

DEPARTMENT OF AGRICULTURAL AND ENVIRONMENTAL ENGINEERING

COURSE LERNING OUTCOMES (CLOs)

GSP1201/ GSP2201: Communication Skills in English

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CL01: Identify possible sound patterns in the English Language										(
CL02: Construct simple and fairly complex sentences in English										(
CL03: Apply logical and critical reasoning skills for meaningful presentations										(
CL04: Demonstrate an appreciable level of the art of public speaking and listening										(

GSP2204: Foundation of Nigerian Culture, Government and Economy

Course Learning Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CLO1: Analyse the historical foundation of Nigerian cultures and arts in pre-colonial times												(
CLO2: Explain the gradual evolution of Nigeria as a political entity						(
CLO3: Enumerate the challenges of the Nigerian state regarding nation building				(
CLO4: Identify the acceptable norms and values of the major ethnic groups in Nigeria						(

GSP2205: Introduction to Logic and Philosophy

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CLO1: Identify the main branches of philosophy & the centrality of logic in philosophical discourse				(
CLO2: Distinguish between valid and invalid arguments		(
CLO3: Critically assess the rationality or otherwise of human conduct								(
CLO4: Develop the capacity to extrapolate and deploy expertise in logic to other areas of knowledge												(

EEP3201: Entrepreneurship and Innovation

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CLO1: Explain the concepts and theories of entrepreneurship, entrepreneurship, opportunity seeking, new value creation and risk – taking											(
CLO2: Analyse the importance of micro and small businesses in wealth creation			(
CLO3: Describe the stages in enterprise formation, partnership and networking, including business planning									(
CLO4: State the basic principles of e – commerce					(

EEP4201: Entrepreneurship Venture Creation and Growth

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012

CLO1: Identify opportunities in problems and high-potential sectors, regardless of geographical location		((
CLO2: Develop a business concept for further incubation or pitching for funding			((((
CLO3: Identify critical sources of entrepreneurial finance				(
CLO4: Apply a wide variety of emerging technological solutions to entrepreneurship			((

Science Courses

CHM1231: Inorganic Chemistry

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 10	P 0 11	P 0 12
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<p>CLO1: Describe the principles of atomic structure and Analyze isotopes and their significance then determine empirical and molecular formulae.</p>	((
<p>CLO2: Analyze electronic configurations and their role in periodic table and Explore the building up of the periodic table.</p>	((
<p>CLO3: Discuss hybridization in molecules and Identify shapes of simple molecules.</p>	((
<p>CLO4: Explain the principles of metallurgy and analyze the extraction of metals from their ores</p>	((

CLO5: Compare the chemistry of groups IA, IIA, and IVA elements.	((
CLO6: Investigate the preparation, properties, structure, and applications of selected compounds.	((
CLO7: Explore the basics of transition metal chemistry.	((

CHM1241: Organic Chemistry

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
CLO1: Describe the development and importance of organic chemistry throughout history.	((

CLO2: Demonstrate proficiency in IUPAC nomenclature and classification of organic compounds.	((
CLO3: Identify and analyze homologous series in organic chemistry.	((
CLO4: Examine the covalent bonds and hybridization to explain the tetravalency of carbon in organic compounds.	((
CLO5: Apply electronic theory in understanding organic chemistry concepts.	((
CLO6: Perform qualitative and quantitative analyses in organic chemistry.	((

CLO7: Determine empirical and molecular formulas of organic compounds.	((
CLO8: Study the techniques for the isolation and purification of organic compounds.	((
CLO9: Describe the properties and reactions of saturated hydrocarbons (alkanes and cycloalkanes).	((
CLO10: Explain the structural isomerism and its significance.	((
CLO11: Explore the chemistry and uses of alkanes and cycloalkanes in petroleum.	((

CLO12: Investigate unsaturated hydrocarbons, including alkenes, alkynes, and cycloalkanes.	((
CLO13: Differentiate cis-trans isomerism and its implications.	((

CHM1251: Physical Chemistry

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 10	P 0 11	P 0 12
CLO1: Explain the principles of atomic structure, including isotopes and nuclear structure.	((

CLO2:
 Demonstrate the knowledge of the electronic structure and arrangement of electrons in atoms, with a focus on the electronic configuration of elements from the first and second rows of the periodic table.

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CLO3. Explain the properties of gases, such as the equation of state, kinetic and molecular theory of gases, and heat capacities.

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CLO4. Apply the concepts of equilibrium and thermodynamics, including thermochemistry, enthalpy of reactions, bond energies, and the use of thermodynamic cycles and Hess's law.

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CLO5.
 Interpret the meaning and significance of K_a , K , and K in

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relation to equilibrium and LeChatelier's principle.												
CLO6. Describe the pH scale, ionic equilibrium, buffers, indicators, solubility product, and the common ion effect in aqueous solutions.	((
CLO7. Analyze redox reactions and understanding concepts related to electrode potentials, electrolytes, and electrolysis.	((
CLO8. Describe the positions of equilibrium and the factors that influence the rate of reactions, including an introduction to activation and catalysis.	((

CHM1261: Practical Chemistry

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 1 0	P 0 1 1	P 0 1 2
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<p>CLO1: Demonstrate understanding and adherence to laboratory safety protocols.</p> <p>Develop proficiency in basic laboratory techniques</p>	(((
<p>CLO2: Apply calorimetry techniques to determine heat changes and</p> <p>Analyze thermodynamic properties during chemical reactions.</p>	((
<p>CLO3: Investigate reaction rates using experimental methods.</p> <p>Apply kinetic analysis to study reaction mechanisms.</p>	((
<p>CLO4: Perform electrochemical experiments, including electrolysis and cell</p>	((

<p>potentials.</p> <p>Analyze and interpret data related to electrochemical processes.</p>												
<p>CLO5: Describe the organic synthesis techniques.</p> <p>Characterize organic compounds using spectroscopic methods.</p>	((
<p>CLO6: Investigate reaction mechanisms in organic reactions.</p> <p>Use experimental data to propose reaction pathways.</p>	((
<p>CLO7: Apply qualitative tests to identify specific functional groups.</p> <p>Utilize spectroscopic techniques for functional group identification.</p>	((

<p>CLO8: Assess the qualitative analysis of inorganic compounds.</p> <p>Identify cations and anions using experimental methods.</p>	((
<p>CLO9: Evaluate the synthesis of selected inorganic compounds.</p> <p>Characterize synthesized compounds through various techniques.</p>	((
<p>CLO10: Study the preparation and properties of transition metal complexes.</p> <p>Use spectroscopic methods to analyze complex structures.</p>	((
<p>CLO12: Interpret results obtained from analytical instruments</p>	((

CSC1201: Introduction to Computer Science

Course Learning Outcomes	P O 1	P O 2	PO 3	PO 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	P O 11	P O 12
CLO1: Identify different software packages and their uses					(
CLO2: Demonstrate understanding and use different data capture techniques					(
CLO3: Identify different programming languages and understand programming in at least one programming language		(
CLO4: Use word processing, spreadsheets, and some application software in engineering												(

MTH1301: Elementary Mathematics I [Algebra & Trigonometry]

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
Perform union, intersection, and complement operations on sets and Solve at least 5 problems involving set operations.	((

Represent set relationships using Venn diagrams and

Solve at least 3 problems involving overlapping sets.

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Apply the inclusion-exclusion principle to solve counting problems and Analyze situations with multiple sets and overlapping elements.

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Factorize at least 5 examples of linear and quadratic equations using quadratic formula and Solve graph inequalities.

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Constructs the graphs: linear and quadratic functions and Analyze transformations and compositions of functions.

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<p>Perform operations on polynomials and rational expressions.</p> <p>Factor polynomials and simplify rational expressions.</p>	((
<p>Define and evaluate trigonometric functions and</p> <p>Understand the unit circle and angular measurements.</p>	((
<p>Prove and apply trigonometric identities and</p> <p>Solve trigonometric equation with its trigonometric graphical representations.</p>	((
<p>Solve real-world problems using trigonometric concepts.</p> <p>Apply trigonometry to geometry and physics problems.</p>	((

MTH1302: Elementary Mathematics I (Vectors, Geometry and Dynamics)

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
CL01: Explain at least two (2) types of vectors, a geometrical representation of vectors, and components of vectors	((
CL02: Clearly illustrate two kinds of linear dependence of vectors and their simple applications	((
CL03: Demonstrate any two types of dimensional coordinates systems	((
CL04: Analyze any two equations of a circle, tangent, and normal to a circle		(
CL05: Describe the properties of parabola, ellipse, hyperbola, straight lines, and planes in space		(
CL06: Describe two types each force, momentum, laws of motion under gravity, projectiles, resisted vertical motion, angular momentum, and simple harmonic motion		(
CL07: Describe any two each elastic strings, a simple pendulum, and an impulse		(

CLO8: Analyse two impacts of two smooth spheres and of a sphere on a smooth surface

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MTH1303: Elementary Mathematics III [Calculus 1]

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
Explain the concept of function of a real value and their graphical representations	((
Describe the notion of limits and the idea of continuity in the context of mathematical function	((
Demonstrate a clear understanding of derivative as the limits of the rate of change of a function	((
Apply various techniques of differentiation to find derivative functions, including the	((

power rule, product rule, quotient rule, and chain rule.												
Determine the extreme curve by sketching critical point and apply the first and second derivative tests.	((
Study the concept of integration as the inverse process of differentiation	((
Apply different methods of integration, such as substitution, integration by parts, and partial fractions	((
Apply calculus to real-world problems, including optimization, related rates, and finding the area under a curve.	((

PHY1210: Mechanics

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
CLO1: Resolve four different forces into their components and obtain the results of the system		((
CLO2: Explain at least two of the fundamental principles of applied mechanics, particularly equilibrium analysis, friction, kinematics, and momentum	(
CLO3: Identify two types of formulate, and solve complex engineering problems by applying principles of engineering, science, mathematics, and applied mechanics	(((

<p>CLO4: Synthesize Newtonian Physics with static analysis to determine the complete load impact (net forces, shears, torques, and bending moments) on all components (members and joints) of a given structure with a load</p>	(((
<p>CLO5: Apply at least engineering design principles to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors</p>	(((

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
<p>Explain the principles of electrostatics and</p> <p>Analyze the behavior of charges and electric fields.</p>	((
<p>Explore the properties of conductors in electric circuits.</p> <p>Analyze the behavior of electric currents.</p>	((
<p>Explain the role of dielectrics in electric fields.</p> <p>Explore the behavior of insulating materials.</p>	((
<p>Describe the fundamentals of magnetic fields.</p> <p>Analyze the behavior of magnetic materials.</p>	((
<p>Explain the electromagnet</p>	((

<p>ic induction principles.</p> <p>Analyze the generation of electric currents by changing magnetic fields.</p>												
<p>Explain the Maxwell's equations and their significance.</p> <p>Apply Maxwell's equations to describe electromagnetic phenomena.</p>	((
<p>Explore the generation and propagation of electromagnetic waves.</p> <p>Describe the principles of electromagnetic oscillations.</p>	((
<p>Apply the concepts learned to practical situations and real-world applications.</p> <p>Analyze how electricity and magnetism principles are used in various</p>	((

PHY1230: Behavior of Matter

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 1 0	P 0 1 1	P 0 1 2
Describe the molecular basis of properties like elasticity and Apply Hooke's law to analyze material deformation then Explore Young's, shear, and bulk moduli.	((
Analyze fluid behavior using streamlines. Apply Bernoulli's and continuity equations. Investigate turbulence and Reynolds number.	((
Explain viscosity and its role in fluid dynamics. Analyze laminar flow and apply Poiseuille's equation.	((

<p>Explore surface tension phenomena.</p> <p>Understand concepts of adhesion, cohesion, capillarity, drops, and bubbles.</p>	((
<p>Apply the zeroth law of thermodynamics.</p> <p>Explore gas laws and the laws of thermodynamics.</p>												
<p>Study the principles of the kinetic theory of gases.</p> <p>Apply kinetic theory to explain gas behavior.</p> <p>Explore applications of kinetic theory in understanding gas properties.</p>	((

PHY1170/1180: Physics Practical's I/II

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 0	P O 1	P O 1	P O 2
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Develop proficiency in quantitative measurements and precise observation techniques.	((
2. Demonstrate the treatment of measurement errors to enhance experimental accuracy.	((
Demonstrate competence in graphical analysis for interpreting experimental data effectively.	((
Develop hands-on experience with a variety of experimental techniques relevant to physics.	((
Explore the proper usage and understanding of meters and oscilloscopes.	((
Conduct experiments on mechanical systems to understand their behavior and properties.	((

Investigate electrical and mechanical resonant systems through practical applications.	((
Explore experiments related to light, covering optics and its applications.	((
Perform experiments on heat, studying thermodynamics and heat transfer.	((
Gain practical knowledge of viscosity and its measurement techniques.	((
Apply the principles covered in the PHY1170/1180 physics courses to practical scenarios.	((

STA1311: Basic Statistics

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
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CL01: Identify at least five (5) various sources of statistical data	((
CL02: Measure at least one location and dispersion in grouped and un-grouped data	((
CL03: Evaluate exponential, elements of a probability distribution; normal, binomial, Poisson, geometrics, and negative binomial distributions	((
CL04: Evaluate two types of estimates and test hypotheses concerning the parameters of distributions	((
CL05: Analyze at least a regression and a correlation model		(
CL06: Construct at least a questionnaire and a simple index number		(((
CL07: Apply at least a statistical principle in agricultural and biosystems engineering		(((

EGR2101: Engineer in Society I

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
Study the historical development of engineering in response to complex societal problems.						((

Recognize significant technological discoveries that have influenced the progress of civilization.						(
Examine the industrial revolution and the utilization of various fuel sources, including coal, oil, electricity, nuclear power, and renewable sources.							(
Evaluate the impact of engineering activities on the environment and its resources.							(
Explain the engineering profession, including the evolution of different branches, organizational structures, and ethical considerations.								(
Identify specific responsibilities to society for civil engineers, electrical engineers, and mechanical engineers.	((

Explore the interrelationships between various engineering disciplines and engage in multidisciplinary projects.			(((
Differentiate between the roles of engineers and scientists, emphasizing the engineering approach to practical problem-solving.	((
Explore the planning, construction, and operation of engineering projects and facilities.			(

EGR2103: Experimental Methods and Analysis

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 10	P 0 11	P 0 12
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Explore the principles of measurement and apply standard deviation for quantitative analysis.	((
Study and utilize the method of least squares in experimental data analysis.	(((
Apply curve fitting techniques to model experimental data effectively.		(((
Demonstrate knowledge of the theory of errors in experimental measurements.	(((
Analyze and apply binomial and other probability distributions for experimental outcomes.	((
Assess goodness of fit and perform Chi-squared tests for data validation.	((
Demonstrate practical	((

skills in various experimental methods, including displacement and strain measurement .												
Apply techniques for force and torque measurement in experimental setups.	(
Demonstrate proficiency in temperature measurement methods.	(
Examine the characteristics and behavior of first and second-order systems.	((
Analyze the dynamic response of systems to external stimuli.	((

EGR2201: Fluid Mechanics I

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
Study the characteristics of fluids, including properties of	((

liquids, mass, ideal fluid behavior, viscosity, compressibility, surface tension, capillarity, and vapor pressure.												
Explore dimensions and units relevant to fluid mechanics.	(((
Analyze static fluids, covering intensity of pressure, hydrostatic pressure on plane and non-plane surfaces, forces on floating and immersed objects, stability, and height.	(
Differentiate between steady and unsteady flow, as well as uniform and non-uniform flow in fluid motion.	(
Examine velocity distribution, discharge, fluid particles,	(

streamlines, and stream tubes.												
Apply the continuity equation (conservation of mass) to fluid flow.	((
Apply the energy equation (Bernoulli's equation) for incompressible steady flow, including applications to orifices, nozzles, venturi meters, pilot tubes, notches, weirs, and time of emptying tanks.	(
Explore fluid friction, distinguishing between laminar and turbulent flow, and understand Reynolds' experiments.	(
Calculate head loss due to friction in pipes and closed conduits, using the Darcy equation and	(

considering the concept of hydraulic gradient.												
Identify and assess other losses in pipe appurtenances.	(
Calculate the basics of flow in open channels, including the Chezy formula.	(

EGR2202: Solid Mechanics

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
Explore the fundamentals of equilibrium in solid mechanics.	(
Determine statical determinacy with reference to pin-jointed frames.	(
Analyze forces in pin-jointed plans and space frames.	((
Calculate shear force and bending moment in	((

structures.												
Construct shear force and bending moment diagrams and understand their relationships with applied loads.	((
Examine normal stress and strain in materials.	((
Study the stress-strain relationship and Poisson's ratio.	((
Analyze thin cylinders and spheres under different loading conditions.	((
Calculate shear stress and complementary shear stress in materials.	((
Evaluate shear strain and analyze the torsion of shafts with circular sections.	((

Apply bending theory to analyze and understand the behavior of beams.	((
Calculate deflections of beams using Macaulay's method and the Moment Area Method.	((
Apply the principles of strain energy to analyze single load systems.	((
Analyze and design close-coiled helical springs.	((

EGR2203: Engineering Drawing I

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 1 0	P 0 1 1	P 0 1 2
Recognize the importance of drawing in the engineering process.	(
Explore and apply standards, units, and paper sizes in engineering drawing.	(((

Demonstrate proficiency in using drawing instruments and equipment.		((
Employ proper scales, lettering, and dimensioning techniques in engineering drawings.		((
Exhibit good draughtsmanship and follow established drawing procedures.		(
Represent three-dimensional objects through freehand sketching.		(
Study and apply first and third angle orthographic projections.		(((
Create isometric drawings and project hidden details and sections.		((
Construct and dimension circles and areas in engineering drawings.		((

Generate oblique (cavalier and cabinet) drawings.		(
Describe axonometric and perspective projections.		(
Gain insights into the representation of various engineering branches in drawings.		(
Familiarize with common engineering terms, conventions, abbreviations, and symbols.	((
Interpret electrical engineering symbols and circuit diagrams.	((

EGR2204: Workshop Practice

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 1 0	P 0 1 1	P 0 1 2
Identify and manage workshop hazards effectively.	((

Demonstrate proficiency in hand processes and bench work techniques.	(
Understand joining and fastening methods, including welding.	(
Utilize hand tools appropriately for various workshop tasks.	(
Apply measurement systems and devices accurately in workshop activities.	(
Demonstrate skill in marking out for precise work.	(
Execute sheet carpentry and joinery tasks.	(
Use electrical tools and understand their applications in workshop practice.	((

Perform simple electrical installations.	(
Engage in cement and concrete preparation, including concrete block making.	(
Execute shuttering and concrete casting techniques.	(
Participate in wall building using blocks and bricks.	((
Gain an introduction to machine tools and their applications.	((
Undertake practical exercises, including marking out and filing exercises.	(
Design and construct a simple bolt using workshop tools and techniques.	((

Construct a simple amplifier as part of practical exercises.	((
Engage in exercises related to battery maintenance and charging.	(
Apply skills in cement and concrete preparation for column casting.	(
Participate in block and brick wall building exercises.	(

EGR2205: Thermodynamics

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
Understand fundamental concepts in thermodynamics and its significance.	((
Define the system and thermodynamic properties in the context of energy analysis.	((

and other thermodynamic cycles.												
Understand corollaries of the Second Law and their implications.	((
Describe a pure substance and examine phase changes in thermodynamics.	((
Explore the relationship between properties of substances.	((
Analyze the behavior of perfect gases and semi-perfect gases.	((

EGR2206: Materials Science I

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
Review the theory and structure of the atom as it relates to the solid state.	(
Study the primary and secondary bonds in solids.	((
Examine the structure of crystalline	((

solids, including common crystal structures in elements.												
Utilize Miller notation for crystallographic planes and directions.	((
Investigate crystal defects, including point defects (vacancy, substitutional, and interstitial) and line defects (dislocations).	(
Examine plane defects, particularly grain boundaries in crystalline materials.	(
Explore single-phase and multi-phase materials, including solid solutions and intermediate phases.	(

Analyze equilibrium diagrams and their relevance to material behavior.	(
Study important commercial alloy systems and their applications.	((
Explore deformation in solids, covering elastic deformation, plastic deformation, and motion of dislocations.	(
Examine mechanical properties of materials, including elasticity and plasticity.	(
Investigate thermal properties, electrical properties, magnetic properties, and optical properties of materials.	(

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
Describe the fundamentals of electric current, Coulomb's Law, potential difference, and Faraday's law of electromagnetic induction.	((
Apply Ohm's Law, Kirchhoff's Laws, and Ampere's Law in the analysis of electrical circuits.	((
Analyze circuit elements, including resistance, capacitance, and inductance parameters.	((
Understand the construction, materials, color code, and preferred values of circuit elements in practice.	((

Analyze series and parallel combinations of resistors, capacitors, and inductors, as well as series-parallel circuits.	((
Apply elementary network theory, including the Superposition Theorem, Thevenin's Theorem, Norton's Theorem, and network analysis by mesh current and node voltage methods.	((
Perform conversions of voltage sources to current sources and apply Delta-star (Δ -Y) transformations for network reduction.	((

Explain steady-state sinusoidal response, sinusoidal functions, instantaneous and average power, power factor, and phasor representation of sinusoids.	((
Analyze sinusoidal steady-state response in R, L, C, and RLC circuits.	((
Apply network theorems to complex impedances and analyze balanced three-phase circuits.	((
Study the properties and characteristics of semiconductor devices, including diodes (standard, Zener, tunnel, varicap, Schottky, and LEDs).	((
Analyze junction transistors, their characteristics,	((

configuration s (CB, CE, CC), biasing, operating point, and stability factors.												
Describe measurement concepts, units, and standards in electrical engineering.	((
Differentiate between direct and comparative measurement s and understand analog and digital measurement s.	((
Perform measurement s of current, voltage, resistance, capacitance, and inductance.	((

EGR2208: Principles of Electrical Engineering II

Course	P	P	P	P	P	P	P	P	P	P	P	P
Learning	0	0	0	0	0	0	0	0	0	0	0	0
Outcomes	1	2	3	4	5	6	7	8	9	10	11	12

Explain magnetic theory and circuits, including permeability, magnetic flux, magnetic field intensity, and derived relationships.	((
Comprehend the theory of magnetism and analyze the magnetic circuit using concepts and analogies.	((
Apply units for magnetic calculations and perform magnetic circuit computations.	((
Analyze hysteresis and eddy current losses in magnetic circuits.	((
Study the theory of operation of transformers, including the development of phase, equivalent circuit, parameters from no-load tests, efficiency, and voltage regulation.	((

Analyze mutual inductance and basic electromagnetic torque in electromechanical energy conversion.	((
Examine the construction features of electric machines and understand practical torque and voltage formulae.	((
Explore types, principles of operation, characteristics, and applications of single-phase motors.	((
Analyze three-phase induction motors, focusing on the revolving magnetic field, equivalent circuit, and computation of performance.	((
Describe the generation of a three-phase voltage system, synchronous generator phase diagram, equivalent circuit, and characteristics	((

of three-phase synchronous machines.												
Analyze the operation of synchronous motors, including operator diagrams, equivalent circuits, computation of performance, and applications.	((
Study DC machines, including DC generator analysis, DC motor analysis, speed-torque characteristics, and speed control.	((
Study the application of DC machines and the use of starters in their operation.	((

EGR2301: Engineering Mathematics I

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 1 0	P 0 1 1	P 0 1 2
Understand basic definitions and operations of vector and matrix algebra.	((

2. Calculate the inverse of a non-singular matrix.	((
Analyze the theory of linear equations, including consistency, dependence, and solution of simultaneous linear equations using Cramer's rule.	((
Explain the concepts of eigenvalues and eigenvectors.	((
Apply coordinate transformations and solid geometry in analytic geometry.	((
Utilize polar, cylindrical, and spherical coordinates in various coordinate systems.	((
Analyze curves and surfaces, including plane curves and quadric surfaces.	((
Explore vector	((

functions, continuity, and derivatives in multivariable calculus.												
Apply elementary partial differentiation and understand multiple integrals.	((
Apply mathematical concepts to solve engineering problems, including applications involving maxima, minima, volumes, tangent planes, and normal lines.	((

EGR2302: Engineering Mathematics II

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 1 0	P 0 1 1	P 0 1 2
Describe vector theory, including dot product, cross product, vector fields, and their applications in line and surface integrals.	((

Analyze the concepts of grad, div, and curl in vector calculus.	((
Apply Green's and Stoke's theorems in vector analysis.	((
Understand series and sequence, including basic definitions and tests for convergence.	((
Analyze power series and Taylor's expansion of various elementary functions.	((
Explain complex numbers, their representation, and algebraic operations involving complex numbers.	((
Explore Fourier series, including Euler coefficients, even and odd functions, and sine and cosine functions.	((

Apply calculus concepts in complex analysis, including elements of complex algebra, trigonometric, exponential, and logarithmic functions.	((
Study analytic and harmonic functions in complex analysis.	((
Explore the integration of complex variables and apply Cauchy's theorem.	((
Solve first-order differential equations and understand special types of second-order equations.	((

EGR2306: Applied Mechanics

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 1 0	P 0 1 1	P 0 1 2
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<p>CLO1: Resolve four different forces into their components and obtain the results of the system</p>		((
<p>CLO2: Explain at least two of the fundamental principles of applied mechanics, particularly equilibrium analysis, friction, kinematics, and momentum</p>		(
<p>CLO3: Identify two types of formulate, and solve complex engineering problems by applying principles of engineering, science, mathematics, and applied mechanics</p>		(((

<p>CLO4: Synthesize Newtonian Physics with static analysis to determine the complete load impact (net forces, shears, torques, and bending moments) on all components (members and joints) of a given structure with a load</p>	(((
<p>CLO5: Apply at least engineering design principles to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors</p>	(((

EGR2313: Computer Programming

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
Study the basics of programming languages and their significance.	(((
Familiarize with operating systems, specifically Microsoft DOS and Windows.	(((
Navigate and perform basic operations in Microsoft DOS, including batch file creation.	(((
Customize the Windows Desktop, including taskbar, start menu, and desktop appearance.	(((

Utilize Windows accessories for tasks like calculation, gaming, note-taking, and multimedia.	(((
Understand the concept of a program, including preparation and execution.	(((
Develop algorithms, flow charts, and pseudocodes for problem-solving.	(((
Explore the elements of Fortran programming language, including characters, symbolic names, variable types, arithmetic and logical expressions, and control structures.	(((
Implement simple loops, logic IF, and unconditional transfer	(((

in Fortran programs.												
Work with arrays, subscripts, and basic external functions in Fortran.	(((
Understand the concepts of function and subroutine subprograms, including external and local variables.	(((
Explore common storage, initialization, and input/output operations in Fortran.	(((
Gain practical experience through exercises, including numerical calculations and solutions to equations.	(((
Be introduced to the basics of the Pascal programming language.	(((

EGR3101: Engineer in Society II

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
Describe the principles of basic economics relevant to business organizations, industrial combinations, public utilities, and finance.						((
Explore industrial concentration and the role of government control in economic systems.						((
Analyze the location of West African industry and trade, considering regional economic factors.						((
Examine the background of the West African economy and the planning of development strategies.						((

Understand the principles of financing development projects and their economic impact.						((
Explore the banking system, including the functions of banks and their role in economic development .						((
Analyze money and capital markets, including their influence on economic activities.						((
Examine the concept of inflation and its effects on economies.						((
Apply cost-benefit analysis to evaluate the feasibility and impact of development projects.						((

Acquire skills in organizing and structuring technical documents for maximum impact.										(
Demonstrate the ability to write clear and coherent technical reports, manuals, and documentation.										(
Understand the conventions and requirements of technical writing in professional settings.										(
Develop oral communication skills for presenting technical ideas effectively.										(
Apply techniques for creating engaging and informative technical presentations.										(
Practice effective use of visual aids and multimedia in technical presentations.										(

Understand and solve partial differential equations, including Poisson's and Laplace's equations.	((
Explore simple solutions, Legendre functions, and Hermite functions in the context of partial differential equations.	((
Apply mathematical techniques to solve application problems in heat transfer (parabolic equations), wave propagation (hyperbolic equations), and steady-state (elliptic equations).	((

Solve boundary value problems in different coordinate systems using differential equations.	((
Apply Laplace and Fourier Transforms to solve differential equations.	((
Understand the theoretical foundations and applications of Laplace and Fourier Transforms.	((
Develop problem-solving skills in engineering applications involving differential equations.	((

EGR3302: Computational Techniques

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 10	P 0 11	P 0 12
Analyze and	((

solve linear and non-linear equations using numerical methods.												
Study and apply finite differences operators in numerical analysis.	((
Create flow diagrams and charts to represent numerical processes.	((
Solve simple algebraic and transcendental equations using numerical techniques.	((
Apply direct methods for the solution of linear equations.	((
Implement iterative methods for matrix inversion.	((
Perform numerical integration and differentiation using Newton-Cotes formulas.	((

Gain an introduction to linear programming and understand its basic principles.	((
Apply various methods for finding zeros of polynomials, including bisection, Newton, Bairstow, synthetic division, and Lehiner.	((
Solve the eigenvalue problem in numerical analysis.	((
Apply numerical methods to solve ordinary differential equations using techniques such as Taylor, Euler, predictor-corrector, and Runge-Kutta.	((
Describe the convergence criteria for iterative numerical methods.	((

EGR3311: Computer Applications

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
Revise operating systems and computer programming concepts, including algorithms, flow charts, and pseudocodes .					(
Review and apply programming languages, with a focus on FORTRAN, BASIC, and introduction to PASCAL.					(
Explore and utilize details of MSDOS, including the creation of batch files and manipulation of AUTOEXEC.B AT and CONFIG.SYS files.					(

Explore data processing concepts, including definitions of data, metadata, databases, files, and records.				((
Understand and apply Database Management Systems (DBMS) and types of files.					(
6. Gain practical experience in using DBASE for import and export operations.				((
Apply macro programming concepts and their applications.					(
Explore word processing concepts, including WYSIWYG formatting, spell checking, thesaurus, and mailing margins.					(

Gain practical experience in using Microsoft Word or another approved word processor.				((
Study desktop publishing, including the use of scanners and laser printers.					(
Engage in exercises that involve programming techniques and numerical calculations, covering sorting, merging, searching, updating, Horner's method, solution of equations, numerical integration, vectors, matrices, linear equations, and graphing.					(

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
Gain a brief understanding of the Nigerian legal system and its relevance to engineering.								(
Familiarize with industrial safety laws and their implications for engineering practices.								(
Study engineering bylaws and their role in regulating engineering activities.								(
Explore electricity supply laws and their impact on engineering projects.								(
Examine water and public health laws in relation to engineering practices.								(
Study the nature and functions of companies, as well as								(

the formation and floatation of companies.												
Explore the nature and types of partnerships in the context of company and partnership law.								(
Explain the legal aspects of copyrights, patents, and trademarks relevant to engineering.								(
Gain insights into the laws related to employers and employees, including contract law.								(
Study the formation of contracts, methods of discharge, and available remedies.								(

Explore the legal aspects of land acquisition relevant to engineering projects.									(
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EGR4201: Engineering Statistics

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
Explore the principles of sampling and its importance in statistical analysis.	((
Create frequency tables and graphs to represent data distributions .	((
Analyze the center and spread of a distribution using appropriate statistical measures.	((

Explore the concepts of outcomes and probabilities in statistical analysis.	((
Study conditional probability and its applications.	((
Analyze independence and standard deviation in the context of statistical distributions .	((
Study random variables and their significance in statistical analysis.	((
Calculate expectation and variance for discrete and continuous probability distributions .	((
Explore specific discrete and continuous probability distributions .	((
Explore higher-dimensional	((

random variables and their applications.												
Explore multinomial and bivariate normal probability distributions .	((
Analyze correlation and regression in statistical modeling.	((
Understand the Law of Large Numbers and the Central Limit Theorem.	((
Gain knowledge about sampling techniques and sampling distributions .	((
Apply statistical tests for hypothesis testing and quality control in engineering contexts.	((

AGE3211: Machine Component Drawing and Design

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
Understand the principles of projections in engineering drawing, including projections of points, lines, plane figures, and solid models.	((
Apply the theory of projections to represent the intersection of lines, planes, and solids in engineering drawings.	((
Gain proficiency in axonometric projections for conveying three-dimensional information.	((
Create detailed drawings of machine components, including part	((

assembly and sketches.												
Apply drawing standards, including paper formatting, lettering, scale usage, dimensioning , and sectioning.	((
Understand surface finish considerations in machine component drawing and design.	((
Apply fits and tolerance concepts to ensure proper functioning of machine components.	((
Create detailed drawings and assembly drawings of power transmission elements, including gears and gear trains.	((

Gain proficiency in the conventional representation of power transmission elements in engineering drawings.	((
Introduce and explore computer-aided drawing tools such as AutoCAD, Pro-Engineer, and SolidWorks.	(((

AGE3212: Engineering Metallurgy

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
Describe the properties and characteristics of metals and alloys.	(
Differentiate between ferrous alloys and non-ferrous alloys.	(

Explore the production and industrial applications of metals and alloys.	((
Analyze the engineering properties of metals, including mechanical and thermal properties.	((
Examine the nature, origin, and control of the structure in metallic systems.	(
Study the relationship between the structure of metallic systems and their mechanical properties.	(
Explore concepts related to diffusion, deformation, hardening, and transformation in metallurgy.	(

Gain knowledge of material selection principles and design considerations in engineering metallurgy.	((
Explain the factors influencing the selection of materials for specific engineering applications.	((
Apply principles of metallurgy to optimize material performance in engineering designs.	((

AGE3213: Introduction to Agricultural and Environmental Engineering

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 10	P 0 11	P 0 12
Part A: Introduction to Agricultural and Environmental Engineering Profession												

Apply the fundamentals of the Agricultural and Environmental Engineering profession.	((
Identify various types of tractors used in agricultural practices.	((
Recognize other farm power sources and their applications.	((
Familiarize with different types of farm implements used in agriculture.	((
Part B: Unit of Concentration												
Gain knowledge of mass concentration units in environmental engineering.	(((
Describe volume/volume and mole/mole units in the context of environmental concentration.	(((
Apply the	(((

ideal gas law to convert units such as parts per million (ppm) to micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).

Physical Processes

Explain the principles of mass and energy balance in environmental engineering.

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Explore the concepts of Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD).

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Describe BOD, CBOD, DO (Dissolved Oxygen), and NBOD (Nitrogenous BOD).

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Identify sources of BOD and understand BOD kinetics.

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Learn the methods for the

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AGE3214: Soil Science for Agricultural and Environmental Engineers

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
Part A: Soil Science												
Study the origin and formation of soils.	((
Gain knowledge of the physical properties of soils.	((
Explore the characteristics and properties of soil colloids.	((
Describe soil reaction (pH) and its significance in soil science.	((
Familiarize with soil mineralogy and its role in soil composition.	((
Examine the importance of soil organic matter in soil science.	((

Learn the principles and methods of soil survey and classification .	((
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Explain water movement in soils and its implications for agriculture and environmental engineering.	((
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Part B: Geotechnical Engineering

Explore phase relationships in soil mechanics.	((
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Study shear strength and its importance in geotechnical engineering.	((
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Learn about consolidation and settlement in soil mechanics.	((
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Describe the principles of soil compaction.	((
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Explore machinery-soil	((
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relationships in agricultural and construction contexts.												
Study the importance of site investigations in soil science and geotechnical engineering.	((

AGE3215: Geology for Agricultural and Environmental Engineers

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
Explain the relevance of geology to engineering, with emphasis on Nigerian geology.	(((
Gain knowledge of the Earth's structure and formation of rocks and minerals.	(((
Explore surface geological processes, including weathering, erosion, and decomposition.	(((
Identify different	(((

types of rocks and understand their engineering properties.												
Learn about stereographic studies and their application in geology.	(((
Describe stratigraphy and its significance in geological studies.	(((
Explore the principles of geotechnics and their application in engineering projects.	(((
Gain insights into geomorphology and its impact on landforms.	(((
Study mineralogy and petrology in the context of geological studies.	(((
Explore time scales in geology, including the importance of fossils.	(((

Explain the application of geology to special engineering problems, such as dykes, canals, dams, and foundations.	(((
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AGE3217: Agricultural Waste Management

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
CLO1: Explain five (5) different types of agricultural waste and their indicators	((((
CLO2: Discuss at least three (3) engineering properties of agricultural wastes	(((
CLO3: Design at least one agricultural waste management systems from a given case study		(((
CLO4: Discuss at least four (4) agricultural wastes handling and disposal methods			((
CLO5: Explain four (4) principles of agricultural waste to wealth		((

AGE3311: Agricultural Land Surveying

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
Discuss the principles of agricultural land surveying.	((
Learn methods for measuring distances in land surveying.	((
Gain proficiency in the use of minor surveying instruments.	((
Introduce and understand different types of surveying instruments, their adjustments, and applications.	((
Explore the theory of errors in land surveying, including types, detection, and elimination.	((
Explain chain surveying and its applications in mapping.	((
Learn about bearing of lines and its significance in	((

land surveying.												
Gain practical experience in leveling for accurate measurements in surveying.	((
Study compass surveying and its applications in fieldwork.	((
Explore plane table surveying for mapping and topographic surveys.	((
Describe the principles of triangulation in land surveying.	((
Explore land shaping and earthwork concepts in agricultural land surveying.	((
Gain proficiency in map reading for interpreting survey results.	((
Introduce tachometric, trigonometric, altimetry, geometric, and theodolite traversing techniques.	((
Discuss the principles and	((

applications of photogrammetry in land surveying.												
Explore aerial photography and its role in mapping and surveying.	((
Introduce the basics of Geographic Information Systems (GIS) and its application in agricultural land surveying.	(((

AGE3313: Animal Production for Agricultural and Environmental Engineers

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
Explain the principles and practices of livestock production for various products such as eggs, milk, meat, and wool.	(

Explore the distribution of livestock in Nigeria, considering regional and environmental factors.	(
Gain knowledge of animal feeding and nutrition principles to optimize livestock health and productivity.	(
Describe the importance of forage crops in animal nutrition and learn methods for their preservation.	(
Explore the principles and techniques of artificial insemination in animal breeding programs.	(
Understand the design and requirements of livestock housing for optimal animal welfare and productivity.	(

Familiarize with processing equipment used in livestock production for various purposes.	(
Gain practical knowledge of the factors influencing animal health, growth, and reproduction .	(
Explore sustainable practices in animal production, considering environmental and ethical concerns.	((
Explain the role of technology and engineering solutions in improving animal production efficiency.	(

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 1 0	P 0 1 1	P 0 1 2
Study the classification and ecology of crops in Nigeria, considering environmental factors and regional variations.	((
Gain knowledge of nutrient requirements and mineral nutrition of plants for effective crop production.	(
Familiarize with different types of manures and fertilizers and their applications in crop management.	((
Understand the principles of plant growth and development, including growth stages and factors influencing growth.	(

Learn about effective tillage practices and weed control methods in crop production.	(
6. Explore various cultural practices that contribute to successful crop management.	((
Discuss cropping sequences and rotations for sustainable and efficient agriculture.	(
Gain insights into different farming systems and their applicability in diverse agricultural contexts.	(
Learn specific production practices tailored to different crops, considering their unique requirements and characteristics.	(

Develop an understanding of sustainable and environmentally friendly practices in crop production.	(((
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AGE4211: Hydraulics

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
Explain the fundamentals of fluid flow and its application in agricultural and environmental engineering.	((
Analyze flow through pipes in parallel and in series, including the effects of branched pipes and simple pipe networks.	((

Gain knowledge of water hammer phenomena and its implications in fluid systems.	((
Explain open channel flow, critical velocity, and methods of flow measurement in hydraulic systems.	((
Familiarize with the principles and applications of weirs, flumes, outlets, gates, and valves in fluid control.	((
Explore the forces developed by moving fluids and their significance in hydraulic engineering.	((
Learn about the classes and types of hydraulic machinery, including pumps and turbines.	((

Understand the principles of reservoir hydraulics and the planning involved in designing hydraulic systems.	(((
Gain practical knowledge of the design and operation of hydraulic structures for efficient water management .	((((
Explore the role of hydraulic engineering in agricultural and environmental projects.	((

AGE4212: Farm Management, Rural Sociology, and Agricultural Extension

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
Apply basic sociological concepts to analyze and understand rural life and communities.	(((

<p>Explain the decision-making process in farm management and apply management functions such as planning, organization, staffing, directing, and controlling.</p>	((
<p>Gain knowledge of financial management principles and their application in agricultural enterprises.</p>	((
<p>Explore the principles of agricultural extension, including diffusion, adoption, and rejection of innovations in rural communities.</p>	((

Discuss the role of communication in agricultural extension and its impact on disseminating information and promoting change.	(
Develop leadership skills relevant to agricultural extension, considering the unique challenges and dynamics of rural communities.	((
Analyze and apply sociological perspectives to address social issues and challenges in rural areas.	((
Explore the principles and practices of effective planning and organization in farm management.	(
Study staffing and human resource consideration	(((

s in agricultural enterprises and extension services.													
Develop the ability to make informed management decisions in the context of agricultural and rural settings.	((

AGE4311: Agricultural Power and Machinery

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
CLO1: Define agricultural power and machinery for farm operations correctly	(((
CLO2: Explain two working principles of an ICE system of a farm tractor from different types of scenarios	((
CLO3: Discuss at least five (5) functions of various farm machinery and their basic mechanism as they affect agricultural productivity	((

CL04: Determine five methods of machinery selection criteria with respect to the appropriateness of application and timeliness factors from different case studies	((
CL05: Explain at least two (2) farm machinery operation practices for optimum machinery performance	((

AGE4312: Irrigation Practices and Drainage

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
CL01: Explain one (1) concept and analyses of the soil-water-plant relationship		((
CL02: Design at least two different irrigation methods for managing agricultural water		((
CL03: Describe two (2) principles and processes of well-designed effectively managing water resources through well-designed drainage and irrigation systems		((
CL04: Apply appropriate techniques and analyses for the selection of low-cost irrigation methods		((

CLO5: Evaluate two (2) types of water delivery systems including the preparation of irrigation water schedules		((
CLO6: Conduct at least one preliminary design for both irrigation and drainage systems in agricultural fields		((
CLO7: Develop two appropriate experiments, analyze and interpret data, and use engineering judgment to draw conclusions		((
CLO8: Apply at least one new knowledge as needed, using appropriate learning and application strategies		(((

AGE4313: Hydrology

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 1 0	P 0 1 1	P 0 1 2
Explain key definitions and concepts related to hydrology.	(
Explore the components of the hydrological cycle, including measurements and evaluation methods.	((

Gain knowledge of solar and earth radiation, precipitation, evapotranspiration, and infiltration processes.	((
4. Analyze rainfall runoff over agricultural land and understand the factors influencing it.	((
Learn about stream gauging, hydrographs, and stream flow routing for effective water flow measurement and analysis.	((

AGE4314: Properties and Handling of Agricultural Products

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
CLO1: Define properties and handling of agricultural materials	((
CLO2: Explain at least two step-by-step procedures for determining various properties of agricultural materials	((
CLO3: Describe two (2) criteria of selecting materials handling equipment	((
CLO4: Explain three (3)	(((

principles of design of appropriate material handling equipment for tropical products												
CL05: Determine two (2) types of power requirement for the operation of conveyors		((

AGE4315: Farm Structures and Environmental Control

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
CL01: Explain two types of proper planning of farmstead	((
CL02: Discuss at least one principle on how to do a structural analysis of farm structures		((
CL03: Design three different storage structures in the farm		((

CLO4: Explain two (2) elements of a building's heat balance and the basic terminology related to the calculation of heating and cooling requirements		((
CLO5: Design at least one proper ventilation system for humans and livestock in a typical farmstead		((

AGE5202: Agricultural Mechanization

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
Explain the nature and objectives of agricultural mechanization.	(
Analyze the factors affecting mechanization	((((

n in tropical agricultural environments .												
Evaluate and analyze different agricultural production systems and their suitability for mechanization.	((
Explore the role of agricultural mechanization as a strategy for rural development.	((
Assess the impact of mechanization on food production and infrastructural development.	((

AGE5203: Land Clearing and Development

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 10	P 0 11	P 0 12
Explain the importance and significance of land resources in agriculture.	(

Analyze the implications of the Land Use Act in the context of Nigerian agriculture.	((
Define the objectives, methods, and equipment used in land clearing and development processes.	((
Explore different types of earth-moving machinery, their selection criteria, and mechanics of operation.	((
Describe the relationship between earthmoving machinery and various vegetation types during land development.	((

AGE5301: Agricultural Engineering Management

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
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Explain the principles of management and their application in the context of agricultural engineering.	((
Explore industrial group dynamics and organizational behavior relevant to agricultural enterprises.	(
3. Examine motives, industrial laws, and legislation related to wages, trademarks, patents, contracts, and the sale of goods.	((
Analyze liability issues for injuries in the agricultural and industrial sectors.	((
5. Explore industrial relations, including the roles of trade unions, employer	(((

AGE5302: Design of Agricultural Machinery

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
Discuss and do classification of machine design.	(((
Gain knowledge of the machinery design processes and associated factors and procedures.	(((
Learn about the selection, strength properties, and costing of materials used in agricultural machinery design.	(((

Conduct stress analysis and consider general design principles for various farm machinery.	(
Explain the design principles for specific machine elements, including shafts, belt drives, chain drives, gear drives, couplings, keys, springs, and fasteners.	(((

AGE5303: Irrigation Systems Engineering

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
Understand techniques for measuring water flow in irrigation systems.	(

Learn principles and methods for designing open channels in irrigation systems.	(((
Calculate the power requirements for pumping water in irrigation systems.	(
Describe the design principles for various irrigation systems, including border/basin, sprinkler, drip/trickle, and sub-surface irrigation.	(((
Examine issues related to salinity and the quality of irrigation water.	((

AGE5304: Processing and Storage of Agricultural Products

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 1	P 0 1	P 0 1
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Study the various techniques and equipment used in the processing of agricultural products.	((
Gain knowledge of the theory and methods of crop drying, including heat treatment and psychrometry.	((
Learn about different types of storage facilities and the environmental factors influencing product storage.	((
Explore the role of solid friction in storage properties and structures.	((
Analyze pressure distribution in storage structures.	((

AGE5305: Farm Electrification

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
Study and apply electric codes, tariffs, and regulations relevant to farm electrification.	((
Explain the significance of electrification in agricultural settings.	((
Review circuit theories and gain knowledge of electricity generation.	((
Design and implement effective farmstead distribution systems.	(((

AGE5306: Soil and Water Conservation Engineering

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
CLO1: Describe at least four (4) principles and control of soil erosion from water and air/wind explain the methods of reclamation of the degraded soils (saline/ sodic, eroded and, waterlogged)		((
CLO2: Conduct at least one analysis from the experimental result on the sediment transport and geographical distribution of soil erosion		((
CLO3: Conduct two practical exercises on the impacts of soil erosion on arid and semi-arid soils from laboratory practical data		(((
CLO4: State at least two (2) theories and measurements of soil water content, movement, storage, and plant availability		(
CLO5: Describe at least six (6) operational principles and maintenance of soil erosion control techniques		(((

AGE5307: Agricultural Power

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12

Discuss the components and systems of internal combustion engines, including intake, exhaust, fuel, cooling, and lubrication systems.	((
Explore the operation of the transmission system, covering the clutch, gearbox, propeller shaft, differential, and final drives.	((
Study the steering and brake systems in agricultural vehicles.	((
Understand the principles and application of hydraulic systems in agricultural machinery.	((
Describe hitches and hitch systems	((

AGE5308: Operation and Management of Farm Power and Machinery Systems

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
Study the operation and management of farm power and machinery systems.	((
Integrate machinery usage into the agricultural production sequence.	((
Apply the seasonality factor to farm tractors.	((
Calculate and analyze field capacities and efficiencies.	((
Explore considerations for machinery ownership and financing.	((

AGE5309: Agricultural Systems' Automation

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
Explain the theory and applications of automation systems.	((
Describe features, capabilities, design, and programming skills of Programmable Logic Controller (PLC) based industrial control systems.	((
Introduction to industrial robots and sensors.	((
Adaptation of industrial automation to agricultural areas, addressing automation problems in the agricultural production process.	((

Developing adjustment techniques, understanding signal flow, transfer and reply functions, and ensuring stability of systems.	(((
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AGE5310: Automotive Service and Maintenance

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12
Describe the service and maintenance procedures for all components of an automobile.	((
Proficiency in diagnosing and addressing issues related to various automotive systems.	((
Skills in conducting routine maintenance tasks to ensure optimal performance and longevity of automotive components.	((

Knowledge of safety protocols and best practices in automotive service and maintenance.	((
Explore modern tools, equipment, and technologies used in automotive service and maintenance.	((

AGE5311: Construction and Installation of Irrigation and Drainage Systems

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
Explain the design and construction principles of farm reservoirs and ponds.	(((
Explore knowledge of the housing requirements and installation of pumping plants for irrigation.	((

Discuss the characteristics and applications of lined and unlined canals in agricultural settings.	((
Acquire skills in the design and construction of farm channels for efficient water distribution.	(((

AGE5312: Agricultural Land Drainage

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
Explain the fundamental principles of flow through porous media and surface drainage in agricultural land.	((

Describe subsurface drainage techniques and their applications in improving soil conditions.	((
Apply skills in designing effective drainage systems for agricultural land.	(((
Study envelope materials used in drainage systems and the principles behind their design.	((
Calculate the loads exerted on conduits in drainage systems and the factors influencing their structural integrity.	((

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
Study basic concepts and theories related to solid waste.	((
Designing solid waste collection and disposal systems.	(((
Conducting field and laboratory sampling for monitoring solid wastes.	((
Analyzing municipal, industrial, and agricultural solid wastes.	((
Exploring various methods for handling and disposing of solid waste.	((

AGE5314: GIS Applications to Agriculture

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
Applying the fundamentals of Geographic Information Systems (GIS).	((
Exploring GIS data structures and their relevance.	((
Familiarity with GIS packages, specifically ArcGIS.	(((
Applying GIS technologies in agricultural and natural resource management.	(((
Identifying and delineating locations and areas using GIS principles.	((

AGE5315: Renewable Energy Applications to Agriculture

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 10	P 0 11	P 0 12
Describe the concept of sustainability in agricultural energy systems.	((
Explore the introduction to renewable energy sources.	((
Study solar radiation and its significance in agricultural energy.	((
Examine solar heating and cooling systems.	((
Analyze solar energy conversion systems.	((

AGE5316: Food Engineering

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 10	P 0 11	P 0 12

Apply the steady flow Energy Equation to analyze boiler and condenser systems.	((
Examine turbines and the principles of adiabatic steady flow processes.	((
Analyze throttling and isothermal steady flow processes in engineering systems.	((
Investigate vapor power cycles, including the Carnot Cycle, Rankine Cycle, Reheat Cycle, and Regenerative Cycle.	((
Assess the economizer and air preheater in vapor power systems.	((

AGE5317: Engineering Properties and Handling of Agricultural Products

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
Determine the physical properties of agricultural products, including factors like size, shape, and density.	((
Analyze the mechanical properties of agricultural materials, such as strength, hardness, and elasticity.	((
Examine the rheological properties of agricultural products, considering their flow behavior.	((

Investigate the thermal properties of agricultural materials, including their response to temperature changes.	((
Differentiate between Newtonian and non-Newtonian fluids in the context of agricultural products.	((

AGE5318: Farm Transportation

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
Assess the planning and design of farm roads to facilitate efficient transportation.	(((
Explore various farm transportation systems and their integration into agricultural operations.	((
Develop	(((

knowledge and skills in the design and construction of farm transport equipment.												
Evaluate standards and specifications related to farm transport systems.	((
Analyze the impact of transportation systems on overall farm efficiency and productivity.	((

AGE5319: Agricultural Machinery

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
Distinguish between primary, secondary tillage, and minimum tillage practices.	((

Examine various tillage equipment, including ploughs, tillers, sub-soilers, harrows, and cultivators.	((
Explore the functionality of planters, drills, broadcasters, hill droppers, and fertilizer distributors.	((
Examine knowledge of different types of fertilizer distributors, such as spinning disc, side dresser, and manure spreader.	((

Study various plant protection equipment, including manually operated sprayers, power-operated boom sprayers, mist blowers, and dusters.	((
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AGE5320: Theory and Design of Tractor Engine

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
Explain the intake, compression, combustion, expansion, and exhaust processes in an engine.	((
Explore the thermal balance of an engine and the kinetics and dynamics of engines.	((
Analyze the kinematics of the crankshaft-	((

connecting rod mechanism.												
Examine the forces acting on the crankshaft-connecting rod mechanism.	((
Study the design principles for various engine parts, including the piston, piston rings, piston pin, connecting rod, crankshaft, valve, and valve mechanism.	(((

AGE5321: Ground Water Technology:

Course Learning Outcomes	P 0 1	P 0 2	P 0 3	P 0 4	P 0 5	P 0 6	P 0 7	P 0 8	P 0 9	P 0 10	P 0 11	P 0 12
Assess the various types and principles of ground water production.	((
Learn the design, construction,	((

installation, operation, and maintenance aspects of ground water extraction systems.												
Explore techniques and strategies for effectively harnessing ground water resources.	((
Study the equipment used in ground water production, including rigs, pumps, casing, screens, and meters.	((
Gain knowledge of the selection and utilization of production equipment.	((

AGE5322: Operation and Maintenance of Irrigation and Drainage SystemsS

Course Learning Outcomes	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 1 0	P O 1 1	P O 1 2
Organize operation personnel for irrigation and drainage systems.	((
Implement irrigation water supply schedules, including field procedures, moisture monitoring, and field efficiency measurements.	((
Manage the operation and maintenance of pumps, pumping plants, canals, farm channels, open ditches, and surface/sub-surface field drains.	((
Conduct repairs on concrete linings, breaches, and bank collapse in irrigation and drainage systems.	((

Analyze and learn from case studies related to the operation and maintenance of irrigation and drainage systems.	((
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AGE5323: Storage of Fresh Fruits and Vegetables

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12
Apply environmental control techniques to optimize storage conditions.	(((((
Design containerization systems for the efficient storage of produce.	((
Describe the principles of evaporative cooling and its application.	((

Evaluate refrigeration plants in terms of development, design, operation, and maintenance.	(((
Analyze the basic principles governing cold storage of perishable produce.	(((

AGE5324: Solar Energy Applications for Processing and Storage

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
Describe the fundamental principles of solar radiation.	((
Apply solar heating and cooling concepts in heat transfer processes.	((
Evaluate the efficiency of solar energy conversion.	(((

Analyze solar heat storage methods.	((
Design storage systems for utilizing solar energy in the processing and storage of tropical crops.	(((

MEC3204: Fluid Mechanics II

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
Determine the properties of real fluids including viscosity, compressibility, elasticity, surface tension, and capillarity.	((
Analyze vapor pressure and its effects within fluid systems.	((
Evaluate stresses in viscous fluids and the relationship	((

between stress and rate of strain.												
Describe the flow characteristics of incompressible fluids, including velocity, acceleration, and steady/unsteady flows.	((
Apply Euler's equation, Bernoulli's equation, and Navier-Stokes equation to one-dimensional and two-dimensional fluid flows.	((

MEC3207: Mechanics of Machines I

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
Analyze acceleration in mechanisms, including the Coriolis component.	((
Determine forces required to accelerate machine elements	((

and create torque diagrams.												
Study the principles and applications of flywheels in machinery.	((
Explore the working principles of cams and governors in machine systems.	((

MEC3301: Solid Mechanics II

Course Learning Outcomes	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
Analyze complex systems for stress and strain.	((
Analyse thermal effects and the combined stresses in materials.	((
Apply Mohr's circle for stress and strain analysis.	((

Explore theories of elastic failure in materials.	((
Study thick cylinders, including Lamé's theory, force fits, and compound bending of thick curved beams.	((