**BAYERO UNIVERSITY, KANO**

**FACULTY OF EDUCATION**

**DEPARTMENT OF SCIENCE AND TECHNOLOGY EDUCATION**

**B.SC (ED) AGRICULTURE**

**CCMAS 30% CONTENT**

**Level 100**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Units** | **Status** | **LH** | **PH** |
| BUK–STE 101 | Foundation of Education II | 2 | C | 30 | - |
| BUK–STE 102 | Basic Mathematics I | 2 | C | 30 | - |
| BUK–STE 112 | Basic Biology I | 2 | C | 30 | - |
| BUK–STE 113 | Basic Biology II | 2 | C | 30 | - |
| BUK–STE 114 | Basic Biology Practical I | 1 | C | - | 45 |
| BUK–STE 115 | Basic Biology Practical II | 1 | C | - | 45 |
| BUK–STE 116 | Basic Chemistry I (Inorganic) | 2 | C | 30 | - |
| BUK–STE 117 | Basic Chemistry II (Organic) | 2 | C | 30 | - |
| BUK–STE 118 | Basic Chemistry Practical I | 1 | C | - | 45 |
| BUK–STE 119 | Basic Chemistry Practical II | 1 | C | - | 45 |
|  | **Total Credit Units** | **16** |  |  |  |

**Level 200**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Units** | **Status** | **LH** | **PH** |
| BUK–STE 201 | Basic Educational Statistics | 2 | C | 30 | - |
| BUK–STE 202 | Introduction to Research Method | 2 | C | 30 | - |
| BUK–AGE 205 | Introduction to Crop Production | 2 | C | 30 | - |
| BUK–AGE 206 | Introduction to Animal Production | 2 | C | 30 | - |
|  | **Total Credit Units** | **8** |  |  |  |

**Level 300**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Units** | **Status** | **LH** | **PH** |
| BUK–STE 301 | Educational Technology | 2 | C | 15 | - |
|  | **Total Credit Units** | **2** |  |  |  |

**Level 400**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Units** | **Status** | **LH** | **PH** |
| BUK–STE 401 | Educational Structure, Administration and Planning | 2 | C | 30 | - |
| BUK–STE 402 | Guidance and Counselling in Science Education | 2 | C | 30 | - |
| BUK-STE 403 | ICT in Science and Technology Education | 2 | C | 30 | - |
| BUK-AGE 408 | Teaching, Learning Methods in Agricultural Extension | 2 | C | 30 | - |
|  | **Total Credit Units** | **8** |  |  |  |

**COURSE CONTENT AND LEARNING OUTCOMES**

**Level 100**

**BUK-STE 101 Foundation of Education II (2 Credits; Core; LH = 30)**

**Senate-Approved Relevance**

The coursework in foundation of education II is very essential course in the teacher education and training. It is in this course that student-teachers are taught the psychology and sociology of learner and learning, the trends of curriculum development and design, and the historical antecedents of education systems from the indigenous system, missionary to the present. Teacher education needs to avail the students with what, when and how of Nigeria education system so as to prepare them on the task of imparting knowledge, skills and improving students attitude and emotions. This is in line with the BUK’s mission of producing high quality human resources required for the promotion of the development of the host community, the nation, Africa and beyond.

**Overview**

This course provides a survey of the psychology, sociology, history and philosophy of education with emphasis on current problems in education, on significant educational innovations, and on the school as a social institution. The course is secondary to EDU 101 Introduction to Teaching and Foundations of Education and lays more emphasis on Intelligence, motivation, Remembering and forgetting, Transfer of learning, Education and Culture, social stratification and education, School as an organization, Educational development since 1950, the development and current structure of the Nigeria curriculum.

The course provides an overview of the cultural, sociological, political, curriculum and historical underpinnings of the Nigeria education system as a requisite for teacher training. The importance of the course lies in meeting and providing high-quality education as enshrine in sustainable development goals (SDGs) in the area of education.

**Learning Objectives**

The objectives of the course are to:

1. Explain the concept of intelligence
2. Describe the influence of heredity and environment on intelligence
3. Explain the term motivation
4. Describe the theories of motivation
5. Define Memory
6. Explain the agents of socialization;
7. Explain the influence of social stratification on education
8. Discuss equality of educational opportunity.
9. Trace the history of educational development since 1950
10. Explain the current structure of the Nigeria curriculum.

**Learning Outcomes**

On completion of the course, students should be able to:

1. Explain the concept of intelligence
2. Describe the influence of heredity and environment on intelligence
3. Explain the term motivation
4. Describe at least two theories of motivation
5. Define Memory
6. Explain at least five agents of socialization;
7. Explain at least five influence of social stratification on education
8. Discuss equality of educational opportunity.
9. Trace the history of educational development from 1950 to date
10. Explain the current structure of the Nigeria curriculum

**Course Contents**

Intelligence; definition; influence of heredity and environment; development and use of IQ tests; limitations of testing;' Introduction to motivation and its relation to learning; basic concepts; theories of motivation; educational implications; Remembering and forgetting: stages of memory; recognition; recall; relearning; causes of forgetting; factors affecting retention; implications for teaching; Transfer of learning: importance of transfer; learning sets; learning to learn; teaching for transfer. Education and Culture: Stages and agents of socialization; social stratification and education, equality of educational opportunity; education and social mobility; Social functions of education: The uses of literacy in society; education for democracy; education for leadership selection in education; School as an organization: Definitions and theoretical models; bureaucratization and professionalization of schooling. *Educational development since 1950.* The development and current structure of the Nigeria curriculum. Historical background: Pre-Islamic and pre-Christian curricula; The curriculum of Islamic education; the Christian mission curriculum; Colonial government schools and their changing curriculum; Post-colonial developments. Current Structure:

**BUK-STE 102: Basic Mathematic I (Algebra and Trigonometry) (2 Units C: LH 30)**

**Senate – Approved Relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in teaching mathematics at Senior Secondary Schools and Colleges which is in agreement with BUK’s mission to address African developmental challenges in producing graduates who are sound in Mathematics.

**Overview**

One of the purposes of Mathematics is to enhance a clear understanding of complex systems and ideas. As such it is of the utmost importance that the language of Mathematics be itself precise and mathematical terms and ideas are introduced unambiguously. This precision of language may be achieved by starting with just a few fundamental terms since any ambiguity in the language, terms and ideas shall necessarily introduce misunderstanding of the system.

The course is designed to acquaint students with some basic concepts in mathematics that may help in the understanding of mathematics in various fields of scientific endeavours.

**Learning Objectives**

The objectives of the course are to:

1. Define Set, Subset, Union, Intersection, Complements and use of Venn diagrams;
2. Solve quadratic equations;
3. Solve trigonometric functions;
4. Identify various types of numbers; and
5. Solve some problems using Binomial theorem.

**Learning Outcomes**

On completion of the course, students should be able to:

1. Define Set, Subset, Union, Intersection, Complements and use of Venn diagrams;
2. Solve quadratic equations;
3. Solve trigonometric functions;
4. Identify various types of numbers; and
5. Solve at least five problems using Binomial theorem.

**Course Contents**

Elementary set theory, subsets, union, intersection, complements. Venn diagrams. Real numbers; integers, rational and irrational numbers. Mathematical induction. Real sequences Education And serie. Theory of quadratic equations. Binomial theorem. Complex numbers; algebra of complex numbers; the Argand diagram. De-Moivre’s theorem, nth roots of unity. Circular measure, trigonometric functions of angles of any magnitude .Addition and factor formulae.

**BUK- STE 112 Basic Biology I (2 Credits, Core, LH=30)**

**Senate-Approved Relevance**

Basic Biology I is a foundational course in Biology approached on the basis of levels that deal with fundamental units of life, structure and function in living organisms. It provides basis of understanding the different branches of Biology, subdivided for convenience of study, while harnessing their interrelationships through basic principles. The foundations of Basic Biology I are built through the introduction of the complementary concepts and fundamentals of Cell structure and organisation, functions of cellular organelles, characteristics and classification of living things. The relationships between chromosomes and genes with their importance, general reproduction, interrelationships of organisms in form of competitions, parasitism, predation, symbiosis, commensalisms, mutualism or saprophytism. Students are introduced to the concepts of Heredity and evolution with emphasis on Darwinism and Lamarkism, Mendelian laws, and key genetic concepts. The course provides an overview of elements of ecology and types of habitats which will help in advancing students’ understanding of the interactions that determine the distribution and abundance of organisms. The course is relevant as it exposes students to various aspects of Biology which provides them with the basic understanding of life and interactions.

**Overview**

This course provides the foundation of biological concepts with emphasis on preparing new students to acquire basic knowledge for high quality scientists that are knowledgeable. It prepares students to apply the knowledge acquired in the development of new skills. This is in line with BUK’s objective and mission to produce students that can apply their scientific knowledge at different capacities.

The relevance is recognized in the ability of graduates from Science Education (BUK) to process biological knowledge which encompasses the great body of information that has been on this earth since thousands of years ago, the new findings scientists are discovering today, and the endless possibilities this knowledge can ultimately benefit mankind in the future. The importance of BUK- STE 112 primarily dwells in understanding life processes with learning opportunities in both the classroom and the companion laboratory component BUK- STE 114.

**Learning Objectives**

The objectives of the course are to.

1. Explain cell structures and organizations.
2. Describe the functions of cellular organelles.
3. Describe the characteristics of living organisms and state their general reproduction.
4. Trace the interrelationship that exists between organisms.
5. Describe the concept of heredity and evolution.
6. State the habitat types and their characteristics.

**Learning Outcomes**

On completion of the course, students should be able to:

1. Explain cell structures and organizations.
2. Describe the functions of cellular organelles.
3. Describe the characteristics of living organisms and state their general reproduction.
4. Trace the interrelationship that exists between organisms.
5. Describe the concept of heredity and evolution.
6. State the habitat types and their characteristics.

**Course Contents**

Cell structure and organization, 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.

**BUK STE 113 Basic Biology II (2 Credits, Core, LH=30)**

**Senate-Approved Relevance**

Basic Biology II is a course designed with the aim of exposing students to the living world and the ways its many species function, evolve, and interact. It is aligned to the vision of grooming undergraduate students with an introduction to biology experience that equips them with capable skills to describe and apply biological concepts. The course is relevant as it helps students to understand themselves and their environment. BUK- STE 113 offers learning opportunities in both the classroom and the companion laboratory component BUK- STE 115.

**Overview**

General Biology II is a segment from the natural sciences concerned with the study of life and living organisms. It is vast and composed of aspects from various disciplines that study unifying concepts which govern the basic characteristics, identification and classification of viruses, bacteria and fungi. It covers a generalized survey of the plant and animal kingdom based mainly in the study or similarities and differences in the external features, general physiology and ecological adaptation of plant and animal forms. This is in line with BUK’s objective and mission to produce students that can apply their scientific knowledge at different capacities.

Relevance is recognized in the ability of graduates from Science Education (BUK) to have a broader understanding of biology and living organisms in the biosphere developed through hand-on, multi-modal engages learning opportunities in both the classroom and laboratory experiences.

**Objectives**

The objectives of the course are to:

1. Describe the characteristics, methods of identification and classification of viruses, bacteria and fungi;
2. Differentiate between the unique characteristics of plant and animal kingdoms;
3. Explain the ecological adaptations in the plant and animal kingdoms;
4. Describe nutrition, respiration, excretion and reproduction in plants and animals
5. Compare the growth and development in plants and animals.

**Learning Outcomes**

On completion of the course, 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.

**BUK STE 114 Basic Practical Biology I (I Credit, Core, PH=45)**

**Senate-Approved Relevance**

Basic Practical Biology I is a practical course that enables students to apply and extend the knowledge and understanding of BUK STE 112 in novel investigative situations, which can aid learning and memory and stimulates students’ interests. The course is designed to enable students learn Laboratory biosafety, technologies and practices implemented to provide foundational relevance. This course is relevant in producing students with hands-on understanding of Biology subject and how the theories learnt are applied to real-life situations. It also allows students to learn quick adaptations needed for daily challenges and scenarios and overall better understanding of the theoretical aspect of the course. It provides students the opportunity to be conversant with attributes of communication, teamwork and perseverance necessary for building sustainable environments. This is in line with the BUK’s mission of producing high quality graduates with skilled knowledge of Biology and its applications in various related fields.

**Overview**

Basic Practical Biology I introduces students to the practical aspect of Biology through which they confirm understanding and apply the knowledge acquired.  It provides students with the opportunity to develop (and demonstrate) their scientific skills in; applying safety measures to common laboratory hazards, prevention and use of first aid, measurements in biology, uses and care of microscope, using compound and dissecting microscope, accuracy in Biological drawings, illustration, scaling, accuracy and proportion, use of common laboratory apparatus and laboratory experiments designed to illustrate the topics covered in BUK STE 112

**Learning Objectives**

The objectives of the course are to:

1. Explain common laboratory hazards;
2. Apply precautionary measure on laboratory hazards;
3. Describe the functions of the different parts of microscope;
4. Identify the different parts of the microscope and describe its maintenance;
5. Draw clearly biological diagrams and illustrations; and
6. Apply scaling and proportion to biological diagrams

**Learning Outcomes**

On completion of the practical, students should be able to:

1. Explain common laboratory hazards;
2. Apply precautionary measure on laboratory hazards;
3. Describe the functions of the different parts of microscope;
4. Identify the different parts of the microscope and describe its maintenance;
5. Draw clearly 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 BUK STE 112.

**BUK- STE 115: Basic Practical Biology II (I Credits, Core, PH=45)**

**Senate-Approved Relevance**

Practical Biology II teaches the principles of scientific inquiry to improve understanding of theory (BUK-STE 113) through practical experience in order to master specific practical skills, such as measurement and observations. It enables students to develop skills and basis of using and managing dissecting kits and other biological wares for various purposes including dissection and general histology of animal tissues based on vertebrate forms and examination of various groups of lower invertebrates.

**Overview**

Practical Biology II is designed for students to carry out their own scientific enquiries and acquire scientific knowledge for themselves. It will engage the students in observing and manipulating real objects and materials. The practical provides an effective means of understanding the anatomy of flowering plants and identifying different types of fruits and seeds. The course will guide students on how to handle and care for biological wares. It will also expose students to basic histology of animal tissues and offer them skills used in identifying various groups in the animal kingdom.

**Learning Objectives**

The objectives of the course are to.

1. Explain the anatomy of flowering plants;

2. Identify types of fruits and seeds;

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

4. Explain the basic histology of animal tissues; and

5. Differentiate various groups in the animal kingdom.

**Learning Outcomes**

On completion of the practical, students should be able to:

1. Explain the anatomy of flowering plants;

2. Identify types of fruits and seeds;

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

4. Explain the basic histology of animal tissues; and

5. Differentiate 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 BUK-STE 113

**BUK-STE 116: Basic Chemistry I (2 Credits, Core, LH30)**

**Senate-Approved Relevance**

## This course; Basic inorganic chemistry I, is an important course that asquint students with relevant chemistry knowledge in the areas of modern electronic theories, periodic table, redox reaction, acids-bases and salts, as well as thermodynamic functions, which forms the essential aspect of inorganic chemistry in order to develop competent and highly skilled chemistry graduates in line with the BUK mission of producing high quality human resources required for national development

## Overview

## Basic Inorganic chemistry I, as a course, is designed to equip students with the elementary knowledge of elements and their nature, by exposing them to study Atoms, molecules, elements, compounds and chemical reactions which forms the basis knowledge of inorganic chemistry.

**Learning Objectives**

The objectives of the course are to:

1. Define atom, molecules and chemical reactions;

2. Discuss the modern electronic theory of atoms;

3. 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 Le Chatelier’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.

## Learning outcomes

On completion of the course, students should be able to:

1. Define atom, molecules and chemical reactions;

2. Discuss the modern electronic theory of atoms;

3. 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 Le Chatelier’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.

## BUK-STE 117: Basic Chemistry I I (2 Credits, Core, LH30)

## Senate-Approved Relevance

## Training students in the aspect of organic chemistry is necessary and essential as it offers students to learn the basic aspect of qualitative and quantitative knowledge of organic compounds, as well as providing students with the importance and development of organic chemistry so as to produce highly qualified chemistry graduates for national development as in line with the BUK’s mission.

## Overview

## Basic organic chemistry II is designed to equip students with the knowledge of the classes of organic compounds, their properties, nature and nomenclature of organic compounds. The course is also designed to offer students with the knowledge of Transition metals/elements which serves as vital organic rudiments for day-to-day practice.

**Learning Objectives**

The objectives of the course are to:

1. State the importance and development of organic chemistry;

2. Define fullerenes and its applications;

3. Discuss electronic theory;

4. Determine the qualitative and quantitative structures in organic chemistry;

5. Describe rules guiding nomenclature and functional group classes of organic compounds;

6. Determine rate of reaction to predict mechanisms of reaction;

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.

## Learning Outcomes

On completion of the course, students should be able to:

1. State the importance and development of organic chemistry;

2. Define fullerenes and its applications;

3. Discuss electronic theory;

4. Determine the qualitative and quantitative structures in organic chemistry;

5. Describe rules guiding nomenclature and functional group classes of organic compounds;

6. Determine rate of reaction to predict mechanisms of reaction;

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-STE 118: Basic Chemistry Practical I (I Credits, Core, PH=45)

## Senate-Approved Relevance

## Conducting chemistry practical is compulsory as it allowed students to practice and view the realistic nature of chemistry classes, by assisting students to acquire first hand an experience which helps to permanent the theoretical knowledge learnt and finally produced highly qualified chemistry graduates for effective national development as contained in the BUKs mission.

## Overview

## Basic chemistry practical I, is designed to equip students with the comprehensive knowledge of laboratory rules safety and procedures, the main purpose of the course is to enables students to collect scientific data correctly and carry out chemical experiments, as well as identifying glass wares and general laboratory equipment.

**Learning Objectives**

The objectives of the course are to:

1. Describe the general laboratory rules and safety procedures;

2. Collect scientific data and correctly carry out chemical experiments;

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

4. Explain the differences between primary and secondary standards;

5. Perform redox titration;

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

7. Analyse the data to arrive at scientific conclusions.

**Learning Outcomes**

On completion of the course, students should be able to:

1. Describe the general laboratory rules and safety procedures;

2. Collect scientific data and correctly carry out chemical experiments;

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

4. Explain the differences between primary and secondary standards;

5. Perform redox titration;

6. Record 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 BUK-STE116 and BUK-STE117. These include acid-base titrations, qualitative analysis, redox reactions, gravimetric analysis, data analysis and presentation.

## BUK-STE119: Basic Chemistry Practical I (I Credits, Core, PH=45)

## Senate-Approved Relevance

## Equipping students with chemistry practical skills is necessary in order to actually helps the students to exercise and observe the precise nature of chemistry lessons, this generally assists the students to obtain first hand knowledge which helps to everlasting the theoretical knowledge acquired in classrooms and finally produced highly qualified chemistry graduates for effective national development as contained in the BUKs mission.

## Overview

## Basic chemistry practical II equipped the students with accurate knowledge of scientific data collection and enables them to learn effective laboratory management and safety as well as conducting basic chemistry experiments such as functional group, volumetric and quantitative analysis.

**Learning Objectives**

The objectives of the course are 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. Execute solubility tests on known and unknown organic compounds;

6. Execute 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.

**Learning Outcomes**

On completion of the course, 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. Execute solubility tests on known and unknown organic compounds;

6. Execute 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 BUK-STE119. Additional laboratory experiments to include functional group analysis, quantitative analysis using volumetric methods.

**Level 200**

**BUK-STE 201 Basic Educational Statistics (2 Credits; Core; LH = 30)**

**Senate-Approved Relevance**

Production of high-quality, qualified and professional teachers requires expertise in educational statistics which is concern with analysis of data for diagnosis of learning and educational problems, students’ promotion and evaluation of success or otherwise of an instruction or entire educational program. This is in line with the BUK’s mission of producing high quality human resources required for the promotion of the development of the host community, the nation, Africa and beyond.

**Overview**

Educational statistics is designed to acquaint students with statical knowledge of data analysis and results interpretation. The students will be exposed to the rudiment of descriptive and inferential statistics for data summary and drawing statistical inferences. The importance of the course lies in meeting and providing high-quality education as enshrine in sustainable development goals (SDGs) in the area of education.

**Learning Objectives**

The objectives of the course are to:

1. Define the concept of Educational Statistics
2. Identify types of data and scales of measurement.
3. Describe the various methods of organising and summarising data.
4. Calculate mean, median and mode of a given set of distributions
5. Describe and use measures of dispersion or variability.
6. Describe the methods of estimating relationship between two sets of a given distributions
7. Develop and test hypotheses using appropriate statistics.

**Learning Outcomes**

On completion of the course, students should be able to:

1. Define educational statistics
2. List and explain three types of data
3. Describe the methods of organising and summarising data
4. Calculate mean, median and mode of a given set of distributions
5. Calculate deviation and standard deviation of a given set of distributions
6. Compute relationship between two set of scores
7. Develop three null hypotheses and test them using appropriate statistics.

**Course Contents**

Introduction to Educational Statistics, Descriptive statistics, frequency distribution, measures of central tendency, measures of variability, percentiles, standard scores, norms. Inferential statistics; rationale for statistical inference, selection of appropriate statistical tests; parametric tests, t-tests, ANOVA, Pearson Product Moment Correlation. Non-parametric tests, chi-square, Spearman Rank-order Correlation.

**BUK-STE 202 Introduction to Research Methods in Education (2 Credits, Core, LH = 30)**

**Senate-Approved Relevance**

Production of high-quality, qualified and professional teachers requires expertise in conducting educational research and providing solutions on problems in the area teaching, learning and educational management. This course research methods in education was design in line with the BUK’s mission of producing high quality human resources required for the promotion of the development of the host community, the nation, Africa and beyond. The course was meant to train student-teachers with the requisite knowledge of identifying educational problem, developing appropriate design in search for the cause/effect of the problem, conducting the study and recommending the ways out of the problem for educational development.

**Overview**

Research methods in education is designed to acquaint students with the knowledge of identifying educational problem, investigating the problem and providing solutions to the identified problem. The students will be exposed to the concept and types of educational research, sources of educational problems, techniques of literature review, research design, types of data collection instruments, validity and reliability of data collection instruments, and writing research proposal. The importance of the course lies in meeting and providing high-quality education as enshrine in sustainable development goals (SDGs) in the area of education.

**Learning Objectives**

The objectives of the course are to:

1. Define the concept of educational research
2. Describe the different types of educational research
3. Identify a research problem
4. Formulate research hypotheses
5. Develop a research proposal

**Learning Outcomes**

On completion of the course, students should be able to:

1. Define educational research
2. Differentiate between three types of research
3. Identify a research problem in their area of specialization
4. Formulate three testable null hypotheses
5. Write a research proposal

**Course Contents**

Topics include: Nature and purpose of research; Categories of research activities; descriptive, historical, experimental; Writing a research proposal; selecting a topic; contents and organization of the proposal; Literature review; its role; methods of citing literature; Research bias; political, religious and social bias in research; objectivity; cross- cultural applications; Ethical issues in research; subjects' understanding and co-operation with the researcher; confidentiality and publication; misinterpretation and misuse of research findings; Hypotheses and research questions; nature and use of hypotheses and research findings; Sampling procedures; rational and procedures; advantages and disadvantages of sampling procedures; Data collection techniques; questionnaires, interviews, observations, case studies, tests, government statistics, documentary analysis; Research validity and reliability’ Writing the research report; Review of the role of research in education.

**BUK-AGE 205 Introduction to Crop Production (2 Credits; Core; LH = 30)**

**Senate-Approved Relevance**

Exposing students to the definitions of the terms, crops and plants (including weeds). Importance of crops and plants to mankind. Origin of different types of crops in tropical, sub-tropical and temperate climatic regions and introduction of crop types to other lands. Botany and basis for classification and/or grouping of crops. Descriptions of various types of crops (grains and legumes, cereal crops, root and tuber crops, tree crops, vegetables and ornamentals.). Description (including diagrams) of crop growth cycle. Seeds and seed management and home gardening. Elements of crop husbandry and end-use technologies.

Definitions of the terms, soil and land. Elements of soil science and soil management. Importance of soils to mankind. Origin of soils. Jenny’s factors and processes of soil formation. Descriptions (including diagrams) of the soil profile. The composition(s) of a normal soil. Soil types and basis for classification/grouping of soils. The soil textural triangle. Soil as a medium for plant growth and concept of hydroponics. Soil fertility versus soil productivity. Soil conservation versus soil degradation. Interactive effects of soil characteristics on plants and animals. Soil water use and soil water balance. This helps students to become effective Agricultural Science teachers which is in line with the BUK’s mission of producing senior secondary schools and colleges of Education teachers who are knowledgeable in Agricultural production and methodology of teaching the subject.

**Overview**

The course equips students with the knowledge of basic concepts and principles of crop production by enabling the students to study the origin of different types of crops in tropical, sub-tropical and temperate climatic regions and introduction of crop types to other lands. Botany and basis for classification and/or grouping of crops. Descriptions of various types of crops. Description of crop growth cycle. Seeds and seed management and home gardening. Elements of crop husbandry and end-use technologies. Descriptions of the soil profile. The composition(s) of a normal soil. Soil types and basis for classification/grouping of soils. Interactive effects of soil characteristics on plants and animals. Soil water use and soil water balance.

**Learning Objectives**

The objectives of the course are:

1. Explain basic agronomic terminologies;

2. Describe crop distribution across climatic regions;

3. Differentiate crop grouping and distinct crop types;

4. Explain soil and its classification; and

5. Describe soil management needs and some conservation practices.

**Learning Outcomes**

On completion of the course, students should be able to:

1. Explain at least ten basic agronomic terminologies;

2. Describe at least ten types of crop distribution across climatic regions;

3. Differentiate crop grouping and distinct crop types;

4. Explain soil and its classification; and

5. Describe soil management needs and some conservation practices.

**Course Contents**

Definitions of the terms, crops and plants (including weeds).Importance of crops and plants to mankind. Origin of different types of crops in tropical, sub-tropical and temperate climatic regions and introduction of crop types to other lands. Botany and basis for classification and/or grouping of crops. Descriptions of various types of crops (grains and legumes, cereal crops, root and tuber crops, tree crops, vegetables and ornamentals.).Description (including diagrams) of crop growth cycle. Seeds and seed management and home gardening. Elements of crop husbandry and end-use technologies. Definitions of the terms, soil and land. Elements of soil science and soil management. Importance of soils to mankind. Origin of soils. Jenny’s factors and processes of soil formation. Descriptions (including diagrams) of the soil profile. The composition(s) of a normal soil. Soil types and basis for classification/grouping of soils. The soil textural triangle. Soil as a medium for plant growth and concept of hydroponics. Soil fertility versus soil productivity. Soil conservation versus soil degradation. Interactive effects of soil characteristics on plants and animals. Soil water use and soil water balance.

**BUK-AGE 206 Introduction to Animal Production (2 Credits; Core; LH = 30)**

**Senate-Approved Relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in livestock industry – problems and prospects. Description of the breeds of cattle, sheep, goats, pigs, poultry, and rabbits. Systems of livestock production. Feeding and feed management. Principles of breeding and livestock improvement. General principles of management of the different types of farm animals .Introduction to game and companion animals. General principles of their management, feeding and feeding habits. Endangered livestock species, their management and conservation. Anatomy and physiology of the cell, tissues, nervous system, skeletal system, muscle, bone, circulatory system, reproductive, digestive, special senses and other systems of farm animals. This is meant to produce senior secondary schools and colleges of Education teachers who are knowledgeable in livestock husbandry and methodology of the subject which is in line with the BUK’s mission of producing professional agricultural science teachers.

**Overview**

Introduction to animal production enables students to acquire necessary teaching and practical skills in livestock industry. Description of the breeds of cattle, sheep, goats, pigs, poultry, and rabbits. Systems of livestock production. Feeding and feed management. Principles of breeding and livestock improvement. General principles of management of the different types of farm animals. General principles of their management, feeding and feeding habits. Endangered livestock species, their management and conservation. Anatomy and physiology of the cell, tissues, nervous system, skeletal system, muscle, bone, circulatory system, reproductive, digestive, special senses and other systems of farm animals.

**Learning Objectives**

The objectives of the course are:

1. Explain the prospects and problems of the animal industry;

2. Identify and describe different types of farm animals;

3. Explain different feeds and feeding management of farm animals;

4. Describe housing and management systems of different livestock;

5. Explain the principles of animal health management;

6. Discuss animal breeding and breed improvement principles; and

7. Explain basic anatomy and physiology of the living systems (histology, circulatory, respiratory, digestive and reproductive).

**Learning Outcomes**

On completion of the course, students should be able to:

1. Explain the prospects and problems of the animal industry;

2. Identify and describe different types of farm animals;

3. Explain different feeds and feeding management of farm animals;

4. Describe housing and management systems of different livestock;

5. Explain the principles of animal health management;

6. Discuss animal breeding and breed improvement principles; and

7. Explain basic anatomy and physiology of the living systems (histology, circulatory, respiratory, digestive and reproductive).

**Course Contents**

The livestock industry – problems and prospects. Description of the breeds of cattle, sheep, goats, pigs, poultry, and rabbits. Systems of livestock production. Feeding and feed management. Principles of breeding and livestock improvement. General principles of management of the different types of farm animals (cattle, sheep, goats, pigs, poultry, and rabbits).Introduction to game and companion animals. General principles of their management, feeding and feeding habits. Endangered livestock species, their management and conservation. Anatomy and physiology of the cell. Tissues. Nervous system. Skeletal system. Muscle. Bone. Circulatory system. Reproductive. Digestive. Special senses and other systems of farm animals.

**Level 300**

**BUK-STE 301 Educational Technology (2 Credits; Core; LH = 30)**

**Senate-Approved Relevance**

Production of high-quality, qualified and professional teachers requires expertise in selecting appropriate and systemic use of techniques, strategies, processes, procedures and instructional materials that enhance teacher instructional delivery an students learning. This course was designed to educate student-teachers on the appropriate and systematic use of hardware, software, processes and procedures in order to enhance teaching and learning, and achieve learning outcomes. This is line with the BUK’s mission of producing high quality human resources in the area of teaching required for the promotion of the educational development. The course was meant to educate student-teachers the knowledge of careful and systematic, preparation, planning and implementation of an instruction.

**Overview**

Educational Technology as a course was designed to acquaint students with the knowledge of educational aims and objectives, developing scheme of work, lesson planning and lesson notes, selecting and using appreciate instructional materials and teaching as communication. The importance of the course lies in meeting and providing high-quality education as enshrine in sustainable development goals (SDGs) in the area of education.

**Learning Objectives**

The objectives of the course are to:

1. Define the concept of educational technology
2. Describe educational objectives as cornerstone of educational technology
3. Explain the different types of instructional materials for classroom teaching
4. List and explain the factors that affect selection and use of instructional materials
5. Explain the concept of teaching as communication
6. Discuss the purpose of educational field trip.

**Learning Outcomes**

On completion of the course, students should be able to:

1. Define educational technology
2. List and explain the three domains of educational objectives
3. Differentiate between projected and non-projected instructional media.
4. List and explain five factors that affect selection and use of instructional materials
5. Explain the concept of teaching as communication
6. Discuss the purpose of educational field trip.

**Course Contents**

This course will introduce students to the concept of Educational Technology and will continue with the familiarization of students with different types of Audio- Visual materials, their operations and uses. Educational technology: teaching as communication; educational objectives. Varieties of education media; Non-projected visuals for classroom teaching; audio media for class teaching; still-projected and motion projected media. Field trips; their purpose and organization; sources of A-V materials. Practical for audio, still, and motion projected media.

**Level 400**

**BUK-STE 401** **Educational Structure, Administration and Planning (2 Credits, Core, LH = 30)**

**Senate-Approved Relevance**

Educational Structure, Administration and Planning coincides with the BUK’s mission of producing high-quality graduates and the need to move forward the frontiers of human knowledge by providing excellent undergraduate and high-quality human resources. The course is meant to produce high-quality professional teachers who are managers of educational instructions. It is meant to educate student-teachers on structure of education as an organisation, processes and procedures for effective planning and administration of human and material resources in educational institutions.

**Overview**

Educational structure, administration and planning as a course was designed to acquaint students with the knowledge of educational structure, educational planning and educational administration. The course helps in producing high-quality educational managers. This is in line with provision of high-quality education as enshrine in sustainable development goals (SDGs).

**Learning Objectives**

The objectives of the course are to.

1. Define the concept of educational administration and planning.
2. Explain the principles of organization
3. Explain the various forms of records within an organization
4. Discuss the purpose and characteristics of educational planning
5. Explain the organizational structure of national education system
6. Describe the structure of federal and state ministry of education.

**Learning Outcomes**

On completion of the course, students should be able to:

1. Define educational administration and planning
2. Explain at least four principles of organization
3. Explain the six different forms of records within an organization
4. Discuss the three purpose and characteristics of educational planning
5. Explain the organizational structure of national education system
6. Describe the structure of federal and state ministry of education

**Course Contents**

Educational administration; meaning and emergence; principles of organization and administration; communication in organizations; organizing schools for effective management; school records and procedure; time-table management; the nature and scope of educational planning definitions and characteristics of education planning; emergence of educational planning in world and Nigerian perspectives; reasons for the growth of interest in planning, objectives of education planning in Nigeria; constraints on educational planning in Nigeria. Organizational structure of the national education system and the operation of administrative policy relationships. The evaluation of the national education system, organization of Nigerian education, the federal ministry of education, the state ministry of education and related agencies such as NUC, NTI, JAMB, etc.

**BUK-STE 402 Guidance and Counseling in Science Education (2 Credits, Core, LH = 30)**

**Senate-Approved Relevance**

Production of high-quality, qualified and professional teachers requires expertise in the field of educational guidance and counseling. The student-teachers need to be educated on educational guidance, vocational guidance, personal guidance and counseling practices. This is in line with the BUK’s mission of producing high quality human resources required for the promotion of the development of the host community, the nation, Africa and beyond.

**Overview**

Guidance and counselling in science education is meant to acquaint students with expertise educational, vocational and persono-social guidance and counselling practices. The students will be exposed to the rudiment of principles, scope and practice of guidance and counselling, role of guidance and counselling in learning and teaching, vocational guidance, counselling theories, guidance services in Nigerian primary and secondary schools; the role of the school counsellor in the Nigerian educational system. The importance of the course lies in meeting and providing high-quality education as enshrine in sustainable development goals (SDGs) in the area of education.

**Learning Objectives**

The objectives of the course are to:

1. Define the concept of guidance and counselling
2. Explain the principles and practice of guidance and counselling
3. Describe types of guidance and counselling
4. Discuss the counselling theories

**Learning Outcomes**

On completion of the course, students should be able to:

1. Define the concept of guidance and counselling
2. Explain three principles and practice of guidance and counselling
3. Describe the three types of guidance and counselling
4. Discuss at least three counselling theories

**Course Contents**

Introduction to the principles, scope and practice of guidance and counselling; role of guidance and counselling in learning and teaching; vocational guidance and prominent career theories; guidance services in Nigerian primary and secondary schools; the role of the school counsellor in the Nigerian educational system.

**BUK-STE 403 ICT in Science and Technology Education (2 Credits, Core, LH = 30)**

**Senate-Approved Relevance**

The 21st century student-teachers need to be acquainted with knowledge, skills and competencies of using Information and Communication Technology in research, teaching and learning. The National Policy on Education (2013) has stressed the need to employ educational technology to improve the quality of education. ICT in Science and Technology Education will expose the student-teachers on how ICT can be used to improve **b.** This is in line with the BUK’s mission of producing high quality human resources required for the promotion of the development of the host community, the nation, Africa and beyond

**Overview**

ICT in science and Technology Education as a course was designed to acquaint students with the knowledge of ICT and its application in teaching and learning of science and technology subjects, computer and its components, internet and other technological tools and resources that are being used in education. This is in line with provision of high-quality education as enshrine in sustainable development goals (SDGs).

**Learning Objectives**

The objectives of the course are to:

1. Explain the meaning of Information and Communication Technology (ICT).
2. List and explain areas of application of ICT in Science and Technology Teaching
3. Examine computer application in learning.
4. Give overview of ICT Policy in education
5. Describe synchronous and asynchronous packaging of instruction.
6. Outline basic programming languages and stages
7. Identify factors influencing the use of ICT in teaching and learning
8. Outline the problems, prospects and challenges of application of ICT in Science and Technology education in developing world.

**Learning Outcomes**

On completion of the course, students should be able to:

1. Explain the meaning of Information and Communication Technology (ICT).
2. List and explain at least three areas of application of ICT in Science and Technology Teaching
3. Examine computer application in learning.
4. Give overview of ICT Policy in education
5. Describe synchronous and asynchronous packaging of instruction.
6. Outline at least six programming languages
7. Identify at least five factors influencing the use of ICT in teaching and learning
8. Outline at least five problems, prospects and challenges of application of ICT in Science and Technology education in developing world.

**Course Contents**

Concept of ICT, Categories of ICT, ICT in Science and Technology Education, Areas of Application of ICT in Science and Technology Education, Factors influencing the use of ICT in teaching and learning, ICT Policy in education. the problems, prospects and challenges of application of ICT in education in developing world., Computer in Science and Technology Education, Internet in Science and Technology Education, Synchronous and Asynchronous packaging of instruction, Computer programming

**BUK- AGE 408 Teaching, Learning Methods in Agricultural Extension (2 Credits; Core; LH = 30)**

**Senate-Approved Relevance**

Teaching and Learning Methods in Agricultural Extension equips students with the knowledge of principles of teaching and learning, types of learning, various methods of learning, factors affecting learning, teaching methods and audio- visuals techniques Extension teaching aids preparation and uses of teaching aids and learning theories in Agricultural Extension. This helps students to become effective Agricultural Science teachers which is in line with the BUK’s mission of producing Agricultural science teachers who are knowledgeable in disseminating information of agricultural production to the society.

**Overview**

The course equips students with the knowledge of Teaching-learning methods in Agricultural Extension. Concepts of teaching and learning. Principles of teaching and learning. Types of learning. Various methods of learning. Factors affecting learning. Teaching methods Audio- visuals techniques and extension teaching aids. Preparation and use of teaching aids. Learning Theories in Agricultural Extension.

**Learning Objectives**

The objectives of the course are:

1. Explain the concept of and Principles of Teaching and Learning in Agricultural Extension

2. Describe the Teaching-learning Methods in Agricultural Extension

3. Explain the types of learning and the various methods of learning in Agricultural Extension, including their advantages and disadvantages

4. Describe the theories of learning in Agricultural Extension

**Learning Outcomes**

On completion of the course, students should be able to:

1. Explain the concept of and Principles of Teaching and Learning in Agricultural Extension

2. Describe at least five Teaching-learning Methods in Agricultural Extension

3. Explain at least five types of learning and the various methods of learning in Agricultural Extension, including their advantages and disadvantages

4. Describe at least two theories of learning in Agricultural Extension

**Course Content**

Teaching-learning methods in Agricultural Extension. Concepts of teaching and learning.

Principles of teaching and learning. Types of learning (Cognitive, Psychomotive and Affective learning).Various methods of learning. Factors affecting learning. Teaching methods (Individual, Group and Mass).Disadvantages and Disadvantages of Teaching Methods. Audio- visuals techniques and extension teaching aids. Preparation and use of teaching aids. Learning Theories in Agricultural Extension.