**BAYERO UNIVERSITY, KANO**

**FACULTY OF EDUCATION**

**DEPARTMENT OF SCIENCE AND TECHNOLOGY EDUCATION**

**B. SC. (ED) MATHEMATICS**

**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 102 | Basic Computer Science | 3 | C | 30 | 45 |
| BUK–STE 106 | Basic Physics I | 2 | C | 30 | - |
| BUK–STE 107 | Basic Physics II | 2 | C | 30 | - |
| BUK–STE 108 | Basic Physics III | 2 | C | 30 |  |
| BUK–STE 109 | Basic Physics IV | 2 | C | 30 |  |
| BUK–STE 119 | Introduction to Probability | 3 | C | 45 |  |
| **Total Units** | | **16** | | | |

**LEVEL TWO**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE** | **COURSE TITLE** | **UNIT** | **STATUS** | **LH** | **PH** |
| BUK–STE 201 | Basic Educational Statistics | 2 | C | 30 | - |
| BUK–STE 202 | Introduction to Research Method | 2 | C | 30 | - |
| BUK–STE 203 | Ethnomathematics | 2 | C | 30 | - |
| BUK–STE 204 | Vector Analysis | 2 | C | 30 | - |
| **Total Units** | | **8** | | | |

**LEVEL THREE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE** | **COURSE TITLE** | **UNIT** | **STATUS** | **LH** | **PH** |
| BUK–STE 301 | Educational Technology | 2 | C | 15 | 30 |
| **Total Units** | | **2** | | | |

**LEVEL FOUR**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE** | **COURSE TITLE** | **UNIT** | **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-STE 404 | Operation Research | 2 | C | 30 |  |
| BUK-STE 405 | Linear System Theory | 2 | C | 30 |  |
| BUK-STE 406 | Stochastic Processes | 2 | C | 30 |  |
| BUK-STE 407 | Classical Theory of Numbers | 2 | C | 30 |  |
| **Total Units** | | **14** | | | |

**COURSE CONTENT AND LEARNING OUTCOMES**

**Level 100**

**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. Comprehend the concept of intelligence
2. Describe the influence of heredity and environment on intelligence
3. Understand the term motivation
4. List and explain theories of motivation
5. Define Memory
6. List and explain 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 be 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. List and explain three 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 102: Basic Computer Science (3 Units C: LH 30; PH 45)**

**Senate – Approved Relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in carrying out basic operations involving computer software and hardware components in agreement with BUK’s mission to address African developmental challenges in producing graduates who are computer literate.

**Overview**

Basic computer sciences lead to acquisition of basic skills in hardware and software components. It will give students basic ideas in information processing and its roles in society. Students will be required to complete lab assignments using the PC’s operating system, and several commonly used applications, such as word processors, spreadsheets, presentations, graphics and other applications. Internet and on-line resources, browsers, and search engines.

**Objectives**

The objectives of the course are to:

1. Trace historical development of computing to the current programmes in the discipline;
2. Distinguish the salient characteristics of the different programmes of the computing discipline;
3. Identify the roles and applications of computers and computing in different areas of human endeavour;
4. Identify and explain the basic components of a computer system;
5. Develop basic literacy on the use of computer systems;
6. Develop competence on the use of common Office productivity applications; and
7. Make purposeful use of the Internet for information gathering, learning and continuous professional development.

**Learning Outcomes**

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

1. Trace historical development of computing to the current programmes in the discipline;
2. Distinguish the salient characteristics of the different programmes of the computing discipline;
3. Identify the roles and applications of computers and computing in different areas of human endeavour;
4. Identify and explain the basic components of a computer system;
5. Develop basic literacy on the use of computer systems;
6. Develop competence on the use of common Office productivity applications; and
7. Make purposeful use of the Internet for information gathering, learning and continuous professional development.

**Course Contents**

History of computing sciences leading to the different programmes in the discipline. Characteristics of each programme in computing sciences. Hardware, Software; and human resources; Integration and application in business and other segments of society. Information processing and its roles in society.

Students will be required to complete lab assignments using the PC’s operating system, and several commonly used applications, such as word processors, spreadsheets, presentations, graphics and other applications. Internet and on-line resources, browsers, and search engines.

**BUK-STE 106: Basic Physics I (Mechanics) (2 Units C: LH 30)**

**Senate - Approved Relevance**

The course prepares graduates who are knowledgeable in the area of physics. They are to be conversant with industrial application of the physics. The course is committed to educate students in the principle tenets of Physics through structured inquiry and opportunities for individualized experiential learning. It is also committed to teaching ethical behavior in experimental design and practice to the students. The course strives to provide the best educational opportunities possible for students to attain their academic goals and to facilitate faculty in scholarship in an atmosphere that encourages free exchange of ideas

**Overview**

The principles of physics are the basis of all modern technology, and understanding the concepts of physics and knowing how to solve physics problems is a key indicator of success in advanced study in all technical fields, including biology, medicine, and the health sciences. The purpose, then, of these courses is to give students a broad understanding of physics and a foundation in problem solving and critical thinking.

General Physics is designed for students interested in science and technology related careers and majors. It is taught at the algebra/trigonometry level and it incorporates conceptual understanding, laboratory work, and mathematical problem solving.

**Learning objectives**

At the end of the course students should be able to

1. Classify physical quantities and their units
2. State fundamental laws of motion
3. Apply Newton’s laws of motion to solve problems on motion
4. Explain the relation between work and energy
5. Define momentum
6. Express the relation between torque, moment of inertia, angular momentum
7. Describe the laws of motion under gravity
8. Solve numerical problems under force gravity

**Learning Outcomes**

On completion, the student should be able to

1. Identify and deduce the physical quantities and their units;
2. Differentiate between vectors and scalars;
3. Describe and evaluate motion of systems on the basis of the fundamental laws of mechanics;
4. Apply Newton's laws to describe and solve simple problems of motion;
5. Evaluate work, energy, velocity, momentum, acceleration, and torque of moving or rotating objects;
6. Explain and apply the principles of conservation of energy, linear and angular momentum;
7. Describe the laws governing motion under gravity; and
8. Explain motion under gravity and quantitatively determine behaviour of objects moving under gravity.

**Course Contents**

Space and time; units and dimension, vectors and scalars. Differentiation of vectors: displacement, velocity, and acceleration. kinematics; Newton laws of motion (Inertial frames, Impulse, force and action at a distance, momentum conservation). Relative motion; Application of Newtonian mechanics, Equations of motion, Conservation principles in physics, Conservative forces, conservation of linear momentum, Kinetic energy, work and Potential energy. System of particles; centre of mass; rotational motion; torque, vector product, moment, rotation of coordinate axes and angular momentum. Polar coordinates, conservation of angular momentum, circular motion, moments of inertia, gyroscopes, and precession. Gravitation: Newton's law of gravitation, kepler's laws of planetary motion, gravitational potential energy, escape velocity, satellites motion, and orbits.

**BUK-STE 107: Basic Physics II (Electricity & Magnetism) (2 Units C: LH 30)**

**Senate - Approved Relevance**

The course is committed to train students in the principle tenets of Physics through structured inquiry and opportunities for individualized experiential learning. It is committed to teaching ethical behavior in experimental design and practice to the students. The course strives to provide the best educational opportunities possible for students to attain their academic goals in physics and to facilitate faculty in scholarship in an atmosphere that encourages free exchange of ideas.

**Overview**

Electricity and magnetism will make students to have basic ideas on concepts of electrostatic forces and properties of simple charge distribution using Coulomb’s and Gauss laws. Electricity and magnetism helps student to understand the influence of magnetic field on moving charges, the magnetic properties of simple current distributions using Biot-Savart and Ampere’s law.

The students will have basic idea on electromagnetic induction and make simple calculations using Faraday’s and Lenz’s laws, and explain the significance of Maxwell’s equations. The students can use DC circuit to determine electrical properties and characteristics of AC voltage, currents in resistors, capacitors and inductors.

**Learning objectives**

At the end of the course students should be able to

1. Explain electrostatic force.
2. Define Coulomb law
3. Derive the relation between Coulomb force, electric intensity, and electric potential
4. Solve numerical problems under Coulomb law
5. Explain the influence of magnetic on moving charges
6. Explain Lenz’s and Faraday’s laws of induction
7. Derive an expression for Biot – Savart and Ampere circuital laws
8. Define capacitance of a capacitor

**Learning Outcomes**

On completion, the student should be able to

1. Describe the electric field and potential and related concepts for stationary charges;
2. Calculate electrostatic properties of simple charge distributions using Coulomb's law, Gauss's law, and electric potential;
3. Describe and determine the magnetic field for steady and moving charges;
4. Determine the magnetic properties of simple current distributions using Biot-Savart and Ampere's law;
5. Describe electromagnetic induction and related concepts, and make calculations using Faraday and Lenz's laws;
6. Explain the basic physics of Maxwell's equations in integral form;
7. Evaluate DC circuits to determine the electrical parameters; and
8. Determine the characteristics of ac voltages and currents in resistors, capacitors, and Inductors.

**Course Contents**

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

**BUK-STE 108: Basic Physics III (Behaviour of Matter) (2 Units; E: LH 30)**

**Senate - Approved Relevance**

The course is committed to educate students in the principle tenets of Physics through structured inquiry and opportunities for individualized experiential learning. It is also committed to teaching ethical behavior in experimental design and practice to all students. The course strives to provide the best educational opportunities possible for students to attain their academic goals in physics and to facilitate faculty in scholarship in an atmosphere that encourages free exchange of ideas.

**Overview**

The course provides students with knowledge of temperature and its scale, general gas equation, thermal conductivity and first law of thermodynamics. The idea of thermodynamics processes, second law, entropy, enthalpy and kinetic theory of gases.

The course also was designed to expose students to ideas in elasticity, hydrostatics, principles of Archimedes, Bernoulli’s equation and incompressible fluid flow; surface tension; adhesion, cohesion, viscosity, capillarity, drops and bubbles.

**Learning objectives**

At the end of the course students would be able to

1. Define heat and temperature and state the difference between the two
2. Derive and apply thermodynamics principles in thermal systems
3. Derive mathematical relation in first and second laws of thermodynamics in relation with entropy
4. Derive Bernoulli's equation and incompressible fluid flow and solve problems

**Learning Outcomes**

On completion, the student should be able to

1. Explain the concepts of heat and temperature and relate the temperature scales
2. Define, derive, and apply the fundamental thermodynamic relations to thermal systems;
3. Education
4. Describe and explain the first and second laws of thermodynamics and the concept of entropy;
5. State the assumptions of the kinetic theory and apply techniques of describing macroscopic behaviour;
6. Deduce the formalism of thermodynamics and apply it to simple systems in thermal equilibrium; and
7. Describe and determine the effect of forces and deformation of materials and surfaces

**Course Contents**

Heat and Temperature and Temperature scales. Gas laws; General gas equation.Thermal conductivity; First Law of thermodynamics; heat, work, and internal energy and reversibility. Thermodynamic processes; adiabatic, isothermal and isobaric. Second law of thermodynamics; heat engines and entropy, Zero's law of thermodynamics; kinetic theory of gases; Molecular collisions and mean free path. Elasticity; Hooke's law, Young's, shear and bulk moduli .Hydrostatics; Pressure, buoyancy, Archimedes' principles; Bernoulli's equation and incompressible fluid flow; surface tension; adhesion, cohesion, viscosity, capillarity, drops and bubbles.

**BUK-STE 109: Basic Physics IV (Vibration Waves and Optics) (2 Units C: LH 30)**

**Senate - Approved Relevance**

B.Sc (Ed) Physics program in Bayero University is committed to educate students in the principle tenets of Physics education through structured inquiry and opportunities for individualized experiential learning. Second, we are committed to teaching ethical behavior in experimental design and practice to all of our students. The program strives to provide the best educational opportunities possible for students to attain their academic goals in physics and to facilitate faculty in scholarship in an atmosphere that encourages free exchange of ideas teaching professions.

**Overview**

This course covers reflection and refraction, lenses and optical instruments, the wave nature of light, interference, diffraction and polarization, behavior of vibration system and properties of waves in sound and light. The idea of wave equation in one, two and three dimensions, geometrical optics and optical instrument will be treated.

**Learning Objectives**

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

1. Analyse the behaviour of vibration system and wave energy
2. State the properties of wave in sound and light
3. Solve numerical problems using wave equation.
4. Demonstrate and shows idea of geometrical optics

**Learning Outcomes**

On completion, the student should be able to

1. describe and quantitatively analyze the behavior of vibrating systems and wave energy;

2. explain the propagation and properties of waves in sound and light;

3. identify and apply the wave equations; and

4. explain geometrical optics and principles of optical instruments.

**Course Contents**

Simple Harmonic Motion (SHM), Energy in a vibrating system, Damped SHM, Q values, and power response curves, Forced SHM, resonance and transients and coupled SHM. Normal modes. Waves; Types and properties of waves as applied to sound, transverse and longitudinal waves; superposition, interference, diffraction, dispersion, polarization; waves at interfaces; energy and power of waves. The 1-D wave equation, 2-D and 3-D wave equations, wave energy and power, phase and group velocities, echo, beats, The doppler effect, propagation of sound in gases, solids and liquids, and their properties.

Optics; Nature and propagation of light; reflection, refraction, internal reflection, dispersion, scattering of light, reflection and refraction at plane and spherical surfaces, thin lenses and optical instruments; wave nature of light; Huygens's principle, interference and diffraction.

**BUK-STE 119 Introduction to Probability (3 Credits; Core; LH = 45)**

**Senate - Approved Relevance**

B. Bc. (Ed) Mathematics program in Bayero University is committed to educate students in the principle tenets of Mathematics education through structured inquiry and opportunities for individualized experiential learning. Second, we are committed to teaching ethical behavior in experimental design and practice to all of our students. The program strives to provide the best educational opportunities possible for students to attain their academic goals in Mathematics and to facilitate faculty in scholarship in an atmosphere that encourages free exchange of ideas teaching professions.

**Overview**

Probability theories are very important tools in describing various chances of occurrence of phenomena that may arise in physical and social sciences. Theories of distributions help in arriving decisions about a phenomenon on the basis of confidence level.

The course is designed to introduce to students basic aspect of probability theories in order to analyze and be able to make decisions on various situations of human endeavors.

**Learning Objectives**

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

1. Discuss the differences between permutation and combination;
2. Describe the concept of random variables and relate it to probability and distribution functions;
3. Describe the basic distribution functions; and
4. Explain the concept of exploratory data analysis.

**Learning Outcomes**

At the end of the course students should be able to

1. Explain at least 3 the differences between permutation and combination;
2. Define the concept of random variables and relate it to probability and distribution functions;
3. Explain the basic distribution functions; and
4. Explain the concept of exploratory data analysis.

**Course Contents**

Permutation and combination. Concepts and principles of probability. Random variables. Probability and distribution functions. Basic distributions: Binomial, geometric, Poisson, normal and sampling distributions; exploratory data analysis.

**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 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 (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. Understand 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. 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-STE 203-ETHNOMATHEMATICS (2Credits, LH=30)**

**Senate-Approved Relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in teaching mathematics Senior Secondary Schools and Colleges which is in agreement with BUK’s mission to educate students in the principle tenets of Mathematics Education through structured inquiry and opportunities for individualized experiential learning

**Overview of the Course**

The importance of mathematics in human life cannot be over-emphasized. For quite some time mathematics suffered as the most detested and hated subject among the sciences. Consequently, low achievement in school mathematics has been increasing and shows no sign of this reversion. So many reasons have been given for this state of affairs, but most important of all, is the cultural arrogance implicit in the conventional mathematics. This has been found recently to inhibit creativity.

Therefore, this course is design to explore ways, modes, practices, intellectual tools (which are mathematical), for explaining, understanding, learning about and managing indeed coping with our natural and socio-cultural environment and use them in the teaching of modern Mathematics.

**Learning Outcomes**

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

1. Observe the cultural psycho emotional dimension of Ethnomathematics
2. Explain some new role of teacher
3. Understand the epistemological of Ethnomathematics

The basic idea; *The cultural and psycho-emotional dimension****:*** Historical overview; Building-up ideas and institutions from the generation to the diffusion of knowledge; Mathematics and self-esteem; A new role for the teacher. *The socio-political dimension:* Reflections on the conquest and colonization; Teachers and the curriculum. *Historical and epistemological dimension****:*** Institutionalization of knowledge; Ethnomathematics (way, mode, practices of explaining, and understanding of the environment); The cultural context; Remarks on the historiography of science and mathematics; Reviewing political considerations; Ethnomathematics in history and pedagogy and its relations.

**BUK-STE 204-VECTOR ANALYSIS (2Credits, LH=30)**

**Senate-Approved Relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in teaching mathematics Senior Secondary Schools and Colleges which is in agreement with BUK’s mission to educate students in the principle tenets of Mathematics Education through structured inquiry and opportunities for individualized experiential learning

**Overview of the Course**

The study of lines and shapes in mathematics is indispensable. Many mathematical problems are solved by transforming them into geometrical representation for further analysis.

The course provides some simple geometric ideas in terms of equations of lines and vectors, divergent and curl that has applications in Physics.

**Learning Outcomes**

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

1. describe vector algebra;

2. explain geometrical equation of lines and planes; and

3. outline problems in gradients, divergent and curl.

**Course Contents**

Elementary vector algebra, vector and vector triple, vector products (more application solution of vector equation, plain curves and space curves. Geometrical equation of lines and planes. Linear independence of vectors; components of vectors, direction cosines; position vector and scaler products; Frenet-Serret formulas; differential definition ofgradients, divergent and simple multiplication)

**L300**

**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.

**L400**

**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 tomove 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, counseling 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 Nigerian educational system.

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

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

**BUK-ST404: Operations Research (2 Credits; Core; LH = 30)**

**Senate – Approved Relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in teaching mathematics Senior Secondary Schools and Colleges which is in agreement with BUK’s mission to educate students in the principle tenets of Mathematics Education through structured inquiry and opportunities for individualized experiential learning

**Overview of the Course**

Companies and industries always seek to get more profit with minimum cost of investments. During a war between two countries, one country would always want to defeat the other. Also determining birth death rates of a country help to improve the welfare of its people, transportation and queuing systems are also important in a very successful community. Mathematics programming can help in achieving these.

Therefore the course is designed to help students learn basics principles and theories of programming both linear and nonlinear so that they can work as consultants and function well in the country.

**Learning Outcomes**

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

1. Define modelling
2. Identify the types of linear programming
3. Solve problems in the various types of programming
4. Solve problems in games and decision theory
5. Define Markov chain
6. Solve problems in Markovian process and queuing system

**Course Contents**

Modelling, linear programming, integer programming, non-linear programming, quadratic programming, Kuhn-Tucker system, deterministic dynamic programming, network analysis.

Probabilistic methods; theory of games, decision theory, stochastic dynamic programming finite Markov chains, Markovian birth death process, queuing system.

**BUK-ST405 Linear Systems Theory (2 Credits; Core; LH = 30)**

**Relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in teaching mathematics Senior Secondary Schools and Colleges which is in agreement with BUK’s mission to educate students in the principle tenets of Mathematics Education through structured inquiry and opportunities for individualized experiential learning

Overview of the Course

Stability analysis and control methods theorems play important roles in dynamical system that help in studying infectious diseases and methods of control of those diseases such as malaria, monkey diseases and host of others.

The course is designed to introduce to students mathematical approaches of solving problems using different models through differential equations and recommendations offered to agencies and government.

**Learning Outcomes**

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

1. Solve problems in classical control methods
2. Define stability
3. Identify methods of stability analysis
4. Determine the applications of stabilizability and detectability

**Course Contents**

Classical Control Methods; Modern Control Methods; Systems Representations; Stability Analyses; Controllability and Observability, Reachability, Stabilizability and Detectability; Applications: In Science, Engineering, Economics, etc.

**BUK-ST406 Stochastic Processes (2 Credits; Core; LH = 30)**

**Relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in teaching mathematics Senior Secondary Schools and Colleges which is in agreement with BUK’s mission to educate students in the principle tenets of Mathematics Education through structured inquiry and opportunities for individualized experiential learning

**Overview of the Course**

The course is an extension of BUK-STE 404 where markov chain models are discussed together with simple random walk models and homogenous death processes.

Therefore the course is designed to help students learn basics principles and theories of Markovian algorithms to solution of real world problems

**Learning Outcomes**

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

1. List simple random walk models
2. Solve problems in simple random walk models
3. Determine Markov process in continuous time
4. Solve problems in homogenous and death processes
5. Solve problems in non-homogenous process

**Course Contents**

Simple random walk models, Markov chains recurrent events, discrete branching processes, Markov process in continuous time, homogenous birth and death processes, some non-homogenous process, multi-dimensional processes, queuing processes.

**BUK-ST407 Classical Theory of Numbers (2 Credits; Core; LH = 30)**

Training of high-quality graduates who are highly skilled and knowledgeable in teaching mathematics Senior Secondary Schools and Colleges which is in agreement with BUK’s mission to educate students in the principle tenets of Mathematics Education through structured inquiry and opportunities for individualized experiential learning.

Overview of the Course

The importance of residues and congruencies cannot be over emphasized. Many physical problems are reduced to integral equations that cannot be solved by methods of integration. Moreover, Modulo arithmetic finds applications in various fields of endeavor

Therefore, the purpose of the course is to acquaint students with basic knowledge and ideas to solve real world problems particularly those in cyclic nature of counting and analytic functions.

**Learning Outcomes**

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

1. Define residue
2. Define congruency
3. State the Fermat’s theorem
4. Solve problems involving residues and congruencies
5. Observe the zeta function

**Course Contents**

Congruencies and residues, Diophantine problems, Fermat's theorem, congruence tocomposite moduli, continued fractions and real numbers, arithmetical functions, thezeta function, partitions, and Waring's problems.