**BAYERO UNIVERSITY, KANO**

**FACULTY OF EDUCATION**

**DEPARTMENT OF SCIENCE AND TECHNOLOGY EDUCATION**

**B.SC (ED) BIOLOGY**

**CCMAS 30% CONTENT**

**LEVEL ONE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE** | **COURSE TITLE** | **UNIT** | **STATUS** | **LH** | **PH** |
| BUK–STE 101 | Foundation of Education II | 2 | C | 30 | - |
| BUK-STE 118 | General Chemistry Practical I | 1 | C |  | 45 |
| **Total Credits** | | **03** | | | |

**LEVEL TWO**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE** | **COURSE TITLE** | **UNIT** | **STATUS** | **LH** | **PH** |
| BUK–STE 201 | Introduction to Research Method | 2 | C | 30 | - |
| BUK–STE 202 | Basic Educational Statistics | 2 | C | 30 | - |
| BUK-STE 203 | Environmental and Pollution Biology | 2 | C | 15 | 45 |
| BUK- STE 204 | Invertebrate Zoology I | 2 | C | 15 | 45 |
| BUK-STE 205 | Invertebrate Zoology II | 2 | C | 15 | 45 |
| **Total Credits** | | **10** | | | |

**LEVEL THREE**

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| --- | --- | --- | --- | --- | --- |
| **COURSE CODE** | **COURSE TITLE** | **UNIT** | **STATUS** | **LH** | **PH** |
| BUK–STE 301 | Educational Technology | 2 | C | 30 | - |
| BUK–STE 302 | Vertebrate Zoology | 2 | C | 15 | 45 |
| BUK–STE 303 | Comparative Animal Physiology | 2 | C | 15 | 45 |
| BUK–STE 304 | Arthropod Diversity | 2 | C | 15 | 45 |
| BUK–STE 305 | Principles of Animal Development | 2 | E | 15 | 45 |
| **Total Credits** | | **10** | | | |

**LEVEL FOUR**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE** | **COURSE TITLE** | **UNIT** | **STATUS** | **LH** | **PH** |
| BUK–STE 401 | Educational Structure, Administration and Planning | 2 | E | 30 | - |
| BUK–STE 402 | Guidance and Counselling in Science Education | 2 | C | 30 | - |
| BUK-STE 403 | Information and Communication Technology (ICT) in Science and Technology Education | 3 | C | 45 | - |
| **Total Credits** | | **06** | | | |

**COURSE CONTENT AND LEARNING OUTCOMES**

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

**Senate-Approved Relevance**

Coursework in foundation of education II is perhaps the most paramount and critical 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.

Therefore, 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. Understand the term motivation
4. explain theories of motivation
5. Define Memory
6. explain the stages and agents of socialization;
7. Explain the influence of social stratification on education
8. Discuss equality of educational opportunity.
9. Trace educational development since 1950.
10. Write on the development and current structure of the Nigeria curriculum

**Learning Outcomes**

At the end of this course students should ne able to;

1. Define intelligence
2. Explain the influence of heredity and environment on intelligence
3. Define motivation
4. List and explain five theories of motivation
5. Define Memory
6. explain the stages and agents of socialization;
7. Explain the influence of social stratification on education
8. Discuss equality of educational opportunity.
9. Trace educational development since from 1950 to date
10. Write on the development and 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 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 students are expected to be able to:

1. Understand 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. Understand 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**

At the end 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 learning objectives of the course are for the students to:

1. Explain 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**

At the end 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. Develop a research proposal
5. Formulate three testable null hypotheses
6. Demonstrate 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-STE 203 Environmental and Pollution Biology (2 Credits, Core, LH =15 PH=45)**

**Senate-Approved Relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in the field of Pollution, types and its impact on Ecosystem at large especially in densely populated human habitations like urban Kano and its peri-urban neighbourhood. It is imperative to know that knowledge on the health and ecological effects of air, soil/land and water pollution will improve the capacity of graduates of Applied Biology in terms of contribution to societal development. Relevance is seen in public health and environmental sanitation knowledge and expertise of Applied Biologists from BUK who will greatly contribute in the project of implementing pollution control strategies in the society and industries. These values are in agreement with vision and mission of BUK of addressing ecological problems which is as a result of exponential waste generation experienced in overpopulated urban habitations like Kano and its peri-urban neighbourhood. Pollution Biology study is vital in the area of assessment and control of pollution in our environment. It is well known that pollution is posing an ecological and health risks to humans and the entire Ecosystem especially in the sub-saharan Africa (Nigeria inclusive). This course is designed to expose students to the types of pollution; sources of pollution; impact of pollution on biota; pollution control strategies; techniques of testing pollution and interpretation of results.

**Overview**

Pollution Biology study is vital in the area of assessment and control of pollution in our environment. It is well known that pollution is posing an ecological and health risks to humans and the entire Ecosystem especially in the sub-saharan Africa (Nigeria inclusive).

This course is designed to expose students to the types of pollution; sources of pollution; impact of pollution on biota; pollution control strategies; techniques of testing pollution and interpretation of results.

**Learning Objectives**

The learning objectives of the course are for the students to:

**1.** describe the basic concepts of pollution;

2. enumerate and explain types of pollution;

3. explain the impact of pollution on biota;

4. introduce students to various sampling techniques.

5. explain pollution control measures and strategies.

**Learning Outcomes**

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

1. explain basic concepts of pollution;
2. enumerate and differentiate types of pollution;
3. describe impact of pollution on biota
4. conduct pollution testing and interprete result;
5. proffer solutions/ways of controlling pollution and strategies;
6. demonstrate understanding of the 3Rs of pollution control.

**Course Contents**

Basic concepts of pollution. Types of pollution (air, water and land/soil). Impact of pollution on biota. Climate change, flooding, drought, precipitation, pesticides etc. Techniques of testing pollution. Pollution control and strategies.

**BUK-STE 204 Invertebrate Zoology I (2 Credits, Core, LH =15 PH=45)**

**Senate-Approved Relevance**

Training of high-quality graduates with sound knowledge on the most diverse group of animals on earth is in line with the University’s objective and mission. The students shall apply the knowledge gained on the functional role of invertebrate group in the natural environment and human society.

**Overview**

The course introduces students to the diversity of invertebrates, which are the vast majority of all animals on the planet. It covers the development, adult anatomy, biology and evolutionary relationships of the main animal phyla including Porifera, Coelenterate, Platyhelminths, Nematoda, Entoprocta, Nemertinea, Acanthocephala, and Rotifera

**Learning Objectives**

The learning objectives of the course are for the students to:

1. study the diversity and classification of lower invertebrates
2. explain the morphology, life cycle and physiology of lower invertebrates
3. study the evolutionary origin of lower invertebrate

**Learning Outcomes**

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

1. describe the variety of lower invertebrate animals and explain their evolutionary origin and diversity;
2. compare and contrast the morphology, life cycle and physiology of different lower invertebrates’ groups;
3. demonstrate practical experiences in laboratory and field conditions, to identify lower invertebrate taxonomic groups; and
4. explain the role of invertebrates in the evolution of animal life to specialist and non-specialist audiences.

**Course Contents**

The systematics, inter-relationship, and basic organization of the lower invertebrates, of the Phylum Protozoa, Porifera, Coelenterate, Platyhelminths, Nematoda, Entoprocta, Nemertinea, Acanthocephala, and Rotifera

**BUK-STE 205 Invertebrate Zoology II (2 Credits, Core, LH =15 PH=45)**

**Senate-Approved Relevance**

Training of high-quality graduates with sound knowledge on the most diverse group of animals on earth is in line with the University’s objective and mission. The students shall apply the knowledge gained on the functional role of invertebrate group in the natural environment and human society.

**Overview**

The course introduces students to the diversity of invertebrates, which are the vast majority of all animals on the planet. It covers the development, adult anatomy, biology and evolutionary relationships of the higher (coelomate) invertebrates such as Phylum Ectoprocta (Bryozoa), Brachiopoda, Phoronida, Annelida, Mollusca, Arthropoda, and Echinodermata.

**Learning Objectives**

The learning objectives of the course are for the students to:

1. describe the variety of higher invertebrate animals and explain their evolutionary origin and diversity;
2. compare and contrast the morphology, life cycle and physiology of different higher invertebrates’ groups;
3. have practical experiences in laboratory and field conditions, to identify higher invertebrate taxonomic groups; and
4. communicate the role of invertebrates in the evolution of animal life to specialist and non-specialist audiences.

**Learning Outcomes**

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

1. describe the variety of lower invertebrate animals and explain their evolutionary origin and diversity;
2. compare and contrast the morphology, life cycle and physiology of different lower invertebrates’ groups;
3. demonstrate practical experiences in laboratory and field conditions, to identify lower invertebrate taxonomic groups; and
4. explain the role of invertebrates in the evolution of animal life to specialist and non-specialist audiences.

**Course Contents**

The systematics, inter-relationship, and basic organisation of the higher (coelomate) invertebrates, of the Phylum Ectoprocta (Bryozoa), Brachiopoda, Phoronida, Annelida, Mollusca, Arthropoda, and Echinodermata.

**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 learning objectives of the course are for the students to.

1. Understand 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**

At the end 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.

**BUK-STE 302 Vertebrate Zoology (2 Credits, Core, LH =15 PH=45)**

**Senate-Approved Relevance**

Training of high-quality graduates with sound knowledge on the highest vertebrate groups of animals on earth is in line with the University’s objective and mission. The students shall apply the knowledge gained on the functional role of vertebrate group in the natural environment and human society.

**Overview**

The course introduces students to higher vertebrates including Ostracoderms and the origin of chordates, their systematic inter-relations, basic organization and evolution. It highlights the geographical distribution of recent Nigeria vertebrate fauna, their comparative anatomy and diversity.

**Learning Objectives**

The learning objectives of the course are for the students to:

1. demonstrate an understanding of, and be able to identify in detail, the anatomical characteristics of members of the phylum chordata. Beginning with protochordate to complex mammals;

2. demonstrate an understanding of the ontogeny and phylogeny relationships of the three chordate subphyla and several vertebrate classes;

3. have practical experiences in laboratory and field conditions, to identify major vertebrate taxonomic groups;

4. discuss the basic life processes of vertebrates, including movement, body support, homeostatic, circulation, gas exchange, reproduction, development, digestion, excretion, sensory perception, cognition, and the immune system;

5. describe the evolutionary history of the vertebrate and the important transition between major taxa and clade;

6. explain the relationship between the form and function of vertebrates and the selection pressures that have influenced their evolution; and

7. discuss the ecology, behaviour, and diversity of the Nigerian vertebrate fauna.

**Learning Outcomes**

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

1. demonstrate an understanding of, and be able to identify in detail, the anatomical characteristics of members of the phylum chordata. Beginning with protochordate to complex mammals;
2. demonstrate an understanding of the ontogeny and phylogeny relationships of the three chordate subphyla and several vertebrate classes;
3. demonstrate practical experiences in laboratory and field conditions, to identify major vertebrate taxonomic groups;
4. discuss the basic life processes of vertebrates, including movement, body support, homeostatic, circulation, gas exchange, reproduction, development, digestion, excretion, sensory perception, cognition, and the immune system;
5. describe the evolutionary history of the vertebrate and the important transition between major taxa and clade;
6. interpret the relationship between the form and function of vertebrates and the selection pressures that have influenced their evolution; and
7. discuss the ecology, behaviour, and diversity of the Nigerian vertebrate fauna.

**Course Contents**

Ostracoderms and the origin of chordates; The systematic inter-relations of the chordate groups; protochordates – urochordates (tunicates), cephalochordates (amphioxus); hemichordates; basic organization of the vertebrates; ammocoete larva (genetic ties between protochordate and vertebrates) vertebrate systematics, evolution, and geographical distribution of recent vertebrates; the Nigeria vertebrate fauna. Comparative anatomy of the vertebrates - viviparity, germ layer and extraembryonic membranes; skin, skeleton, muscles, digestive system, respiratory system, circulatory system, urinogenital system, nervous system, sense organs, endocrine organs

**BUK-STE 303 Comparative Animal Physiology (2 Credits, Core, LH =15 PH=45)**

**Senate-Approved Relevance**

Training of high-quality graduates with sound knowledge on Comparative physiology by exploration of physiological principles through examination of the functional diversity among animal species. Because diversity derives from evolution and natural selection, the course extends beyond characterizing a physiological system at the mechanistic level to consideration of how the mechanisms work as an integrated system with relevance in ecological or evolutionary contexts.

**Overview**

The course introduces students to the various physiological processes among animal groups such as homeostasis osmoregulation, excretion, nutrition, digestion, respiration, blood and circulation, movement and the integrating system of nervous coordination, sense organs and endocrine system.

**Learning Objectives**

The learning objectives of the course are for the students to:

1. compare the function of key physiological systems within, and between, animal groups;
2. explain the fundamental concepts of physiology of digestion, blood vascular system, respiration, excretion, and musculature;
3. explain the endocrine system and its interactions with other systems; and
4. have practical experiences in the laboratory, on different physiology of major animal groups

**Learning Outcomes**

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

1. Compare and contrast the function of key physiological systems within, and between, animal groups;
2. Describe the fundamental concepts of physiology of digestion, blood vascular system, respiration, excretion, and musculature;
3. explain the endocrine system and its interactions with other systems; and
4. demonstrate practical experiences in the laboratory, on different physiology of major animal groups

**Course Contents**

Homeostasis as a central concept in physiology; osmoregulation and balanced excretion among animal groups. Nutrition and digestion; respiration; blood and circulation in animals. The integrating system (nervous coordination, sense organs and endocrine system). The physiology of movement.

**BUK-STE 304 Arthropod Diversity (2 Credits, Core, LH =15 PH=45)**

**Senate-Approved Relevance**

Training of high-quality graduates with sound knowledge on the most diverse and distinct groups of animals. Arthropods in addition to their diversity are also ubiquitous, abundant, and functionally important components of terrestrial and aquatic ecosystems, occupying varied habitats and niches along a range of temporal and spatial scales. The students shall apply the knowledge gained in ensuring the maintainance of the healthy ecosystems, utilize arthropods in provision of livelihoods and nutrition to human communities, while ensuring that students develop a variety of visions of sustainability with regards to arthropods.

**Overview**

The course is designed to allow students explore the largest phylum in the animal kingdom, which includes such familiar forms as lobsters, crabs, spiders, mites, insects, centipedes, and millipedes, along with their structure, function, biology and successes.

**Learning Objectives**

The learning objectives of the course are for the students to:

1. illustrate arthropod taxonomy
2. describe the general insect morphology and physiology
3. explain the role played by arthropods in food, agriculture, medicine, and as disease vectors and pests; and
4. have practical experiences in the laboratory and field conditions, to collect, identify and preserve local arthropods.

**Learning Outcomes**

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

1. illustrate arthropod taxonomy
2. demonstrate the general insect morphology and physiology
3. explain the role played by arthropods in food, agriculture, medicine, and as disease vectors and pests; and
4. demonstrate experiences in the laboratory and field conditions, to collect, identify and preserve local arthropods.

**Course Contents**

Adaptive radiation within the phylum Arthropoda with reference to the structure and functions of the body appendages. General biology of selected arthropod class. Biological success of the arthropods.

**BUK-STE 305 Principles of Animal Development (2 Credits, Core, LH =15 PH=45)**

**Senate-Approved Relevance**

Training of high-quality graduates with sound knowledge on the development and processes that lead eventually to the formation of a new animal starting from cells derived from one or more parent individuals. The students shall apply the knowledge gained to understand the various processes and problems of development. This will provide the graduates from Science Education (BUK) with the ability to conduct researches that are related to animals’ development and to address and solve the problems involved in the processes of development.

**Overview**

The course is designed to introduce students to various aspects of cellular and molecular basis of embryogenesis, gametogenesis, gene-activity in oogenesis, cytoplasmic localisation, fertilisation and cleavage. blastulation, gastrulation and cell interactions, differentiation and tissue interactions in development, organogenesis, placentation and the significance of the placenta in the development of immunity, parthenogenesis in animals.

This emphasizes the need of training students with the principles of animal development, as it provides students with skills to manage organisms like chicken (poultry farming) and conduct biological researches in different fields of biology that can benefit both humans and animals growth and development.

**Learning Objectives**

The learning objectives of the course are for the students to:

1. discuss the basic concepts of development and explain the theories of preformation, and concepts like growth, differentiation, and reproduction.
2. relate the principles and process of fertilization, cleavage, gastrulation, and embryogenesis.
3. explain the fundamental concept of organogenesis.
4. outline the early embryonic development of selected invertebrates and vertebrates
5. have practical experiences in the laboratory to incubate and observe the developmental stages of the chick embryo.

**Learning Outcomes**

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

1. discuss the basic concepts of development and explain the theories of preformation, and concepts like growth, differentiation, and reproduction.
2. explain the principles and process of fertilization, cleavage, gastrulation, and embryogenesis.
3. explain the fundamental concept of organogenesis.
4. describe the early embryonic development of selected invertebrates and vertebrates
5. demonstrate practical experiences in the laboratory to incubate and observe the developmental stages of the chick embryo.

**Course Contents**

Problems and processes of development. Cellular and molecular basis of embryogenesis. Gametogenesis Gene-activity in oogenesis. Cytoplasmic localisation in the mature egg. Fertilisation and cleavage in the zygote; blastulation, gastrulation and cell interactions. Cellular and molecular basis of embryogenesis. Differentiation and tissue interactions in development. Organogenesis; placentation and the significance of the placenta in the development of immunity; parthenogenesis in animals

**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. Understand 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**

At the end 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 counselling. The student-teachers need to be educated on educational guidance, vocational guidance, personal guidance and counselling 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 counseling, role of guidance and counseling in learning and teaching, vocational guidance, counselling theories, guidance services in Nigerian primary and secondary schools; the role of the school counselor 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 learning objectives are for the students to.

1. Understand and 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**

At the end 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 counseling; role of guidance and counseling in learning and teaching; vocational guidance and prominent career theories; guidance services in Nigerian primary and secondary schools; the role of the school counselor in the Ni

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

**Senate-Approved Relevance**

The 21st century student-teachers needs 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 **students engagement, performance and retention.** 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 for the students to.

1. Understand and 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**

At the end of this course students should be able to;

1. Clearly define and explain the meaning of Information and Communication Technology (ICT).
2. List and explain three broad areas of application of ICT in teaching Science and Technology.
3. Give overview of ICT Policy in education
4. Describe synchronous and asynchronous packaging of instruction.
5. Outline six programming languages
6. Identify five factors influencing the use of ICT in teaching and learning
7. Outline the 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