BOT 101 Introductory Botany I: 3+0+0 (Units) Harmattan

Biology in a modern world: The growth and ways of science. Scientific method. The science of Botany. Why Study Botany. Why study Botany?

The Cell-Structure and Function: Cell theory, Cell components; similarities and differences of animal and plant cells; similarities and differences between eukaryotic and prokaryotic cell; Cell division - mitosis, Cell in development — growth, differentiation, integration.

Elementary treatment of genetics: The physical and chemical nature of genetic material; the major historical events in the elucidation of the nature of division in cells. Mendelian genetics; human genetics and genetic counseling; genetic engineering and biotechnology.

Plant Physiology: - Elementary treatment of the mechanism of movement of materials in and out of the cell, transpiration, plant and mineral nutrition, photosynthesis, respiration; plant growth substances and their functions.

Ecology: definition; elementary consideration of biotic and abiotic components, cycling of matter and energy flow. Types of ecosystems. Pollution - water, air, oil pollution, global warming.

BOT 102 Introductory Botany II: 3+0+0 (3 Units) Rain Semester

Variety of forms: classification and evolution in the plant kingdom.

Elementary treatment of cryptogams – algae, fungi, bryophytes.

Pteridophytes – their distribution, classification, morphology, reproduction and economic importance. Evolution and significance of the seed habit in the spermatophytes (non-flowering and flowering seed plants).

Elementary treatment of the anatomy and morphology of angiosperms:

Simple and complex tissue system in roots, stems and leaves. Scope of morphology — external and internal morphology; morphology of plant organs – root morphology and variations; leaf morphology and variations. Morphology of inflorescence and flowers. Fruit morphology and variations.

BOT 103 Experimental Botany I 0+0+3 (1 Unit) Harmattan semester

BOT 104 Experimental Botany II 0+0+3 (1 Unit) Rain Semester

CHM 101 – Introductory Chemistry 1: 3 + 1 (4 units) Harmattan Semester.

3 + 1 means three hours of lecture, one hour of tutorial and three hours of practical work per week

This course is divided into 9 sections and taught by 6 – 8 lectures with 4 – 5 professors participating each session.

Emphasis is laid on fundamental chemical principles including detailed atomic structure and physical principles involved in chemical reactions. Topics include:

1. INTRODUCTION:

Methods of science: Measurement and precision. Significant figures: errors in quantitative measurement: nature of matter: elements and compounds. Types of chemical reactions.

2. ATOMIC THEORY AND NATURE OF ATOMS

Dalton atomic theory: Atomic weight, Avogadro's number: structure of the atom: Divisibility of atom, Cathode rays: mass spectrometer: contributions to atomic structure by Bohr, Thompson, Morseley and Rutherford: Discovery of nucleus: electronic energy levels and periodic table: atomic size: ionization potentials, electron, electron affinity: ionic radii and electronic configuration.

3. STOICHIOMETRY 1

Chemical formulae and equations; simplest formulae; molecular formulae; mole concept; calculation of formulae and equations from gravimetric data and vice-versa; ionic equations for neutralization and precipitation reactions. Concentrations; molarity and volumetric calculations based on stoichiometric coefficients; Oxidation and reduction as electron transfer; oxidation number; balancing of equation including balancing of redox equations by election transfer equality.

4. STOICHIOMETRY 11

Volumetric analysis including relevant calculations. Preparation of standard solutions, molarity and volumetric coefficients in neutralization, redox precipitation and complexation reactions.

5. CHEMICAL EQUILIBRIA

The equilibrium state; Mass action; equilibrium constant calculations; Equilibrium changes; Dissociation of water; pH of acids and bases; buffer solution; Indicator theory; solubility of ionic solids; solubility products; precipitation reactions (using solubility products) calculations as applied to qualitative and quantitative analysis. Common ion effect.

6. THERMOCHEMISTRY

Balancing of intermolecular forces. Hydrogen bonding; order – disorder phenomenon; entropy; free energy; energy effects; exothermic and endothermic changes; enthalpy of reaction. Hess's law of enthalpy summation (with relevant calculations), heats of neutralization; combination and formation; bond dissociation energies; relevant calculations; free energy and spontaneous change.

7. ELECTROCHEMISTRY

Electrical units; Ohm's law; faraday's laws of electrolysis; Galvanic cells; Standard Half-Cell potentials and reactions. Concentration effects (Nernst equation). Redox reactions; Oxidation potential treated in terms of free energy change; cells and batteries.

8. KINETICS

Introduction to chemical kinetics, Basic definitions of order of reaction, molecularity, reactions rates and simple reaction mechanism. Activation energy and kinetic theory.

9. RADIOACTIVITY

Types of radioactive disintegration; nuclear fission and fusion; Detection of radioactivity; Uses of radioisotope.

CHM 102 – Introductory Chemistry 11: 3 + 1 +1 (5 units) Rain Semester

1. Qualitative analysis (Inorganic) – Tests for simple cations and anions
2. Identification of organic compounds to include:
    a. Isolation and purification
    b. Qualitative analysis: Tests for common elements e.g. carbon, hydrogen, nitrogen, sulphur, halogens etc.
    c. Quantitative analysis using Dumas, Kjeldahl and Carius' methods
3. **(a) Chemical bonding**

Why and how atoms combine? The molecule and chemical bonding: electrons in molecules; Ionic, covalent, dative and complex bonding; polarity of bonds; co-ordinate bonds; metallic bonds; basic crystalline structure e.g. NaCl and metallic lattices. Hybridization and resonance in chemical bonding.

(b) Chemistry of hydrogen, noble gases, Alkali metals (Group 1) and the alkali earth metals (Group II).

4. Introduction to Organic Chemistry

Introduction to the term "Organic Chemistry"; Hybridization in Carbon – sp^3, sp^2 and sp hybridization; Physical properties as related to structures – bond length, strength, rotation etc.: Electrophiles and nucleophiles - examples to include acids and bases; Homolytic and heterolytic fission of bonds; Factors influencing organic reactions – inductive and mesomeric effects, steric factors etc.

5 (a) Homologous series and functional groups' chemistry

(b) Types of organic reactions

(c) Isomerism – structural, geometric and optical isomers

(d) Chemistry of hydrocarbons (alkanes, alkenes, alkynes, alkyl halides and Grignard reagents) to include

i. Nomenclature (IUPAC rules to be treated under Alkanes)
ii. Preparation
iii. Physical properties
iv. Chemical reactions with simple mechanisms where applicable
v. Applications

These subheadings are to be applied to each of the families above.

6. Main Group Chemistry (Groups III – V)

   Trends in properties of elements (Structures, ionization energy, physical and chemical properties); Properties of selected types of compounds – hydrides, oxides, acids and bases: Chemistry of B and Al; C and Pb; N and Ni.

7. Main Group Chemistry (Groups VI and VII) and transition metal Chemistry

   (a) Main Group Chemistry (Groups VI and VII)

   i. Trends in properties of elements

   ii. properties of selected types of compounds

   iii. Chemistry of O and S; F and Cl

   (b) Transition Series

   i. Properties of elements and compounds of d-block elements, lanthanides and actinides.

   ii. Electronic configuration: Complexes and IUPAC nomenclature of complexes

   iii Chemistry of Cr, Fe, Co, Ni and Cu; particularly of the most common oxidation states.

8. Chemistry of Alcohols, Ethers, Aldehydes and Ketones: Carboxylic acids, derivatives and Amines

   Nomenclature (IUPAC); Preparation; Structure; Physical properties and general reactions. Introduction to Aromatic compounds.

9. Carbohydrates, Proteins and Lipids

   Simple treatment of carbohydrates – monosaccharides (e.g. glucose and fructose), disaccharides and polysaccharides: Proteins – Amino acids, peptide bonds etc.: Lipids – fats and oils, soap and detergent.

SSC101: Man and his Social Environment

Credit load: 3 units

What constitutes the social environment? The origin of man, his distinctive characteristics as compared to other mammals. Human culture, its evolution, meaning, significance and dynamics. Social institutions, socialization and social interaction.

SSC102: Man and his Economic Environment

Credit load: 3 units

Nature and scope of Economics. Fundamental Economic problems. Role of Economics in the Society; the Economic Agents and Institutions. Economic systems; Poverty and Wealth of Nations; Contemporary Economic Issues

ZOO 101: Introductory Zoology 1

Credit Load: 3+0+0(3 units) – Harmattan Semester

Animal Complexity – Acellular and metazoan. Grades of organization; protoplasmic grade (protozoa), cellular grade, cell-tissue grade. Tissue-organ system grades. Animal embryology – types of eggs, fertilization, cleavage, gastrulation differentiation of tissues, organs and systems.

Outline of animal classification, Diversity of invertebrate animal life. Acellular animals (protozoa): e.g. Amoeba, Paramecium. Euglena and Trypanosoma. Radiate animals (Coelenterata) e.g. Hydra and Obelia. Acoelomate animals (Platyhelminthes) e.g. Ascaris, Coelomate animals (segmented worms e.g. earthworm): Mollusca e.g. land snails and Cephalopods. Arthropods. Arthropods-aquatic mandibulates., e.g. crayfish (Crustacea) and terrestrial Mandibulates e.g. Centipedes, Millipedes and insects, chelicerate arthropods e.g. Scorpions and spiders. Echinodermata e.g. starfishes, Protochordates e.g. Tunicates.

ZOO102: Introductory Zoology II

Credit Load: 2+0+3(3 units) Rain semester

Introductory Ecology: Introduction to concepts in ecology.

Definition of ecology: the environment and climate; habitat and niche; Autecology; Synecology, ecosystem and communities: Biomes, pollution and global warning.

Introductory Genetics: Historical development of science of genetics;

Life cycles and reproduction. Mendelian genetics. Chemical composition of the gene and molecular basis of heredity.

Introductory physiology, nutrition, excretion, respiration and reproduction in animals. Introductory Vertebrate Biology.

Zoo 103: Experimental Zoology I

Credit Load: 0+0+3(1 unit) Harmattan Semester.

General laboratory procedure: use and care of microscope: Diversity of living thing, plant cells, animal embryology: Eggs of chicken, starfish, toads. Animal classification: dissection of the toads.

Zoo 104: Experimental Zoology II

Credit Load: 0+0+3(1 unit)

Concept and components of the environment, abiotic (temperature, water/humidity, topography etc.) and biotic components; Distribution of organisms in different habitats e.g. fresh water, ponds, slow flowing stream etc.: Determination of energy relationships, population/communities and ecosystems, Mendelian trait in fruit flies and human; population genetics, analysis of human blood types (MN, ABO, S & P); Diversity of the vertebrate group; Dissection of the toads, dissection of the lizard and dissection of the rat.

BCH 202- Cell and Molecular Biology 2+0+0 (2units) – Rain Semester

Principles of the chemical basis of life. The molecular basis of cellular structure: Polysaccharides, lipids, proteins, nucleic acid; the cellular basis of life: organization and function of cell nucleus; structure and function of cell membranes; cell differentiation and proliferation; cell metabolism, enzymes, digestion, anabolism and catabolism, energy release and utilization in the cell; main techniques used in cell biology.

BOT 202 Biometry*:* 2+0+3 (Units) Harmattan and Rain Semesters

Introduction: What Biometry is about; the development of biometry; uses and limitations. Data in Biology. Samples and populations; variables and varieties; accuracy and precision of data; derived variables a; frequency distributions. Descriptive Statistics: Measures of location (mean median and modes); Measures of Spread or dispersion (range, variance and standard deviation). Coding of Data for easier computation. Probability Distributions: Discrete probability distributions (Binomial and Poisson distributions); continuous probability distributions: frequency distributions of continuous of variables; normal distributions. Estimation and Hypothesis Testing: Distribution and variances of means; confidence limits, and distribution of variances; hypothesis testing regarding means and variances. Analysis of variance (ANOVA): Single classification and factorial ANOVA; assumptions of ANOVA. Correlation and Regression. Analysis of frequency: Tests of goodness of fit (single classification tests and tests of independence).

BOT 203 Introductory Genetics 3+0+3 (3 Units) Harmattan

The subject matter of Genetics. Heritable and non-heritable traits. A short history of Genetics. Sexual and asexual reproduction. Chromosome number and structure; chromosomes and genes. Meiosis and mitosis; alternation of generations. The transmission of hereditary character: Mendelism; gene interaction; quantitative genetics. Cytoplasmic inheritance. Sex determination and sex linkage. Probability in Genetics. Linkage and recombination. Genetics of Lower Organisms viruses, bacteria and fungi. The molecular basis of heredity. Introduction to population genetics. Introduction to evolution and its processes. **Pre-requisite: BOT 101**

CHM 207 – Physical and Inorganic Chemistry (for non-chemistry majors) 3 + 1 + 0 (4 units) Harmattan Semester.

A broad base course, covering much of the material in CHM 201 and 202, but less rigorously and less detail. Topics include: development of modern chemistry; chemical bonding and the states of matter; buffer systems and pH – controlled precipitations complex ions analysis; chemistry of representative metals, metalloids, non-metals, and transition elements; inorganic chemical production; basic chemical kinetics and thermodynamics; interfacial and surface properties, films, micelles and colloids; absorption at surfaces, with particular reference to heterogeneous catalysis.

CHM 205 – Experimental Physical/Inorganic Chemistry (0 + 0 + 1) (1 unit) Harmattan Semester

A basic practical Chemistry course designed to;

(a) Develop good experimental expertise
(b) Illustrate the principles of the topics covered in the CHM 200 level courses
(c) Demonstrate the empirical nature of chemistry

Basic techniques to be developed are in physical and inorganic Chemistry and shall include;

(i) Estimation of errors, theoretical processing of experimental data to yield best curve or linear fits and error limits
(ii) Quantitative inorganic analysis by volumetric and gravimetric methods including;
    a. Measurement of pH and preparation of buffer solutions
    b. Oxidation – reduction titrations;
    c. Mixed base titrations requiring the use of more than one indicator
(iii) Thermal analysis, including
    a. Measurement of heat of reaction
    b. Measurement of heat of solution and mixing
(iv) Analysis of intermolecular forces
(v) Chemical kinetics
    a. Measurement of reaction rates
    b. Measurement of activation energy
(vi) Electrochemistry
(vii) Simple inorganic synthesis

Pre-requisite: CHM 101 or A-level chemistry, Co-requisite: CHM 201 or 203 or 207

CHM 202 – Basic Organic Chemistry: 3+1+0(4 units) (Rain Semester)

Revision of chemistry of common functional groups covering the material of CHM 102. Extension of aliphatic chemistry, including hydrocarbons, alkenes, the carbonyl group, the hydroxyl group, the amino group, carboxylic acids and their derivatives. Survey of aromatic chemistry, topics including benzene and its mono-substitution products. Bifunctional compounds. Introduction to lipids, carbohydrates, amino-acids and proteins, and to chromatographic and spectroscopic methods of investigating organic structures. Synthesis of some organic compounds.

CHM 206 – Experimental Organic Chemistry 1. 0+0+1 (1 unit) Rain Semester

A course designed to illustrate the principles covered in lecture course CHM 202. Topics include separation, purification and identification of organic compounds by solvent extraction, distillation, crystallization followed by determination of physical constants, simple organic synthesis and qualitative analysis by chemical methods.

Pre-requisite: CHM 102 or A-level Chemistry; Co-requisite: CHM 202

CHM 208 – Introductory Analytical Chemistry: 2+0+0(2 units) Rain Semester.

1. Review of steps in and applications of quantitative chemical analysis. Expressions of concentration, to include units used in instrumental work (ppm etc.).
2. Statistics: Data treatment, potential sources of error in chemical analyses. Sampling and sample size, and sample collection
3. Laboratory techniques: General operations and tools of the trade.

4. Gravimetric methods: Applications of organic precipitating agents e.g. oxine, -8-hydroxyquinoline, drug and sodium tetraphenylborate (NaTPB) (-for K^+, NH_4).
5. Volumetric Methods
   a. Acid-base titrations
   b. Precipitation titrations – Volhard, Mohr and Fajan
   c. Redox – Titrations and indicators, and
   d. Complexometric titrations – equilibria and analytical uses of complexes
6. Electroanalytical Techniques
   Potentiometer and non-potentiometer electro analysis.
   Karl Fischer titrations as examples of amperometric titrations
   Theory and applications of ion-selective electrodes
   Pre-requisite: CHM 101

BCH 303 – Introductory Biochemistry I - 2 +0+4 0 (units) Harmattan

pH and buffers; structure of cells - intracellular organization and organelles functions; Methods of cell fractionation. Intracellular localization of enzymes and biochemical activities. Chemistry of the major constituents of the cells; Carbohydrates, lipids, proteins, nucleic acids and nucleoproteins. Coenzymes: structure and functions; enzyme kinetics; mechanism of enzymes action and control of enzymatic action. Biological membranes, Transport, Bioenergetics. Biological oxidation.

BCH 304 – Introductory Biochemistry II – 2+0+4 (units). Rain Semester.

Methods of studying metabolism of carbohydrates, lipids, amino acids, nucleic acids, and proteins. DNA replication, transcription, protein synthesis, recombinant DNA technology. Photosynthesis, Regulation of metabolism, Hormones, electron transport and oxidative phosphorylation. Molecular biology of bacteriophage lambda. Biochemistry of animal viruses, acquired immunodeficiency syndrome (AIDS). Neurotransmission, vision, special topics in Biochemistry.

MCB 201: GENERAL MICROBIOLOGY I: (3 Units) (L 30: P 30: T 0).

Origin and scope of Microbiology, Introduction to various forms and characteristics of Microorganism including bacteria, viruses, fungi, protozoa and algae. A brief account of their growth, reproduction and distribution in nature, their relationship to each other and living things, and their beneficial and harmful effects on man. Control of microbial populations involving both physical and chemical agents.

MCH 202: GENERAL MICROBIOLOGY II: (3 Units) (L 30: P 15: T 7.5)

Systematic classification of microorganisms including bacteria, viruses, fungi, protozoa and algae microbial variation and hereditary. Microorganisms as geochemical agents, including cycles of elements such as carbon, nitrogen and sulphur. Emphasis will be placed on laboratory

methods involved in the isolation, cultivation, preservation, and identification of microorganisms.

MCB 301: MICROBIAL GNETICS AND MOLECULAR BIOLOGY: (3 Units) (L 30: P 30: T 15.)

A survey of the current status of microbial genetics (bacteria, Viruses, protozoa and fungi) including discussion of methods and findings in the areas of mutagenesis, induction, isolation and chemical characterization of mutants, adaptation, transformation, transduction conversion and conjugation. Experiments with Virulent Phases, Temperate phages and lysogenic bacteria and other lower eukaryotic genetics. Recombinant technology, methods in closing and isolation of germs. Transposons; Application of genetic engineering in medicine, industry and agriculture. Pre-requisite BCH 202, MCB 201/202

MCB 302: PATHOGENIC BATERIOLOGY: (3 Units) (L 30: P 15: T 7.5)

Host-parasite relationship. Pathogenic microorganism and various disease they manifest in their hosts. Microbial and host factors that contribute to disease, state. Methods in diagnostic bacteriology. Prerequisite. MCB 201/202

MCB 303: IMMUNOLOGY AND IMMUNOCHEMISTRY (4 Units) (L 30: P 30 T 15)

A brief history of immunology. Basic concepts of immunology, structure of antigens, antigenic determinants; cellular immune response genetics of response to specified antigenic stimulation. Structure and classification of immunoglobulins. Mechanisms and theories of antibody formation. Antigen and antibody interactions. Primary and secondary lymphoid tissues and organs.

Hypersensitivity, immune-pathology autopathology, autoimmunity. Histocompatibility; genes and gene products transplantation immunology. Immunodeficiency and immunoprophylaxis. The practical will include laboratory exercises in modern technique in immunology and immunochemistry. Pre-requisite. MCB 201/202, BCH 202.

MCB 304: ENVIRONMENTAL MICROBIOLOGY: (2 Units) (L 15: P 30 T 0).

Microorganisms and other organisms important in aquatic systems and disposals. Ecology of microorganisms in fresh water. Pollution and self-purification of water, purification of water. Brief studies of marine microbiology. Disease transmission by water. Microbiological examination of water; solid waste disposal and management; Biological oxygen demand (BOD) and chemical oxygen demand (COD) demand tests for sewage and water. Micro-organism and soil, water, air pollution. Pre-requisite. B10 101/102/MCB 201/202.

MCB 306: MICROBIAL PHYSIOLOGY AND METABOLISM: 3(Units) (L 30: P 0 T 15)

Aspects of microbial physiology, a review of cell structure and function; growth and death of microorganisms; Bacterial cell wall synthesis. Biosynthesis of nucleic acids and protein synthesis and their regulation. The nutritional types of different bacteria in relation to their kinetics, isolation and purification. Pre-requisites – BCH 202, MCB 201,

MCB 307: SOIL MICROBIOLOGY (3Units) L 30: P 30 T 0)

The characterization of soil environment; Microbial flora and fauna of soil; Microbial activities in soil; Nitrogen cycle, Carbon cycle, Sulphur cycle; Mineral transformation by microorganism; Organic matter decomposition and nitrogen fixation. Ecology: relationships among the soil fauna and flora; soil pathogen, effects of pesticides on soil microorganisms; Biodegradation of pesticides; Methane biosynthesis and biofuels generation. Pre-requisite. MCB 201/202.

MCB 308: PATHOGENIC MYCOLOGY: (2Units) (L15: P 30: T 0)

Structure, reproduction and classification of pathogenic fungi and their laboratory methods of study. Concept of plant pathology. Study of some selected plant diseases caused by fungi common in Nigeria. Principles of plant disease control. Pathology and immunology of superficial, systemic mycoses and actinomycetes. Pre-requisite – MCB 201/202.

MCB 309: FOOD MICROBIOLOGY (2 Units) (L 15: P 30 T 0)

The distribution, role and significance of microorganisms in food; intrinsic and extrinsic parameters of foods that affect microbial growth. Food spoilage and food-borne disease microorganisms. Indices of food sanitary growth and food microbiological standards. Disease of animals transmissible to man via animal food products

Pre-requisites MCB 201/202, BCH 202, BCH 201

MCB 310: MYCOLOGY (3Units) (L 30: P 30 T 0)

The major groups of fungi and their probable relationships.

Function, structure and growth of specified representatives of higher and lower fungi. Economic and ecological importance of fungi; references to Nigeria examples. Pre-requisites: MCB 202.

MCB 399 - INDUSTRIAL ATTACHMENT (3Units)

Industrial attachment in Medical/ Public Health Industrial establishments will be arranged for study during the long vacation.

MCB 401 SEMINAR IN MICRIBIOLOGY AND BIOTECHNOLOGY (2Units)

Under the supervision of an academic staff, the student is expected to select a seminar topic for detailed study, using library method. Students will be encouraged to choose areas of recent advances in the chosen field. The course is expected to give the student the opportunity for independent thought and expression. The study will result in seminars and symposia.

MCB 402 RESEARCH PROJECT IN MICROBIOLOGY AND BIOTECHNOLOGY (6 Units) (L 45: P 30 T 15)

The student will undertake a research project or a critical literature review under supervision of a staff in any special area of Microbiology and Biotechnology. The student will be expected to write a project report and be examined for his/her knowledge of the work before a panel of external examiners in an oral examination

MCB 403 PHARMACEUTICAL MICROBIOLOGY (2 Units) L 15: P 30 T 0)

The chemistry of synthesis of chemotherapeutic agents and antibiotics. Production and synthesis of antibiotics and antimicrobial agents. Quality control of pharmaceutical products. Concepts of growth and death of microorganisms; disinfection, sterilization and asepsis. Sterility and sterility tests. Concepts of antibiotics sensitivity and resistances as related to microbial physiology. Pre-requisites. MCB 201/202, BCH 202.

MCB 404 ANALYTICAL MICROBIOLOGY AND QUALITY CONTROL (2 Units) (L 15: P 30 T 0)

Microorganism as agents in quantitative analysis. Selection of test organisms for assays (antibiotics, amino acids vitamins etc.). Responses of microorganism used in assays. Obtaining and measuring responses. Preparation of assay samples. Methods of assays. Interpretation of results. Aspects of quality control. Plant and equipment sanitation. Microbiological standards and specification. Pre-requisites – MCB 201/202, BCH 202.

MCB 405 - PRINCIPLES OF EPIDEMILOGY AND PUBLIC HEALTH (3 Units)

Statistical application to epidemiology. Nature of epidemics. Epidemiological investigations. Spectrum of infection. Herd Immunity, Latency of Multifactorial systems in epidemics. Zoonoses, antigenic drifts; biological products for immunization; Recommended immunization schedules. Pre-requisite MCB 201. 202, MCB 302

MCB 406 – MEDICAL VIROLOGY (3Units0 (L 30: P 15 T O)

Attention will be given to the viruses pathogenic for man and animals with emphasis on virulence, type of disease produced, methods of control. The bacteriophage will be used in some of the laboratory practical, to demonstrate the characteristics of the viruses.

Representative viruses will also be studied in the laboratory to demonstrate the nature of viral virulence. Methods of virus cultivation and identification with special reference to tissue culture techniques will also be introduced.

MCB 407 INDUSTRIAL MICROBIOLOGY (4Units) (L 30: P 30: T 15)

Nature of industrial Microbiology. Microorganisms of industrial importance. Aspects of the biology of moulds, yeasts, bacteria, actinomycetes and viruses of importance in various fermentations. Culture techniques and maintenance of selected cultures. Mutation, strain selection and development; hybridization. Media formulation and economics. Optimization of fermentation media at laboratory scale. Perimeter design operation. Antifoams. Aspects of biochemical engineering. Patents and patent law. Pre-requisites. MCB 201/202, MCB 306, BCB 202.

MCB408 MICROBIAL ECOLOGY (3 Units) (L 15: P 30: T 0)

Microbes and ecological theory. Physiological, morphological and genetic adaptations of microorganisms to their environment. Microbial interactions. Microorganisms in ecosystems. Microbial bioconversions. Pre-requisites. MCB 304.

MCB 409 - AQUATIC MICROBIOLOGY (3Units)

The life of micro-organism in springs, rivers, lakes, and seas. The influence of physical and chemical factors on aquatic microorganisms. Role of microorganisms in the cycling of elements in water and sediments. Water treatment and drinking water standard. Sewage treatment. The role of microorganisms in the origin of mineral resources and self-purification of waters. Oligotrophic and eutrophic lakes. Iron corrosion and iron bacteria. The economic significance of aquatic microorganisms.

Pre-requisites MCB 302, MCB 308, MCB 304.

MCB 410- PETROLEUM MICROBIOLOGY (3Units)

Detailed study of the carbon cycle. Theories about the genesis of fossil fuels with emphasis on microbiological influence. Prospecting for oil by means of microbial indicators. Drilling: Corrosion of pipes and equipment- microbiology of the process. Acid mine drainage. Risks posed by bioleaching. Physiology and genetics of *Thiobacillu*s *Ferrobacillus* and *Desulfovibrio* species. Environmental aspects of oil shale oxidation including industrial waste disposal. Effects of oil spills on microbial ecology of seas and soils. Problems in transportation and storage- microbial decomposition of petroleum-economic considerations and control methods. Structures and recalcitrance of by-products of the petroleum industry including plastics, waxes, sprays, paints and oils. Fungal influence on these products, equipment and models of experimentation in petroleum microbiology research. Relationships with other fields of petroleum technology.

Pre-requisites: MCB 302, MCB 304, MCB 301.

INTRODUCTION TO LAW - SEL 001 (2 Units)

Meaning and scope of Law, the five and Schools of Jurisprudence – Natural Law school, Historical School, Positivist/Analytical School, Sociological School and Realist School. Importance and main functions of Law in the Society, Major branches of Law, Laws applicable in Nigerian Courts like the Constitution, Criminal Code, Penal Code etc.

Definition of Criminal Law, Elements of an Office; Aims of Criminal Punishment; is death penalty justified? Concept of Euthanasia.

A brief Constitutional history of Nigeria, Definition and importance of a Constitution as an organic law of a nation; major Constitutional problems of Nigeria, Problems of Political Election in Nigeria, Main Features of the Electoral Act. 2006; important Provisions of the 1999 Constitution on Supremacy, Organs of government, impeachment and Immunity, Courts of Law in Nigeria and their categories like native, inferior and superior. Essence of Justice in the Society.

Definitions and Scope of a Contract; the main elements of a Contract-offer, Acceptance and Consideration; void, voidable and Perfect Contracts.

Concept of Human Rights, Relevant Provisions of the 1999 Constitution for their protection; Battery, Assault, False Imprisonment, Defamation, Definition of Criminal Law, Elements of an offence, Aims of Criminal Law.

Meaning and Scope of International Law; Importance and Relevance of International Law, Objectives of the UNO, ICC, African Chapter on Human and Peoples' Rights.

What are women's Rights, Major Domestic and international legal Instruments relating thereto; Effects of Female Genital Mutilation.

What is Democracy? What is Democratization? Features of Democracy, Challenges of Nigerian Democratic Systems, Strategies for challenges to Democracy in Nigeria, Nigerian Security Problems and Probable Solutions.