UNIVERSITY OF PORT HARCOURT

Faculty of Engineering

Department
of
Mechanical Engineering

Student Handbook
B.Eng. Degree Programme

2015 – 2019

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Brief Historical Background 1

Mechanical Engineering is one of the broadest of the engineering disciplines. In University of Port Harcourt, the Department of Mechanical Engineering was established in 1986 as the last of the five (5) Departments in the Faculty of Engineering. Studying Mechanical Engineering offers students a wide choice of options in industry. The University of Port Harcourt produced its first graduates in Mechanical Engineering in 1991/92 session.

The undergraduate programme in Mechanical engineering is for a minimum duration of five (5) academic years and a maximum duration of seven (7) academic years. On successful completion of the programme and fulfillment of other University requirements, a Bachelors of Engineering degree in Mechanical Engineering (B.Eng., Mech. E) is awarded.

The Department has made three revisions of the courses it offers in its programme of study since inception to keep

abreast with the dynamics of the profession as well as to meet the requirements of both the Council for the Regulation of Engineering in Nigeria (COREN), the National University Commission (NUC) and the University Senate.

The academic staff strength of the Department grew from two (2), at inception, to twenty nine (29) at present. The physical facilities (laboratories and workshops) have also improved significantly over the years. The undergraduate programme of the Department currently enjoys full accreditation from both COREN and NUC.

The Department also supports postgraduate programmes leading to Masters of Engineering in Mechanical Engineering (M. Eng, Mech. Engr.) with options in Applied Mechanics and Design, Engineering Materials Design, Industrial and Production Engineering, and Thermofluid Engineering, and Doctor of Philosophy in Mechanical Engineering (PhD, Mech. Engr.).

1.1 Vision Statement

The Department of Mechanical Engineering, University of Port Harcourt, shall be a centre of excellence in producing well-trained mechanical engineering graduates and in conducting applied research and development in Nigeria and the world, by attracting and retaining high quality staff and admitting and teaching the best students from across the country and the world.

1.2 Mission Statement

The Department of Mechanical Engineering shall:

(i) provide high quality education to the best brains from the locality, Nigeria and the world at large;

(ii) engage in applied research, design and development to aid local and national industries and thus, foster the industrialization of Nigeria;

(iii) expand the available product line to include new undergraduate and postgraduate programmes so as to more fully satisfy societal needs;

(iv) diversify the available product line by establishing and running an Integrated Industrial Centre (IIC) for the development and production of mechanical

engineering and allied products (components and systems) to meet immediate, short-and medium-term needs of the locality; and

(v) foster Engineering professional practice in Nigeria through active participation in the activities/programmes of, and strict adherence to the regulation of both the Council for the Regulation of Engineering in Nigeria (COREN) and the Nigerian Society of Engineers (NSE).

Academic Policies 2

The following academic policies govern the Mechanical Engineering degree programme:

2.1 Highlights

The following extracts have been taken from the document "Statement of Academic Policies, University of Port Harcourt 2014". This document was issued first in 1977, revised in 1983 to reflect the reorganization from a School a Faculty-Department system; and revised in 1990 to reflect changes in line with the NUC Minimum Academic Statements. The present revision reflects changes made by Senate in 1995 and from 2002 to 2014. Students are advised to familiarize themselves with this document.

The last section of this Chapter: General Remarks have been included to alert the fresh student on the implications of the new grading system in relation to his/her final degree classification, and the virtue of and reward for hard work,

honesty and abstinence from vices: examination malpractice and cultism.

2.2 Entry Requirement

Credit passes at the SSCE, WASC/GCE O-Level, NECO in English, Mathematics, Chemistry, Physics, and any one of Biology, Agric. Science, Technical Drawing, Further Mathematics.

The minimum admission requirements for entry into the 5-year Bachelor of Engineering Degree programmes are five 0-level credits which must include English Language, Mathematics, Physics, Chemistry or equivalent qualifications. Also, required is a score in JAMB not below the cut-off point for the particular department in the year in question.

2.3 Registration of Courses

Every student is required to register for all courses during the time stipulated which is usually within the first week of resumption, except where otherwise indicated. Students who cannot register during the specified time may however, register later but all registration exercise must be completed within the time allowed for late registration.

Course registration is the responsibility of the student's parent department. The Head of Department signs for all the courses registered. In registering students, the parent Department should ensure that students re-register for all previously failed courses in which the programme requires a pass and meet the prescribed requirements for each course registered; furthermore, that the total credit units registered are not less than 15 nor more than 24 semester.

Any registration completed after the time specified will be null and void and will not be credited to the student even when he/she has taken and passed the examination in the course. Students are not allowed to sit for examinations in courses for which they have not previously registered. Such actions are fraudulent and culprits will be appropriately disciplined.

Any genuine request for late registration must be made in writing to the Head of Department, and a late registration fee, whose amount is reviewed each year in line with the cost of living, must be paid to the Bursary. Forms for late registration will be given out only when the appropriate receipt is documented on the form.

Application for adding or dropping a course must be made on the prescribed Add/Drop Form and certified by the Registrar after obtaining the approval of the Head of Department concerned, not later than four weeks before the examination in each semester. Any change of course made by altering the registration form will be null and void.

2.5 Grading System

The following system of Grade Points shall be used for all Mechanical Engineering courses:

Mark/score	***Letter Notation***	***Grade Point (GP)***
70% & above	**A**	**5.00**
60-69	**B**	**4.00**
50-59	**C**	**3.00**
45-49	**D**	**2.00**
40-44	**E**	**1.00**
0-39	**F**	**0.00**

Students are obliged to sit for examinations in all registered courses. Any student who fails to sit for a course examination without satisfactory reason earns the grade of "F".

2.5 Computation of Grade Point Average

Every course carries a fixed number of Credit Units (CU); one Credit Unit being when a class meets for one hour every week for one semester, or three hours every week in the laboratory, workshop or field. Quality Points (QP) are derived by multiplying the Credit Units for the course by the Grade Points (GP) earned by the student: e.g. in a course with 3 Credit Units in which a student earned a B with 4 Grade Points, the Quality Points are: 3 x 4 = 12.

Grade Point Average (GPA) is derived by dividing the Quality Points for the semester by the Credit Units for the semester: e.g. in a semester where the student earned 56 Quality Points for 18 Credit Units, the GPA is: 56/18 = 3.11.

Cumulative Grade Point Average (CGPA) is derived by adding the Total Quality Points (TQP) to date and dividing by the Total Credit Units (TCU) to date: e.g. if the TQP are 228 and the TCU are 68, the CGPA is: 228 ÷ 68 = 3.35.

Detailed example of how to calculate GPA and CGPA is as presented in Table 2.1 below:

Table 2.1: Typical GPA – CGPA computation

First Year, Semester One

Course Code	Credit Units (CU)	Letter Grade	Grade Points (GA)	Quality Points (QP)	Grade Point Average (GPA)	Cumulative Grade Point Average (CGPA)
APC100	3	B	4	12	QP = 66 CU = 17 GPA = 66 ÷ 17 = **3.88**	TQP = $\sum QP$ = 66 TCU = $\sum CU$ =17 CGPA = 66/17 = **3.88**
APC101	2	C	3	6		
APC102	1	C	3	3		
APC103	4	B	4	16		
APC104	5	A	5	25		
APC105	2	D	2	4		
Total	**17**			**66**		

First Year, Semester Two

Course Code	Credit Units (CU)	Letter Grade	Grade Points (GA)	Quality Points (QP)	Grade Point Average (GPA)	Cumulative Grade Point Average (CGPA)
APC106	5	E	1	5	QP = 48 CU = 20 GPA = 48 ÷ 20 = **2.40**	TQP = $\sum QP$ = 66 +48 = 114 TCU = $\sum CU$ =17 + 20 = 37 CGPA = 114/37 = **3.08**
APC107	4	D	2	8		
APC108	5	B	4	20		
APC109	3	F	0	0		
APC110	3	A	5	5		
Total	**17**			**66**		

NB: The procedure is repeated for the 2nd, 3rd, 4th and 5th years, giving rise to CGPA computation at graduation.

The following points are noteworthy for GPA-CGPA computation:

(i) Grades obtained in all approved courses of a student's prescribed programme, excluding audited courses, shall be used to compute the GPA.

(ii) Where a student has registered more than the allowed number of free elective courses, only the grades obtained in the allowed number of elective courses, chosen in the order of registration, will be used in computing the CGPA. Other elective courses will be treated as audited courses and will not be used in calculating the CGPA.

(iii) Where a student was registered for a course but the result is unavailable, due to no fault of the student, no result will be recorded for that course and the student will re-register for it in the next academic year.

(iv) When a student transfers from one Faculty to another, only the grades obtained in the courses in the new prescribed programme of study will be used to compute the CGPA. Courses which were completed

before the change of programme and which are not part of the new prescribed programme will be treated as audited courses.

2.6 Continuation, Probation and Withdrawal

The essential points on the subject matter are as highlighted below:

(i) **Continuation Requirement**

The continuation requirement in the University is a CGPA of 1.00 at the end of every academic year.

(ii) **Probation**

Probation is a status granted to a student whose academic performance falls below an acceptable standard. A student whose Cumulative Grade Point Average (CGPA) is below 1.00 at the end of a particular year of study earns a period of probation for one academic session

(iii) **Limitation of Registration** (for students on probation)

Students on probation may not register for more than 18 units per semester. The purpose of the

restriction is to give the students a chance to concentrate on improving their performance and thus raising their CGPA.

(iv) **Warning of Danger of Probation**

Students should be warned by their Department if at the end of any semester their GPA falls below 1.00

(v) **Repeating Failed Course Unit(s)**

Subject to the conditions for withdrawal and probation, a student must repeat the failed course unit(s) at the next available opportunity, provided that the total number of credit units carried during that semester does not exceed 24, and the Grade Points earned at all attempts shall count towards the CGPA.

(vi) **Temporary Withdrawal from Study**

A student may apply for temporary withdrawal from study for a period of one year which may be renewed up to a maximum of two (2) years.

(vii) **Withdrawal**

A student whose Cumulative Grade Point Average is below 1.00 at the end of one year's probation shall be required to withdraw from the programme.

2.7 Auditi ng of Courses

Students may attend a course outside their prescribed programme. The course shall be recorded in their transcript only if they have registered for it with the approval of the Head of their Department and the Dean of their Faculty and taken the prescribed examination. An audited course shall not be used in calculating the CGPA.

2.8 Classification of degrees

The degree shall be awarded with 1st, 2nd Upper, 2nd Lower, or 3rd Class Honours, or as a Pass degree. The Cumulative Grade Point Average (CGPA) for these classes shall be:

	Cumulative Grade Point Average (CGPA)	
Class of Degree	New Students*	Old Students*
1st Class	4.50 – 5.00	4.50 – 5.00
2nd Class Upper	3.50 – 4.49	3.50 – 4.49
2nd Class Lower	2.40 – 3.49	2.40 – 3.49
3rd Class	1.50 – 2.39	1.50 – 2.39
Pass		1.00 – 1.49

Old Students are those enrolled in second or higher level course in the 2013/2014 session.

New students are those enrolled in the first year of the degree programme in the 2013/2014 session and after. In line with directive of the National Universities Commission (NUC), with effect from the new intake of 2013/2014 academic session, the classification of First Degree in Nigerian Universities terminates at Third Class. In other words, "Pass" Degree has been abolished.

2.9 COURSES Taught

Course Title and Code

Year One

First Semester

Course Code	Course Title	L	P	C
GES 100.1	Communication Skills in English	3	-	3
GES 102.1	Introduction to Logic and	2	-	2

	Philosophy			
CHM 130.1	General Chemistry I	2	3	3
PHY 101.1	Mechanics and Properties of Matter	3	-	3
PHY 102.1	Physics Laboratory I	-	3	1
MTH 110.1	Algebra and Trigonometry	3	-	3
MTH 120.1	Calculus	3	-	3
ENG 101.1	Engineering Drawing I	1	3	2
Total		**17**	**09**	**20**

Second Semester

GES 101.2	Computer Appreciation and Applications	2	-	2
GES 103.2	Nigerian Peoples and Culture	2	-	2
CHM 131.2	General Chemistry II	2	3	3
PHY 112.2	Electricity and Magnetism	3	-	3
PHY 103.2	Physics Laboratory II	-	3	1
MTH 124.2	Coordinate Geometry	3	-	3
ENG 102.2	Engineering Drawing II	1	3	2
ENG 103.2	Engineer-in-Society	1	-	1
ENG 104.2	Manufacturing Tech./Workshop Practice	1	3	2
Total		**15**	**12**	**19**

Year Two

First Semester

PHY 216.1	Vibration, Waves and Optics	3	-	3
ENG 201.1	Engineering Mathematics	3	-	3
ENG 202.1	Engineering Mathematics II	2	-	2
ENG 203.1	Engineering Mechanics	3	-	3
ENG 204.1	Basic Engineering Materials	2	-	2
ENG 205.1	Engineering Laboratory I	-	9	3
ENG 213.1	Computer Programming for Engineers	1	3	2
MEG 251.1	Machine Drawing I	-	3	1
Total		**14**	**15**	**19**

First Semester Break

MEG 200.0	Intro. to Manufacturing Processes	-	6	2

Second Semester

CHM 240.2	Physical Chemistry I	2	3	3
ENG 206.2	Engineering Mathematics III	3	-	3
ENG 207.2	Basic Fluid Mechanics	2	-	2
ENG 208.2	Basic Strength of Materials	2	-	2
ENG 209.2	Basic Thermodynamics & Heat Transfer	3	-	2
ENG 210.2	Basic Electrical Engineering	3	-	3
ENG 211.2	Engineering Laboratory II	-	3	1
ENG 212.2	Community Service	-	3	1
MEG 202.2	Basic Software Engineering	1	3	2
MEG 252.2	Machine Drawing II	-	3	1
Total		**16**	**21**	**21**

Year Three

First Semester

ENG 301.1	Engineering Mathematics IVB	3	-	3
ENG 302.1	Technical Writing and Presentation	2	-	2
MEG 301.1	Fluid Mechanics II	2	-	2
MEG 303.1	Strength of Materials II	2	-	2
MEG 305.1	Theory of Machines and Mechanics	3	-	3
MEG 307.1	Engineering Thermodynamics	2	3	3
MEG 309.1	Basic Metallurgy & Materials Selection	2	3	3
MEG 311.1	System Instrumentation	3	-	3

Total		**19**	**06**	**21**

First Semester Break

MEG 300.0	System Instrumentation Workshop Practice	-	3	1

Second Semester

GES 300.2	Fundamentals of Entrepreneurship	2	-	2
ENG 303.2	Engineering Mathematics V	2	3	3
MEG 302.2	Fluid Mechanics III	2	-	2
MEG 304.2	Mechanical Engineering Design I	1	3	2
MEG 306.2	Manufacturing Processes	2	-	2
MEG 308.2	Engineering Materials Production	2	-	2
MEG 310.2	Heat and Mass Transfer	2	3	3
MEG 312.2	Mechanics of Machines	2	-	2
MEG 352.2	Mechanical Engineering Laboratory I	-	9	3
Total		**15**	**18**	**21**

Long Vacation

ENG 300.3	Industrial Training I	Pass/Fail

Year Four

First Semester

ENG 401.1	Engineering Mathematics VI	3	-	3
ENG 402.1	Engineering Economics	2	-	2

EEE 404.1	Electrical Machines	3	-	3
MEG 401.1	Mechanical Engineering Design II	1	3	2
MEG 403.1	Computer-Aided Design & Manufacturing	1	3	2
MEG 405.1	Principles of Automotive Engineering	2	-	2
MEG 407.1	Principles of Air-cond. & Refrig. Eng.	3	-	3
MEG 451.1	Mechanical Engineering Laboratory II	-	6	2
MEG 453.1	Air-cond. & Automotive Workshop Practice	-	3	1
Total		**15**	**15**	**20**

Second Semester and Long Vacation

ENG 400.2	Industrial Training II	9	-	9
GES 400.2	Fundamentals of Entrepreneurship	2	-	2
	Total	11	-	11

Year Five

First Semester

ENG 501.1	Professional Practice and Procedure	2	-	2
ENG 502.1	Engineering Management	2	-	2
MEG 503.1	Principles of Industrial Engineering	2	-	2
MEG 505.1	Mechanical Vibration and Noise	2	-	2

MEG 507.1	Mechanical Engineering Design III	1	6	3
MEG 551.1	Mechanical Engineering Laboratory III	-	6	2
MEG 561.1	Technical Seminar	-	3	1
MEG 5xx.1	Technical Elective I	3	-	3
MEG 5xx.1	Technical Elective II	3	-	3
Total		**15**	**15**	**20**

Second Semester

MEG 500.2	Final Year Project	-	18	6
MEG 502.2	Control Engineering	2	3	3
MEG 504.2	Theories of Elasticity and Plasticity	3	-	3
MEG 506.2	Applied Thermofluids	2	-	2
MEG 508.2	Power Plant Engineering	3	-	3
MEG 5xx.2	Technical Elective III	3	-	3
Total		**13**	**21**	**20**

Technical Electives (3 Credit Units each)

MEG 531.1	Air-conditioning Engineering
MEG 533.1	Refrigerating Engineering
MEG 535.1	Automotive Engineering
MEG 537.1	Production Engineering
MEG 539.1	Quality and Reliability Assurance
MEG 532.2	Ind. Ventilation & Air Pollution Control Systems
MEG 534.2	Vehicle Dynamics
MEG 536.2	Numerical Control Machine Tools

MEG 538.2 Computational Transport Phenomenon
MEG 540.2 Building Services Engineering

Related courses from other Engineering or Science Departments may be accepted, with the academic adviser's approval, as Technical Elective.

Course Outline

GES 100.1: Communication Skills in English (3 Credits)

Study skills and methods including use of language and use of the library. Listening comprehension skills. Reading skills. Using grammar in reading and writing. Writing skills. Examination techniques.

GES 101.2: Computer Appreciation and Applications (2 Credits)

History of Computers. Generations and classification of computers. IPO model of a computer. Components of a computer system – hardware and software. Programming languages, organization of data. Data capture techniques. Introduction to computer networks. Software and its application. Use of keyboard as an input device. DOS, Windows, word processing, spreadsheets. Application of computers in Medicine, Social Sciences, Humanities, Education and Management Sciences.

GES 102.1: Introduction to Logic and Philosophy (2 Credits)

The nature, definition and branches of Philosophy. Philosophy and other disciplines. Nature of philosophical problems. Periods in the history of Philosophy. Philosophy and national development. Types of argument and reasoning. Inferences.

GES 103.2: Nigerian Peoples and Culture (2 Credits)

The concept of culture. Pre-colonial cultures and languages of Nigeria. Principles of kinship, descent and marriage in Nigeria cultures. Nigerian economic institutions. Nigerian political institutions. Education and development in Nigeria. Religion in Nigerian culture. Culture, environment and health practices in Nigeria.

GES 300: Fundamentals of Entrepreneurship

The course discusses the Concept, history and the development of entrepreneurship; The Entrepreneur Qualities and Characteristics; The Entrepreneur and Business Environment; Identifying Business Opportunities; Starting and Developing New Business Ventures; Legal Forms of Business Ownership and Registration; Types of Business Ownership; Feasibility Studies; Role of Small and Medium Scale Enterprise (SME) in the Economy; Role of Government on Entrepreneurship; Business Location and Layout; Accounting for SME; Financing SME; Managing of SME; Marketing in SME; Risk.
Management of SME; Success and Failure factors of SME; Prospects and Challenges of Entrepreneurship and Intrapreneurship, Ethical Behaviour in Small Business.

ENG 101.1: Engineering Drawing I (2 Credits)

Introduction to drawing instruments, scales, draughting aids and their proper use. Size of paper and drawing layout. Dimensioning, line work and lettering. Geometrical constructions and Engineering graphics. Development of geometrical figures and intersection of solids and curves. Introduction to projections.

ENG 102.2: Engineering Drawing II (2 Credits)

Orthographic projections in first and third angles. Isometric Projection; sections and sectioning, auxiliary views and staggered sectioning. Freehand sketching. Conventional practices with Simple examples, including threads and threaded fasteners, cam profiles and Assembly drawing from detailed components. Pre-requisites ENG 101.1.

ENG 103.2: Engineer-in-Society (1 Credit)

History of Engineering and technology and the Philosophy of Science. Development of the Engineering industry up to the present day. Safety and health at work. The role of engineers in Nation Building. Food production, housing, transportation, employment opportunities, energy supply, communication and social infrastructure, etc. The choice of Engineering solutions and decision-making process, risk analysis, etc. Lectures by invited professionals.

ENG 104.2: Manufacturing Technology/Workshop Practice (2 Credits)

Manufacturing methods with metal materials (cold and hot workings) such as deep drawing; wire drawing; spinning and rolling; extrusion. Machine-tool manufacture (turning, milling and shaping, etc), Fabrication by welding and threaded fasteners and riveting etc., metal-casting; Manufacture of plastic products (moulding and blowing). Use of hand-tools, bench work and measuring instruments. Fitting and joining processes (soldering, brazing) wood-working and machinery. Surface finishes, forging, etc

ENG 201.1: Engineering Mathematics I Mathematical Analysis (3 Credits)

Functions of several variables: functions of 2, 3 or more variables, partial derivatives, differentials, total differentials, application to approximate computations, Higher-order partial derivatives and differentials. Differentiation of composite, and implicit functions of several variables. Extrema and Conditional extremum. Change of variables. Multiple integrals: Double and triple integrals, analysis in Cartesian coordinates, change of variables to polar, cylindrical, and spherical coordinates, curvilinear coordinates, application to problems of mechanics. Integral dependent on parameters, improper integrals, line integrals, Green's formula, conditions for independence of line integral on path, application of problems of mechanics and thermodynamics. Surface integrals, fluid flux across a surface, properties, Stroke's formula. Field theory, vector field and vector lines. Applied series: Expansion of power series, applications of Taylor's series, Fourier series orthogonal systems of functions, the Parseval's relation. Hilbert space, orthogonality with weight function, Fourier integral, Fourier transformation, applications. Special Functions, Gamma, Beta, Error, Bessel, Legendre and hypergeometric functions. Introduction to analytic functions, Cauchy-Riemann equations, conformal mappings. Pre-requisite: MTH 120.1

ENG 202.1: Engineering Mathematics II (Linear Algebra and Analytic Geometry) (2 Credits)

Surfaces and curves in space, cylinders, cones, and surfaces of revolution. First and second-order algebraic surfaces, ellipsoids, hyperboloids and paraboloids. Systems of linear equations: Determinants, minors and cofactors, evaluation methods. Vector space, linear spaces, Euclidean space, orthogonality, change of basis, inverse matrix, eigenvectors and eigenvalues of a matrix, rank. Linear mappings, symmetric, bilinear and quadratic forms. Differentiation and integration of matrices. Applications of matrix algebra Pre-requisite MTH 110.1 and 124.2.

ENG 203.1: Engineering Mechanics (Statics and Dynamics) (3 Credits)

Basic concepts and principles of mechanics, equilibrium of particles in 2- and 3 – dimensions, moment and couple , system of forces, equilibrium of rigid bodies, friction – wedges, screw, wheel bolts and statically determinate structure - beams, trusses, frames and machines. Linear and curvilinear motions, acceleration, Kinetics of parties, Newton's Second law, impulse , momentum, impact and restitution, work, energy, power and efficiency. Pre-requisite: PHY 101.1 and MTH 120.1

ENG 204.1: Basic Engineering Materials (2 Credits)

Atomic and crystal structures, Crystal imperfections and impurities in solids. Fundamentals of crystallography. Atomic vibrations and diffusion. Mechanical properties – Engineering and true stress – strain curves, ultimate strength, ductility, impact strength, hardness. Electrical properties- conductivity, semi-conductivity and super-conductivity. Optical and magnetic properties of materials. Simple phase diagrams of alloys, with emphasis on the iron-iron carbide system. The relationship between structure and properties. Creep, fatigue. Heat treatment processes. Stability of materials in the services environment – corrosive media, sub-zero and elevated temperatures, irradiation. Basic criteria for the selection of materials for Engineering applications. Engineering properties of wood, concrete, ceramics, polymers, and non-ferrous metals and allovs. Pre-requisite: CHM 131.2 and MATH 124.2

ENG 205.1: Engineering Laboratory I (3 Credits)

Assigned laboratory exercises to reflect the basic Engineering courses in Applied Mechanics, Materials Science, Fluid Mechanics, Strength of materials. Thermodynamics and Heat

transfer. Guidance on specific experiments and calculations will be provided by the various Lecturers.

ENG 206.2: Engineering Mathematics III (Differential Equations) (3 Credits)

Ordinary differential equations; First-order equations, examples of Engineering models, equations with variables separable, Bernoulli's equation; exact equations; the envelops of a family of curves, singular solutions, Clairaut's and Lagrange's equations, orthogonal and isogonal trajectories. Second-and higher-order equations and systems of equations, transformation of higher-order equations to system of first-order equations, first integrals. Linear equations, general theory, boundary value problems. Euler's equations, geometrical and physical interpretation of solutions. Operators and the operator method of solving equations, system of linear equations. Operational calculus, Laplace transform, theory and application to initial-value problems. Introduction to partial differential equations elliptic, hyperbolic and parabolic equations. Pre-requisite: MTH 120.1 and 124.2

ENG 207.2: Basic Fluid Mechanics (2 Credits)

Fluid properties, fluid statics, principles of fluid flow and applications, flow measurements. Real fluid flow, curvilinear flow (2-dimensional). Dimensional analysis and similitude. Pipe flow and friction factors. Boundary layers and drag Pre-requisite: PHY 101.1 and ENG 211.1

ENG 208.2: Basic Strength of Materials (2 Credits)

Force equilibrium – free body diagrams, centroids and second moment of area. Concept of stress and strain; stress-strain diagram. Axially loaded members, composite bars; temperature stresses; relation between elastic constants. Thin cylindrical

spherical and conical pressure vessels, cylindrical shells with rings, torsion of circular shafts and power transmission of shafts. Axial force, shear force and bending moment diagrams. Pure bending of beams, bending stresses in composite beams, shearing stresses in beams, complex stresses; principal stresses. Pre-requisite: ENG 211.1.

ENG 209.2: Basic Thermodynamics and Heat Transfer (3 Credits)

Engineering Thermodynamics: Basic concepts definitions, thermodynamic properties; the thermodynamic system units; equations of state for perfect and real gases, and gas mixtures, thermodynamics work and heat; the First law of thermodynamics, energy equations and analysis; basic thermodynamic processes and cycles for ideal gas, pure substance and mixtures; reactive systems; thermodynamic relations; the Second law of thermodynamics and introduction to irreversible processes. Heat Transfer Basic concepts, heat transfer modes and rate processes. Fourier's law of heat conduction; Newton's law of cooling; Stephan-Boltzmann law of thermal radiation and configuration factor algebra; stationary heat conduction in simple geometries and composite bodies; correlational equations for convective heat transfer, boiling and condensation; heat transfer by combined modes; insulation and intensification of heat transfer; electrical and triple analogies; introduction to heat exchangers. Pre-requisite: PHY 101.1

ENG 210.2: Basic Electrical Engineering (3 Credits)

Circuit elements (R, L, C,) DC and AC circuits and signals Electrostatics and Electromagnetism, Basic circuit laws and theorems. Three phase circuits, power and power factor. Electrical and electronic measurements and measuring instruments. Introduction to machines. Introduction to Electronics; Semi-conductors. Pre-requisite; PHY 101.1

ENG 211.2: Engineering Laboratory II (1 Credit)

Assigned laboratory exercises to reflect the basic Engineering course in Electrical/Electronics. Guidance on specific experiments and calculations will be provided by the Lecturer.

ENG 212.2: Community Service (1 Credit)

Civil works beneficial to the University community and its environs including but not limited to farming, road building and maintenance, landscaping, planting of flowers and hedges, grass-cutting and general cleaning of campus and its environs, concreting and laying of seating and footpath slabs.

ENG 213.1 Computer Programming for Engineers (2 Credits)

Computers, Computing and Engineering, Algorithms, flour chart and pseudo code. Computer languages, programming in Fortran? Or later versions. Debugging techniques. Computer code security. Laboratory: Hands-on experience on computers through the use of Compilers to run programs' and to solve simple analysis problems in fluid, the thermodynamics, heat transfer and electrical systems.

ENG 300.3: Industrial Training I (0 Credit: Pass or Fail)

The practical exposure of the student through direct participation in the work of an industry, to real life working condition. During the training, the student acquires a familiarity with Engineering works, organization. Physical layout, and the flow of information, materials and operations. This information is expected to complement and integrate the student's classroom instruction and laboratory/workshop exercises. Duration: 3 months

ENG 301.1: Engineering Mathematics IV (Probability and Statistics) (3 Credit)

Theory of probability: Motivation, probability models, probability axioms, combinatorial problems. Conditional probability, independence of events, Bernoulli trials. Discrete and continuous random variables, mass, distribution, and generating functions, random vectors, independent random variables, exponential distribution, reliability, failure density, hazard function, some important distributions, functions of two random variables, transform methods, computation of mean time to failure, inequalities and limit theorems. Conditional distribution and expectation, Stochastic process, Bernoulli, Poission, and Renewal processes, availability analysis, random incidence. Introduction to discrete and continuous Markov chains. Measures of central tendency. Statistical inference, parameter estimation, Hypothesis testing. Regression, correlation and analysis of variance. Elements of experimental design. Pre-requisite: ENG 201.1

ENG 302.1: Technical Writing and Presentation (2 Credits)

Data gathering and presentation. Technical correspondence: letters of inquiry and replies, letters of application and memoranda. Illustrating technical writing using tables, graphs, diagrams, equations and appendices. Report writing: progress reports, proposals, students project, thesis and dissertations. Oral and visual presentations. Computer-aided technical writing and presentation; word processing and word-processing software packages.

ENG 303.2: Engineering Mathematics V (Numerical Methods and Computer Applications) (3 Credits)

Review of the number systems and error analysis. Numerical schemes, error analysis, computer algorithms and program for the solution of the following problems of linear equations, determinants and matrix eigenvalue problems; approximations; data fitting, orthogonal polynomials, least-squares, splines and fast Fourier transforms; differentiations and integration;

difference equations; differential equations by Runge-Kutta and other methods; boundary-value problems in ODE. Introduction to the finite-difference method for partial differential equations. Pre-requisite: ENG. 202.1 & ENG. 206.

ENG. 401.1:Engineering Mathematics VI (Mathematical Modeling and Operations Research) (3 Credits)

Basic concept methodology, structures, information support and systems approach. Synthesis, analysis, validation and computer simulation of mathematical methods. Mathematical modeling of engineering problems at micro, micro and meta-levels. Inverse problems; unconstrained and constrained problems. Introduction to Operations Research. Sensitivity analysis; linear, integer, goal, geometric, dynamic, nonlinear and stochastic mathematical programming. Allocation, routing, searching, project scheduling, sequencing, replacement, inventory, gaming and queuing problems. Computer aided mathematical modeling of engineering systems, processes and operations. Application software packages. Pre-requisite: ENG. 206.2, 301.1 & 303.2.

ENG. 402.1: Engineering Economics (3 Credits)

Scope of Engineering investment decisions; compounding, discounting, and economic equivalence; cash flow analysis and inflation. Choosing between alternatives: methods for evaluating investments; depreciation, taxes, and cost of capital; comparing alternative investment; replacement analysis budget and budget control, evaluation of public projects. Decisions and cost analysis; lease-or-by decisions; economic feasibility study of Engineering projects. Computer-aided Engineering economics. Pre-requisite: ENG. 301.1

ENG. 501.1: Professional Practice and Procedures (2 Credits)

Registration of engineering, duties and code of conduct and practice. Ethics, professional responsibilities and practice of

Engineering in Nigeria. Typical problems and solutions in various areas of Engineering. Engineering projects, planning, feasibility studies and their relevance, guide pre-design survey and stages of Engineering design project scheduling. Law: sources and branches of Nigeria Law, courts and tribunals. Law of contracts, the engineer as an expert witness. Industrial legislation concerned with incapacity or injury, working conditions, wages, redundancy, Trade Unions, structure, right and liabilities. Industrial disputes, safety and environmental protection. Pre-requisite: Good academic standing.

ENG. 502.1: Engineering Management (2 Credits)

Organizational structure, goals and functions. Project planning and control. Cost Engineering; capital and operating cost estimating, contingencies and allowances. Production forecasts. Phases and constraints, decline functions. Productivity improvement. Purchasing and materials management. Maintenance management. Contract management. Pre-requisite: Good academic standing.

MEG 200.0 Introduction to Manufacturing Processes (2 Credits)

Workshop practice on: Enhancement of the properties of materials by heat treatment; Foundry and forging practice; Machine work; Joining/Fabrication. Pre-requisite: Good academic standing.

MEG 202.2: Basic Software Engineering (2 Credits)

Review of computers: hardware, peripherals and applications. Information processing; the Babbage engines. Formal languages; the syntax and semantics of programming

languages: Assembly and high-level languages. Design of algorithms: Stepwise refinement, modularity, recursion and parallelism. Data structures: arrays, records, files, lists, stacks and queues. Sorting and searching. Computability, complexity and correctness of algorithms. Computer arithmetic. Introduction to computer architecture. Data processing and application packages. Systems analysis. Computer installations and networks. Software design and implementation in FORTRAN, Pascal and Visual Basic or C involving practice in DOS and Windows environments.

Laboratory: Laboratory sessions emphasise hands-on computer practice. Pre-requisite: GES 101.2 and ENG 213.1

MEG 251.1: Machine Drawing 1 (1 credit)

Review of joints – permanent and separable and shaft fittings. Advanced problems in development of curved surfaces and intersections. Complicated working drawings of machine components. Machine drawings of units and assemblies. Pre-requisite. ENG 102.2.

MEG 252.2: Machine Drawing II (1 Credit)

Assembly and working drawings of bearings, gears, valves, engine details and other units of machines. Fits, limits and tolerances and their specifications. Intechangeability requirements for machine units and assemblies. Introduction to Computer Graphics.

MEG 301.1: Fluid Mechanics II (2 Credits)

Continuity, energy and momentum equations and their applications. Ideal flow, vorticity, potential and stream functions,

irrotational flows, flow fields. Viscous flow, Prantdl mixing length, fluid resistance: laminar and turbulent, flow through pipe systems. Boundary layer theory, drag on immersed bodies. Lift aerofoil theory. Compressible flow, 1-D isentropic flow, venturies and orifices, De-Laval nozzle, shock waves. Fanno and Rayleigh flows, isothermal flow. Introduction to Turbomachinery, cavitation. Pre-requisite: ENG 207.2

MEG 300.0: System Instrumentation Workshop Practice (1 Credit)

Intensive practice covering the following topics: Basic tools. Measuring instruments and sensing devices; transducers and attenuators. Indentification, symbols and testing of electronic components. Circuit diagrams and processes. Construction and testing of power supplies, amplifiers, thermocouples, simple control systems, CCTV monitoring systems, power inverters and motor-driven control systems. Projects. Co-requisite; MEG 311.1.

MEG 302.2: Fluid Mechanics III (Turbomachinery) (2 Credits)

Unified principles underlying the design of pumps, turbines, compressors and fans. Similarity and scaling laws. Cavitation. Aerodynamic analysis and design of axial flow and radial flow compressors, steam and gas turbines. Meridional flow analysis for general equilibrium. Centrifugal compressor modeling; unsteady flow; rotating stall and surge. Turbomachinery selection. Computer aided turbomachinery design and selection.

Laboratory: Laboratory sessions involve experimentation/testing of fluid flow machines and networks. Pre-requisite: MEG 301.1

MEG 303.1: Strength of Materials II (2 Credits)

General state of stress and strain at a point. Bening of beams with unsymmetrical sections, skew bending, bending of curved bars, thin plates, beams on elastic foundations. Torsion of thin walled sections. Statically indeterminate systems and stability analysis. Introduction to plastic behaviour of materials, elastic, perfectly plastic and strain hardening materials, linear viscoelastic materials, theories of failure. Problems in stress analysis; thin shells of revolution, pressure vessels, stresses due to shrinkage fit, concentrated forces, contact stresses. Computational methods and software design for analysis of strength of the materials. Pre-requisite: ENG 208.2

MEG 304.2: Mechanical Engineering Design I (2 Credits)

The design process. Reliability and economics in design for production, strength, wear and material consideration. Review of the basic types of force systems and stresses encountered in design. Design of keys and pins, bolted riveted, welded, brazed and bonded joints. Design of springs and cast structures. Review of interchangeability problems. Design of thin pressure vessels, tanks, and thick walled vessels. Computer algorithms and programs for designing mechanical components. Design Projects.

Laboratory: Laboratory sessions are individual/group projects on design of basic mechanical components using computer and

manual drafting facilities. Completed design projects are properly presented and assessed. Pre-requisite: ENG 208.2, MEG 303.1 and MEG 309.1.

MEG 305.1: Theory of Machines & Mechanisms (3 Credits)

Concepts of mechanisms, linkages, kinematic pairs, kinematic chains and kinematic inversion. Types of mechanisms, slider crank mechanisms. Kinematic and kinetic analysis; coupler curves, velocity and acceleration, static and dynamic forces. Kinematic synthesis, computer techniques. Cam design. Theory of involute gearing; simple, compound and epicyclic gear trains. Dynamics of rotating and reciprocating machines; static and dynamic balancing of machines. Balancing of rotating masses, governors. Computer algorithms and programs for analysis of machines and mechanisms. Design projects. Pre-requisite: ENG 203.1.

MEG 306.2: Manufacturing Processes (2 Credits)

Review of the basic manufacturing processes: solid state, plastic, material removal and forming. Mechanics of metal cutting and machining. Tools, speeds and feeds in machining, cutting tool geometry, tool signature. Drilling and reaming. Multipoint cutting tools. Grinding wheels. Tool failure and tool wear mechanisms. Cutting fluids. Machinability. Drilling, planning and milling machines-block diagrams. Surface finish of machine parts. Production, turning and milling operations and machines. Gear cutting broaching, sawing. Production grinding, tool and cutter grinding, surface and abrasive belt grinding. Precision and surface finishing, lapping, horning, polishing and buffing.

Chipless material removal processes. Compute algorithms and programs for the design and control of manufacturing processes. Pre-requisite: Good academic standing.

MEG 307.1: Engineering Thermodynamics (3 Credits)

Review of the Second Law of thermodynamics: entropy, availability, irreversibility, Helmoholtz and Gibbs functions. Gas and vapour cycles-ideal and modified. Imperfect gases. Relations between thermodynamic properties. Mixtures of gases and vapour. Reactive systems. Gas compressors, turbines and jet engines. Reversed cycles. Nozzles and diffusers. Thermodynamics of irreversible processes. Computational methods, computer algorithms and programs for energy audit and other thermodynamic analysis.
Laboratory: Laboratory sessions are based on materials covered in this course. Pre-requisite: ENG 209.2.

MEG 308.2 Engineering Materials Production (2 Credits)

Metal casting technology: Introduction to the basic elements in foundry practice-pattern making, moulding, melting and pouring. Principles of solidification of metals and alloys, design of gates and risers, design of castings. Metal working and fabrication techniques: rolling, extrusion, forging, wire drawing, welding, brazing, soldering, riveting. General techniques of production and processing of glasses, ceramics, polymers and composite materials. Powder metallurgy. Engineering applications of non-metals. Failure analysis. Computer-aided materials production. Pre-requisite: MEG 309.1

MEG 309.1: Basic Metallurgy and Materials Selection (3 Credits)

The scope of Metallurgy: Metallurgical operations in Nigeria. Modern metallurgical processes and operations. Extracting metals from ores. The manufacture of steel products, identification and selection of iron and steel and other non-ferrous metals. Heat treatment equipment and procedures. Theories of corrosion and oxidation. Corrosion prevention, measurement and monitoring. Evaluation of the relevant factors in materials selection, technical and economic considerations. Materials for structural, high-temperature, cryogenic, electrical, electronic and nuclear applications. Principles and economics of recycling. Computer-assigned materials selection.

Laboratory: Laboratory sessions are based on materials covered in this course. Pre-requisite: ENG. 204.1

MEG 310.2: Heat and Transfer (3 Credits)

Steady and unsteady state heat transfer in 1-, 2- and 3-dimensional geometries. Systems with heat source. Heat transfer in extended surfaces. Combined modes. Mass diffusion. Convective heat and mass transfer. Analogy between momentum, heat and mass transfer. Forced and free convection in ducts and over surfaces. Evaporation and condensation. Heat radiation. Radiation heat transfer between black bodies and between ray surfaces. Configuration factor algebra. Radiation shields, radiation from gases and vapours. Heat exchangers. Thermal design of heat and mass exchangers. Computational methods. Computer algorithms, programs and software packages for Heat and Mass Transfer analysis.

Laboratory: Laboratory sessions are based on materials covered in this course. Pre-requisite: ENG 209.2

MEG 311.1: System Instrumentation (3 Credits)

General characteristics of measuring systems; error analysis. Mechanical instrumentation: Interferometry; dimensional and angular measurement; assessment of surface finish; measurement of strain, time, speed, acceleration, frequency, force, power, pressure, fluid flow and temperature. Intelligent instrumentation: sensing elements, transducers and interfaces; analog-digital data sampling and conversion; semiconductor devices; oscillators; amplifiers; filters and rectification process; logic gates and switching devices; microprocessors and control; computer hardware and peripheral. Pre-requisite: ENG 210.2 Co-requisite: MEG 300.0

MEG 312.2: Mechanics of Machines (3 Credits)

Friction, wear and lubrication; applications in kinematics, selection of power screws, belt and rope drives, chains, brakes and clutches. Hydrodynamic and hydrostatic lubrication; journal bearings, Reynolds equation, graphical solutions, oil and gas bearings. Hydrodynamic drives; torque converters. Vibrations. Computational procedures and software packages for the analysis of tribological problems.

Laboratory: laboratory sessions are based on materials covered in this course. Pre-requisite; MEG 305.1

MEG 352.2: Mechanical Engineering Laboratory I (3 Credits)

Laboratory experiments on strength of materials, metallurgy, materials production, and manufacturing processes.

MEG 401.1: Mechanical Engineering Design II (2 Credits)

Shafting and the design of shafts and axles, pulleys and belt drives. Design of gears, gear tooth loads, surface strength and wear. Spur, helical, worm and bevel gear design. Bearings and bearing selection. Design of miscellaneous machine components. Design procedures, computer algorithms, programs and software packages for design for machine elements.

Laboratory: Laboratory sessions are individual/ group projects on design of major machine elements using computer and manual drafting facilities. Completed design projects are properly presented and assessed. Pre-requisite: MEG 304.2

MEG 403.1: Computer-Aided Design & Manufacturing (2 Credits)

Review of computer hardware and software. Introduction to CAD/CAM and Computer integrated Manufacturing (CIM). Geometric modeling. Engineering analysis. Automated drafting and manufacturing systems. Work piece handling. Continuous and intermittent transfer. The general mechanism. Programmable controllers and their programming. Numerical control and robotics, motion control, linear and circular interpolation. Programming numerically control machines. Basic concepts of robotics.

Laboratory: Practice using AUTOCAD for computer-aided drafting. CNC part programming to manufacture selected jobs

using computer. Design analysis and drafting with Personal Computers. Pre-requisite. Good academic standing.

MEG 405.1: Principles of Automotive Engineering (2 Credits)

Review of thermodynamics cycles of internal and external combustion engines; theoretical and actual cycles. Spark ignition and compression ignition engines. Cycles of supercharged and turbocharged engines. Operating principles of two stroke and four stroke engines. Principles of carburetor and diesel fuel injection systems. Combustion in internal combustion engines. Microprocessors in automotive engines. Computer-aided analysis. Pre-requisite. ENG 209.2.

MEG 407.1: Principles of Air-conditioning and Refrigerating Engineering (3 Credits)

Refrigeration: Production of low temperatures. Applications of the Second Law. Thermodynamics of vapour compression: vapour compression cycle, Pressure-Enthalpy diagram and analysis, standard rating cycle and effect of operating conditions, actual compression cycle. Refrigerants: designation, selection, and requirements; secondary refrigerants; binary mixture. Introduction to multipressure systems. Vapour absorption systems. Ejection-compression system. Air-conditioning: Properties of moist air. Psychrometric properties. Psychrometric processes in air-conditioning equipment. Simple air-conditioning systems and state and mass rate of supply air. Summer and winter air-conditioning. Design conditions. Introduction to ventilation. Aspects of design and application of air-conditioning and refrigerating systems. Microprocessors in system controls.

Computer-aided system design and analysis. Pre-requisite: Good academic standing.

MEG 451.1: Mechanical Engineering Laboratory II (2 Credits)

Laboratory experiments on electrical machines, machine elements, automotive engineering, air-conditioning, refrigeration and ventilation.

MEG 453.1: Airconditioning and Automotive Workshop Practice (1 Credits)

General shop practice, use of tools, safety requirements and service operations for airconditioning and refrigeration and automobile workshops. Airconditioning and Refrigeration Practice: Evaluation and charging, units, fans and air distribution systems, evaporators and condensers. Troubleshooting. Automobile practice: Engine diagnosis, servicing valves and valve train, cylinder block, crankshaft, bearings, connecting rod, piston and rings, cooling system, fuel systems and ignition systems, frame and suspension system, steering system, braking system, clutch and power transmission systems and drive shafts. Lubrication. Pre-requisite: MEG 405.1 & 407.1.

MEG 500.2: Final Year Project (6 Credits)

An individually supervised research / design project on any mechanical engineering (or related) subject chosen by the student-Lecturer team. Pre-requisite; Good academic standing.

MEG 502.2: Control Engineering (3 Credits)

Mathematical models of systems. Analogous electrical circuits. Transfer functions and Laplace transforms in simple and multi-

loop control systems. Servomechanisms, components transfer functions and analysis. Mechanical, electrical, hydraulic and thermal control systems. Steady and transient state analysis and frequency response. Root Loci. Bode and Nyguist plots. Stability of linear systems. Control system design. Non-linear control systems, computers controls. Simulation of control systems.
Laboratory: Laboratory sessions are based on materials covered in this course. Pre-requisite; Good academic standing.

MEG 503.1: Principles of Industrial Engineering (2 Credits)

A brief history of Industrial Engineering. Plant layout and organization of industry. productivity analysis, production fundamentals and manufacturing economics. Quality control, inventory control, cost control, Operations planning and control. Financial compensation. CAD/CAM, robotics and automation. Ergonomics. Resource management.
Application of operations research techniques to Industrial Engineering problems. Computer methods and software packages for industrial Engineering analysis. Pre-requisite: Good academic standing.

MEG 504.2: Theories of Elasticity and Plasticity (3 Credits)

Three dimensional analysis of Hooken stress and strain in Cartesian and curvilinear co-ordinates and applications to axi-symmetric problems. Equations of equilibrium and compatibility. Stress function. Applications to Engineering problems-beams, rings, concentrated loads. Introduction to the theory of plates and shells. The laws of plastic flow. Theories of plastic failure. Plastic bending and torsion. Application to metal-working processes and thick pressure vessels. Pre-requisites. Good academic standing.

MEG 505.1: Mechanical Vibration and Noise (2 Credits)

Detailed treatment of the one-degree-of-freedom systems in mechanical vibrations. Multi-degree-of-freedom systems by receptance and impedance methods; selected topics, including rigid body vibrations on elastic soils and perturbation methods of non-linear vibrations. Vibration and Noise control. Computer-aided vibration and noise analysis and control. Pre-requisite: Good academic standing.

MEG 506.2: Applied Thermofluids (2 credits)

Thermodynamics of irreversible processes; the exergy methods. The Navier-Stokes equations; approximate solution methods. Unified equations of heat and mass diffusion and convection; analytical solution methods. Numerical solution of thermofluid problems by finite difference method. Selected topics in thermofluids. Computer-aided design of thermofluid systems. Pre-requisite: Good academic standing.

MEG 507.1: Mechanical Engineering Design III (3 Credits)

Methods of systems analysis and synthesis applied to complete machines and systems of interest to the mechanical engineer. Algorithms, computer programs for mechanical systems design. System design projects taken from the local industry, mechanical Engineering case studies and applications of lecture material.

Laboratory: Laboratory sessions are individual/ group projects on design of mechanical Engineering systems using computer and manual drafting facilities. Completed design projects are properly presented and assessed. Pre-requisite. MEG 401.1.

MEG 508.1: Power Plant Engineering (3 Credits)

The world and Nigeria's energy demands. Methods of electrical power generation. Steam power generation cycles, steam generators and turbines, condensers, water heaters, pumps and auxiliaries. Gas power generation cycles, gas turbines, combustors and auxiliary equipment. Nuclear power generation. Hydropower generation. Alternative energy sources and their power cycles. Energy storage. Economics of power generation. Computer-aided power plant Engineering, Industrial visits to at least one each of the hydro-, steam- and gas-turbine power stations in the country. Pre-requisites: Good academic standing.

MEG 531.1: Airconditioning Engineering (3 Credits)

Advanced psychrometry and airconditioning processes. Design conditions. The flow of air in duct systems. Airconditioning equipment. Airconditioning systems. Solar radiation. Heat transfer in building structures. Load calculation. Design of airconditioning units. Transmission and distribution of air. Fans. Automatic control. Applications. Computer-aided design and analysis of airconditioning units and systems. Pre-requisite: MEG 407.1.

MEG 532.2: Industrial Ventilation and Air-Pollution Control System (3 Credits)

The role air pollution control in modern society. Scope and nature of industrial ventilation and air-pollution control. Dynamics of particles in fluids. Pollutant distribution and collection efficiencies. Design of industrial ventilation systems. Setting chambers. Inertial devices. Electrostatic precipitators. Particulate scrubbers. Filters. Absorption and adsorption devices. Combustion and condensation devices. Computer algorithms

and programs for design and analysis of ventilation and pollution control systems. Pre-requisite: Good academic standing.

MEG 533.1 Refrigerating Engineering (3 Credits)

Multipressure systems. Refrigerant compressors and their design, performance and selection. Design of refrigerant condensers, expansion devices and evaporators. Complete vapour compression system. Gas cycle refrigeration. Vapour absorption systems. Ejector-compression system. Refrigeration control systems. Application. Computer applications in refrigerating engineering. Pre-requisite: MEG 407.1.

MEG 534.2 Vehicle Dynamics (3 Credits)

Characteristics of motor vehicle engines. Internal resistance. Direct and reverse transmission efficiency. Rolling resistance an air resistance. The dynamic characteristics of a motor vehicle during starting, acceleration, and braking. Stability and steereability of a motor vehicle. Computer-aided vehicle dynamics. Pre-requisite; MEG 535.1.

MEG 535.1: Automotive Engineering (3 Credits)

The cooling, lubricating, ignition and fuel supply systems. Valves and valve train design, operating mechanism and valve timing. Engine cylinder block and head design. Pistons and connecting rods. Crankshaft and engine balancing. The automobile, body, chassis and engine design. Frame and suspension systems. Steering, braking and transmission systems. Drive shafts, differentials and axles. Analysis and design algorithms and

programs for computer treatment of automotive Engineering problems. Pre-requisite: MEG 405.1

MEG 536.2: Numerical Control Machine Tools (3 Credits)

The basic design structure of numerical control (NUC) machine tools. Open-and-close-loop NC. Input media and data coding in NC. Point to point manual programming. Economics of NC and selection of machines. NC manual part programming for manufacturing jobs requiring linear and circular interpolations. Continuous part programming. Special NC languages, the Automatically Programmed Tools (APT) language. Advances in numerical control machine tools. Pre-requisite: Good academic standing.

MEG 537.1: Production Engineering (3 Credits)

Advanced topics in machine tool analysis and cutting tool design, Gear and cam design and manufacture. Gear cutting machines. Unconventional machining techniques. Tools and die design. Facilities design. Production Planning and Control. Group technology. Production economics. Computer-aided production analysis and design. Pre-requisite: MEG 306.2.

MEG 538.2 Computational Transport Phenomena (3 Credits)

Applications of computational methods to fluid mechanics and heat transfer problems. Formulation of initial value, boundary value and mixed type problems and their disretisation. Stability, convergence and accuracy of numerical solutions. Discretisation of boundary conditions. Methods of characteristics, finite difference, relaxation and finite element. computer solutions to problems considered. Pre-requisite: Good academic standing.

MEG 539.1: Quality Reliability Assurance (3 Credits)
Review of probability and statistics. Control charts; acceptance sampling plans for attributes, for continuous production and for variables. Reliability. Data collection and analysis. Quality and reliability costs. Product liability. Reliability of machine elements and mechanical systems. Maintenance Engineering. Ergonomic, environmental and safety assurance. Computer algorithms and program packages for Quality and Reliability Assurance. Introduction to Total Quality Management (TQM). Pre-requisite: Good academic standing.

MEG 540.2 Building Services Engineering (3 Credits)
Basic concepts of the built environment; building energy economics; thermal analysis of buildings; heating, cooling, ventilating and air-conditioning of buildings; hot and cold water supplies; soil and waste systems; surface water and below-ground drainage; condensation in buildings; lighting; gas services; electrical installations; mechanical transport, fire protection; refuse disposal; plant and service areas. Installation and maintenance of mechanical and electrical equipment for buildings. Computer controls and methods in building services Engineering. Design Projects. Pre-requisite: Good academic standing.

MEG 551.1: Mechanical Engineering Laboratory III (3 Credits)

Laboratory experiments in vibration and noise, industrial, production, automotive, airconditioning and refrigerating Engineering.

MEG 561.1: Mechanical Engineering Seminar (1 Credit)

This course is designed to allow project, research and industrial training topics to be discussed by both staff and students. in the process, the students learn how to initiate, design, communicate and implement Engineering Projects. pre-requisite: Good academic standing.

2.10 General Remarks

All the students admitted into the 1st year of the Faculty of Engineering programmes must have met the entry requirements, and thus, eligible to pursue the available careers in the Faculty. However, experience has shown that many of these students relax their efforts in the early years of study, apparently assuming that, like the practice in the primary and secondary schools, they would make up the lost efforts in their later years of study. This assumption is false in the Nigerian University System.

Here, at the University of Port Harcourt, every registered course (except officially dropped):

(i) requires a minimum of 70% attendance to lecture/tutorial (L) and/or laboratory/Practice (P);

(ii) must be continuously assessed through assignments, tests, etc;

(iii) must culminate in an examination, and

(iv) must have a grade returned for every student who registered for it, which must comprise of at least 30% from the continuous assessment and 70% from the examination.

Each course in the programme contributes toward the Cumulative Grade Point Average (CGPA) with its weight (credit units). In the Faculty of Engineering, the weights for courses may be 1, 2 or 3 credit units as the case may be, except for the final year project whose weight is 6 credit units. The Industrial Training course offered during the 3rd year long vacation and for which reports are presented, have zero credit unit but is recorded as Pass or Fail.

Most top job opportunities in the industry are usually reserved for graduates with excellent or very good degree classification (1st class or 2nd class upper division). For

example, to be qualified to become a lecturer in the University, one's first degree must not fall below 2nd class upper division. And to qualify for admission into a post-graduate degree programme at the University of Port Harcourt, one's first degree must not fall below a 'high' 2nd class lower division (that is, his/her final CGPA must not be below 3.0).

In terms of the letter grades earned in all the courses offered in a given academic programme of study, 1st class, 2nd class upper division and 'high' 2nd class lower division simply mean, receptively:

(i) The *1st class* is equivalent to the attainment of at least 'A', 'B' average (a minimum final CGPA of (5+4)/2 = 4.50) during the course of study. To achieve this, one must earn very few 'Cs', say, two or three and more 'As' than 'Bs' in all the courses. Earning even one 'E' grade and/or Ds' can be fatal.

(ii) The *2nd class upper division* is equivalent to the attainment of at least 'B', 'C' average (a minimum final CGPA of 4+3)/2 = 3.50) during the course of

study. To achieve this, one must earn very few 'Ds', say, two or three, many 'Bs' and 'As'. Earning few 'Es' and 'Ds' can be fatal.

(iii) The *'high' 2nd class lower division* is equivalent to the attainment of an average grade of 'C' (a minimum final CGPA of 3.0) during the course of study. To achieve this, one must be an average student throughout the programme of study.

Therefore, for the ambitious student, hard work begins from year 1 and spans through year 5. Few low grades can thwart his/her ambition. However, one should always be true to his/her abilities, and not resort to cheating to claim what does not belong to him/her. Appendix A presents some of the penalties for a false ambition (Examination Malpractice).

Students are therefore advised to completely avoid vices (such as secret cultism and examination malpractice) that will ultimately put them out of course and disrepute. They are rather encouraged to be obedient, humble and law-

abiding and to act in such a manner as to achieve their primary purpose of advancing their education.

Staff Details 3

DEPARTMENT OF MECHANICAL ENGINEERING ACADEMIC, TECHNICAL AND ADMINISTRATIVE STAFF

Academic Staff

S/N	Name	Qualification	Field of specialization	Designation
1	Okoli, J.U.	B.Sc (UNN) Ph.D. (Lagos), MNSE, R.Eng (5792)	Design and Production Engineering	Professor
2	Oko, C.O.C.	M.Sc, Mech.Eng, M.Sc., Eng Math, PGD Computer Sci., Ph.D Mech. Eng (Sofia), MNSE, R.Eng (7935)	Thermofluids System and Mathematical Modeling	Professor
3	Etebu, O.M.O.	B.Sc, M.Sc Chem.Eng (Pittsburgh), M.Eng (Uniport), Ph.D Ind. & Prod. Eng. (FUTO) FNSE, R.Eng (8615) Ph.D Thermofluid Eng. (RSUST)	Industrial Engineering	Professor & Dean Faculty of Engineering
4	Nwosu, H.U.	B.Sc, M.Eng; D.Eng (Texas), MBA (Oklahoma), MNSE, R.Eng (9852)	Applied Mechanics and Production Engineering	Professor

5	Ofodu, J.C.	B.Eng (ESUT) M.Eng (Uniport), Ph.D (RSUST) MNSE, R. Eng (10438)	Thermofluids	Senior Lecturer
6	Briggs, T.A	B.Eng, M.Eng (Uniport) Ph.D (UNN), MNSE, R.Eng (13334)	Industrial Engineering	Senior Lecturer
7	F.U. Nte	B.Sc. (Uniport), P.G.D.E. (ABU, Zaria) Ph.D (RSUST)	Mechanical Engineering	Senior Lecturer
8	Ossia, V. C.	B.Tech (RSUST), M.Tech, Ph.D (Korea). R.Eng (10375)	Nano-Mechatronic and Tribology	Senior Lecturer & Ag. HOD
9	C.N. Nwankwo	B.Sc. (Ibadan), PGD (Lagos), MSc. &Ph.D (UPHt)	Mechanical Engineering	Senior Lecturer
10	Ejimofor, R.A. *	B.Sc. M.Sc., D.Eng. (Germany)	Material Science & Engineering	Senior Lecturer
11	Ojapah, M. M.	B.Sc., (Ilorin), M.Sc., (Lagos), Ph.D,(England)	Automotive and Power Train Engineering	Senior Lecturer
12	E.O.Godwin	B.Tech (FUTA), MSc & Ph.D (UPH)	Mechanical Engineering	Senior Lecturer
13	Diemuodeke, E.O.	B.Eng. Mech.Eng. (UPH) ;M.Eng. Mech Eng. (UPH); PhD(UK) R.Eng (22274)	Energy and Thermofluids	Senior Lecturer
14	Big-Alabo, A.	B.Eng. Mech.Eng. (UPH), M.Sc. Mech & Mgt Eng.(Glasgow);PhD(Glasgow)	Applied Solid Mechanics/Dynamics	Senior Lecturer
15	Saturday, E.G.	B.Eng. Mech.Eng. (UPH)	Thermofluids/ Gas	Senior

		M.Eng. Mech Eng. (UPH); PhD (Cranfield), R.Eng (22597)	Turbine Technology	Lecturer
16	Shadrack, M.U.	B.Eng (ABU), M.Eng (Ilorin); Ph.D (In View)	Mechanical Engineering	Lecturer I
17	Ayoka, K. E.**	B.Eng. (Illinois), M.Eng (Connecticut), R.Eng (8298)	Mechanical Engineering	Lecturer I
18	Eseonu, O.	HND,(Kebbi), B.Eng., M.Eng.(UPH), R.Eng (24593)	Mechanical Engineering	Lecturer II
19	Obieke, C.C.	B.Eng. (ESUT), M.Sc. Eng. Design (England), MNSE	Mechanical Engineering	Lecturer II
20	Major, I.E.	B.Eng., M.Eng. (UPH)	Mechanical Engineering	Lecturer II
21	Udeh, T.G.	B.Eng., M.Eng. (UPH)	Mechanical Engineering	Lecturer II
22	Ebieto, C.E.***	B.Eng. Mech.Eng. (UPH), M.Eng. Mech Eng. (UPH)	Mechanical Engineering	Lecturer II
23	Asiegbu, N.M. ***	B.Eng., M.Eng. (UPH)	Mechanical Engineering	Lecturer II
24	Anyanwu, S.I.***	B.Eng., M.Eng. (UPH), MNSE, R. Eng	Mechanical Engineering	Lecturer II

***Adjunct Academic Staff**, ****On Contract Appointment*, *****On Study Leave*

Senior Technical Staff

S/N	Name	Qualification	Designation
1.	Ibeneme, R.U.	HND, (Idah), PGDE, (ESUT), B.Eng. Mech. Eng. (UPH), R. Eng. (11849)	Chief Technologist
2	Chukwu, Glory	HND	Principal Technologist
3	Akenzua, Smart O.	HND	Principal Technologist
4	Suitor, Gift	HND, PGD	Senior Technologist
5	Ishiekwene, Matilda	HND	Senior Technologist
6	Odinaka, Ogbonna B.	HND	Technologist I
7.	Ayisimaka, Edward Boma	HND	Technologist II
8	Odike, Odike C.	HND	Technologist II
9	Egbo, Chukwuma C.	HND	Technologist II
10	Ekeh, Emmanuel C.	HND	Technologist II

11	Paul Joy Herbert	HND	Technologist II

Laboratory Staff

S/N	Name	Qualification	Designation
1	Yaako, Cecilia	WAEC	Head Lab. Assistant
2	Igbani Ibeloye	WAEC	Head Lab. Attendant
3	Lemea Barizomdu	WAEC	Laboratory Assistant
4	Tigirih Rejoice	WAEC	Laboratory Assistant
5	Amadi, V. Alete	NECO	Laboratory Assistant
6	Francis, O. G.	NECO	Laboratory Assistant
7	Olumati, K. G.	WAEC	Laboratory Assistant

Administrative Staff

S/N	Name	Qualification	Designation
1	Onyenweaku, Aloy	BA(ED), PGD (UPH)	Higher Executive Officer
2	Nwodim, C. N.	WAEC/SSCE, 50 WPM in Typewriting Stage II	Chief Secretarial Assistant
3	Ogbuche, K. J.	WAEC	Computer Operator
4	Nwulu, O.	FSLC	Head Cleaner/Messenger
5	Wali, B.	FSLC	Caretaker

Academic & Other Supports 4

4.1 University Library

The University has central learning resource – Donald Ekong Library, to support students academically. Students of Mechanical Engineering would find the library an invaluable learning resource for academic development. The Library is housing many relevant Mechanical Engineering textbooks and other academic learning resource materials. Students are allowed to borrow books from the library with their library access cards. Other useful information can be found at http://library.uniport.edu.ng.

4.2 Academic Advisers

Every student is attached to an Academic Adviser who is a member of the academic staff and who will advise him/her on academic affairs as well as on personal matters. Academic Advisers are expected to follow their students'

academic progress and provide counseling to them. It is the duty of the Head of Department to assign an Academic Adviser to each student at the beginning of each session. Academic Advisers should give clear information on the notice-boards or on their office doors about appropriate times and places at which they will be available to students who wish to consult them.

APPENDIX A

EXAMINATION MALPRACTICE *

A.1 Definition of Examination Malpractice

Examination malpractice shall be defined as all forms of cheating, which directly or indirectly falsify the ability of the students. These shall include cheating within an examination hall, cheating outside an examination hall and any involvement in all examination related offences.

A.2 Cheating Within an Examination Hall/Room

Copying from one another or exchanging questions/answer sheets.

- Bringing in prepared answers, copying from textbooks, notebooks, laboratory specimens and any other instructional aids smuggled into the hall.
- Collaboration with invigilator/lecturer, where it involves the lecturer-invigilator providing written/oral answers to a student in the examination hall.
- Oral/Written communication between and amongst students.
- Bringing in prepared answer written on any part of the body.
- Receiving information whether written or oral from any person(s) outside an examination hall.
- Refusal to stop writing at the end, within half a minute in an examination.
- Impersonation
- Non-submission of answer scripts at the end of an examination.
- Copying laboratory and fieldwork reports and or term papers or others.
- Manipulation of registration forms in order to sit for an examination for which the student is not qualified.
- Sitting for an examination for which the student is not qualified as a result of manipulation of registration forms.
- Using an electronic device to cheat e.g. handset, i-pads, i-pods, etc.
- Illegal removal of answer scripts from the examination hall. Non-submission of answer scripts at end of the

examination. A check-off system of students who have actually submitted answer scripts should be devised.

A.3 Another Form of Examination Malpractice

Plagiarism is a form of examination malpractice and should be investigated and punished in the same way as cheating in the examination hall/room. Plagiarism is the use of another person's work (i.e., in writing term papers, final year project, seminar presentation, etc) without appropriate acknowledgement both in the text and in the references at

**Extracts from the University Statement of Academic Policies*

A.4 Punishment for Examination Malpractice

Any student found guilty of examination malpractice after due process shall be **dismissed** from the University. This decision shall be pasted on all notice boards throughout the university and shall be contained in each Faculty prospectus so as to give it the widest possible publicity.

APPENDIX B

GUIDE FOR UNDERGRADUATE PROJECT REPORT

B.1 Highlight

The Faculty of Engineering with the approval of the Board of Studies in a meeting held in a later part of 1984 commissioned the preparation of this manuscript. This is aimed at achieving uniformity in student final year project documentation. The emphases are directed to the following areas:

1. The order of paging for binding;
2. Manner of presenting abstract and acknowledgement;

3. Standard format for title and signature page, table of content, conclusion, appendix and references; and
4. General remarks on typing spacing and margins, quality of paper, tables, figures, photographs, equations and total number of pages for the entire text.

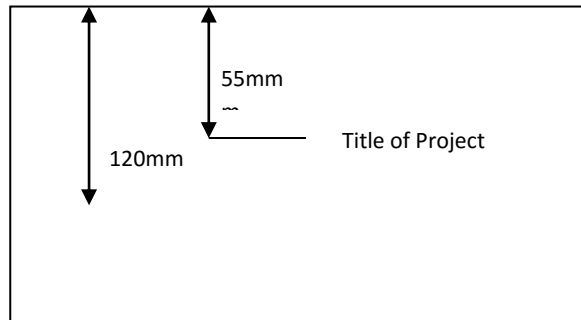
To meet these “preparation guidelines”, students are highly encouraged to work closely with their project supervisors. Final reports must be reviewed and edited for grammatical errors before binding.

B.2 Cover page

Recommended colour is light green. Must be hard cover of quoto size and should bear in print the title of the project (about 55mm from the top and properly centered). This is immediately followed by student name (about 120mm from the top) and matriculation number (a double space); the student department, written for example, as;

Department of Mechanical Engineering
Faculty of Engineering
University of Port Harcourt

and; finally the month and year of graduation (about 45mm from bottom) Figure B1.



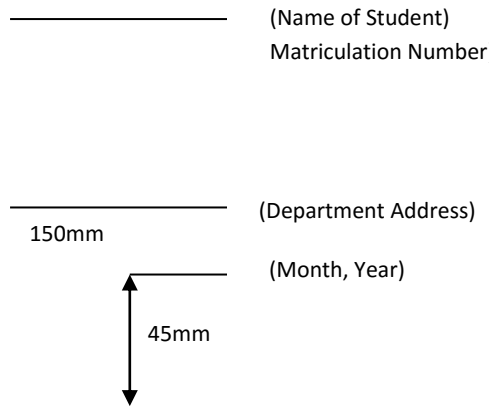


Figure B1: Sample of a Typical Cover Page

B.3 Title Page

This should contain the following items; title of project, name of the author, year and some inscription as shown in Figure B.2 .

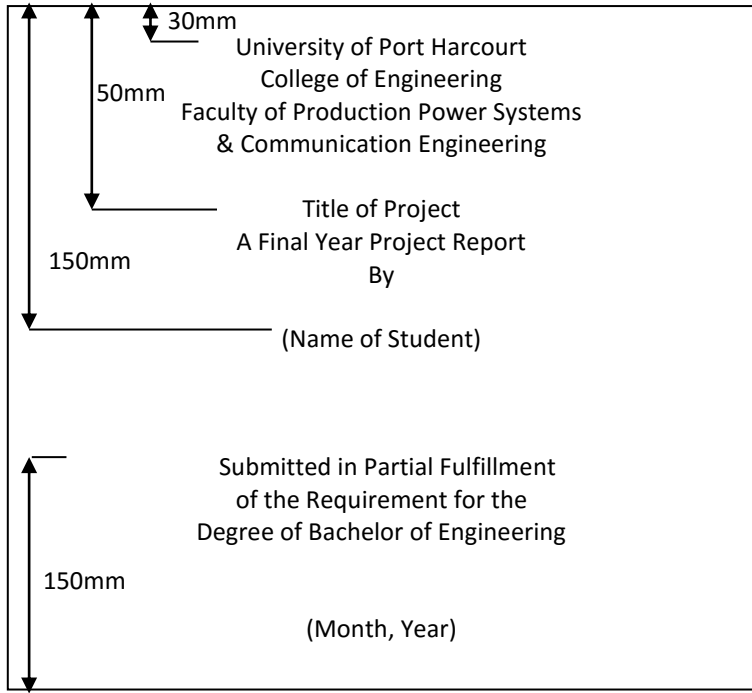


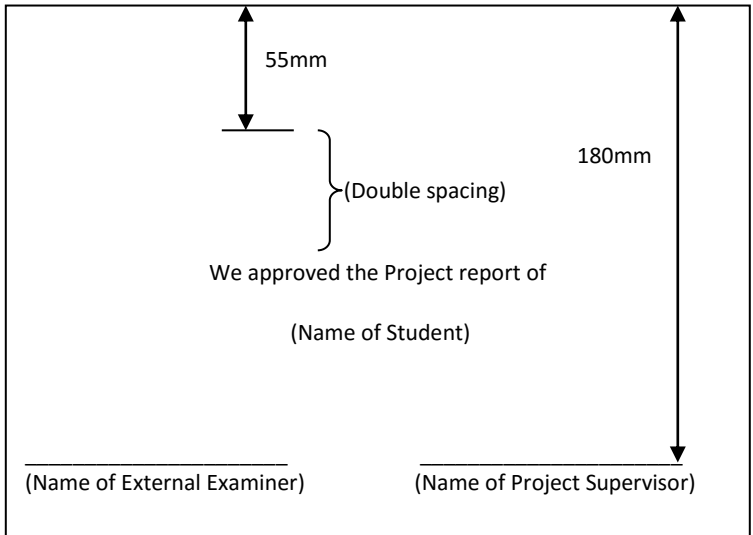
Figure B.2: Sample of a Typical Title Page

B.4 Dedication Page

Where need be, students who wish to dedicate their project reports are free to do so. This should be type-written at the centre of the page leaving equal spacing above and beneath.

B.5 Signature (Approval) Page

It should be on a separate page. Required signature must be obtained after the report has been edited, corrected and approved by the project supervisor, Head of Department, External Examiner and probably the Dean of the Faculty. The recommended format is shown on the specimen copy in Figure B.3.



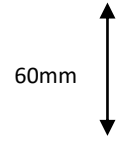


Figure B.3: Typical Example of an Approval/Signature Page

B.6 Acknowledgement Page

Number of lines is limited to the range 10 and 12. This should reflect appreciation directed to all those individuals who offered significant assistance to the student projects. And where the project is funded (matching grants, allotment grants, Faculty or University incentive fund, etc. a note of thanks will be worthwhile.

B.7 Abstract Page

The abstract write-up should not be a mere summary of the project findings. Description should reflect the scope, method of study and results. A well-written abstract affords the readers a quick overview of the project methodology and what it wishes to accomplish. The entire text needs not

be read in order to assimilate the above information. For abstract to be acceptable, it should not exceed 150 words.

B.8 Table of Contents

The following standard format is recommended:

Chapter

Abstract

List of Figures

List of Tables

List of Plates (Photographs)

1. Introduction
    - Background
    - Area of Study
    - Study Objectives
    - Scope of work
    - Methodology

2. Literature Review
3. Main Body
4. Summary and Conclusion

References

Appendixes

Note: Appendix is most appropriate for descriptions of tedious equations or other pertinent information considered inadequate for the main text (chart, major calculations, etc.)

B.9 Main Body

The main body of the report should be divided into convenient chapters as listed in the table of content. Each chapter can be sub-divided and given appropriate sub-headings. Where applicable, sub-headings and sub-sub-headings can be employed.

Students are highly encouraged to discuss with their project supervisors on relevant style. The recommended format for uniformity sake is:

Chapter 3*

3.1 (Sub-heading)

3.1.1 (Sub-sub-heading)

* etc.

3.2 ……..

* etc

* Use Arabic numbering system.

B.10 Conclusion

Should be a summary of the project findings. Significant results should be itemized. Recommended format:

Based on the results of this study, the following conclusions can be drawn:

- Nigerian engineers should register with professional bodies for proper implementation of the code of practice and ethics.
- To enhance Engineering research in Nigerian, government as well as private support is vital, etc.

References

References should conform to the standard format for Journals, Conference, Proceedings, Seminars, Books, Monographs, etc. (Onyekonwu, 1994; Nwaogazie, 1992; Pruitt, 1985; Gunning, 1968):

1. **Journal**
   The last name(s) of author(s) should be written first, followed by their initials, year in brackets, title of the paper, abbreviations for the journal name. volume, and the page. Abbreviations for each journal should conform to the standard format for the particular journal. Students are advised to consult the journals to see how they are abbreviated and referenced.

   Smith, J.A. and Jone, A.K. (1982): “Combustion of kerosene” .J.Oil and Gas, Vol. 3, pp 210-215.

2. **Book**

Authors last names first, followed by their initials, year in brackets, title of book (underlined or printed in bold face), edition, publisher, city and page.

Example 1

James, B.A. (1975): Fluid Mechanics, 2nd edition, McGraw-Hill Publishers, New York, p. 247.

Example 2

Spiers, H.M., Jr. (1961): **Technical Data on Fuel**, the British National Committee on Energy, London.

3. Conference Proceeding

Authors' last names first, followed by their initials, year in brackets, title in quotation sign, abbreviations for the proceeding, volume and page.

Example 1:

Baker, R.A. (1979): "Design of a Digital System", Proc. R. Soc. London, 292, pp. 45-99.

Example 2:

Spiff, R.B. (1983): “Furnace Performance”. 19” Symposium (International, on Combustion, The Combustion Institute, pp. 1021-1036.

4. **Report**

Reports should conform with the standard format for the particular type of report (memorandum, technical, etc).

Example:

Kofi, A.K. (1975): Agip Memorandum Report, No. ANL-031.

5. **Seminar**

This should include the name of author(s), the title of seminar, the theme of the seminar and the date.

Example

Adegoke, S.R. (1984): “Role of Management in Power Generation”, Seminar Presented on Electric Power Systems, University of Port Harcourt, Port Harcourt.

6. **Personal Communication**

This concern information collected through personal interview or oral conversation and can be referenced as follows:

Example:

Nwachukwu, C.C. (1985): Personal Communication, Department of Management, University of Port Harcourt, Rivers State, Port Harcourt.

7. Referencing in the Text

Referencing in the text serves the purpose of crediting the original source of information cited. In presenting 'Literature Review' or the body of the report, information such as: previous research findings, sources of governing equations to be used, etc. must be referenced.

Recommended format: write the surname of the author(s), immediately followed by the year of publication in parenthesis. Some samples of popular referencing techniques are presented below (Nwaogazie, 1992):

i. Single Author

(a) The variational principle is based on the works of Rayliegh (1877) and Ritz (1909).

(b) Puls (1928) Established a curve of relation…

(c) The method of characteristics is highly suitable for rapidly varied flows (Amein, 1966).

(d) Interested readers are referred to the basic texts on hydrology (Chow, 1964; Viessman, 1972).

NB: If an author has more than one publication, n the same year, to be referenced, use alphabets such as 1984a, 1984b, 1984c etc. to distinguish them.

ii. Two Authors

(a) Amein and Fang (1969) also used an implicit scheme in solving .....

(b) The major criticism of this approach is that it may not yield a general scheme (Desai and Christian, 1977; Oden and Fost, 1`973).

iii. Three or More Authors

Name only the first author and use “and others” to replace the rest of the authors names:

(a) Isaacson and others (1954, 1956) Investigated ……

(b) The early works of Zienkiewicz and others (1966), Javandel and others (1968)

iv. Personal Communication

Referencing personal communication in the text is similar to items (i) through (iii) as may be applicable:

The field data were provided by Nwachukwu (1985).

NB: In the References, all the publications or works referred to in the text must be arranged with the authors’ surnames in alphabetical order. Also, they should be numbered sequentially, using Arabic numbering system.

B.11 General Remarks

1. **All project documentation** should "be limited to 30-50 pages. Sentences should be geared towards explaining an idea or directed to a concept or objective. Flamboyant expressions should be avoided.

2. **Drawing:** Major drawings should be on a full page as figure with a title placed beneath. This is where Engineering drawing finds significant utility and such skills must be demonstrated. Avoid drawing on stencils.

3. **Quality of paper:** We suggest quarto (white in colour) because of its availability and low cost.

4. **Typing Margins:** Should be double spacing, enough margins should be left at the four adjoining corners of the page. For a chapter page, top margin will ordinarily be 38mm. However, margin to the left side will be about 38mm in all pages to allow enough clearance for binding, whereas 25.4mm suffices as the right side margin.

5. **Tables:** All tables and figures should meet the margin specifications or otherwise should appear in the appendix. Suggested title format for table:

   Table 1: Rainfall runoff Components of flood modeling.

6. **Equations:** For sake of convenience in referencing, mathematical equations should be numbered consecutively for each chapter. For instance, in chapter 3: MODEL DEVELOPMENT ten equations are found and are numbered as follows: 3.1., 3.2., 3.2, 3.3 …3.10.

This numbering technique has the advantage of associating equations to respective chapters where they first appeared, thus, enabling easy referencing. For chemical equations (reaction-type-equations), the above numbering technique applies, in addition to the inclusion of letter “R” before the number.

The format for referencing equations in the text is as follows:

(a) Equation (3.1) implies that …….

(b) The computer program solution of Equation (3.8) is facilitated by the use of ……

NB: Do not abbreviate equations in the text; for example, Eqn. (3.1), Eq. (3.1) or (3.1) is unacceptable.

B.12 Order of Paging for Binding

The following order should be followed:

1. Title page
2. Dedication Page
3. Approval (Signature) Page
4. Acknowledgement page
5. Abstract page
6. Table of Content
7. List of Figures
8. List of Tables
9. Body (Text)
10. Summary and Conclusion
11. References

12. Appendices

References

Gunning, R. (1968): The Technique of clear Writing, 2nd edition, McGraw-Hill Book Company, Inc., New York.

Houp and Pearsall (1973): Technical Communication Macmillan Publishing C., Inc., New York.

Nwaogazie., I.L. (1986): Technical writing: Lecture note series, vol. 1, pp. 104 Faculty of Engineering, University of Port Harcourt, Port Harcourt.

Nwaogazie, I.L (1992) Technical Communication, Report Writing and Presentation. A shot Course Training Manual, Gazems Ventures Limited, Port Harcourt.

Onyekonwu, M. (1994): Effective Report Writing and Presentation skill, CSS Press, Port Harcourt, pp. 217.

Pruitt, V.M. (2985): Writing the Research paper, APCON Limited, Calabar.

APPENDIX C

Students Records

UNIVERSITY OF PORT HARCOURT
DEPARTMENT OF MECHANICAL ENGINEERING
Student's Spreadsheet

Name of Student: **Mat. No.**
State of Origin: **Marital Status**
Year One 1st Semester **2014/2015**

Course Code	Course Title	CU	Mark	Grade	GP	QP
GES 100.1	Communication Skills in English	3				

GES 102.1	Introduction to Logic & Philosophy	2				
CHM 130.1	General Chemistry 1	3				
PHY 101.1	Mechanics & Properties of Matter	3				
PHY 102.1	Physics & Laboratory 1	1				
MTH 110.1	Algebra & Trigonometry	3				
MTH 120.1	Calculus	3				
ENG 101.1	Engineering Drawing 1	2				
Total		**20**				

Year One 2nd Semester **2014/2015**

Course Code	Course Title	CU	Mark	Grade	GP	QP
GES 101.2	Computer Appreciation & Applications	2				
GES 103.2	Nigerian Peoples and Culture	2				
CHM 131.2	General Chemistry II	3				
PHY 112.2	Electricity and Magnetism	3				
PHY 103.2	Physics Laboratory II	1				
MTH 124.2	Coordinate Geometry	3				
ENG 102.2	Engineering Drawing II	2				
ENG 103.2	Engineer-in-Society	1				

ENG 104.2	Manufacturing Tech./Workshop Practice	2				
Total		**19**				

TCU = TQP = GPA= CGPA =

UNIVERSITY OF PORT HARCOURT
DEPARTMENT OF MECHANICAL ENGINEERING

Student's Spreadsheet

Name of Student: **Mat. No.**
State of Origin: **Marital Status**
Year Two 1st Semester **2015/2016**

Course Code	Course Title	CU	Mark	Grade	GP	QP
PHY 216.1	Vibration, Waves and Optics	3				
ENG 201.1	Engineering Mathematics	3				
ENG 202.1	Engineering Mathematics II	2				
ENG 203.1	Engineering	3				

	Mechanics					
ENG 204.1	Basic Engineering Materials	2				
ENG 210.1	Basic Electrical Engineering	3				
ENG 213.1	Computer Programming for Engineers	2				
MEG 251.1	Machine Drawing I	1				
MEG 200.0	Introduction to Manufacturing Processes	2				
Total		**21**				

Year Two 2nd Semester **2015/2016**

Course Code	Course Title	CU	Mark	Grade	GP	QP
CHM 240.2	Physical Chemistry I	3				
ENG 206.2	Engineering Mathematics III	3				
ENG 207.2	Basic Fluid Mechanics	2				
ENG 208.2	Basic Strength of Materials	2				
ENG 209.2	Basic Thermodynamics &	3				

	Heat Transfer					
ENG 205.2	Engineering Laboratory I	1				
ENG 211.2	Engineering Laboratory II	1				
ENG 212.2	Community Service	1				
MEG 202.2	Basic Software Engineering	2				
MEG 252.2	Machine Drawing II	1				
Total		**19**				

TCU = **TQP =** **GPA =** **CGPA=**

UNIVERSITY OF PORT HARCOURT
DEPARTMENT OF MECHANICAL ENGINEERING

Student's Spreadsheet

Name of Student: **Mat. No.**
State of Origin: **Marital Status**
Year Three 1st Semester **2016/2017**

Course Code	Course Title	CU	Mark	Grade	GP	QP
ENG 301.1	Engineering Mathematics IVB	3				
ENG 302.1	Technical Writing and Presentation	2				
MEG 301.1	Fluid Mechanics II	2				
MEG 303.1	Strength of Materials II	2				

MEG 305.1	Theory of Machines and Mechanics	3				
MEG 307.1	Engineering Thermodynamics	3				
MEG 309.1	Basic Metallurgy & Materials Selection	3				
MEG 311.1	System Instrumentation	3				
MEG 300.0	System Instrumentation Workshop Practice	1				
Total		**22**				

Year three 2nd Semester **2016/2017**

Course Code	Course Title	CU	Mark	Grade	GP	QP
ENG 303.2	Engineering Mathematics V	3				
GES 300.2	Fundamentals of Entrepreneurship	2				
MEG 302.2	Fluid Mechanics III	2				
MEG 304.2	Mechanical Engineering Design I	2				
MEG 306.2	Manufacturing Processes	2				
MEG 308.2	Engineering	2				

	Materials Production					
MEG 310.2	Heat and Mass Transfer	3				
MEG 312.2	Mechanics of Machines	2				
MEG 352.2	Mechanical Engineering Laboratory I	3				
Total		**21**				

TCU= **TQP =** **GPA=** **CGPA=**

UNIVERSITY OF PORT HARCOURT
DEPARTMENT OF MECHANICAL ENGINEERING
Student's Spreadsheet

Name of Student: **Mat. No.**
State of Origin: **Marital Status**
Year Four 1st Semester **2017/2018**

Course Code	Course Title	CU	Mark	Grade	GP	QP
ENG 401.1	Engineering Mathematics VI	3				
ENG 402.1	Engineering Economics	2				
EEE 404.1	Electrical Machines	3				

MEG 401.1	Mechanical Engineering Design II	2				
MEG 403.1	Computer-Aided Design & Manufacturing	2				
MEG 405.1	Principles of Automotive Engineering	2				
MEG 407.1	Principles of Air-cond. & Refrig. Engineering	3				
MEG 451.1	Mechanical Engineering Laboratory II	2				
MEG 453.1	Air-cond. & Automotive Workshop Practice	1				
Total		**20**				

Year Four 2nd Semester **2017/2018**

Course Code	Course Title	CU	Mark	Grade	GP	QP
ENG 400.2	Industrial Training II	9				
GES 400.2	Entrepreneurship Development	2				
Total		**11**				

TCU= **TQP=** **GPA=** **CGPA=**

UNIVERSITY OF PORT HARCOURT
DEPARTMENT OF MECHANICAL ENGINEERING

Student's Spreadsheet

Name of Student: **Mat. No.**
State of Origin: **Marital Status**
Year Five 1st Semester **2018/2019**

Course Code	Course Title	CU	Mark	Grade	GP	QP
ENG 501.1	Professional Practice &	2				

	Procedure					
ENG 502.1	Engineering Management	2				
MEG 503.1	Principles of Industrial Engineering	2				
MEG 505.1	Mechanical Vibration and Noise	2				
MEG507.1	Mechanical Engineering Design III	3				
MEG 551.1	Mechanical Engineering Lab III	2				
MEG 561.1	Technical Seminar	1				
MEG 531.1	Air-Conditioning Engineering	3				
MEG 533.1	Refrigerating Engineering	3				
MEG 535.1	Automotive Engineering	3				
MEG 539.1	Quality and Reliability Assurance	3				
Total		**26**				

Year Five 2nd Semester **2018/2019**

Course Code	Course Title	CU	Mark	Grade	GP	QP
MEG 500.2	Final Year Project	6				
MEG 502.2	Control Engineering	3				
MEG 504.2	Theories of Elasticity and Plasticity	3				
MEG 506.2	Applied Thermofluids	2				

MEG 508.2	Power Plant Engineering	3				
MEG 534.2	Vehicle Dynamics	3				
MEG 536.2	Numerical Control Machine Tools	3				
MEG 538.2	Computational Transport Phenomena	3				
Total		**26**				

TCU	=	TQU	=	CGPA	=	FINAL CGPA	=

UNIVERSITY OF PORT HARCOURT
DEPARTMENT OF MECHANICAL ENGINEERING

Student's Spreadsheet

Name of Student: **Mat. No.**
State of Origin: **Marital Status**
Year Six 1st Semester **2019/2020**

Course Code	Course Title	CU	Mark	Grade	GP	QP

Total						

Year Six 2nd Semester **2019/2020**

Course Code	Course Title	CU	Mark	Grade	GP	QP
Total						

TCU = **TQU =** **FINAL GPA =** **CGPA =** **FINAL CGPA =**

UNIVERSITY OF PORT HARCOURT
DEPARTMENT OF MECHANICAL ENGINEERING

Student's Spreadsheet

Name of Student: **Mat. No.**
State of Origin: **Marital Status**
Year Seven 1st Semester **2020/2021**

Course Code	Course Title	CU	Mark	Grade	GP	QP

Total						

Year Seven 2nd Semester **2020/2021**

Course Code	Course Title	CU	Mark	Grade	GP	QP
Total						

TCU = TQP = GPA = CGPA =