the demand/supply aspects of shipping and its relationship to world trade.
2. Understand how the major shipping markets operate and identify significant problems associated with them.
3. Explain the meaning of common maritime economic and commercial terms.

Syllabus Content:

• World Economy and International Trade
• Demand of maritime transport
• Maritime geography
• Supply of maritime transport
• Major maritime transport countries
• Shipping organisation: tramp and liner
• Brokers, agents and freight forwarders
• The costs of maritime transport
• Maritime transport freight market

Maritime Technology
Course Code: MST 604
Course Type: Lecture
Credit Units: 4

Aims: To provide a general understanding of the technical aspects of ships; to emphasize the importance of maritime technology for safe and secure operations as well as environmental protection; and to consider how technological innovations influence the development of the shipping industry.

Learning outcomes: The student will be able to describe/identify/explain/discuss/analyse:

- Different criteria for classification of ships.
- Construction features of different types of ships.
- Effects of various static and dynamic forces on ships structure and stability.
- Criteria for estimation of power and fuel consumption.
- Effective use of energy for operating ships.
- Impact of ship operation on environmental issues
- The general concepts behind navigation and the need for aids to navigation.
- Different navigational devices and systems.
- Different types of ships and basic operations.
- Basics of Ships Safety (applicable regulations, dangers associated with ship operations
- Maneuvering characteristics and basics for safe ship handling.

Syllabus Content:

- Criteria for classification of ships
- Ships terminology and parts of ships

- Ship design
- Constructional details of different types of ships
- Principle dimension and tonnage
- Ship stability and IMO relevance
- Ship resistance and Propulsion power, power losses and fuel consumption
- Harmful substances from ship and the impact on environment
- Navigation and associated terminology
- Aids to navigation - lights, buoys and buoyage system
- Ship's routing
- Ship reporting systems
- Vessel Traffic Services
- IMO and other organizations' instruments on cargo handling
- Terminology used in ship handling, ship motions
- Manoeuvring characteristics and safe ship-handling in different conditions

Research Methodology
Course Code: MST 605
Course Type: Lecture
Credit Units: 4

Aims:

A workshop-based subject designed to provide a clear understanding of the research methods and academic skills required at Master's degree level.

Learning Outcomes:

The students will gain:

A better understanding of the basic principles how research activities are designed, carried out, and how the results from research projects are analysed.

A better capability of writing research proposals and report results from research projects;

Maritime Safety and Environmental Protection
Course Code: MES 611
Course Type: Lecture
ECTS Credits: 3

Aims:

- To provide an adequate understanding of issues and principles regarding measures necessary to protect marine environment and prevent pollution from ships.
- To address the operational issues on board all vessels and some specialized ships.
- To examine regional and International approaches to marine environmental protection under MARPOL, HNS and OPRC. To study current approaches to contingency planning, response and casualty investigation of marine pollution events, as well as related issues, such as Places of Refuge, PSSAs, Special Areas, etc.

Learning Outcomes:
The student will be able to describe, identify, discuss, appreciate and explain:

1. Operational issues and specific issues in relationships with hazardous cargo transported. The regulations and principles apply on board the vessel to prevent pollution (MARPOL ANNEX 1-5). And Shipboard Oil Pollution Emergency Plans.
2. Air emissions issues MARPOL Annex VI
3. Management of Harmful Aquatic Organisms and Pathogens: Ballast Water Management Convention (dedicated training on Compliance Monitoring and Enforcement will be provided) & Anti-fooling Convention
4. Ship-breaking related issues
5. Contingency planning in the context of marine environmental protection involving International, regional and domestic responses to pollution, particularly oil /chemical preparedness and response regimes, etc.
6. Casualty investigation and feedback

<u>Management of pollutants on board</u>

1. Origin of operational wastes on all ships: garbage management, sewage, sludge, air emission, contaminated ballast, etc.
2. Record Books-Oil, Cargo, Garbage Management, Ballast Water Management, etc.
3. Management of bunkers on board and Convention on Civil Liability for Bunker Oil Pollution Damage 2003
4. Management of hazardous cargo. Example: liquid cargo and cargo in containers (tank cleaning, crude oil washing, inert gas systems, P&A Manual for Chemical tankers, IMDG management on container vessels, etc.)

<u>Shipbuilding and recycling</u>

1. Inventory of Hazardous Materials
2. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal & HKG convention on recycling of ships

Ship's technology

1. Anti-fooling
2. Ballast Water Management
3. Air emission etc.

Ship waste management

1. Shore facilities (garbage / oil / hazardous material…)
2. Ballast regulations

Oil Pollution Preparedness and Response Regimes and Regimes relating to Liability and Compensation

1. Cooperation between states to control vessels (PSC) and to contain and respond to major pollution incidents (OPRC), including regional agreements established to enhance preparedness and response to pollution incidents (HELCOM/Bonn Agreement)
2. Cooperation between state organizations and other stakeholders (i.e. ITOPF, INTERTANKO, IPEICA, environmentalists, Unions, etc.)
3. How nations domestically, regionally, and internationally prepare and respond to pollution at sea that threatens the marine environment and ecosystems.
4. The legal basis and marine pollution compensation frameworks. The International Oil Pollution Compensation Funds (IOPCFunds) and their legal basis (under the Civil Liability Convention, the Fund Convention and the Supplementary Fund Protocol). IOPCFunds' relationship with IMO and other international organizations and agreements (STOPIA and TOPIA). Also, discuss other oil spill funding sources and oil spill response framework, such as Oil Pollution Act of 1990 (Oil Spill Liability Trust Fund) and the U.S. National Oil and Hazardous Substance Contingency Plan.

Maritime Casualty investigation

1. The importance of maritime casualty investigations for the definition of maritime safety and marine environmental protection standards
2. The principles of the maritime casualty investigation process and the related reporting

3. The methods involved in and options for maritime casualty analysis and the related administrative follow-up

Syllabus Content:

Environmental Issues

- Background
  - Global concern – Visibility principle
  - Main UN instruments
  - Short introduction of IMO instruments (Coastal Protection & Pollution Prevention)

- MARPOL and related IMO tools
  - MARPOL Annex I & tanker safety
  - MARPOL Annex II
  - MARPOL Annex III
  - MARPOL Annex IV
  - MARPOL Annex V

- Air emissions : MARPOL Annex VI and GHG
  - Air emissions previously out of Annex VI
  - Emissions recently considered and included in Annex VI
  - EEDI & SEEMP

- Management of Harmful Aquatic Organisms and Pathogens
  - Anfi-fouling Convention
  - Ballast Water Management Convention (2 days training)

- Shipbreaking and related issues
  - Hong Kong Convention
  - Basel Convention

- Cooperation and tools to protect coastline
  - OPRC Convention
  - Place of refuge & PSAS
  - Oil Spill management & Response regime
  - Legal issues (IOPC Funds & Bunker liability)
  - OPA 90

Maritime Casualty Investigations

- Introduction
  - The need to investigate maritime casualties

- Legal background
  - Overview about relevant regulations in different international and maritime legal instruments regarding casualty investigations, Reporting requirements to IMO about maritime casualties, Selected national approaches related to maritime casualty investigations

- Accident investigation process
  - Initiation of maritime casualty investigations, Appointment of investigators, Collecting of evidence, Developing time lines, Conducting interviews with witnesses

- Accident analysis
  - Accident causation models, Introduction of selected analysis tools, such as Event and Causal Factor Charts, Formulation of safety lessons, Principles of reporting

- Human Factors involved in maritime casualty investigations
  - Overview about human and organizational factor approaches in maritime casualty investigations, Introduction of SHEL and Hybrid Model, Discussion of the current gaps in human and organizational factor gathering during maritime casualty investigations.

Law of the Sea and Maritime Security
Course Code: MLS 621
Course Type: Lecture
Credit Units: 3

Aims: To provide a clear understanding of the regimes of maritime zones in particular the UN Convention on the Law of the Sea, from the perspective of maritime and environmental administrations and their particular interests. To provide a broad overview of the importance of maritime security in the current context and to afford a clear understanding of various regimes under IMO instruments and UNCLOS.

Learning Outcomes: The student will be able to:

1. Gain an understanding of the different types of maritime crime and acts of maritime violence.
2. Become familiar with current issues in maritime security.
3. Understand the different historical, legal, political, economic, and other issues complicating the campaign against piracy and armed robbery at sea.
4. Become familiar with UNCLOS, SUA, SOLAS and other international instruments relevant in the campaign against crimes of piracy, armed robbery, and maritime violence.

The student will be able to describe, identify, discuss, appreciate and explain:

1. The legal regimes applicable to various maritime zones under the UN Convention on the Law of the Sea including the territorial sea, the contiguous zone, the exclusive economic zone, the continental shelf regime and archipelagic waters; and
2. The implications and influence of these regimes on maritime administration and their particular interests.

Syllabus Content:

- Maritime fraud
    - Documentary
    - Charter party
    - Insurance
    - Container crime
    - Deviation
    - Phantom ships
- Terrorism at sea
- Problems in defining piracy and armed robbery
- International approaches in combating piracy and armed robbery other criminal acts
    - LOSC 82
    - IMO's anti-piracy programme
    - IMO circulars and other instruments
    - SUA 198
    - ISPS Code
- Regional and national approaches
- Why do piracy and armed robbery thrive?
- Possible solutions
- Maritime zones

    - The territorial sea
    - Archipelagic waters
    - The contiguous zone
    - The exclusive economic zone
    - The continental shelf regime
    - Workshop exercises
- Contemporary issues in the implementation of LOSC 82

Quantitative Methods and Market Analysis
Course Number: MMS 633
Course Type: Lecture
Credit Units: 4

Aims:

To discuss advanced statistical concepts and modelling for logistics and tran sport, including statistical distributions, with an application to transport mod eling and statistical forecasting. To apply existing quantitative techniques and models to complex logistics and transport problems, particularly regarding the shipping and port industries.

Learning Outcomes:

By the end of the course, students will be able develop, appraise, analyse and implement:

- Statistical tools and methods in the day-to-day shipping business practice
- Regression and forecasting time-series techniques
- Application of quantitative techniques and models to transportation and logistics problems
- The empirical techniques employed in the analysis of shipping and port markets and how they are applied to actual market data.
- Analytical and other generic skills, which facilitate the rigorous analysis of shipping markets.

Syllabus Content:
Introduction

- Statistical tools and techniques for market analysis
- Economic modelling in shipping and ports

The Classical Linear Regression Model

- What is a regression model
- Simple linear regression
- Possible forms of the regression function
- The assumptions of the Ordinary Least Squares
- Properties of OLS
- Precision and standard errors
- Hypothesis testing
- Normal and t probability distributions
- Confidence intervals

Multiple Linear Regressions

- Generalizing the simple model
- How the parameters are calculated
- Testing single hypothesis: the t-test
- Testing multiple hypotheses: the F-test
- The relationship between the t- and F-distributions
- Goodness of fit statistics
- Case Study: Kavussanos, M., Juell-Skielse, A. and Forrest, M. (2003), International Comparison of Market Risks Across Shipping-Related Industries, Maritime Policy and Management, 30(2): 197-122.

Issues with the Classical Regression Model

- Violations of the assumptions
- Dynamic models
- Multicollinearity
- Adopting the wrong functional form
- Parameter stability tests
- Case Study: Drobetz, W., Schilling, D. and Tegtmeier, L. (2010), Common Risk Factors in the Returns of Shipping Stocks, Maritime Policy and Management, 37(2): 93-120.

Univariate Time-Series Modelling and Forecasting

- Strictly and weakly stationary process
- White noise process
- Moving Average (MA) processes
- Autoregressive (AR) processes

- Autoregressive Moving Average (ARMA) processes
- Time-series forecasting in Shipping using ARMA models in Eviews
- Estimating Exponential Smoothing Models
- Information criteria for ARMA model selection
- Case Study: Cullinane, K. P.B., Mason, K.J. and Cape, M. (1999), A Comparison of Models Forecasting the Baltic Freight Index: Box Jenkins Revised, Maritime Economics and Logistics, 1: 15-39.

Multivariate Time-Series Modelling

- Simultaneous equations
- Exogeneity principal and Tests
- Introduction to Vector Autoregressive (VAR) models
- Causality tests

Technological Innovation in the Shipping Industry

Course Code: MST 607
Course Type: Lecture
Credits: 2

Aims: To provide principles of technological innovation and the process of the diffusion in general; to review and analyse aspects of technological innovations developed in shipping industries, based on the relationship between economic demands and technical developments; to discuss future perspectives on technical contributions to maritime safety, security and environmental protection.

Learning Outcomes: The student will be able to describe, identify, discuss, appreciate and explain:

1. the principle of diffusion of innovations and classification of technological innovations
2. the economic and legal driving forces for technological innovations and advancement in the shipping industry
3. historical reviews of some technological innovations in the shipping industry
4. the impact of technology in maritime transport on shipping economy and production.
5. Concepts of transport efficiency based on energy used for transport vehicles, such as ships, trains, cars, and aircraft, and their comparative study.
6. Review and assessment of Green ship technology

7. Perspectives on technical contributions to maritime safety, security and environmental protection

Maritime Logistics
Course Code: MMS 634
Course Type: Lecture
Credit Units: 3

Aims: To discuss the concepts and developments of modern logistics, including the supply chain management and to study the position of shipping/port in the logistics system, with special emphasis on IT-based logistics systems.

To analyse the impact of logistics on shipping and port activities by examining how shipping companies and ports turn themselves into logistics service providers and how logistics concepts and techniques are applied in the maritime sector.

Learning Outcomes: The student will be able to:

1. demonstrate an understanding of the basic concept of logistics and supply chain management
2. discuss the role of shipping and ports in the logistics chain
3. use logistics concepts and analytical tools to solve transport and port roblems
4. analyse major logistics issues concerning maritime organizations

Syllabus Content:

- Scope and evolution of logistics
- Basic logistics concept
- Total cost
- Supply chain management
- Cost trade offs
- Customer services
- Logistics strategy
- Third party logistics
- Transport strategies
- Transport modal choices
- Warehousing and costs
- Warehousing strategies
- Inventory cost and control
- Logistics, ports and shipping

- IT and logistics software and models
- Maritime logistics
- Container fleet logistics
- Terminal logistics

Ship and Port Management
Course Number: MMS 632
Course Type: Lecture
Credit Units: 3

Aims:

- To provide a comprehensive understanding of port management, including the role and significance of ports in maritime transport, importance of ports to the national/regional economy, ownership and contemporary issues regarding ports. To implement port performance indicators for berth planning, quay transfer and storage operations, and the relationship between port indicators in effective port management. To introduce the principles and evolution of container terminal management
- To provide fundamental knowledge of ship management and types of ship--management structures. To develop an understanding of the underlying economics of various shipping sectors, to identify strategic challenges, including operational issues, competition issues, capacity adjustments and financial exposure.

Learning Outcomes:

By the end of this lecture, the student will be able to:

1. explain the role and function of port management and its trend in terms of ownership, funding and operation
2. discuss the importance of ports to the national economy
3. identify contemporary issues in ports
4. describe the concept of port performance indicators (PPIs) and the importance of key port performance indicators (KPIs)
5. demonstrate the port indicators for berth planning, quay transfer and storage operations
6. use KPIs for futuristic port planning

By the end of the course, students will be able to develop / appraise / analyse / implement:

- • Organisational structures and major activities in shipping companies
- • Strategic ship management processes
- • Influences of regulatory and economical constraints on ship management
- • Key strategic issues in decision---making, within all sectors of the shipping industry
- • Strategic performance measurement, including KPIs
- • The risk---return trade---offs and the sources of business risks in ship management
- • Risk management strategies, with the use of shipping derivatives

Syllabus Content:

- Basics in port management
- Alternative port management structures and ownership models
- Global terminal operator(s)
- The evolution of container terminal and its equipment
- Port economic impact study (PEIS)
- Key performance indicators (KPIs)
- Service time, waiting time, idle time
- Utilisation ratios - berths, equipment, storage facilities, labour force
- Operation efficiency and performance indicators
- KPIs and facility planning
- Generic organisational structure of shipping companies
- Ship & Fleet management defined, the basic principles & key components
- Managing Money & Relationships
- Managing People & Technology (Workshop feedback)
- Managing Information & Risks/Reputation
- Characteristics of main ship management
- The strategic management process in shipping
- The operating costs of running ships
- The concept and sources of business risks in shipping
- Vessel portfolio strategy of shipping companies
- Chartering portfolio strategy of shipping companies
- The use of derivatives for risk management in shipping
- The underlying Baltic Exchange freight indices and freight derivatives
- Risk management practical examples in the dry---bulk, tanker and containership sectors
- Bunker fuel risk management
- Vessel value risk management
- Balanced scorecard framework in shipping

- Key Performance Indicators (KPI) in shipping

Law and Policy Related to the Marine Environment
Course Number: MLS 622
Course Type: Lecture
Credits: 3

Aims: To provide an in-depth understanding of the public international law, regulatory law and private law regimes governing the protection of the marine environment and a critical thinking on policy implications for relevant public and private entities; to give an introduction to the laws of wreck, salvage, towage and pilotage related to marine pollution incidents.

Learning Outcomes: The student will be able to:

1. Acquire a comprehensive understanding of relevant rules and principles in public international law such as general obligations of states to protect the marine environment under UNCLOS Part XII, the doctrine of state responsibility, the obligation of due diligence and strict/absolute liability.
2. Gain a sound knowledge and understanding of the salient features of regulatory conventions concerning marine pollution including MARPOL, OPRC and the London Convention, and analyse cases by finding applicable rules to operational discharges, deliberate dumping of wastes, and accidental spills.
3. Appreciate and identify legal issues pertaining to civil liability and compensation regimes (CLC, FUND Convention, etc.) and analyse factual and legal situations by applying legal principles of tort law, relevant civil liability conventions, legislation, and case law to determine polluter's liability and compensability of claims.
4. Acquire a sound appreciation of the general rules and principles applicable to salvage, wreck, towage and pilotage.

Syllabus Content:

- Public law, regulatory law and private law aspects of marine pollution and their interrelationships
- Doctrine of state responsibility
- Strict and absolute liability
- Limitation of liability
- Criminal liability relating to marine pollution
- Salvage, wreck, towage, pilotage

Marine Risk Management & Insurance
Course Code: MMS 635
Course Type: Lecture
Credit Units: 3

Aims:

To provide a broad overview of maritime risks in ship operation and navigation under different ship and environmental conditions. To provide advanced understanding of risk management and its application to maritime practice in the context of existing and new international rules and regulations.

To provide a comprehensive understanding of marine insurance principles and practice, marine insurance cover for property and liabilities, and standard policy conditions in various insurance markets. To analyse the concept of shipowners' liability, limitation of liability regimes and enforcement of maritime claims.

To provide knowledge of the principles of assessment and management in the maritime sector. To discuss in detail how contemporary issues in maritime administration can have been addressed by suitable risk assessment tools. Practical examples and elaborate case study discussions are the main focus of this course. In addition, a detailed introduction to SAR planning and management principles is given.

Learning Outcomes:

The student will be able to identify, describe and discuss as well as appreciate and explain:

1. the principles of division and classification of risk management and types of maritime operational risks
2. the basic methods and tools to be applied for the management of maritime operational risk
3. Concepts of historical reviews of some technological innovations including IMO's standardisation processes
4. the impacts of the application of human factor related and usability concept driven design of systems to support managing operators.
5. Concepts of IMO's/IALA's activities and initiatives in context of maritime operational risks
6. Review and assessment and contemporary issues of integrated supporting systems

7. Perspectives on technical contributions to ship safety and environmental friendly ship operation as main frames for efficient ship operation

Students will be able to describe/explain/discuss/analyse:

1. The fundamental concepts of risk, loss and insurability of risk and fundamental principles of marine insurance law
2. Different types of marine risks and insurance cover for such risks
3. Principles of shipowners' liability and application of different limitation regimes
4. Enforcement of maritime claims and arrest of ships

Syllabus Contents

- Definition of risk and loss (direct loss/consequential loss) and insurability of risk
- Risk management (retention, control and risk transfer)
- The fundamental principles of insurable interest, utmost good faith and indemnity
- Types of risk in shipping (total loss, constructive total loss, partial loss, third party liability, expenses)
- Hull and Machinery insurance
- P&I insurance
- Cargo insurance
- General average
- Salvage
- Freight insurance, Loss of hire, Strike insurance, War risks
- Liability for maritime claims, global limitation and their relation to marine insurance
- Limitation of liability for pollution, passenger and cargo claims
- Enforcement and priorities of maritime claims
- Arrest of ships

Contemporary Issues in Maritime Risk Management

After attending this course students will be able to:

1. Explain the scope, nature and evolution of technical and operational risks associated with maritime transport
2. Describe the principles and procedures of risk management in the maritime sector

3. Apply the theory and methodology of risk management

Advances in Management, Training, and Administration of SAR

After attending this course students will be able to:

1. Analyse the capabilities and resources available in their country
2. Develop a plan to establish and enhance the current SAR system in their own country within the constraints and requirements
3. Determine the facilities and equipment required to operate an effective SAR service
4. Establish the minimum communications equipment required to run an effective SAR service
5. Identify national and local organizations which can be of help and be used effectively, including voluntary group
6. Establish effective co-operation with neighbouring States in accordance with the provisions of the SAR Convention
7. Co-ordinate the SAR service operations with the activities of other services such as the Navy, the Coast Guard, and the Air Force etc..

Leadership and Human Resource Management

Course Code: MMS 636
Course Type: Lecture
Credit Units: 3

Aims: To provide an in-depth understanding of the role and significance of leadership in managing people, including a comprehensive overview of human resource development issues, and the planning and implementation of human resource development policy and techniques, to review and discuss aspects of leadership in the context of modern team and project management principles and techniques, stress and crisis management, motivation, social responsibility, and organizational behaviour in the maritime field.

Learning Outcomes:

The student will be able to describe/identify/ discuss /explain and analyze:

1. the role of human resource development in enhancing the effectiveness and competitive capability of a government agency or maritime company; including human resource functions and structures.

2. strategic management and its conceptual framework, various models of strategic human resource management.
3. human resource management themes such as leadership, team management, outsourcing, change management, learning organization, workplace learning, crisis management, stress and conflict management, organizational values and ethics, rewards and career development,
4. the linkages between human resource management and organizational performance,
5. organizational and motivational theories, behaviours, training and development, and performance management
6. human resource management and industrial/employee relations.

Seminar on Contemporary Issues in Maritime Transport

Course Code: MST 607
Course Type: Seminar
Credit Units: 2

Aims: To give students an opportunity to exchange ideas with each other and with maritime experts through presentation, debates and discussions. The subject covers contemporary issues in various aspects of maritime transport, including in areas such as safety, security, environment, technology, commerce and policy.

Learning Outcomes: The student will be able to describe/identify/explain/discuss/analyse:

1. Current subjects of maritime policy and the importance of marine policy issues for the development of a national merchant marine.
2. Compare different models and approaches regarding maritime policy making in various countries and regions.
3. Current issues and key concerns in the maritime industry.
4. The importance for national interest and the challenges of maritime safety, security, environment protection and labour issues.
5. Issues relating to the carriage of dangerous goods.
6. Developments in satellite and other communications and data transfer systems and their application to the maritime community.
7. Potential use of IT and multi-media technology for maritime education and shipping industry needs.

Dissertation Research

Course ode: MST 608
Course Type: Independent Study

Credits: 6

Aims: In-depth study to demonstrate skill in research writing and analysis.

Learning Outcomes: On completion, student will be able to:

1. Find and use relevant material found in the public domain (secondary research) critically and constructively, giving particular attention to sourcing, collection, and interpretation of information.
2. Identify contemporary issues in their subject area, and develop a plan of work to produce a report based on a current problem or relevant issue;
3. Identify appropriate methods of research as well as techniques and tools for conducting research, synthesis, and comparative analysis.
4. Demonstrate good written communication skills and techniques.

Guidelines for Written Assignments and Dissertations. These guidelines are reviewed, updated and re-issued every calendar year.

G TRANSPORT, OIL & GAS COURSES

SPO 602 PORT OPERATIONS AND PLANNING 3 UNITS

Ship, Quay and shed operations . Port cargo operations. Planning and organization of container and general cargo storage areas. Export and import acceptance and delivery procedures including documentation and claim procedures. Elements of port planning and engineering. Technological development in port equipment design and maintainance.

MLI 601 MARITIME LAW AND INSURANCE 2UNITS 3 UNITS

Fundamental elements of law of carriage of Goods By Land , Sea And Air Especially Sea. . Maritime Liens, Arbitration, collision, salvage and towing laws. Principles of Marine Insurance. Hull and Cargo Insurance. P and I Insurance General Average Doctrine Of General Average . Analysis and provision of the york- Antwerp Rules . IMO conventions.

SCP 613 SHIP BROKING AND CHARTERING PRACTICE 3 UNITS

Operation of the freight marking . communication techniques and methodology in ship –broking practices . The roles of ship broker and the agent . Elements of the various Chatering contracts . Chatering Marketing Practice , Perform Laytime calculation. Carryout Voyage Estimation. Reason for Freight and Voyage Calculations and their relevance to a Shipper / owner. Relevance of Duration Of Employment and changing Marketing , Various costs to be considererd. Differenciation between Running capital costs in Shipping . Perform voyage estimates for Linear , Reefer, Tanker and Dry Bulk . Assess Voyage profitability taking into Man Ship.

EPS 610 ENVIRONMENTAL PROTECTION AND SAFETY 3 UNITS

Casses of General Environmental Pollution Especially Marine Pollution and Effects. General outline and the main provision of the International Convention For the Prevention Pollution from Environment Especially ships 1973- As modified by the protocol of 1978 [MARPOL]. Recent Developments in Tanker Design Aimed at preventing Accidental Oil Pollution. Principles coastal Zone Management Contingency Plan for oil Spill Response.

RMS 606 RESEARCH METHODOLOGY/SEMINAR 3UNITS

Understand Research Problem/Methodology in a given maritime subject or know how to conduct research in a systematic order in a given maritime subject. Look for the necessary skills for enquiring into problems and analysing them

OGT 603 UPSTREAM OIL AND GAS 3 UNIT

Fundamentals of oil and gas technology. An overview of the offshore oil and gas industry. Fundamentals of the current concept of upstream offshore drilling, production techniques, working principles of marine offshore systems, Topside production modules and subsea modules. Considerations for foundation, layouts and the entire lifecycle of oil and gas platforms from procurement, construction, commissioning operations and decommissioning. Basic chemistry and properties of natural gas and oil.

Design considerations for offshore structures .Introduction to API recommended practices and ISO 19900 Standards for offshore platform design. Various wave theories, Diffraction theory, Morrison's theory and Spectral Modeling Approaches to offshore industries. Exploration of the capabilities of software packages for structural analysis of offshore platforms latest engineering concepts and practices in offshore design, construction and installation

Introduction to petroleum geology, petroleum exploration studies. Project start up and analysis. Risk analysis and Management. Recommended Optional Module: Management of Occupational Health Risk in Oil and Gas Industries.

OAG 614 DOWNSTREAM OIL AND GAS 3 UNITS

Operational(Function-Specific Progress Operations). Gas chromatography. Hp Liquid Chomatography. Infrared Analysis. Ion Concentration Analysis, Mass Spectrometry. Nuclear Magnetic Resonance. Optical analysis, UV Visible spectroscopy, Basic Lab Operations, Lab Glassware, hardware and robotics QA/QC in the Lab. Sample preparation, separation and Isolation of materials. Weighing and measuring techniques. Basic principles of power plant operations. Alkylation Operations Azeotropic extractive and vacuum columns. Blending operations. Crude distillation operations. Hydrotreating and catalytic reforming 1 & 2. Process reactor fundamentals. Treating and sulphur recovery operations. Typical progress reactions, part 1 & 2.

Oil and Gas proress operations(suitadle for certificate programme). Basic and heavy lifting. Overflow of rigging. Abnormal conditions and emergencies. Combustion of Various power plants and their parts. Combustion with operations. Power plants used in refineries and their systems, Above ground storage tank parts 1, 2 & 3. Bearing and operation boiler and turbine protection etc.
Electrical: Basic electrical as applicable in the oil and gas industry and refinery (theories – Ohms, Kirchhoff's law, Ckts, resistors, capacitors, Inductance, Amplifiers, Scrs, triacs, transistors configurations, rectifiers, AC generators maintenance, battery systems, relays, fuses, Gd fault interrupter, high voltage breakers and switch gear transformers, breakers and switches. Maintenance of LV circuit breakers)

H MARITIME AND HARBOUR TECHNOLOGY COURSES

MHT 611 INTRODUCTION TO MARITIME TERMINAL OPERATION

Transport Administration, Port Operation,Port System and Control, Terminal Layout and Clear Zone, Land use Plan, Demand and Capacity, Logistics Operation, Marketing , Cleaning Process, Maritime Policies, Etc.

MMS 601 MANAGEMENT

Nature of management, environment, organizations, business functions, theories, development, functions, policies and ethics, marketing, finance and administration

MMS 691 STATISTICS

As Applicable

MGS 610 GEOGRAPHY

As Applicable

MHT 613 INTRODUCTION TO TRAFFIC ENGINEERING

Urban network, route and mapping, safety management, road traffic organization, traffic rules, weighing bridge function, link and bridges, accidents control mechanism, transport policy, congestion forecast and network expansion.

MHT 603 INTRODUCTION TO COMMERCIAL SHIPPING

Principles of shipping, ship and shipping, origin of trade, ship board operation, navigation and voyage planning, Cargo survey, Cargo broking, freight forwarding, ship chartering, shipping operation

MST 606 MARITIME ENVIRONMENTAL PROTECTION & PORT SAFETY

Casses of General Environmental Pollution Especially Marine Pollution and Effects. General outline and the main provision of the International Convention For the Prevention Pollution from Environment Especially ships 1973- As modified by the protocol of 1978 [MARPOL]. Recent Developments in Tanker Design Aimed at preventing Accidental Oil Pollution. Principles coastal Zone Management Contingency Plan for oil Spill Response, Safety and Security Management

MST 656 PORT LOGISTICS

Inventory management, Nature and Intensity of operations, Storage and ware housing, types of cargos, types of haulage, traffic, port Logistics, high way distribution, tonnage, cost, charges freight, destination measurement, clearing operation and types of port facilities, ETC.

MHT 611 OCEAN TECHNOLOGY

Steering electronics, weather reading, weather forecast, tide and draft, maritime jurisdiction, vessels and crafts, radar, chart, wind forecast, high sea hazards, masts, international codes, fisheries technology, territorial sea and environment.