**BAYERO UNIVERSITY, KANO**

**FACULTY OF EDUCATION**

**DEPARTMENT OF SCIENCE AND TECHNOLOGY EDUCATION**

**B. TECH. (ED) METALWORK TECHNOLOGY**

**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 103 | Basic Mathematics I | 2 | C | 30 | - |
| BUK–STE 104 | Basic Mathematics II | 2 | E | 30 | - |
| BUK–STE 105 | Basic Mathematics III | 2 | E | 30 | - |
| BUK–STE 106 | Basic Physics I | 2 | C | 30 | - |
| BUK–STE 107 | Basic Physics II | 2 | E | 30 | - |
| BUK–TED 101 | Introduction to Technical Drawing | 3 | C | 30 | 45 |
| **Total Units** | | **12** | | | |

**LEVEL TWO**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE** | **COURSE TITLE** | **UNIT** | **STATUS** | **LH** | **PH** |
| BUK–STE 201 | Basic Educational Statistics | 2 | C | 30 | - |
| BUK–TED 201 | Applied Mechanics | 2 | C | 30 | - |
| BUK–TED 202 | Material Technology | 2 | C | 15 | 45 |
| BUK–TED 203 | Introduction to Industrial Economy | 2 | E | 30 | - |
| BUK–TED 204 | Mathematics for Technology | 2 | C | 30 | - |
| BUK–TED 205 | Workshop Practice | 2 | C | 15 | 45 |
| BUK–TED 206 | Electrostatics and Electromagnetism | 2 | E | 15 | 45 |
| BUK–TED 207 | Metallurgy and Heat Treatment | 2 | E | 15 | 45 |
| **Total Units** | | **10** | | | |

**LEVEL THREE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE** | **COURSE TITLE** | **UNIT** | **STATUS** | **LH** | **PH** |
| BUK–STE 301 | Educational Technology | 2 | C | 15 | 45 |
| BUK–TED 301 | Industrial Design | 2 | E | 15 | 45 |
| BUK–TED 302 | Quality Control | 2 | E | 15 | 45 |
| BUK–TED 303 | Improvisation of Workshop Equipment | 2 | E | 15 | 45 |
| BUK–TED 304 | Mechanical Engineering Drawing | 3 | C | 30 | 45 |
| **Total Units** | | **5** | | | |

**LEVEL FOUR**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE** | **COURSE TITLE** | **UNIT** | **STATUS** | **LH** | **PH** |
| BUK–STE 403 | Information and Communication Technology (ICT) in Science and Technology Education | 2 | E | 30 | - |
| BUK–TED 401 | Introduction to AutoCAD | 2 | C | 15 | 45 |
| BUK–TED 402 | Workshop Organisation and Management | 2 | E | 15 | 45 |
| BUK-TED 407 | Metal Finishing | 2 | C | 15 | 45 |
| BUK-TED 404 | Practical Project | 4 | C | - | 135 |
| **Total Units** | | **8** | | | |

**COURSE CONTENT AND LEARNING OUTCOMES**

**Level 100**

**BUK-STE 101 Foundation of Education II (2 Units; 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 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

**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.

**Minimum Academic Standards**

Conducive Lecture Theatre with NUC-MAS requirement facilities

**BUK-STE 101: 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 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.

**Minimum Academic Standards**

Computer laboratory with NUC-MAS requirement facilities

**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 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 introduce 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.

Therefore, this 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**

At the end 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 some 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.

**Minimum Academic Standards**

Conducive lecture room with NUC-MAS requirement facilities

**BUK-STE 103: Basic Mathematics II (Calculus) (2 Units E: LH = 30)**

**Senate - Approved Relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in teaching mathematics in 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**

The importance of differential equation in human activities in this world cannot be over emphasized. Derivatives and integrations are very important concepts that find applications in natural and applied sciences, Engineering, Medicine and host of others to solve real world problems.

The course is designed to acquaint students with basic tools that can be used to address mathematical challenges arising from Sciences, Engineering and Technology.

**Learning Objectives**

The objectives of the course are to.

1. Apply types of rules in Differentiation and Integration.
2. Solve problems involving Functions of a real variable, graphs, limits and continuity; and
3. Apply definite integrals in areas and volumes.

**Learning Outcomes**

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

1. Apply types of rules in Differentiation and Integration.
2. Solve problems involving Functions of a real variable, graphs, limits and continuity; and
3. Apply definite integrals in areas and volumes.

**Course Contents**

Function of a real variable, graphs, limits and idea of continuity. The derivative, as limit of rate of change. Techniques of differentiation. Extreme curve sketching. Integration as an inverse of differentiation. Methods of integration. Definite integrals. Application to areas, volumes.

**Minimum Academic Standards**

Conducive Lecture room with NUC-MAS requirement facilities

**BUK-STE 104: Basic Mathematics III (Vectors, Geometry and Dynamics) (2 Units E: LH = 30) Pre-requisite – BUK-STE 102**

**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**

Mathematics is the body of knowledge centred on concepts such as quantity, structure space and change and also the academic disciplines that study them. Today Mathematics is used throughout the world in many fields, including natural sciences, engineering medicine and the social sciences. Reflecting a growing interest in Mathematics Education at all levels, many in the Mathematics community have turned their attention to the Mathematical preparation of precollege teachers. This can only be achieved if students have been prepared to handle such.

In this course, students will be acquainted with basic ideas and knowledge of modern Mathematics that prepares them to solve many real world problems.

**Learning Objectives**

The objectives of the course are to.

1. Solve some Vectors in addition and multiplication.
2. Calculate Force and Momentum; and
3. Solve Differentiation and Integration of vectors.

**Learning Outcomes**

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

1. Solve some Vectors in addition and multiplication.
2. Calculate Force and Momentum; and
3. Solve Differentiation and Integration of vectors.

**Course Contents**

Geometric representation of vectors in 1-3 dimensions, components, direction cosines. Addition, Scalar, multiplication of vectors, linear independence. Scalar and vector products of two vectors. Differentiation and integration of vectors with respect to a scalar variable. Two-dimensional co-ordinate geometry. Straight lines, circles, parabola, ellipse, hyperbola. Tangents, normals. Kinematics of a particle. Components of velocity and acceleration of a particle moving in a plane. Force, momentum, laws of motion under gravity, projectiles and resisted vertical motion. Elastic string and simple pendulum. Impulse, impact of two smooth spheres and a sphere on a smooth surface.

**Minimum Academic Standards**

Conducive Lecture room with NUC-MAS requirement facilities

**BUK-STE 105: Basic Physics I (Mechanics) (2 Units C: LH = 30)**

**Senate - Approved Relevance**

Technology education is a teacher education program which produces 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**

The objectives of the course are 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.

**Minimum Academic Standards**

Physics laboratory with NUC-MAS requirement facilities

**BUK-STE 106: Basic Physics II (Electricity & Magnetism) (2 Units E: 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**

The objectives of the course are 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.

**Minimum Academic Standards**

Physics laboratory with NUC-MAS requirement facilities

**BUK–TED 101 Introduction to Technical Drawing (3 Units; core; LH = 30; PH = 45)**

**Senate – Approved Relevance**

This course introduces students to technical drawing which is basic in all technology related programmes. The course will expose students to the aims and objectives of technical drawing, differences between technical drawing, fine art and photography. It will also acquaint the learners with understanding of drawing equipment, drawing layout, numbering and lettering, principles of construction of common figures, construction of angles, triangles, circles, methods of dividing circle, tangents, quadrilaterals and polygons using different methods in agreement with BUK’s mission to address Nigerian developmental challenges in producing graduates with adequate skills in technical drawing.

**Overview**

Introduction to technical drawing lead to acquisition of basic skills in technical drawing and give students basic ideas in the aims and objectives of technical drawing, differences between technical drawing, fine art and photography.

Students will recognise the principles of construction of common figures, construction of angles, triangles, circles, methods of dividing circle, tangents, quadrilaterals and polygons using different methods.

**Objectives**

The objectives of the course are to:

1. State the aims objectives of technical drawing;
2. Differentiate between technical drawing, fine art and photography;
3. List the drawing instruments;
4. Appreciate the principles of construction common figures, angles, triangles and circles;
5. Highlight methods of dividing circle, tangents, quadrilaterals and polygons using different methods.
6. Describe the methods of construction ellipse, cycloid, epicycloid, hypocycloid, parabola, hyperbola, involute of a square and circle

**Learning Outcomes**

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

1. State the aims objectives of technical drawing;
2. Differentiate between technical drawing, fine art and photography;
3. List the drawing instruments;
4. Appreciate the principles of construction common figures, angles, triangles and circles;
5. Highlight methods of dividing circle, tangents, quadrilaterals and polygons using different methods.
6. Describe the methods of construction ellipse, cycloid, epicycloid, hypocycloid, parabola, hyperbola, involute of a square and circle

**Course Contents**

Aims and objectives of Technical drawing, differences between technical drawing, fine art and photography. Drawing equipment, drawing layout, numbering and lettering, principles of construction of common figures, construction of angles, triangles, circles, methods of dividing circle, tangents, quadrilaterals and polygons using different methods. Conic sections, ellipse, cycloid, epicycloid, hypocycloid, parabola, hyperbola, involute of a square and circle.

**Minimum Academic Standards**

Drawing studio with NUC-MAS requirement facilities

**Level 200**

**BUK-STE 201 Basic Educational Statistics (2 Units; 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 statistical 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. Explain the importance of statistics in education
2. Describe the methods of organising data
3. Calculate mean, median and mode of a given distributions
4. Calculate mean deviation and standard deviation of a given distributions
5. Describe the methods of estimating relationship between two sets of a given distributions

**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.

**Minimum Academic Standards**

Conducive lecture theatre with NUC-MAS requirement facilities

**BUK–TED 201 Applied Mechanics (2 Units; Core; LH = 30)**

**Senate - Approved Relevance**

This course was developed to address students’ needs in the acquisition of mechanical application and interpretation of technical data for the designing of engineering products in relation to automobile, building, electrical and electronics metal and wood materials and components which is in accordance with BUK’s mission to address African developmental challenges in producing high-quality technology education graduates. This is relevant in seeing technology education graduates of BUK being able to translate and apply abstract engineering thoughts into sustainable industrial products towards the overall technological development of Nigeria and the word at large.

**Overview**

Technological inventions require adequate knowledge in analysing the relationship between mass and motion, work and power. Students need to understand the forces acting on vector and scalar quantities using the basic laws of motion in solid, liquid and gaseous substances.

This course is designed to give students the needed critical thinking skills in the calculation of forces, mass, motion, work and power involving solid matter using the equations of uniform acceleration motion as well as Newton’s laws of motion. Students will acquire knowledge in analysing the properties of fluids in motion and energy in fluids (gas and liquids).

**Objectives**

The objectives of this course are:

1. Define force, vectors and mass;
2. Explain the relationship between mass and motion, work and power
3. State the equations of motion;
4. Apply the equation of uniformly acceleration motion;
5. State Newton’s laws of motion and Hooke’s law;
6. Explain the properties of fluid, fluid in motion and energy in fluid.

**Learning Outcomes**

Upon completion of this course, the students should be able to:

1. Define force, vectors and mass;
2. Explain the relationship between mass and motion, work and power
3. State the first, second and third equation of motion;
4. Apply the equation of uniformly acceleration motion;
5. State Newton’s laws of motion and Hooke’s law;
6. Explain the properties of fluid, fluid in motion and energy in fluid.

**Course Contents**

Force, vectors; addition and subtraction. Friction force. Mass, relationship between mass and motion. Work and power, the relationship between work and power. Torque and angular motor. Equation of uniformly acceleration motion; first, second and third equation of motion. Newton’s laws of motion. Energy, conservation of energy. Machine. Stress and strain, type of stresses. Elasticity. Hooke’s law, factor of safety. Fluid mechanic, properties of fluid, fluid in motion and energy in fluid.

**Minimum Academic Standards**

Technical workshop with NUC-MAS requirement facilities

**BUK–TED 202 Material Technology (2 Units; Core; LH = 15; PH = 45)**

**Senate - Approved Relevance**

In accordance with BUK’s mission to address African developmental challenges in producing high-quality technology education graduates, this course was designed to address students’ needs in the selection, analysis and application of the properties of engineering and technological materials in relation to automobile, building, electrical and electronics metal and wood products. Relevance is seen in technology education products from BUK being able to participate in the design and construction of technological components and products for the socio-economic development of Nigeria and Africa as well as the world at large.

**Overview**

The world of technology is rapidly developing as such, there is need to prepare technology education graduates in the area of materials technology especially in the utilization of local contents of raw materials including glass, rubber, wood and iron towards industrial production for sustainable economic development.

The course is designed to enable the students acquire basic knowledge of technology materials and to apply the knowledge in the selection and application technology materials. Knowledge of various sources and properties of ceramics, rubbers and glass; methods of producing ceramics, rubbers and glass from their different sources known, the different constituents of glass and their different functions.

**Objectives**

The objectives of this course are to:

1. Acquire basic knowledge of material technology;
2. Apply the knowledge in selection technology materials;
3. State the sources and properties of material technology;
4. Explain the methods of producing ceramics, rubbers and glass from their different sources known;
5. Describe the different constituents of glass and their different functions.

**Learning Outcomes**

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

1. Acquire basic knowledge of material technology;
2. Apply the knowledge in selection technology materials;
3. State the various sources and properties of ceramics, rubbers and glass;
4. Explain the methods of producing ceramics, rubbers and glass from their different sources known;
5. Describe the different constituents of glass and their different functions.

**Course Contents**

The course is designed to enable the students acquire basic knowledge of technology materials and to apply the knowledge in the selection and Lisa technology materials. Knowledge of various sources and properties of ceramics, rubbers and glass; methods of producing ceramics, rubbers and glass from their different sources known, the different constituents of glass and their different functions.

**Minimum Academic Standards**

Technical workshop with NUC-MAS requirement facilities

**BUK–TED 203 Introduction to Industrial Economy (2 Units; E; LH = 30)**

**Senate - Approved Relevance**

The relevance of this course is in line with current emphasis on self-reliance and job creation for the teaming population. This is in accordance with BUK’s mission of addressing African Developmental challenges through cutting-edge research, knowledge transfer and training of high-quality graduates who are expected to make significant contribution to the Nigerian Education Industry as well as the country’s economic sector.

**Overview**

The economic prosperity of every nation depends of it technological and industrial feats. Technology education students need to have the basic economic knowledge towards self-reliance in running of small scale and medium scale industries. These include understanding of economic metrics related to investment in R&D as well as understanding of various industrial markets.

This course is designed to give students the required knowledge to understand industries, markets and industrial economy in meeting the needs for achieving sustainable development goals (SDGs) numbers 1, 2, 11, and 13 in the areas of poverty reduction, zero hunger, sustainable communities/cities, and climate action issues, respectively.

**Objectives**

The objectives of this course are to:

1. Define industries, markets and industrial economy;
2. Appreciate the levels at which capacity, output, and prices are set and the extent that products are differentiated from each other;
3. Explain how much firms invest in research and development (R&D) and how and why firms advertise

**Learning Outcomes**

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

1. Define industries, markets and industrial economy;
2. Appreciate the levels at which capacity, output, and prices are set and the extent that products are differentiated from each other;
3. Explain how much firms invest in research and development (R&D) and how and why firms advertise

**Course Contents**

Industrial Economics is the study of firms, industries, and markets. It looks at firms of all sizes – from local corner shops to multinational giants. And it considers a whole range of industries, such as electricity generation, car production, and restaurants. Industrial Economics helps us understand such issues as: the levels at which capacity, output, and prices are set, the extent that products are differentiated from each other, how much firms invest in research and development (R&D) and how and why firms advertise

**Minimum Academic Standards**

Technical workshop with NUC-MAS requirement facilities

**BUK–TED 204 Mathematics for Technology (2 Units; Core; LH = 30)**

**Senate - Approved Relevance**

In accordance with BUK’s mission to address African developmental challenges in producing high-quality technology education graduates, this course was designed to cater for students’ needs in the selection, analysis and application of mathematical thinking for accurate calculation of data in relation to the design and maintenance of automobile, building, electrical and electronics metal and wood products. Relevance is seen in technology education products from BUK being able to apply appropriate mathematical thoughts in the design and construction of technological components and products for the socio-economic development of Nigeria and Africa as well as the world at large.

**Overview**

The world of technology is rapidly developing as such, there is need to prepare technology education graduates in the area of mathematical problem solving and modelling towards industrial production and maintenance of engineering components for sustainable economic development.

The course is therefore designed to give students adequate knowledge and skills to tackle the mathematical aspects of Technology courses for accurate calculation of data in relation to the design and maintenance of automobile, building, electrical and electronics metal and wood products.

**Objectives**

The following are the objectives of the course:

1. acquire the knowledge and skills to tackle the mathematical aspects of Technology courses
2. observe, measure and record data in technology
3. take measurements using simple instruments such as rulers and thermometers, or involve sophisticated devices such as electron microscopes or lasers, and make decisions about how the results are to be represented
4. decide the units of measurements to be used and the precision to which the measurements will be made

**Learning Outcomes**

Upon the completion of this course, the students should be able to:

1. acquire the knowledge and skills to tackle the mathematical aspects of Technology courses
2. observe, measure and record data in technology
3. take measurements using simple instruments such as rulers and thermometers, or involve sophisticated devices such as electron microscopes or lasers, and make decisions about how the results are to be represented
4. decide the units of measurements to be used and the precision to which the measurements will be made

**Course Contents**

This course is designed to help students acquire the knowledge and skills to tackle the mathematical aspects of Technology courses they are studying. Observation, measurement and the recording of data are central activities in technology. Speculation and the development of new theories are crucial as well, but ultimately the predictions resulting from those theories have to be tested against what actually happens and this can only be done by making further measurements. Whether measurements are made using simple instruments such as rulers and thermometers, or involve sophisticated devices such as electron microscopes or lasers, there are decisions to be made about how the results are to be represented, what units of measurements will be used and the precision to which the measurements will be made. In this exciting elective course we will consider these points in turn.

**Minimum Academic Standards**

Conducive lecture room with NUC-MAS requirement facilities

**BUK–TED 205 Workshop Practice (2 Units; Core; LH = 15; PH = 45)**

**Senate - Approved Relevance**

In line with BUK’s mission of addressing African development challenges through cutting-edge research, knowledge transfer and training of high-quality graduates, this course was designed to prepare students with the basic knowledge of workshop safety as well as skills necessary for supervision of practical activities in the workshops using appropriate tools and equipment. The relevance of this course matches the need for competent graduates who have acquired the necessary practical skills and knowledge to be able leverage the rapid advancement in the world of technology for self-reliance as well as being employed as skilled and semi-skilled workers.

**Overview**

Science and technology education students need to be prepared to be able to think and interpret abstract ideas into useful products using appropriate tools and equipment. This knowledge is necessary considering the need to encourage the spirit of enquiry, creativity in producing teachers with the knowledge, skills and attitudes which will enable them to contribute to the growth and development of their communities in particular and their nation in general.

This course is intended to help students acquire and practice the basic workshop safety rules and regulations in the use of various units of technology education workshop as well as identification and effective handling of various tools and equipment used in technology education workshop.

**Objectives**

The objectives of the course are:

1. appreciate and observe the basic workshop safety rules and regulations
2. identify the common tools and equipment used in technology education workshops
3. recognise the basic concepts and skills of the various units under the technology education

**Learning Outcomes**

Upon the completion of this course, the students should be able to:

1. appreciate and observe the basic workshop safety rules and regulations
2. identify the common tools and equipment used in technology education workshops
3. recognise the basic concepts and skills of the various units under the technology education

**Course Contents**

This course is intended to help students acquire and practice the basic workshop safety rules and regulations of the various units of technology education workshop. Identification of various tools and equipment used in technology education workshop. The basic concepts and skills of the various units under the technology education.

**Minimum Academic Standards**

Technical workshop with NUC-MAS requirement facilities

**BUK–TED 206 Electrostatics and Electromagnetism (2 Units; E; LH = 15; PH = 45)**

**Senate - Approved Relevance**

In accordance with BUK’s mission to address African developmental challenges in producing high-quality technology education graduates, this course was designed to address students’ needs in the selection, analysis and application of the properties of magnetism and electrostatic materials in relation to industrial products. Relevance is seen in technology education products from BUK being able to participate in the design and construction of technological components and products for the socio-economic development of Nigeria and Africa as well as the world at large.

**Overview**

The course is designed to inform students that electric charge is a property of fundamental particles found in all the matter around us, and in that sense, charge is not so different from mass. The big difference between the mass and charge of a particle is that there are no negative masses. On the other hand, whereas the protons in the nucleus of an atom carry positive charge, the electrons that inhabit the outer regions of an atom are negatively charged. Students will describe the superposition principle and the concept of capacitance.

This course will further explain the concept of magnetism and electromagnetism as well as absolute and relative permeability of a medium. A **magnet** is a material or object that creates a **magnetic field**. While the magnetic field is invisible, it creates a force that pulls on other ferromagnetic materials, such as iron, steel, nickel, and cobalt. It can also attract or repel other magnets. Students will know that a magnet attracts these examples of **magnetic materials**, while **non-magnetic materials**, such as rubber, coins, feather and leather, are not attracted.

**Objectives**

The objectives of this course are:

1. define electrostatics and electromagnetism and state the importance of electrostatics, absolute and relative permittivity of a medium, Coulomb’s law of electrostatics
2. describe the superposition principle, Electrostatic induction, electric field, electric flux, flux density, field strength, Capacitance and capacitor, Types of capacitors, Parallel plate capacitor, Multiple and Variable Capacitor, Capacitor connection, series and parallel connection, Energy stored in a capacitor, Magnetism and Electromagnetism
3. explain absolute and relative permeability of a medium, laws of magnetic force, magnetic field strength, magnetic potential intensity of magnetization.

**Learning Outcomes**

After completion of this course, the students should be able to:

1. define electrostatics and electromagnetism and state the importance of electrostatics, absolute and relative permittivity of a medium, Coulomb’s law of electrostatics
2. describe the superposition principle, Electrostatic induction, electric field, electric flux, flux density, field strength, Capacitance and capacitor, Types of capacitors, Parallel plate capacitor, Multiple and Variable Capacitor, Capacitor connection, series and parallel connection, Energy stored in a capacitor, Magnetism and Electromagnetism
3. explain absolute and relative permeability of a medium, laws of magnetic force, magnetic field strength, magnetic potential intensity of magnetization.

**Course Contents**

Introduction to electrostatics, importance of electrostatics, absolute and relative permittivity of a medium, Coulomb’s law of electrostatics, The superposition principle, Electrostatic induction, electric field, electric flux, flux density, field strength, Capacitance and capacitor, Types of capacitors, Parallel plate capacitor, Multiple and Variable Capacitor, Capacitor connection, series and parallel connection, Energy stored in a capacitor, Magnetism and Electromagnetism , Absolute and relative permeability of a medium, laws of magnetic force, magnetic field strength, magnetic potential intensity of magnetization.

**Minimum Academic Standards**

Technical workshop with NUC-MAS requirement facilities

**BUK–TED 207 Metallurgy and Heat Treatment (2 Units; E; LH = 15; PH = 30)**

**Senate - Approved Relevance**

The need to produce high-quality technology education graduates In accordance with BUK’s mission to address African developmental challenges gives relevance in training technology education students to acquire skills in modern machining and metalworking processes that are now more precise and sophisticated. Students will understand the need to improve the cost-efficiency and outcomes of the metallurgy and heat treatment methods towards economic prosperity of the graduates and the country at large.

**Overview**

This course was designed to introduce the process of heating and cooling of metals or alloys without melting. The heating and cooling sequence may involve temperatures above, below, and at the ambient. Controlled heating and cooling rates and a variety of furnace atmospheres and heating media will be used to illustrate the concepts of metallurgy and heat-treatment.

The course further explains how heat treating can improve wear resistance by hardening the material. Metals (including steel, titanium, Inconel, and some copper alloys) can be hardened either on the surface (case hardening) or all the way through (through hardening), to make the material stronger, tougher, more durable and more resistant to wear.

**Objectives**

This course has the following objectives:

1. describe the processes of production of iron and steels
2. differentiate between ferrous and nonferrous metals
3. explain the mechanical properties of steels
4. state and explain the heat treatment processes

**Learning Outcomes**

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

1. describe the processes of production of iron and steels
2. differentiate between ferrous and nonferrous metals
3. explain the mechanical properties of steels
4. state and explain the heat treatment processes

**Course Contents**

Production of iron and steels; Furnaces: i) Open Heat, ii) Cupola Furnace, iii) Electric arc furnace etc; - Alloy and Alloy steels, - Ferrous and nonferrous metals, - Mechanical properties of steels

- Heat treatment processes, i) Annealing, ii) Tempering, iii) Normalizing etc. Heat treatment temperatures and colours.

**Minimum Academic Standards**

Technical workshop with NUC-MAS requirement facilities

**Level 300**

**BUK-STE 301 Educational Technology (2 Units; Core; LH = 15; PH = 45)**

**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 in 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 and explain the concept of educational technology
2. Explain the different types of audio-visual materials for classroom teaching
3. Explain the concept of teaching as communication
4. Discuss the purpose of educational field trip and write a report after 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.

**Minimum Academic Standard**

Conducive lecture theatre with NUC-MAS requirement facilities

**BUK–TED 301 Industrial Design (2 Units; E; LH = 15; PH = 45)**

**Senate - Approved Relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in industrial design which dealt with industrial layout that form the collection/ sources of industrial raw material screening of raw materials, production or processes of raw material into usable items or products and lastly to the marketing of industrial product. This course not only expose students industrial know skills but also the mainstream of ‘factors of productions thereby provides students with more employment opportunities after graduation in line with BUK’s mission to address Nigerian challenges of unemployment.

**Overview**

Industrial design dealt with industrial layout that from the collection/ sources of industrial raw material screening of raw materials, production or processes of raw material into usable items or products and lastly to the marketing of industrial product.

The course will not only expose students industrial know skills but also the mainstream of ‘factors of productions. That is Land, Labour, Capital and Entrepreneurship skills. As such the course will change the mind-set of the students from job seeker to job creation thereby provides students with more employment opportunities after graduation.

**Objectives**

The objectives of the course are to:

1. Appreciate the philosophy of design;
2. State the types of design, element of design, factors that influence design;
3. differentiate between the design processes;
4. explain the technological team in industry and organization of industry with their functions
5. describe industrial diversity and interrelationship;
6. state reasons why industries conduct market survey and research, market and production marketing analysis

**Learning Outcomes**

Upon the completion of this course, the students should be able to:

1. Appreciate the philosophy of design;
2. State the types of design, element of design, factors that influence design;
3. differentiate between the design processes;
4. explain the technological team in industry and organization of industry with their functions
5. describe industrial diversity and interrelationship;
6. state reasons why industries conduct market survey and research, market and production marketing analysis

**Course Contents**

Philosophy of design, type of design, element of design, factors that influence design, different example of design process, materials use in design, Technological team in industry and their functions, organization of industry, industrial diversity and interrelationship, industrial production process, market survey and research, market and production marketing analysis.

**Minimum Academic Standards**

Technical workshop with NUC-MAS requirement facilities

**BUK–TED 302 Quality Control (2 Units; E; L = 15; P = 30)**

**Senate - Approved Relevance**

The course acquaints the students with methods through which manufactured product or component made meet the prescribed international or national requirement or standards as stated by SON (Standard Organisation of Nigeria). It is therefore necessary for item produce in an industries to passed through the process of quality control to ascertain his functionality or otherwise. 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**

Quality control is a method or ways through which manufactured product or component made meet the prescribed international or national requirement or standards as stated by SON (Standard Organisation of Nigeria). It is therefore necessary for item produce in an industries to passed the process of quality control to ascertain his functionality or otherwise.

The knowledge and experience acquired by the student could be used in ascertaining both the local and the standard company products before putting it into use. The course will also expose the student skill of interchangeability of parts which is the global practice industrial production of items.

**Objectives**

The objectives of the course are:

1. Define quality control common concepts in quality control in technology;
2. Explain how products are designed, manufactured, and brought to market;
3. Describe how products perform in the consumer market and how to package and transport products in optimal ways
4. Explain Operations Management, Production Planning and Control, Statistical Quality Control and Supply Chain Management.

**Learning Outcomes**

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

1. Define quality control common concepts in quality control in technology;
2. Explain how products are designed, manufactured, and brought to market;
3. Describe how products perform in the consumer market and how to package and transport products in optimal ways
4. Explain Operations Management, Production Planning and Control, Statistical Quality Control and Supply Chain Management.

**Course Contents**

Quality control in technology entails the testing, assembling and improvement of products so they're safe for the public. Common concepts in quality control: Good and services, Product design, Industry standards, Procedural documentation, Product assembly. It covers how products are designed, manufactured, and brought to market. Additionally, students learn to track how these products perform in the consumer market and how to package and transport products in optimal ways. List of topics include: Operations Management, Production Planning and Control, Statistical Quality Control and Supply Chain Management.

**Minimum Academic Standards**

Technical workshop with NUC-MAS requirement facilities

**BUK–TED 303 Improvisation of Workshop Equipment (2 Units; E; LH = 15; PH = 30)**

**Senate - Approved Relevance**

Improvisation in Technology Education introduces students to simple production of the consumable’s items needed in teaching or demonstration in the school workshop. Thus improvisation in the workshop became necessary for the smooth running of teaching and learning in the school workshop. This is in line with the BUK’s vision of developing and promoting a comprehensive and integrated system of functional education that is in line with the values and aspirations of its host community, the nation, Africa and beyond.

**Overview**

Improvisation in Technology Education refers to simple production of the consumable’s items needed in teaching or demonstration in the workshop. Some consumable items are too expensive and are required in large quantities for demonstration or some items may not be readily available as the time needed. Thus improvisation in the workshop became necessary for the smooth running of teaching and learning in the workshop. The workshop could be Automobile, Electrical/electronic, Building technology, Metalwork technology and woodwork technology workshop.

The course will expose the student to utilise the local resources or materials to aid teaching and learning process.

**Objectives**

The objectives of the course are to:

1. State the philosophy of improvisation in technology education;
2. Explain the sources of producing a catalogue of technology teaching materials from the immediate and distant environment;
3. Evaluate the process of utilising technology instructional materials;
4. Explain the process of selection and utilisation of improvised materials.

**Learning Outcomes**

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

1. State the philosophy of improvisation in technology education;
2. Explain the sources of producing a catalogue of technology teaching materials from the immediate and distant environment;
3. Evaluate the process of utilising technology instructional materials;
4. Explain the process of selection and utilisation of improvised materials.

**Course Contents**

Meaning and Philosophy of Improvisation in Technology Education. Sourcing for Producing a Catalogue of Technology Teaching Materials in Immediate Environment. Sourcing for Producing a Catalogue of Technology Teaching Materials in the Distant Environment. Utilisation of Technology Instructional Materials. Selection and Utilisation of Improvised Materials.

**Minimum Academic Standards**

Technical workshop with NUC-MAS requirement facilities

**BUK–TED 304 Mechanical Engineering Drawing (3 Units; Core; LH = 30; PH = 45)**

**Senate - Approved Relevance**

This course introduces students to mechanical engineering drawing which is basic in all mechanical engineering related programmes. The course will expose students to the aims and objectives of mechanical engineering drawing. Mechanical Engineering Drawing provides directions steps and process in executing the actual engineering work. This is in line with the global requirement of core engineering skills. The course exposes students in translating the fundamentals concepts of pictorial, isometric and oblique drawings, characteristics and general applications in line with BUK’s mission to address Nigerian developmental challenges in producing graduates with adequate skills in mechanical engineering drawing.

**Overview**

Mechanical Engineering Drawing is an engineering language of communication through the use of line to describe the component or parts to be produce. All design and analysis which involves angles, dimensions, holes, projections where all addressed before the actual production of parts using the five basic machine tools (lathe machine, drilling machine, shaping machine, milling machine and grinding machine).

Mechanical Engineering Drawing provides directions steps and process in executing the actual engineering work. This is in line with the global requirement of core engineering skills. The course exposes students in translating the fundamentals concepts of pictorial, isometric and oblique drawings, characteristics and general applications.

**Objectives**

The objectives of the course are to:

1. State the principles of mechanical engineering drawing;
2. Describe the concept and fundamental principle of places and projections, orthographic drawing of solids, blocks and machine parts drawing;
3. define and present detailed working drawings, Fastening devices, tolerance, welding, riveting;
4. Construe and develop cylinders, pipes, sheets cover and containers.

**Learning Outcomes**

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

1. State the principles of mechanical engineering drawing;
2. Describe the concept and fundamental principle of places and projections, orthographic drawing of solids, blocks and machine parts drawing;
3. define and present detailed working drawings, Fastening devices, tolerance, welding, riveting;
4. Construe and develop cylinders, pipes, sheets cover and containers.

**Course Contents**

Mechanical engineering drawing principles, selection and identification of places and projections, Orthographic drawing of solids, blocks and machine parts drawing, definition and presentation of detailed working drawings, Fastening devices, tolerance, welding, riveting, etc. Interpretation and development of cylinders, pipes, sheets cover and containers.

**Minimum Academic Standards**

Drawing studio with NUC-MAS requirement facilities

**Level 400**

**BUK-STE 403 Information and Communication Technology (ICT) in Science and Technology Education (2 Units; E; 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 **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. Define 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 the overview of ICT Policy in education
5. Describe synchronous and asynchronous packaging of instruction.
6. Outline basic programming
7. Identify factors influencing the use of ICT in teaching and learning
8. Outline the problems, prospects and challenges of application of ICT in 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

**Minimum Academic Standards**

Computer laboratory with NUC-MAS requirement facilities

**BUK–TED 401 Introduction to AutoCAD (2 Units; Core; LH = 15; PH = 45)**

**Senate - Approved Relevance**

Training of high quality graduates who are highly skilled and knowledgeable in design of various projects in Automobile Technology, Building Technology, Electrical Technology, Metalwork Technology and Woodwork Technology using AutoCAD applications are in agreement with BUK’s mission of addressing various African developmental challenges in the field of Mechanical and Architectural design.

**Overview**

AutoCAD is a course which prepares the students to become familiar with both basic and advance tools that enable them draw various objects in both two dimensions (2D) and three dimensions (3D) that are directly related to their area of specializations. The course cover the essential core topics for working with AutoCAD software such as creating basic geometry, editing and manipulating geometry, dimensioning, design projects for Automobile Technology, Building Technology, Metalwork Technology, Electrical Technology and Woodwork Technology, and present them in either 2D or 3D.

The teaching strategy is to start with a few tools that enable the students to create and edit a simple drawing, and then continue to develop those tools in an advance way. The importance of the course lies in meeting the aim of technical education of providing people with technical knowledge and vocational skills necessary for agricultural, industrial and economic development, as well as given training and impart the necessary skills leading to the production of craftsmen, technicians and other skilled personnel who will be enterprising and self-reliant.

**Objectives**

The objectives of the course are to:

1. Create basic geometry
2. Edit and manipulate geometry
3. State the attribute and properties of basic geometry
4. Apply dimensions and add notes
5. Design projects for all the area of specializations
6. Make 2D & 3D Presentation of various objects

**Learning Outcomes**

Upon the completion of this course, the students should be able to:

1. Create basic geometry, points and lines, circles, arcs and polygons.
2. Edit and manipulate geometry; using object snaps, zoom and pan feature, copy, offset, rotate, erase, trim, extend, and grips, fillets and champers, creating blocks.
3. State the attribute and properties of layers, line types and colours, inserting and text properties;
4. Apply dimensions and add notes;
5. Design projects for mechanical and architectural drawings;
6. Make 2D & 3D Presentation: showing an isometric views of the three dimension object from any direction;

**Course Contents**

Basic commands, Entry and mouse/keyboard functions. Creating basic geometry; points and lines, circles, arcs and polygons. Editing and manipulating geometry; using object snaps, zoom and pan feature, copy, offset, rotate, erase, trim, extend, and grips, fillets and champers, creating blocks. Attributes and properties; layers, line types and colors, inserting and text properties. Detailing; adding dimensions, adding notes. Outputs; saving and opening files, printing. Design projects for mechanical and architectural drawings. 2D & 3D Presentation: showing an Isometric views of the three dimension object from any direction, Computer softwares used in CAD design techniques: Basic crafting and design techniques in CAD.

**Minimum Academic Standards**

Computer laboratory with NUC-MAS requirement facilities

**BUK–TED 402 Workshop Organisation and Management (2 Units; E; LH = 15; PH = 45)**

**Senate - Approved Relevance**

Training of high quality graduates who are highly skilled and knowledgeable in planning and organization of workshop facilities, selecting of site, location of machines and equipment, storage of materials and tools are in agreement with BUK’s mission to address African developmental challenges in the area of workshop organization and management for effective practical experiences in different area of specializations.

**Overview**

Workshop Organisation and Management is a course designed to equip students with the knowledge, skills and competence for planning and organizing of workshop facilities in Technology Education Laboratory which cover the selection of site, location of machines and equipment, storage of materials and tools.

This will prepare the students to efficiently manage their various workshops for practical experiences in their different area of specializations in addition to managing industrial operations after graduation. The importance of the course lies in meeting the need in achieving the aim of technical education of providing people with technical knowledge and vocational skills necessary for agricultural, industrial and economic development, as well as given training and impart the necessary skills leading to the production of craftsmen, technicians and other skilled personnel who will be enterprising and self-reliant.

**Objectives**

The objectives of the course are to:

1. Explain the principles and practices involved in the planning and organizing of facilities in the Technology Education Laboratory for effective skill training.
2. Determine the responsibility for selecting, procuring, storing and dispensing tools, materials and supplies for training etc.

**Learning Outcomes**

Upon completion of this course, the students should be able to:

1. Explain the principles and practices involved in the planning and organizing of facilities in the Technology Education Laboratory for effective skill training.
2. Determine the responsibility for selecting, procuring, storing and dispensing tools, materials and supplies for training etc.

**Course Contents**

Principles and practices involved in the planning and organizing of facilities in the Technology Education Laboratory for effective skill training. This includes responsibility for selecting, procuring, storing and dispensing tools, materials and supplies for training etc.

**Minimum Academic Standards**

Technical workshop with NUC-MAS requirement facilities

**BUK-TED 407 Metal Finishing (2Units; Core; L = 15; P = 45)**

**Senate - Approved Relevance**

Metal finishing encompassed process of placing some type of metal coating on the surface of metallic part, typically referred to as substrate. It can also involve the implementation of a process of cleaning, polishing or otherwise improving a surface of metal products. Metal finishing maximizes the life span and the functionality of metal product. The course will expose students to the innovative knowledge and skills of cleaning, polishing, coating of metals and the comprehensive advance effect of corrosion and chemical resistance on metal. This is in line with the BUK’s vision of development and promotion of comprehensive and integrated system of functional education that is in line with the values and aspirations of its host community, the nation, Africa and beyond.

**Overview**

Metal finishing: is an all-encompassing term used to describe the process of placing some type of metal coating on the surface of metallic part, typically referred to as substrate. It can also involve the implementation of a process of cleaning, polishing or otherwise improving a surface of metal products. Metal finishing maximize the life span and the functionality of metal product.

The course will expose student to the skills of Cleaning, polishing, coating of metals and the advance effect of corrosion and chemical resistance on metal. Students will also have the knowledge and skills in finishing metals on machine shop, emery clothes and surface grinding machine.

**Objectives**

1. Describe metal finishing.
2. Explain the processes of metal finishing.
3. State the purpose of metal finishing.
4. Describe different methods of metal finishing.
5. Identify the limitations of different methods of metal finishing.

**Learning Outcomes**

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

1. Describe metal finishing.
2. Explain the processes of metal finishing.
3. State the purpose of metal finishing.
4. Describe different methods of metal finishing.
5. Identify the limitations of different methods of metal finishing.

**Course Contents**

Finishing on bench work-Use of files, smooth files, dead smooth files, emery clothes, scrappers etc. Finishing on machine shop-fine cut, emery clothes and surface grinding machine-procedures of finishes on machine shop (lathe, drilling machines, milling machines and grinding)

**Minimum Academic Standards**

Technical workshop with NUC-MAS requirement facilities

**BUK-TED 404 Practical Project (4 Units; Core; PH = 135)**

**Senate - Approved Relevance**

Application of the acquired knowledge and skills over the preceding years of study to solve one particular problem either individually or in a group by developing an innovative practical project is in agreement with the mission of Bayero University Kano of addressing African developmental challenges in the field of industry.

**Overview**

Practical project is a mandatory course for each an every final year student that can be done individually or in a group depending on the complexity and financial requirement of the project. Embarking on final year project enable students apply knowledge and skills they have acquired over their preceding years of study and extensive practical training in providing solution to a problem.

The course is designed to enable students gives an original contribution to knowledge in their different area of specializations. The project constructed by the students will be expected to show a sound grasp of relevance, innovation, uniqueness and appropriate skills of design and construction expression. The importance of the course can be seen in providing solutions to various industrial problems which is in line with the aims of technical education of providing people who can apply scientific knowledge to the improvement and solution of environmental problems.

**Objectives**

The objectives of the course are to:

1. Identify project topics on contemporary problems in relevant subject specialization in technology;
2. Search and review literature pertinent to identified topical issues;
3. Conceptualize and design the project to address an identified problem;
4. Write a comprehensive report on the project constructed;
5. Work independently to accomplish the project with the guidance of the research supervisor.

**Learning Outcomes**

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

1. Identify project topics on contemporary problems in relevant subject specialization in technology;
2. Search and review literature pertinent to identified topical issues;
3. Conceptualize and design the project to address an identified problem;
4. Write a comprehensive report on the project constructed;
5. Work independently to accomplish the project with the guidance of the research supervisor.

**Course Contents**

All Technology Education students are required to undertake a compulsory Practical Project whose outcome is a Construction work to be submitted in partial fulfilment of the B.Tech (Ed) Degree of the Department of Science and Technology Education. In addition to making an original contribution to knowledge of the project, the project will be expected to show a sound grasp of the relevance, innovation, uniqueness and appropriate skills of design and construction expression.

**Minimum Academic Standards**

Technical workshop with NUC-MAS requirement facilities