**Bayero University Kano**

**Physical Sciences**

**Pure and Industrial Chemistry**

**B. Sc Forensic Science Programme**

**30% Addition to CCMAS Courses Structure/Summary**

**100 Level**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Unit(s)** | **Status** | **LH** | **PH** |
| BUK-CHM 101 | General Chemistry I | 2 | C | 30 | - |
| BUK-CHM 102 | General Chemistry II | 2 | C | 30 | - |
| CHM 107 | General Chemistry Practical I | 1 | C | - | 45 |
| CHM 108 | General Chemistry Practical II | 1 | C | - | 45 |
| BIO 101 | General Biology I | 2 | C | 30 | - |
| BIO 102 | General Biology II | 2 | C | 30 | - |
| BIO 107 | General Biology Practical I | 1 | C | - | 45 |
| BIO 108 | General Biology Practical II | 1 | C | - | 45 |
| PHY 101 | General Physics I | 2 | C | 30 | - |
| PHY 102 | General Physics II | 2 | C | 30 | - |
| PHY 107 | General Physics Practical I | 1 | C | - | 45 |
| PHY 108 | General Physics Practical II | 1 | C | - | 45 |
| **Total Credits** | | **18** |  |  |  |

**200 Level**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Unit(s)** | **Status** | **LH** | **PH** |
| CHM 211 | Organic Chemistry I | 2 | C | 30 |  |
| CHM 213 | Analytical Chemistry I | 2 | C | 30 |  |
| CHM 207 | General Chemistry Practical III | 1 | C | - | 45 |
| CHM 208 | General Chemistry Practical IV | 1 | C | - | 45 |
| BIO 208 | Biostatistics | 2 | C | 30 | - |
| **Total Credits** | | **08** |  |  |  |

**300 Level**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Unit(s)** | **Status** | **LH** | **PH** |
| PHA 311 | Pharmacology I | 2 | C | 30 | - |
| **Total Credits** | | **02** | | | |

**400 Level**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Unit(s)** | **Status** | **LH** | **PH** |
| CHM 410 | Analytical Chemistry II | 2 | C | 30 |  |
| CHM 400 | Seminar | 1 | C | - | 45 |
| BUK-FRS 401 | Explosive Chemistry | 2 | C | 30 |  |
| BUK-FRS 402 | Microscopy | 2 | C | 30 |  |
| BUK-FRS 403 | Chemical Pathology | 2 | C | 30 |  |
| BUK-FRS404 | Applied Forensic Biology | 2 | E | 30 |  |
| FRS405 | Applied Forensic Chemistry | 2 | E | 30 |  |
| FRS406 | Digital and Cyber Forensics | 2 | E | 30 |  |
| **Total Credits** | | **11** |  |  |  |

**BUK-CHM 101: General Chemistry I (2 Units C: LH 30)**

**Learning Outcomes**

At the end of this course, the students should be able to:

1. define atom, molecules and chemical reactions;

2. discuss the Modern electronic theory of atoms;

write electronic configurations of elements on the periodic table;

4. justify the trends of atomic radii, ionization energies, electronegativity of the elements based on their position in the periodic table;

5. identify and balance oxidation – reduction equation and solve redox titration problems;

6. illustrate shapes of simple molecules and hybridized orbitals;

7. identify the characteristics of acids, bases and salts, and solve problems based on their quantitative relationship;

8. apply the principles of equilibrium to aqueous systems using LeChatelier’s principle to predict the effect of concentration, pressure and temperature changes on equilibrium mixtures;

9. analyse and perform calculations with the thermodynamic functions, enthalpy, entropy and free energy; and

10. determine rates of reactions and its dependence on concentration, time and temperature.

**Course Contents**

Atoms, molecules, elements and compounds and chemical reactions. Modern electronic theory of atoms. Electronic configuration, periodicity and building up of the periodic table. Hybridization and shapes of simple molecules. Valence Forces. Structure of solids. Chemical equations and stoichiometry; Chemical bonding and intermolecular forces, kinetic theory of matter. Elementary thermochemistry. Rates of reaction, equilibrium and thermodynamics. Acids, bases and salts. Properties of gases. Redox reactions and introduction to electrochemistry. Radioactivity.

**CHM 102: General Chemistry II (2 Units C: LH 30)**

**Learning Outcomes**

At the end of this course, the students should be able to:

1. state the importance and development of organic chemistry;

2. define fullerenes and their applications;

3. discuss electronic theory;

4. determine the qualitative and quantitative of structures in organic chemistry;

5. describe rules guiding nomenclature and functional group classes of organic chemistry;

6. determine rate of reaction to predict mechanisms of reactions;

7. identify classes of organic functional group with brief description of their chemistry;

8. discuss comparative chemistry of group 1A, IIA and IVA elements; and

9. describe basic properties of Transition metals.

**Course Contents**

Historical survey of the development and importance of Organic Chemistry. Fullerenes as fourth allotrope of carbon, uses as nanotubules, nanostructures, nanochemistry. Electronic theory in organic chemistry. Isolation and purification of organic compounds. Determination of structures of organic compounds including qualitative and quantitative analysis in organic chemistry. Nomenclature and functional group classes of organic compounds. Introductory reaction mechanism and kinetics. Stereochemistry. The chemistry of alkanes, alkenes, alkynes, alcohols, ethers, amines, alkyl halides, nitriles, aldehydes, ketones, carboxylic acids and derivatives. The Chemistry of selected metals and non-metals. Comparative chemistry of group IA, IIA and IVA elements. Introduction to transition metal chemistry.

**BUK-CHM 107: General Chemistry Practical I (1 Unit C: PH 45)**

**Learning Outcomes**

At the end of this course, the students should be able to:

1. describe the general laboratory rules and safety procedures;

2. collect scientific data and correctly carrying out chemical experiments;

3. identify the basic glassware and equipment in the laboratory;

4. identify the differences between primary and secondary standards;

5. perform redox titration;

6. recording observations and measurements in the laboratory notebooks; and

7. analyse the data to arrive at scientific conclusions.

**Course Contents**

Laboratory experiments designed to reflect topics presented in courses CHM 101 and CHM 102. These include acid-base titrations, qualitative analysis, redox reactions, gravimetric analysis, data analysis and presentation.

**CHM 108: General Chemistry Practical II (1 Unit C: PH 45)**

**Learning Outcomes**

At the end of this course, the students should be able to:

1. identify the general laboratory rules and safety procedures;

2. collect scientific data and correctly carrying out Chemical experiments;

3. identify the basic glassware and equipment in the laboratory;

4. identify and carry out preliminary tests which includes ignition, boiling point, melting point, test on known and unknown organic compounds;

5. perform solubility tests on known and unknown organic compounds;

6. conduct elemental tests on known and unknown compounds; and

7. conduct functional group/confirmatory test on known and unknown compounds which could be acidic / basic / neutral organic compounds.

**Course Contents**

Continuation of CHM 107. Additional laboratory experiments to include functional group analysis, quantitative analysis using volumetric methods.

**BIO 101: General Biology I (2 Units C: LH 30)**

**Learning Outcomes**

At the end of this course, students should be able to:

1. explain cell structure and organizations;

2. summarize functions of cellular organelles;

3. characterize living organisms and state their general reproduction;

4. describe the interrelationship that exists between organisms;

5. discuss the concept of heredity and evolution; and

6. enumerate habitat types and their characteristics.

**Course Contents**

Cell structure and organisation, functions of cellular organelles. Characteristics and classification of living things. Chromosomes, genes; their relationships and importance. General reproduction. interrelationships of organisms (competitions, parasitism, predation, symbiosis, commensalisms, mutualism, saprophytism). Heredity and evolution (introduction to Darwinism and Lamarkism, Mendelian laws, explanation of key genetic terms). Elements of ecology and types of habitat.

**BIO 102: General Biology II (2 Units C: LH 30)**

**Learning Outcomes**

At the end of the lectures, students should be able to:

1. List the characteristics, methods of identification and classification of viruses, bacteria and fungi;

2. state the unique characteristics of plant and animal kingdoms;

3. describe ecological adaptations in the plant and animal kingdoms;

4. explain nutrition, respiration, excretion and reproduction in plants and animals; and

5. describe growth and development in plants and animals.

**Course Contents**

Basic characteristics, identification and classification of viruses, bacteria and fungi.

A generalized survey of the plant and animal kingdoms based mainly on the study of similarities and differences in the external features. Ecological adaptations. Briefs on physiology to include nutrition, respiration, circulatory systems, excretion, reproduction, growth and development.

**BIO 107: General Biology Practical I (1 Unit C: PH 45)**

**Learning Outcomes**

At the end of the course, students should be able to:

1. outline common laboratory hazards;

2. provide precautions on laboratory hazards;

3. state the functions of the different parts of microscope;

4. use the microscope and describe its maintenance;

5. draw biological diagrams and illustrations; and

6. apply scaling and proportion to biological diagrams.

**Course Contents**

Common laboratory hazards: prevention and first aid; measurements in biology. Uses and care of microscope: compound and dissecting microscope. Biological drawings and illustration, scaling, accuracy and proportion. Use of common laboratory apparatus and laboratory experiments designed to illustrate the topics covered in **BIO 101.**

**BIO 108: General Biology Practical II (1 Unit C: PH 45)**

**Learning Outcomes**

At the end of the course, students should be able to:

1. describe the anatomy of flowering plants;

2. differentiate types of fruits and seeds;

3. state ways of handling and caring for biological wares;

4. describe the basic histology of animal tissues; and

5. identify various groups in the animal kingdom.

**Course Contents**

Anatomy of flowering plants, primary vegetative body: stem, leaf and root to show the mature tissues namely parenchyma, collenchyma, sclerenchyma, xylem and phloem. Types of fruits and seeds. Care and use of dissecting kits and other biological wares. Dissection and general histology of animal tissues based on vertebrate forms. Morphology and functions of epithelial, muscular, nervous and connective tissues. Examination of various groups of lower invertebrates under microscopes, identification of various groups of organisms in Animal Kingdom and any experiment designed to emphasize the practical aspects of topics in BIO 102.

**PHY 101: General Physics I (Mechanics) (2 Units C: LH 30)**

**Learning Outcomes**

At the end of this course, the student should be able to:

1. identify and deduce the physical quantities and their units;

2. differentiate between vectors and scalars;

3. describe and evaluate motion of systems on the basis of the fundamental laws of mechanics.

4. apply Newton’s laws to describe and solve simple problems of motion.

5. evaluate work, energy, velocity, momentum, acceleration, and torque of moving or rotating objects.

6. explain and apply the principles of conservation of energy, linear and angular momentum.

7. describe the laws governing motion under gravity; and

8. explain motion under gravity and quantitatively determine behaviour of objects moving under gravity.

**Courses Contents**

Space and time. Units and dimension, Vectors and Scalars. Differentiation of vectors: displacement, velocity and acceleration. Kinematics. Newton laws of motion (Inertial frames, Impulse, force and action at a distance, momentum conservation). Relative motion. Application of Newtonian mechanics. Equations of motion.Conservation principles in physics. Conservative forces. Conservation of linear momentum. Kinetic energy and work. Potential energy. System of particles. Centre of mass. Rotational motion:Torque, vector product, moment, rotation of coordinate axes and angular momentum. Polar coordinates. Conservation of angular momentum. Circular motion. Moments of inertia. gyroscopes and precession. Gravitation: Newton’s Law of Gravitation. Kepler’s Laws of Planetary Motion. Gravitational Potential Energy. Escape velocity. Satellites motion and orbits.

**PHY 102: General Physics II (Electricity & Magnetism) (2 Units C: LH 30)**

**Learning Outcomes**

At the end of this course, the student should be able to:

1. describe the electric field and potential, and related concepts, for stationary charges;

2. calculate electrostatic properties of simple charge distributions using Coulomb’s law, Gauss’s law and electric potential;

3. describe and determine the magnetic field for steady and moving charges;

4. determine the magnetic properties of simple current distributions using Biot-Savart and Ampere’s law;

5. describe electromagnetic induction and related concepts, and make calculations using Faraday and Lenz’s laws;

6. explain the basic physical of Maxwell’s equations in integral form;

7. evaluate DC circuits to determine the electrical parameters; and

8. determine the characteristics of AC voltages and currents in resistors, capacitors, and Inductors.

**Course Contents**

Forces in nature. Electrostatics; electric charge and its properties, methods of charging. Coulomb’s law and superposition. electric field and potential. Gauss’s law. Capacitance. Electric dipoles. Energy in electric fields. Conductors and insulators, current, voltage and resistance. Ohm’s law and analysis of DC circuits. Magnetic fields. Lorentz force. Biot-Savart and Ampère’s laws. magnetic dipoles. Dielectrics. Energy in magnetic fields. Electromotive force. Electromagnetic induction. Self and mutual inductances. Faraday and Lenz’s laws. Step up and step-down transformers: Maxwell's equations. Electromagnetic oscillations and waves. AC voltages and currents applied to inductors, capacitors, resistance, and combinations.

**PHY 107: General Practical Physics I (1 Unit C: PH 45)**

**Learning Outcomes**

At the end of this course, the student should be able to:

1. conduct measurements of some physical quantities;

2. make observations of events, collect and tabulate data;

3. identify and evaluate some common experimental errors;

4. plot and analyse graphs; and

5. draw conclusions from numerical and graphical analysis of data.

**Course Contents**

This introductory course emphasizes quantitative measurements, the treatment of measurement errors and graphical analysis. A variety of experimental techniques should be employed. The experiments include studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity etc., covered in PHY 101 and PHY 102. However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis and deduction.

**PHY 108: General Practical Physics II (1 Unit C: PH 45)**

**Learning Outcomes**

At the end of this course, the student should be able to:

1. conduct measurements of some physical quantities;

2. make observations of events, collect and tabulate data;

3. identify and evaluate some common experimental errors;

4. plot and analyse graphs;

5. draw conclusions from numerical and graphical analysis of data; and

6. prepare and present practical reports.

**Course Contents**

This practical course is a continuation of PHY 107 and is intended to be taught during the second semester of the 100 level to cover the practical aspect of the theoretical courses that have been covered with emphasis on quantitative measurements. The treatment of measurement errors, and graphical analysis. However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis and deduction.

Level 200

**CHM 211: Organic Chemistry I (2 Units C: LH 30)**

**Learning Outcomes**

At the end of this course, the students should be able to:

1. describe and solve problems in chemistry of aromatic compounds;

2. describe the structures of simple sugars, starch and cellulose, peptides and proteins and show the difference in their conformation structure;

3. describe and solve problems in chemistry of bifunctional compounds;

4. explain he mechanisms of substitution, elimination, addition and rearrangement reactions;

5. describe stereochemistry and its application;

6. describe condition and pathways of the following organic reactions - Grignard reaction, Aldol and related reactions; and

7. describe simple alicyclic carbon compounds and their synthesis.

**Course Contents**

Chemistry of aromatic compounds. Structures of simple sugars, starch and cellulose, peptides, and proteins. Chemistry of bifunctional compounds. Energetics, kinetics, and the investigation of reaction mechanisms. Mechanisms of substitution, elimination, addition, and rearrangement reactions. Stereochemistry. Examples of various named organic reactions e.g., Grignard reaction, Aldol and related reactions. Simple alicyclic carbon compounds and their synthesis.

**CHM 213: Analytical Chemistry I (2 Units C: LH 30)**

**Learning Outcomes**

At the end of this course, the students should be able to:

1. explain analytical processes which include description of chemist as a problem solver;

2. describe and differentiate forms of error;

3. explain its implication on laboratory analysis;

4. state different statistical tool use in treatment of data;

5. solve practical problems using the statistical tools;

6. define sampling and give reasons for sampling in field work;

7. state and describe different sampling techniques;

8. state different forms of sample collection and processing;

9. describe volumetric method of analysis and solve some practical problems; and

10. describe gravimetric method of analysis and solve some practical problems.

**Course Contents**

Theory of errors; and statistical treatment of data: Theory of sampling. Chemical methods of analysis including volumetric, gravimetric, data analysis. Presentation and physicochemical methods. Optical methods of analysis; separation methods.

**CHM 207: General Chemistry Practical III (1 Unit C: PH 45)**

**Learning Outcomes**

At the end of this course, the students will be able to:

1. describe the measurement of pH;

2. determine the relative molar mass from the colligative properties;

3. demonstrate the partition coefficient of two immiscible solvents;

4. demonstrate temperature measurements and heat of dissolution, heat of neutralization and many others

5. determine the critical solution temperature of water-phenol system; and

6. measure the molar volume of a gas and universal gas constant.

**Course Contents**

Ph measurement determination of relative molar mass from colligative properties demonstration of partition coefficient in two immiscible solvents. Temperature measurement and heat of dissolution. Heat of neutralisation. Determination of critical solution temperature of water- phenol system ideal gas law: measuring the molar volume of a gas and the universal gas constant.

**CHM 208: General Chemistry Practical IV (1 Unit C: PH 45)**

**Learning Outcomes**

At the end of this course, the students will be able to:

1. identify general laboratory rules;

2. explain the preparation of simple organic compounds (esters, aldehydes and ketones);

3. describe the analysis of vinegar;

4. demonstrate a simple experiment on thin layer chromatography;

5. perform an experiment on the dehydration of alcohol; and

6. conduct experiments on qualitative analysis of common functional groups.

**Course Contents**

Preparation of esters. Preparation of aldehydes and ketones. Vinegar analysis, chromatography. Thin layer chromatography. Dehydration of alcohol groups. Qualitative analysis of common functional groups.

**BIO 208: Biostatistics (2 Units C: LH 30)**

**Learning Outcomes**

At the end of the lectures in this course, students should be able to:

1. differentiate between continuous and discontinuous data;

2. explain sampling procedures in biology;

3. summarize and present biological data;

4. describe measures of central tendency and probability theory; and

5. conduct ANOVA, Chi-square, t-tests and F-tests and state their importance.

**Course Contents**

Variability in biological data: continuous and discontinuous variables. Statistical sampling procedures. Observations and problems of estimation. Representation and summarization of biological data. Frequency distribution. Measures of central tendency and dispersion. Probability theory. Normal, binomial and Poisson distribution. T-test, f-test and chi-square test. Analysis of variance (ANOVA) and covariance. Principles of experimental design. Correlation, linear and curvilinear regression and transformation.

**Level 300**

**PHA 311: Pharmacology I (2 Units C: LH 30)**

**Learning Outcomes**

At the end of the course, the student will be expected to understand the behaviour of the drug from its administration until its removal from the body and introduce them to general and systemic Pharmacology and its application to therapy.

**Course Contents**

Introduction: History of Pharmacology and relationship of Pharmacology to other pharmaceutical and clinical subjects. Pharmacology Textbooks and journals. Definition and sources of Drugs. Routes of Drug Administration. Drug Absorption, Distribution, Elimination and factors affecting them. Enzyme induction and enzyme inhibition. Mechanisms of drug action – receptor and non-receptor theory. Drug dosage and dose response curves. Measurement of some pharmacological parameters.

Modern approaches to anti-infective drug design: The mechanism of action, design and synthesis of b-lactam antibiotics; Antiviral drug design; Antifungal drug design; The importance of protease enzymes as drug targets as illustrated by examples including the falcipain 2 inhibitors (cysteine proteases) and HIV protease inhibitors (aspartate proteases); advanced techniques in computational drug design. Introduction to the fundamental principles that underpin modern medicinal chemistry of anti-infective drugs; these will include qualitative and advanced quantitative SAR techniques, computer aided molecular design, further techniques in solid phase chemistry / combinatorial chemistry.

**Level 400**

**CHM 410: Analytical Chemistry II (2 Units C: LH 15; PH 45)**

**Learning Outcomes**

At the end of this course, the students should be able to:

1. describe different thermal methods of analyses: TG, DTG, DTA, DSC;

2. describe the potentiometric method of analysis using pH;

3. describe the conductometric method analysis;

4. describe the colorimetric method analysis;

5. describe the polarography methods analysis;

6. explain and perform calculation using chromatography principles;

7. explain principles of different chromatographic technique; and

8. explain the principle of radiochemical method in environmental analysis.

**Course Contents**

Potentiometric and pH methods. Conductometric, electroanalytical, amperometric, colorimetric methods of analysis. Coupled methods of analysis e.g. GC-MS, LC-MS. Radio-chemical methods, chromatography.

**CHM 400: Seminar (1 Unit C: PH 45)**

**Learning Outcomes**

At the end of this course, students should be able to:

1. demonstrate basic knowledge of report writings;

2. identify basic elements of research which includes: Introduction, literature reviews, methodology/experimentation/materials and methods, results and discussion, conclusion, recommendations and referencing;

3. identify various types of referencing such as, APA, Chicago, Harvard and many others.

4. identify Spacing and paragraph used in presentation writings;

5. identify the use of multimedia in seminar presentations; and

6. demonstrate assessment and grading of the written and oral presentation.

**Course Contents**

Student reports on an assigned or chosen current topic in chemistry. Review of literature on the assigned topic should be included. Assessment to be on written report and oral presentation.

**BUK-FRS 401: Explosive Chemistry (2 Unit C: LH 30)**

**Learning Outcomes**

Upon successful completion of the course, the student will be able to:

1. Demonstrate an understanding of the chemical and physical as pects of explosion
2. Demonstrate an understanding ofdetonation kinetics of explosions
3. Relate the theories of thermal and branching chain
4. Illustrate the mechanisms of explosions in liquids and solids
5. Demonstrate an understanding of the chemistry of active materials for the manufacture of explosives.

**Course Contents**

Chemical and physical explosion; Detonation kinetics of explosions; the explosion nucleus; thermal theory and branching chain theory; explosion limits; Limitation of explosions in liquids and solids by friction and impact; growth of explosions to detonation; The composition of modern explosives (explosive trains); The chemistry of active materials for the manufacture of explosives preparation (formulations) of some well-known explosives: stability tests

**BUK-FRS 402: Microscopy (2 Unit C: LH 30)**

**Learning Outcomes**

Upon successful completion of the course, the student will be able to:

1. Demonstrate an understanding microscopes and theirvarious types
2. Demonstrate an understanding of the scope of microscopy in Forensic Science
3. Relate the elementary theory of microscopy
4. Illustrate the operation principle of various microscopes

**Course Contents**

Microscopy: Definition, different types of microscopes: Simple microscope, Compound microscope, Comparison microscope, Stereomicroscope, Polarizing Microscope, SEM and TEM microscopes, and Fluorescence microscope (Components, performance criteria and uses); Scope of microscopy in Forensic Science and elementary theory of microscope; light and lenses; Fiber Optics: Optical fibers, Propagation of light through optical fiber, Angle of acceptance and numerical aperture, losses and Solar cells;

**BUK-FRS 403: Chemical Pathology (2 Unit E: LH 30)**

**Learning Outcomes**

Upon successful completion of the course, the student will be able to:

1. Demonstrate an understandingof Clinical Chemistry
2. Demonstrate an understanding of Human Nutrition
3. Demonstrate an understanding of Immunology
4. Relate the central role of abnormalities of biochemical functions in diagnosis and management of diseases.

**Course Contents**

The course in Chemical Pathology shall be taught in three parts, namely: Clinical Chemistry, Human Nutrition and Immunology. The course in Clinical Chemistry is designed to highlight to the student the central role which abnormalities of biochemical functions of cells, tissues and organs play in the diagnosis, management and prognosis of disease states and how these abnormalities of biochemical functions may be recognized by measurements of components of biological fluids, blood, urine, cerebrospinal fluid, secretions, excretions, tissues or organs.

**BUK-FRS 405: Applied Forensic Biology (2 Unit E: LH 30)**

**Learning Outcomes**

Upon successful completion of the course, the student will be able to:

1. Demonstrate an understandingof forensic biology
2. Demonstrate an understanding of botanical evidences of forensic significance.
3. Demonstrate an understanding of wild life forensics
4. Illustrate an understanding of forensic palynology and its applications
5. Relate the forensic examination of different types of hair

**Course Contents**

Forensic Botany: Identification of Plant specimens, Techniques for dating specimens and Algal colonization, Applications of plant ecology, botanical evidences of forensic significance(Leaves, seeds, etc); Diatoms: Classification, basic structure and morphology, Isolation and forensic significance; Wild Life Forensics: Introduction and importance of wild life, Protected and endangered species of Animals and Plants; Identification of wild life materials such as skin, fur, bones, nails, horn, teeth and flowers by conventional and modern methods; Identification of Pug marks of various animals and census of wild life populations; Forensic Palynology: Study of spores, powdered minerals and pollens of forensic importance; Use of pollen grains & spores in criminal or civil investigations; Applications of Forensic Palynology; Hair: Importance, nature, location, collection, evaluation, its biochemical properties; Phases of hair growth and types of hair; Differences between animal and human hairs; Forensic examination of different types of hair

**BUK-FRS 406: Digital and Cyber Forensics (2 Unit e: LH 30)**

**Learning Outcomes**

Upon successful completion of the course, the student will be able to:

1. Apply forensic science to computers and networks
2. Demonstrate an understanding of digital forensic
3. Demonstrate an understanding of cyber trail.
4. Illustrate an understanding of technology and law
5. Relate the application offorensic in investigating the theft of digital intellectual

**Course Contents**

Introduction to Digital forensic: Digital evidence, Increasing awareness of Digital evidence, challenging aspects of Digital evidence; Cyber trail: challenging aspects of the cyber trail, brief history of computer crime investigation, evolution of investigative tools, language of computer crime investigation, the role of computers in crime; Technology and law: jurisdiction, pornography and obscenity, child pornography, privacy, copyrights and the “theft” of Digital intellectual property; investigative process and reconstruction with Digital evidence; Applying forensic science to computers, forensic examination of windows systems, Unix system, handheld devices and network basic for Digital investigators; applying forensic science to networks; Digital evidence on physical and data-link layers, network and transport layers and the internet.