

DETAILS OF COURSE CONTENT

UNIVERSITY COURSE (UC)

Electrical & Electronic Engineering

Code: MTH 101

Credit Unit: 4

Title: Elementary Mathematics I

Rationale:

To provide a background in mathematics for all engineering students which will enable them to follow technical literature and to apply mathematical analysis to engineering problems. The course starts at a level, which is appropriate to students who may not come through traditional educational routes

Aims:

To ensure that all students have adequate background in calculus and mathematical manipulations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the mathematical expressions and the techniques of differential and integral calculus, and appreciate the use and role of mathematics in the analysis and design of engineering systems.

Assessment:

Test 30% Examination 70%

Content:

Number systems. Indices. Surds and Logarithms. Polynomials, Remainder and factor theorems. Polynomial equations. Rational functions. Partial fractions. Fields. Ordered fields. Inequalities. Mathematical induction. Permutations and combinations. Binomial theorem, Sequences and Series. The quadratic equation and function. Relation between the roots and the coefficients. Complex numbers. Addition, subtraction, multiplication and division. Argand diagram De-Morgan's theorem, n-th roots of complex numbers. Elementary Set theory. Venn diagrams and applications. De-Morgan's laws.

Trigonometry. Elementary properties of basic trigonometric functions. Addition formulae and basic identities. Sine and Cosine formulae, Half angle formulae. Area of Triangle. Solution of trigonometric equations. Inverse trigonometric functions. Functions, Concept and Notation. Examples. Composition. Exponential and logarithmic functions. Graphs and properties. Limits and continuity. Techniques for finding limits. The derivative. Calculation from first principles. Techniques of differentiation. Chain rule. Higher order derivatives. Extremum problems. Mean value theorem. Applications. Indeterminate forms and L' Hospital's rule. Taylor's and Maclaurin's series. Curve sketching. Integration as the reverse of differentiation, as area, as limit of finite sums. Definite integrals. Properties of definite integrals. Applications.

Code: MTH 102

Credit Unit: 4

Title: Elementary Mathematics II

Rationale:

To provide a further background in mathematics for all engineering students which will enable them to follow technical literature and to apply mathematical analysis to engineering problems. The course starts at a level, which is appropriate to students who may not come through traditional educational routes.

Aims:

To ensure that all students have adequate background in calculus and mathematical manipulations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence and confidence in the mathematical expressions and the techniques of differential and integral calculus, and appreciate the use and role of mathematics in the analysis and design of engineering systems.

Assessment:

Test 30% Examination 70%

Content:

Transcendental functions. Hyperbolic functions. Inverse functions. Logarithmic differentiation. Methods of integration. Integration of rational functions. Integration by

substitution. Integration by parts. Improper integrals. Applications. Areas and volumes. Centre of mass. Ordinary differential equations. First-order equations with variables separable. First order linear equation. Second-order homogeneous equations with constant coefficients. Applications. Plane analytic geometry. Rectangular Cartesian co-ordinates. Distance between two points. The straight line. Loci. The circle, parabola, ellipse and hyperbola. Second degree curves. Plane polar co-ordinate systems. Graphs of polar equations. Plane areas in polar coordinates. Vectors. Vector functions and their derivatives. Velocity and acceleration. Matrix algebra. Addition and multiplications. Transpose. Determinants. Inverse of non-singular matrices. Cramm's rule and application to the solution of linear equations, (Examples should be limited to $m \times n$ matrices where $m = 1,2,3$, etc). Transformation of the plane. Translation, reflection, rotation, enlargement. Composition of transformations. Invariant points and lines.

Code: CHM 101

Credit Unit: 4

Title: General Chemistry

Rationale:

To provide a background in chemistry for all engineering students to complement their 0- Level knowledge.

Aims:

To ensure that all students have adequate background in chemistry

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the atomic structure of metals.

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Atomic structure and the periodic classification of the elements; ionic and covalent bonding including the effect of dipole-dipole interacting of physical properties. Redox reactions and the concept of Oxidation numbers; introduction to gas kinetics; introduction to nuclear chemistry. Solids and lattice structure; acid base reactions; general principles of extraction of metals.

Code: CHM 102

Credit Unit: 4

Title: General Chemistry

Rationale:

To provide a background in chemistry for all engineering students to complement their O-Level knowledge.

Aims:

To ensure that all students have adequate background in chemistry

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the atomic structure of metals.

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Physical and chemical equilibrium, elementary electrochemistry and chemical kinetics. Survey of reactions of function group in aliphatic and aromatic compounds. Concept of hybrid bonds. Alkanes, alkenes, alkynes reactions of alcohol and alkyl; halides; addition and elimination reactions of carbon multiple bonds, elimination and substitution in benzene; hydroxyl groups and carbonyl compound, organic acid bases and derivatives.

Code: PHY 101

Credit Unit: 4

Title: General Physics I

Rationale:

To provide a background in Physics for all engineering students to complement their O-Level knowledge and prepare them for circuit analysis.

Aims:

To ensure that all students have adequate background in basic Physics.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the laws of physics.

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Mechanics: Space and time units and dimensions; vectors; kinematics, Newton's law; Galileo invariance, statics and dynamics of particles; universal gravitation, work and potential energy, conservation of energy and momentum; rigid bodies; fluid mechanics. Thermal physics: Thermal properties, including elementary thermodynamics and Kinetics Theory.

Code: PHY 102

Credit Unit: 4

Title: General Physics II

Rationale:

To provide a background in Physics for all engineering students to complement their a-Level knowledge and prepare them for circuit analysis.

Aims:

To ensure that all students have adequate background in basic Physics.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the laws of physics.

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Electricity and Magnetism: Electrostatics; conductors and currents; dielectrics; magnetic fields and induction; Maxwell's equations; electromagnetic oscillations and waves.
Geometrical Optics: Geometrical methods applied to the optics of mirrors, lenses and prisms.

Code: BIO 101

Credit Unit: 3

Title: Biology for Physical Sciences

Rationale:

To provide a good background in Biology of living things for all engineering students to complement their O- Level knowledge and prepare them for circuit analysis.

Aims:

To ensure that all students have adequate background in Biology.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in Biology.

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Scientific methods and the characteristics of living and non-living things. Cell and Tissue biology. Elements of biological chemistry and cellular metabolism. Taxonomy of living things, heredity and evolution. Elements of ecology and types of habitats.

Code: GST 101

Credit Unit: 2

Title: The Use of English I

Rationale:

To provide a good communications skill for all engineering students

Aims:

To ensure that all students have adequate communications skills.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in communications skill and be able to read and understand reports.

Assessment:

Test 30% Examination 70%

Content:

Use of Library. Use of words and sentence construction. Functions of sentences purpose structure, correct use of verbs (Action words), word order and punctuation. Essay/Composition Writing. Paragraphs – structure, function, links and style. Exposition description and explanation. Special types of exposition, e.g. letter writing, layout of a business letter, technical reports including terms of reference, drafting and editing of reports.

Code: GST 102

Credit Unit: 2

Title: The Use of English II

Rationale:

To provide a good communications skill for all engineering students

Aims:

To ensure that all students have adequate communications skills.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in communications skill and be able to read and understand reports.

Assessment:

Test 30% Examination 70%

Content:

Comprehension and interpretation reading efficiency of technical and non-technical material. Note taking; techniques of note taking from reading and from lectures, precise-writing or summarizing methods, technical vocabulary, word formation, use of classical terms and affixes, special terms, acronyms, new words, definitions by example synonym or antonym, analytic or operational definitions, basic words in fields of specialization, e.g. mechanical, electrical, civil, aeronautical, automobile engineering, metallurgy, mathematics.

Code: GST 103
Credit Unit: 1
Title: Humanities

Rationale:

To provide a good understanding of the environment and the various policies of the government as it affects the citizens.

Aim:

To ensure that all students have adequate knowledge of government operations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence and participate in the discussions in government activities.

Assessment:

Test 30% Examination 70%

Content:

The nature and the scope of economics. The Nigerian political system: policy and means of production in Nigeria. The structure of the Nigerian economy aspects of economics and technological dualism; internal migration rural to urban migration and the informal sector. The role of capital growth and development; public investment criteria; choice of "Appropriate" or "relevant" technology. Human resources development in Nigeria labour utilization, education and manpower development and planning. Agriculture in the development process; land tenure and reform, Agricultural technology and green revolution and integrated rural development. Industrialization: role and types of industry, choice of techniques, import substitution, and export expansion. The economic role of the government expenditure and taxation; the federal structure, fiscal federalism and revenue allocation; the financial system, problems of development planning and plan implementation in the federal system of Government, prospects of the Nigerian economy.

Code: GST 108
Credit Unit: 2
Title: Social Sciences

Rationale:

To provide a good understanding of the environment and the various policies of the government as it affects the citizens as well as the economic base of the nation.

Aim:

To ensure that all students have adequate knowledge of the public and private sector operations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence and participate in the discussions involving the public and private sector activities.

Assessment:

Test 30% Examination 70%

Content:

Introduction: The nature and scope of politics and economics. Definition of basic concept in economics and political science.

Nigeria's Public Sector: The political set up in Nigeria. The civil service structure, Public investment and economic infrastructure. The economic role of government: government expenditures and revenues, fiscal federalism and revenue allocation.

Nigeria's Private Sector: The financial system in Nigeria. The role of the agricultural sector in the development process. The Industrial sector and public investment in Nigeria. Human resources development and utilization in Nigeria, National developmental planning-problems and prospects, aspects of economic and technological dualism. Political and Economic future of Nigeria. A global perspective of economics; economic system and developing nations' economies. International trade and economic development; balance of payments, commercial policies of Nigeria and other developing countries. Economic integration; state and structure of economies of ECOWAS countries, the ECA and Economics Co-operation in Africa. Foreign aid and investments: The multinational corporations, technological transfer and technological

dependence. Global inter dependence and the new international economic order. World economic crisis-energy and OPEC, food storage and armament.

Code: GST 110

Credit Unit: 1

Title: Science, Technology and Society

Rationale:

To provide a good understanding of the environment and the evolution of technology as it affects the citizens as well as the economic base of the nation.

Aim:

To ensure that all students have adequate knowledge of the effects of science and technology on man.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of understanding in the various ways innovations and inventions in science and technology has impacted on man.

Assessment:

Test 30% Examination 70%

Content:

The Scientific Evolution of Man Science, need for science, history of science, classifications, modern scientific methods; *Science and man's environment* Terrestrial and cosmic life; *Harnessing science* climate and vegetation. Production, processing, conservation, distribution; *Energy resources* solar thermal, nuclear energy fossil fuels, estimates of energy reserve in Nigeria. *Key Revolution in Technology* technology, electronics and computer technology, robotics and cybernetics, every day applications; technology history of technological evolution/practice in Nigeria; role of technology in the national economy; *Education for technology* past, present and future; constraints in the use of New technology products reliability, quality control, cost effectiveness, politics

and environment; effects of mechanization, consumerism, *Social implication of scientific advances* science in the civilization of man, science and culture, society social of scientific advances e.g. Population explosion, environmental pollution; Social Implications of technological research and advances E.g., displacement of man by machines, space travels, threat of nuclear and neutron war, genetic research, energy crisis; *Ethics in technology* ethics, professionalism legal aspects.

Code: FRN 101

Credit Unit: 1

Title: Use of French I

Content:

This course will introduce the students to the basics of French Language such as greeting in French, French alphabets, vowels, pronunciation and accents. The students will also learn the components of French grammar such as the articles, verbs, etc.

Code: FRN 102

Credit Unit: 1

Title: Use of French II

Content:

Here the students will be drilled in French grammar proper, dialogue and other oral exercise. The student will also be introduced into reading, starting with France Afrique Book 1. At the end of this course the students should be able to speak basic French and be able to tell time in French.

Code: IGB 101

Credit Unit: 1

Introduction to Igbo grammar, composition and comprehension. Mkpuru edemede Igbo (Otografi onwu). Nkejiasusu Igbo. Akara edemede Nkebiokwu Igbo. Nkebiahiri Igbo. Ahiriokwu Igbo. Udi Ahiriokwu di iche iche. Asusu Igbo dika asusu svo. Nkejiokwu Igbo. Ndakorita udaume. Udaolu. Ntughari Edemede (Kompozishion). Edemleta. Atumatu okwu. Aghota azaa (Aguoazaa). Nchikota. Ekwumekwu n'asusu Igbo. Ikwu okwu n'oha. Nsupe n'Igbo. Njem nleghari anya/igba nkiri.

Code: IGB 102

Credit Unit: 1

Title: Introduction to Igbo History, Culture And Literature

Content:

Akuko banyere ndigbo na mmalite ndu ha., Ekele na nsopuru n'ala Igbo. Uzo di iche iche e si enye nsopuru, Ndi Igbo na nnabata ndi obia. Ewumewu ndi Igbo, Ewumewu nkwalite aku na uba. Ewumewu Okpukperechi Ewumewu Ahuike. Ewumewu Okwu Ochichi. Mmekorita Ndi Igbo na ndi agbataobi ha. Akuko okike. Aru. Onwu na ndu. Akwamozu Okwukwe di iche iche ndi Igbo nwere. Agumagu Igbo. Ngalaba agumagu igbo na ejirimara ha. Akparamagwa na uru agumagu onu na agumagu ederede. Njem nleghari anya

Code: GST 201

Credit Unit: 1

Title: Nigerian and African Cultural
Development Social Science II

Rationale:

To provide a good understanding of the environment and the various policies of the government as it affects the citizens as well as the economic base of the nation.

Aim:

To ensure that all students have adequate knowledge of the public and private sector operations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence and participate in the discussions involving the public and private sector activities.

Assessment:

Test 30% Examination 70%

Content:

Concept and meaning of development; traditional African its geographical and ethnographical review, its family structure, kingship system etc., socio-economic pre-occupation, political system, art and music, modes of communication; Africa and processes of modernization education, writing and the press, urbanization and social change, modern trends in art and aesthetic, nationalism and cultural revival, mass media and national development.

Code: CSC 201
Credit Unit: 4
Title: Computers and Applications I
Pre-requisite: MTH 101 or MTH 102

Rationale:

To provide a good understanding of computers and its applications for all engineering students which will enable them to see computer as a basic tool for solving all engineering problems.

Aim:

To introduce students to the constituent parts of computers as well as the use of computers and applications software, the use of High level languages to solve mathematical problems.

Learning Outcomes:

At the end of this course the student will be capable of exploring mathematical software packages and to evaluate their use in engineering analysis.

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Introduction to digital computer, their uses and modern programming techniques. Brief history of computers, generation of computers, structure of a general purpose computer general problem solving, systematic development of algorithms, flow diagrams, meaning of logical processes analysis of computational problems coding of programs, verification and validation of programs. Practical experience operating computers, and peripheral equipment. Extensive practice with one or more higher-level language. Emphasis on technical applications. Elementary numerical algorithms.

Code: MTH 202
Credit Unit: 3
Title: Mathematical Methods II
Pre-requisite: MTH 101 or MTH I02

Rationale:

To provide a further background in mathematics for all engineering students which will enable them to follow technical literature and to apply mathematical analysis to engineering problems at a higher level.

Aims:

To ensure that all students have adequate background in calculus and mathematical manipulations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the mathematical expressions and the techniques of differential and integral calculus, and appreciate the use and role of mathematics in the analysis and design of engineering systems.

Assessment:

Test 30% Examination 70%

Content:

Vectors. Product of vectors. Equations of lines and planes. Vector spaces. Linear dependence and independence. Basis and dimensions. Linear transformations, matrices. Operations in matrices. Rank of a matrix. Determinants. Inverse of a matrix. Solutions of systems of linear equations. Cramer's rule. Eigenvalues and eigenvectors. Similarity to diagonal matrices. Bilinear and quadratic forms. Applications.

Code: MTH 203
Credit Unit: 3
Title: Elementary Differential Equations
Pre-requisite: MTH 101 or MTH 102

Rationale:

To provide a further background in mathematics for all engineering students which will enable them to follow technical literature and to apply mathematical analysis to engineering problems at a higher level.

Aims:

To ensure that all students have adequate background in calculus and mathematical manipulations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the mathematical expressions and the techniques of differential and integral calculus, and appreciate the use and role of mathematics in the analysis and design of engineering systems.

Assessment:

Test 30% Examination 70%

Content:

Derivation of equations from physics, chemistry, biology, geometry etc., First order equations. Applications of first order equations. Second order linear equations. Fundamental solutions. Linear dependence and independence. Wronskian properties of solutions of linear equations, methods of undetermined coefficients and variation of parameters. Application of second order linear equations. General theory of n-th order linear equations. Laplace transform. Convolution. Solution of initial-value problems by Laplace transform method. Difference equations.

Code: MTH 211
Credit Unit: 3
Title: Introduction to Statistics and Probability
Pre-requisite: MTH 101 or MTH 102

Rationale:

To provide a further background in mathematics for all engineering students which will enable them to follow technical literature and to apply mathematical analysis to engineering problems at a higher level.

Aims:

To ensure that all students have adequate background in calculus and mathematical manipulations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the mathematical expressions and the techniques of differential and integral calculus, and appreciate the use and role of mathematics in the analysis and design of engineering systems.

Assessment:

Test 30% Examination 70%

Content:

Frequency distribution, measures of location and dispersion in simple and grouped data. Laws of probability. The Binomial, Poisson and Normal distributions. Estimation and tests of hypothesis. Analysis of variance and covariance, simple regression and correlation, contingency tables and 2 applications.

Code: **ENS 301**

Credit Unit: **2**

Title: **Introduction to Entrepreneurship and
Innovation**

Content:

Development, Entrepreneurship. The Nigerian Entrepreneurial Environment. Creativity and Intellectual Rights. Technological Entrepreneurship. Innovation: Theories and Management. Family Business and Succession Planning. Women Entrepreneurship. Social Entrepreneurship. Business Opportunity Set and Evaluation. Introduction to Business Strategy. Introduction to Business Ethics and Corporate Governance. Relationship between Scientific Research Innovation and Products. Product Invention, Timeliness and Processes.

Code: **ENS 302**

Credit Unit: **2**

Title: **Business Creation, Growth and Corporate
Governance**

Concept of business and new value creation. Introduction to theories of growth

Business strategy. Sources of Capital. Principles of marketing. Business ethics and social responsibility. Opportunity sets and expansion considerations (e-commerce, e business, e-trade). The scientist/engineer as an entrepreneur; opportunities and challenges. Managing transition (start up, growth). Basic accounting literacy. Feasibility and viability studies including issues in cash flow analysis. Crafting business plan. Corporate governance and change movement.

SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY (SEET) COURSES

Code: ENG 101
Credit Unit: 1
Title: Workshop Practice I

Rationale:

To provide for all engineering students the knowledge of the various tools used in engineering workshops.

Aims:

To ensure that all students have adequate background in the use of engineering measuring instruments such as calipers etc.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the use of engineering tools and safety precautions in workshops.

Assessment:

Laboratory 40% Test 30% Examination 30%

Content:

General: Use of Engineering Measuring instruments: Calipers e.g. Vernier Calipers; Gauges e.g. Micrometer; Screw gauge and other devices. Introduction to hand tools, proficiency in the use of wood planer, Hand Saw, Sanders and Pattern Making.

Sheet Metal Work: Production of sheet metal products layouts, cutting, shaping, simple bend theory etc. **Introduction To Joining Techniques:** soldering, brazing, fusion welding, fastening and assembly. Basic woodworking principles and tools finishing and evaluation of finished products.

Code: ENGI02
Credit Unit 1
Title: Workshop Practice II

Rationale:

To provide for all engineering students the knowledge of the various tools used in engineering workshops.

Aims:

To ensure that all students have adequate background in the use of engineering measuring instruments such as calipers etc.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the use of engineering tools and safety precautions in workshops.

Assessment:

Laboratory 40% Test 30% Examination 30%

Content:

Industrial Safety: Safety Code of conduct and safety consciousness. Survey of common sources of accidents in the work place. Accident prevention and control.

Machine Shop Work: Working Components in a lathe machine, instructions in simple metal working processes e.g. shaping, milling, grinding, drilling, reaming, metal spinning, design of jigs and fixtures. Introduction of automation in manufacturing visualization fixtures and CAD, automobile work, simple

automotive diagnosis and repairs.

Electrical Workshop Practice: Convention and application of colours, codes for cables, resistors etc and signs. Use of simple electrical tools, machines etc.

Code: **ENG 103**

Credit Unit: **1**

Title: **Engineering Drawing 1**

Rationale:

To provide for all engineering students the knowledge of engineering drawings and projections.

Aims:

To ensure that all students have adequate background in the use of engineering drawings layouts and lettering.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the constructions of various shapes.

Assessment:

Assignments 50% Examination 50%

Content:

Introduction to Engineering Tools. Planning and layout of Engineering Drawing. Engineering Drawing Concept. Introduction to Dimensioning types; Dimensioning of circles, holes, radio, tolerance. Descriptive Geometry, Freehand sketching.

Introduction to Drawing/Drafting software and CAD basic tools. Orthographic multiview projection. Construction of plane shapes using CAD Construction techniques.

Presentation of data and results using charts, graphs etc by appropriate Computer Software. Further dimensioning, addition of dimensions to drawings using CAD.

Code: **ENG 104**

Credit Unit: **1**

Title: **Engineering Drawing II**

Rationale:

To provide for all engineering students the knowledge of engineering drawings and projections.

Aims:

To ensure that all students have adequate background in the use of engineering drawings layouts and sectioning.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the constructions of various shapes.

Assessment:

Assignments 50% Examination 50%

Content:

Connections in Engineering Drawing. Introduction to IS Code of Drawing. Conics and Engineering Curves ellipse, parabola, hyperbola, cycloid, trochoid, involutes. Projection of planes and solids (cube, prism, pyramid, cylinder, cone and sphere). Projection on auxiliary planes Isometric Projection. Introduction to section drawing and use of CAD Construction techniques. Development and intersection of surfaces. Detail drawing with the addition of machine and surface texture symbols. Simple assembly drawing with suitable fits and a part list and introduction to limits and tolerances. Screw threads, fasteners and springs including keys and key ways.

Code: ENG201
Credit Unit: 1
Title: Engineering Workshop Practice III
Pre-requisite: ENG 101 or ENG 102

Rationale:

To provide for all engineering students the knowledge of the various tools used in engineering workshops.

Aims:

To ensure that all students have adequate background in the use of engineering measuring instruments such as calipers etc. this course the student will demonstrate a high degree of competence in the use of engineering tools and safety precautions in workshops.

Assessment:

Laboratory 40% Test 30% Examination 30%

Content:

Introduction to Manufacturing Technology, Basic Foundry Technology: Sand testing, mixing of sands, and preparation of moulds. Pattern making solid, spilt, sweep patterns; hoisting gates and risers. Melting and pouring of metals, Solidification, casting of simple shapes using sand moulds, permanent moulds and expendable polystyrene. Casting defects.

Joining: Design of welded joints, stress analysis, types of joints, e.g. T joints, BUTT Joint, Comer Joints (Cap joints etc), soldering, brazing, and adhesive joints. Fusion welds e.g. Manual metal arc, TIG, SAW, SPOT etc. Edge preparation, surface cladding etc. Strength and toughness of welded joints, Laser welding, radio frequency (RF) welding.

Code: **ENG 203**

Credit Unit: **1**

Title: **Engineering Drawing III**

Pre-requisite: **ENG I03**

Rationale:

To provide for all engineering students the knowledge of engineering drawings and projections.

Aims:

To ensure that all students have adequate background in the use of engineering drawings layouts and sectioning.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the constructions of various shapes.

Assessment:

Assignments 50% Examination 50%

Content:

Drawing conventions including weld vents, piping, referencing, and selection of tolerances based on design requirements. Gears, gear drives, and rolling bearings. Pipes/structural drawing. Reading and interpreting complete drawing. Detailed use of CAD for Engineering Drawing, and introduction to AutoCAD.

Code: ENG 206
Credit Unit: 1
Title: Workshop Practice IV
Pre-requisite: ENG 101 or ENG 102

Rationale:

To prepare engineering students in the use of engineering materials to assemble engineering products

Aims:

To ensure that all engineering students have adequate background in the use of foundry, welding machines, to produce simple engineering products.

Learning Outcomes:

At the end of this course the student will be able to know how to produce products to the required tolerance and specification.

Assessment:

Assignment 50% Examination 50%

Content:

Manufacture of simple Engineering and technology products to specification using Machinery, Foundry, Welding and Woodworking Technologies. Introduction to computer aided design/computer aided manufacture (CAD/CAM). Inspection and testing of the manufactured products for accuracy using appropriate equipment and methods.

Code: ENG 207
Credit Unit: 2
Title: Introduction to Engineering Materials I
Pre-requisite: CHM 102 or PHY 102

Rationale:

To provide for all engineering students the basic knowledge of engineering materials.

Aims:

To ensure that all engineering students have adequate background in the crystal structure of all materials used in engineering designs and fabrications.

Learning Outcomes:

At the end of this course the student will be able to know the effect of heat on various metals, the effects of imperfections and mechanical properties of metals used in engineering.

Assessment:

Test 30% Examination 70%

Content:

Review of atomic bonding, classification of Engineering Materials (Metals, Ceramics, Polymers, composites, Semi-conductors). Introduction to extractive metallurgy. Elements of crystallography Crystal structures: Lattice unit cells, planes and directions, miller indices, inter planar spacing. Packing of spheres simple cubic, body centered cubic, face centered cubic, hexagonal close packed structures, atomic packing densities, interstitial sites, sizes and their distribution, Lathel impartations Vacancies, and other point defects, line and surface defects. Phase Equilibria and alloy theory, solid solution. Introductory to heat treatment of steels.

Code: ENG 208
Credit Unit: 2
Title: Introduction to Engineering Materials II
Pre-requisite: CHMI02 or PHYI02

Rationale:

To provide for all engineering students further knowledge of engineering materials.

Aims:

To ensure that all engineering students have adequate background in the crystal structure of all materials used in engineering designs and fabrications.

Learning Outcomes:

At the end of this course the student will be able to know the effect of heat on various metals, the effects of imperfections and mechanical properties of metals used in engineering.

Assessment:

Test 30% Examination 70%

Content:

Non-ferrous engineering alloys and their properties. Mechanical properties of engineering materials:

Plastic deformation of a single crystal, stress and strain curves, strain hardening; Creep, toughness and fatigue hardness. Principles of mechanical testing mechanism of ductile brittle transition in fracture and ITT Curves. Physical properties of materials electrical, optical and magnetic properties. Electronic structure and properties. Non-metallic materials. Ceramics, Structures, properties, processions application. Plastic types, structures, processing and applications. Composites types and properties. Wood as an Engineering material. Environmental stability of engineering materials corrosion and corrosion control.

Laboratory: Mechanical testing of materials, ITT determination using charpy, I20cl, Hardness tests, particle sizing and compaction of powders.

Code: **ENG 209**

Credit Unit: **3**

Title: **Engineering Thermodynamics**

Rationale:

To acquaint engineering students with the laws of thermodynamics.

Aims:

To ensure that all engineering students have adequate background in thermodynamic processes. Learning Outcomes:

At the end of this course the student will be able to know the laws of thermodynamics and be able to apply them in the design of heat engines.

Assessment:

Test 30% Examination 70%

Content:

Fundamental concepts. History of thermodynamics, dimensions, units, system, state property, process, heat, work, pressure, temperature. Zeroth Law.

First law of Thermodynamics: Conservation of energy (Joule's experiment) first law, energy Non-flow process, entropy, steady flow processes. Properties of pure substances, PVT relations and Diagrams, CP, CY, Ideal gas, thermodynamic charts, and tables.

Second Law of Thermodynamics and boat engine cycles Carnot heat engine and cycle. The second law and its corollaries. Entropy: Reversible and irreversible processes. Classics inequality, entropy and irreversibility. Heat engine and heat pump calculations. Applications of 2nd law of non flow and steady flow processes.

Available and unavailable energy, availability Gibbs equations.

Code: ENG 212
Credit Unit: 2
Title: Engineering Economy

Rationale:

To prepare engineering students towards the management of engineering projects.

Aims:

To ensure that all-engineering students have adequate background in the setting up and management of engineering projects as well as making good cost estimates and valuations.

Learning Outcomes:

At the end of this course the student will be able to master economic analysis of alternatives, decision making among alternatives and be able to compute depreciation on engineering materials

Assessment:

Test 30% Examination 70%

Content:

Introduction: The role of Engineering Economic analysis, e.g. engineering economic analysis, the decision making process. Engineering costs fixed, variable, marginal and average costs, sunk cost, opportunity costs, recurring and non-recurring costs, incremental costs.

Interest and Equivalence: Computing cash flows, time value of money, simple and compound interests, interest formulas, Calculation of equivalence involving interests. Economic analysis of alternatives Basics of comparison (annual equivalent cost comparison, present equivalent cost comparison, incremental approach, rate of return comparisons, benefit/cost comparisons, MARR). Evaluating Replacement alternatives, Break Even analysis.

Accounting and Depreciation: Accounting and cost accounting, application of computer in accounting. Basic aspects of depreciation. Depreciation and expenses. Depreciation accounting methods traditional methods, straight line sum of the year digits and declining balance methods, Modified Accelerated Cost Recovery System (MACRS) Methods. Comparison of MACRS to other depreciation accounting methods.

Income Tax: Income tax rates, calculation of taxable income of individuals and firms. Financial reports/statement of accounts of companies.

Code: ENG 213
Credit Unit: 2
Title: Engineering Mechanics I (Statics)
Pre-requisite: MTH 101, MTH 102 or PHY 101

Rationale:

To introduce students to the statics of particles and rigid bodies in a plane.

Aims:

To introduce all the engineering students to techniques for solving static problems in real life.

Learning Outcomes:

At the end of this course the student will be able to solve real life problems the areas of statics and kinematics.

Assessment:

Test 30% Examination 70%

Content:

Basic concepts in statics. Statics of particles and rigid bodies in a plane; analysis of forces; distributed forces, vectors, flexible cables, motion static and dynamic. Equilibrium of a particle and equilibrium of Rigid body, Areas, Centroids, masses,

centres of gravity, analysis of structures; internal forces, Newton's third law, shearing forces, moments, trusses and frames. The basics of free body diagrams. General mathematical principles. Moments of inertia of an area, Computer application and simulations in statics.

Code: **ENG 214**

Credit Unit: **2**

Title: **Computer Programming for Engineering Applications**

Pre-requisite: **MTH 102**

Rationale:

To provide a good understanding of computers and its applications for all engineering students which will enable them to see computer as a basic tool for solving all engineering problems,

Aim:

To introduce students to the use of High-level languages to solve mathematical problems.

Learning Outcomes:

At the end of this course the student will be capable of exploring mathematical software packages and to evaluate their use in engineering analysis.

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Introduction to C/C ++/JAVA Programming Language. The MAIN () function, Comment lines, Types conversion. Constants, Expressions. The PRINTF Function. The SCANF function. The assignment statement formatted input and output statement. Arithmetic Operators. The IF Statement. Comparison Operators, logical operators. Nested IF

ELSE Statements UNARY Operators, TERNARY Operators, Bitwise Operators, Combined Operators, Table of priority of C/C++/JAVA Operators. The WHILE top, to DO WHILE Loop, the FOR Loop Statement, NESTED loops, unconditional program branching. The GO TO statement, the CONTINUE Statement, the BREAK and SWITCH Statement. Application of C/C++/JAVA programming languages in solving engineering problems.

Code: **ENG 217**

Credit Unit: **1**

Title: **Science, Technology and Society**

Rationale:

To provide a good understanding of the environment and the evolution of technology as it affects the citizens as well as the economic base of the nation.

Aim:

To ensure that all students have adequate knowledge of the effects of science and technology on man.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of understanding in the various ways innovations and inventions in science and technology has impacted on man.

Assessment:

Test 30% Examination 70%

Content:

Science, Technology and Engineering: Definitions, historical development of engineering, science and technology. **The Engineering Family:** The Engineer, the Technologist, the Technician, the Artisans and Craftsmen. **Role of the Engineer in the society:** In Space travel missions, in Oil and Gas production operations, in politics, law,

medicine, education, administration, management, food production, utilities, military service, and developing new technologies and products.

Branches of Engineering: Agricultural Engineering, Aeronautical Engineering, Civil Engineering, Mechanical Engineering, Materials and Metallurgical Engineering, Electrical and Electronic Engineering, Petroleum Engineering, Gas Engineering and Chemical Engineering, etc.

Professional Qualifications: Engineering Education qualifications, registrable as a professional Engineer with: Nigerian Society of Engineers (NSE), Council for the Regulation of Engineering in Nigeria (COREN), Africa Institute of Science and Technology (AIST NIGERIA). Etc, other countries have their own bodies.

Professional Practice: Professional Ethics and Conducts. Professional Registration procedures and Engineering Professional responsibilities. Management skills, project management, developing new technologies, tools, machines, computers, and systems protecting intellectual property rights and business legal rights, handling human and energy resources, fossil, geothermal, nuclear, wind and solar. Conversant with safety in Engineering Practices. Control of occurrences of accidents in Production Industry (Oil, Steel, mining, etc). Rules and regulations guiding pollution of the environment. Capable of applying appropriate technologies, Information and Communication Technology (ICT) systems in Engineering practice. Financial Management knowledge requirement, human relations management essential in developing the Engineer to promote productivity in any enterprise.

Code: ENG 224

Credit Unit: 2

Title: Engineering Mechanics (Dynamics)

Pre-requisite: MTH102 or PHY 101

Rationale:

To introduce students to the Kinetics and kinematics of particles and rigid body motions.

Aims:

To introduce all the engineering students to techniques for solving kinetics problems in real life.

Learning Outcomes:

At the end of this course the student will be able to solve real life problems the areas of kinematics.

Assessment:

Test 30% Examination 70%

Content:

Newtonian principles of dynamics of particles and rigid bodies applied to one-dimensional and two-dimensional motions. Force system resultants, structural analysis, kinematics and kinetics of particles and rigid body motions, methods of impulse and momentum, linear and angular momentum, work and energy, Relative motion concepts. Computer applications and simulation of engineering mechanics and dynamics.

Laboratory:

Experiments illustrating dynamics of particles and rigid bodies, material elasticity, friction and machines.

Code:	ENG 226
Credit Unit:	3
Title:	Introduction to Electrical and Electronics Engineering
Pre-requisite:	MTH I02 or PHY I02

Rationale:

To provide engineering students with an understanding of the analytical and computational techniques used to solve electric circuit problems and applications. Electrostatic and electromagnetic concepts are introduced to provide for understanding of the field concepts associated with circuits and to explore the problems of electromagnetic interference.

Aims:

To introduce all the engineering students to techniques for solving dc circuit problems and to apply the techniques to practical problems.

To introduce all the engineering students to the concept of digital logic circuits.

Learning Outcomes:

At the end of this course the student will be able to analyse and simulate D.C. and A.C. electrical circuits. Be able to implement simply logic circuits

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Review of electrostatics and electromagnetism. Transient and Steady-State analysis of circuits; network theorems and techniques, passive and active circuits and building blocks, sinusoidal analysis and phasors.

Transformers: Principles and operation.

Electrical Machines: Principles and operation of electrical machines, motors, generators, single and polyphase systems.

Introduction to electronic circuits and models: Conduction mechanisms and applications of diodes, junction transistors, and amplifiers. Introduction to integrated circuit technology and digital circuits.

Laboratory:

Analogue and digital instrumentation and systems, applications of operational amplifiers, associated laboratory experiments.

Code: ENG 301
Credit Unit: 2
Title: Industrial Studies I

Rationale:

To introduce students to the various practices in the industry.

Aims:

To introduce students to the various practices in the industry.

Learning Outcomes:

At the end of this course the student will be able to fit into any industry for industrial attachment.

Assessment:

Test 30% Examination 70%

Content:

Manufacturing Systems Analysis. Types of production; associated layout problems, materials handling and control Network Analysis; arrow diagrams; bar charts. Critical path method, program evaluation and review technique, resource leveling, activity crashing. Modern manufacturing methods, automation, Computer Aided Engineering (CAE) applications, CAD/CAM, Finite Element Analysis (FEA) and Computer Integrated Manufacturing.

Applications: Cost analysis, scheduling, job loading and job sequencing, production planning and control.

Inspection and testing methods, introduction to quality control.

Practice: Group/Individual implementation/ manufacture/ assembly of selected technological products in simulated production environments, construction of physical models of relevant concepts.

Code: **ENG 305**

Credit Unit: 3

Title: **Strength of Materials I**

Pre-requisite: **ENG 207**

Rationale:

To provide for all engineering students the basic knowledge of strength of materials.

Aims:

To ensure that all engineering students have adequate background in the strength of all materials used in engineering designs and fabrications.

Learning Outcomes:

At the end of this course the student will be able to know the effect of elasticity and stress/strain on materials used in engineering design and construction.

Assessment:

Test 30% Examination 70%

Content:

Elementary concepts in two-dimensional theory of Elasticity, generalized Hook's law, equations of equilibrium, strain-displacement and stress-strain relations. Axial force, shear force and bending moments, simple bending theory, shear and moment diagrams. Torsion; combined bending. Stresses; transformation of stresses. Mohr's circle. Deflection of beams, elementary buckling of column.

Laboratory:

Mechanical testing of members under axial, bending and torsional loads. Deformation and characteristics stress-strain curves; strength, ductility, brittleness loading and unloading.

Code: ENG 307
Credit Unit: 3
Title: Engineering Mathematics I
Pre-requisite: MTH 203

Rationale:

To provide a further background in mathematics for all engineering students which will enable them to follow technical literature and to apply mathematical analysis to engineering problems at a higher level.

Aims:

To ensure that all students have adequate background in calculus and mathematical manipulations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the mathematical expressions and the techniques of differential and integral calculus, and appreciate the use and role of mathematics in the analysis and design of engineering systems.

Assessment:

Test 30% Examination 70%

Content:

Review of Ordinary Differential Equations: Bessel, Lagrands.

Partial differential equations: Engineering applications, Laplace transformations and other transform methods. Series solutions and special functions: such as: Gamma functions, Beta, Gauss functions, Fourier series.

Code: **ENG 309**

Credit Unit: 3

Title: **Fluid Mechanics I**

Rationale:

To provide for all engineering students the basic knowledge of behavior of fluids in engineering.

Aims:

To ensure that all engineering students have adequate background in the behavior of fluids in engineering used in engineering designs and fabrications.

Learning Outcomes:

At the end of this course the student will be able to know the effect of elasticity and stress/strain on materials used in engineering design and construction.

Assessment:

Test 30% Examination 70%

Content:

Definition of a fluid and fluid properties. Statics of fluid systems; pressure in a static fluid. Manometry, Forces on Plane and Curved surfaces; Buoyancy and Floatation, stability of Floating and submerged bodies. Kinetics of Fluid motion, Types of flow, Continuity Equation, Momentum Equation, Fluid resistance; Laminar and Turbulent flow in closed conduits: Boundary layer concepts.

Hydraulics of pipe flow; Hydraulic and energy grade lines, pipes in series, parallel pipes. Branching pipes, network of pipes, Deterioration of pipes. Unsteady flow conduits; Water Hammer, Surge Control.

Laboratory:

Measurement of fluid properties, stability of floating bodies, hydrostatic pressure centre of pressure on submerged surfaces, bernoulli equation, friction loss along pipelines, impact of jet.

Code:	ENG 308
Credit Unit:	3
Title:	Engineering Mathematics II
Pre-requisite:	MTH 202 or ENG 307

Rationale:

To provide a further background in mathematics for all engineering students which will enable them to follow technical literature and to apply mathematical analysis to engineering problems at a higher level.

Aims:

To ensure that all students have adequate background in calculus and mathematical manipulations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the mathematical expressions and the techniques of differential and integral calculus, and appreciate the use and role of mathematics in the analysis and design of engineering systems.

Assessment:

Test 30% Examination 70%

Content:

Numerical methods and digital computer methods applied to various engineering problems including matrix inversion, approximation of functions, integration, differentiation ordinary and partial optimization. Application in engineering. Fast Fourier analysis. Introduction to Optimization e. g. transportation problems, Dynamic

programming, Design and stimulation of simple engineering components and applications. Introduction to state space formulation analysis and applications. Monte Carlo simulation.

Code: **ENG 313**

Credit Unit: **2**

Title: **Engineering Writing and Presentation**

Rationale:

To introduce students to the various practices in the industry.

Aims:

To introduce students to the various practices in the industry.

Learning Outcomes:

At the end of this course the student will be able to be self reliant in developing a product.

Assessment:

Test 30% Examination 70%

Content:

Method and formations involved in and presentation of technical reports. Current technical reports, current techniques in engineering paper presentation, communication schemes, referencing and types of referencing e.g. (Harvard and Vancouver Methods), use of Internet research methods, technical presentation (writing and data collection, organization and presentation), oral presentation of technical ideas, use of audio-visual presentation aids (Multimedia, computer hardware and software applications) etc, use of modern software in presentation, example Microsoft PowerPoint, CorelDraw, Microsoft Word and others.

Code: ENG 405

Credit Unit: 2

Title: Engineering Management and Law

Rationale:

Engineering Management is designed to provide an awareness and introduction to business and management practices.

Aims:

To provide an awareness of the theory and practice of management and the management of human resources in an engineering environment.

To develop knowledge of business and management practices to meet the demands of the highly competitive engineering industry.

To develop a knowledge of contract law for engineering projects.

Learning Outcomes:

Demonstrate knowledge of the functions of the manager, the need to provide leadership and motivation, coordination and authority and delegation and define the structure and methods of communications.

Assessment:

Test 30% Examination 70%

Content:

Management:

Organizational structure and behavior, conversion of engineers into managers, managerial functions, principles and techniques of planning forecasting, organizing technical activities, project selection and management. Leadership: styles of leadership and management. Techniques in engineering management, motivation appraisal, participative and control technique, personnel management. Management Information Systems (MIS).

Law:

Engineering profession; professional ethics and conducts, definition and specifications, tenders, bonds, construction forms. Application of business law of engineering; patents,

inventions, trademarks, copyright, contracts and contract documents. Engineering business types, the responsibilities professional liability, negligence, arbitration, the engineer as an expert witness. Public work Acts, and Compensation Act.