

**EDO STATE COLLEGE OF AGRICULTURE AND
NATURAL RESOURCES**

**SCHOOL OF FORESTRY AND
ENVIRONMENTAL TECHNOLOGY
(UROMI)**

A publication of:

EDO STATE COLLEGE OF AGRICULTURE AND NATURAL
RESOURCES

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NATURAL RESOURCES

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**DEPARTMENT OF AGRICULTURAL
BIOTECHNOLOGY**

AGRICULTURAL BIOTECHNOLOGY PROGRAMME

Programme Goal

This programme is designed to produce Agricultural technologies capable of applying core techniques in Agricultural Biotechnology to commercial Plant and Animal Breeding, Farming, Research, Forensics of Food Verification and Safety, Animal, Crop, Fisheries, Forestry and Wildlife Conservation. Diplomats are equipped with knowledge and training for Entrepreneurial practices (Agropreneurship) in their specialism (Biotechnology) and beyond. In addition, it aimed at producing skillful technical personnel who are knowledgeable and competent in the disciplines of applied biotechnology for the enhancement of improved crop varieties and livestock productivity as panacea to hunger and sustainable global food security.

Programme Objectives

On completion of this programme, diplomats should be able to:

1. Apply relevant general principles and standards of technology transfer and modern biotechnology to boost local crop and livestock production for sustainable food security.
2. Teach and train skilled, semi-skilled and unskilled farmers simplified biotechnology techniques for higher productivity.
3. Assist and /or collaborate with agricultural extension officers to disseminate current biotechnological research developments aimed at enhancing returns to crop and livestock farmers.
4. Be well equipped and confident to venture into higher acquisition of knowledge in the discipline with a view to

making an accomplished career in the science and business of biotechnology.

National Diploma (ND)

Duration: Two (2) years; comprising four full academic semesters over two academic sessions.

Entry Requirements:

- i. Five SSCE/NECO/GCE O' Level Credit Passes in English Language, Mathematics, Chemistry, Biology or Agricultural Science and Physics, at not more than two sittings.
- ii. UTME Subjects required are: English Language, Chemistry, Biology or Agricultural Science and Physics with UTME score of 130 and above.

Higher National Diploma (HND)

Duration: Two (2) Years; comprising four academic semesters over two academic sessions.

Entry Requirements:

- i. ND in Agricultural Biotechnology with a minimum of Lower Credit Pass.
- ii. Five SSCE/NECO/GCE O' Level Credit Passes in English Language, Mathematics, Chemistry, Biology or Agricultural Science and Physics, at not more than two sittings.
- iii. Evidence of one year post National Diploma Cognate Work Experience.

DEPARTMENT OF AGRICULTURAL BIOTECHNOLOGY

COURSES

NATIONAL DIPLOMA: YEAR 1, FIRST SEMESTER

SN	CODE	COURSE TITLE	UNITS*					PRE REQUI SITE
			L	T	P	CU	CH	
1	STB 111	Cell Biology	2	0	3	3	75	
2	MTH 101	General Mathematics	2	0	0	3	30	
3	PTD 111	Technical Drawing	1	0	4	3	75	
4	AGR 101	Introduction to Agriculture	2	0	3	3	75	
5	CME 122	Basic Workshop Practice	1	0	3	2	60	
6	BCH 111	General and Physical Chemistry	2	0	3	3	75	
7	STB 112	Morphology and Physiology of Living Things	2	0	3	3	75	
8	ABT 101	Introductory Genetics	2	0		2	0	
9	GNS 101	Use of English	2	0	0	2	30	
10	COM101	Computer Science	1	0	1	2	30	
11	GNS 111	Citizenship Education I	2	0	0	2	30	
SUB-TOTAL							28	

* *L - Lecture; T - Teaching; P - Practical; C - Credit Units; CH - Credit Hours.*

**NATIONAL DIPLOMA:
YEAR 1, SECOND SEMESTER**

S N	CODE	COURSE TITLE	L	T	P	CU	CH	PRE REQUI SITE
1	ABT 108	Biomolecules and Macromolecules	2	0	3	3	75	
2	ABT 110	Reproductive Physiology of Farm Animals	2	0	3	3	75	
3	ABT 112	Agricultural Botany, Crop Science, Production and Breeding	2	0	3	3	75	
4	BCH 121	Organic and Inorganic Chemistry		0			0	
5	SUG 101 /TSL 101	Basic Principles in Land Surveying	2	0	3	3	75	
6	GNS 102	Communication in English	2	0	0	2	30	
7	GNS 128	Citizenship Education II	2	0	0	2	30	
8	EED 126	Introduction to Entrepreneurship	2	0	3	3	75	
9	EEP 128	Skill Acquisition I	0	0	3	1	45	
SUB-TOTAL							20	

**NATIONAL DIPLOMA: YEAR 2, FIRST
SEMESTER**

S N	CODE	COURSE TITLE	L	T	P	CU	C H	PRE REQUI SITE
1	ABT 209	Agricultural Chemistry and Biochemistry	2	0	3	3	75	
2	ABT 211	Forest, Wildlife, Fishery and Aquaculture Resources	2	0	3	3	75	
3	ABT 213	Animal Science and Production	2	0	3	3	75	
4	ABT 215	Molecular Biology	2	0	3	3	75	
5	EED 216	Practice of Entrepreneurship	2	0	3	3	75	
6	GNS 201	Use of English II	2	0	0	2	30	
7	COM 201	Computer Package 1	1	0	3	2	60	
8	EEP 217	Skill Acquisition III	1	0	1	2	30	
SUB-TOTAL							21	

NATIONAL DIPLOMA: YEAR 2, SECOND SEMESTER

SN	CODE	COURSE TITLE	UNITS*					PRE
			L	T	P	CU	CH	
1	ABT 202	Recombinant DNA Techniques and Genetic Engineering	2	0	3	3	75	
2	ABT 204	Genetics for Biotechnology	2	0	3	3	75	
3	SUG 102 /TSL 102	Basic Principles in Land Surveying II	1	0	4	3	75	
4	AGT 124	Rural Sociology	2	0	3	2	75	
5	EED 216	Practical Entrepreneurship	0	0	6	2	90	
6	EEP 218	Skill Acquisition IV	1	0	3	2	60	
7	ABT 290	Final Year Project	0	0	18	6	270	
SUB-TOTAL							21	

ND GRADUATION REQUIREMENTS

S/N	Year/Semester	CREDIT UNITS
1	ND Year 1, Semester 1	28
2	ND Year 1, Semester 2	20
3	ND Year 2, Semester 3	21
4	ND Year 2, Semester 4	21
SUB-TOTAL		90

HND AGRICULTURAL BIOTECHNOLOGY CURRICULUM COURSES

HIGHER NATIONAL DIPLOMA: YEAR 1, FIRST SEMESTER

SN	CODE	COURSE TITLE	UNITS					PRE REQUI SITE
			L	T	P	CU	CH	
1	AGR302	Field Experimentation and Data Analysis	2	0	3	3	75	
2	ABT 301	Advanced Cell Biology	2	0	3	3	75	
3	ABT 303	Molecular Pathology and Pest Management	1	0	3	2	60	
4	ABT 305	Statistics for Agricultural Biotechnology	2	0	0	2	30	
5	ABT 309	GMOs, Ethics, Safety and Regulation of Agricultural Biotechnology	2	0	0	2	30	
6	ABT 315	Microbial Culture and Biology	1	0	1	2	30	
7	ABT 317	Biotechnology in Plant Breeding and Reproduction	1	0	3	2	60	
8	ABT 319	Biotechnology in Animal Breeding and Reproduction	2	0	3	3	75	
9	EED 301	Entrepreneurship	2	0	0	2	30	
10	GNS 301	Use of English III	2	0	0	2	30	
SUB-TOTAL							23	

**HIGHER NATIONAL DIPLOMA:
YEAR 1, SECOND SEMESTER**

SN	CODE	COURSE TITLE	UNITS*					PRE REQUI SITE
			L	T	P	CU	CH	
1	ABT 302	Biotechnology in Plant and Animal Health	1	0	3	2	60	
2	ABT 306	Biotechnology in Plant and Animal Identification, Ecology, Forensics/Food Safety.	1	0	3	2	60	
3	ABT 310	Biotechnology in Diagnostics and Epidemiology	1	0	3	2	60	
4	ABT 312	Biological Control of Plant and Animal Diseases.	1	0	3	2	60	
5	ABT 314	Enzymology	1	0	3	2	60	
6	ABT 316	Bacterial and Yeast Genetics	1	0	3	2	60	
7	ABT 318	Immunology	2	0	3	3	75	
8	AEM314	Extension Methods	1	0	3	2	60	
9	EED 302	Entrepreneurship Development Practical	2	0	0	2	30	
10	GNS 302	Communication in English Language II	2	0	0	2	30	
11	GNS304	Citizenship Education	2	0	0	2	30	
SUB-TOTAL							23	

**HIGHER NATIONAL DIPLOMA: YEAR
2, FIRST SEMESTER**

SN	CODE	COURSE TITLE	UNITS*					PRE
			L	T	P	CU	CH	
1	ABT 401	Quality Control and Assurance in Biotechnology	1	0	3	2	60	
2	ABT 403	Applied Mycology (Mushroom Cultivation)	2	0	3	3	75	
3	ABT 405	Synthetic Biology	1	0	3	2	60	
4	ABT 407	Metabolic Pathways and Their Regulation	2	0	3	3	75	
5	ABT 409	Biophysical Chemistry	1	0	3	2	60	
6	ABT 411	Instrumentation and Analytical Techniques.	2	0	3	3	75	
7	ABT 413	Introduction to Proteomics	1	0	1	3	30	
8	ABT 415	Environmental Biotechnology for Agriculture	2	0	3	3	75	
9	GNS 401	Communication in English IV	2	0	0	2	30	
10	AGR 401	Research Methodology	2	0	3	3	75	
11	IIT 401	Industrial Internship Training	2	0	0	2	30	
12	EED 401	Entrepreneurship and Development	2	0	0	2	30	
SUB-TOTAL						30		

**HIGHER NATIONAL DIPLOMA: YEAR 2,
SECOND SEMESTER**

SN	CODE	COURSE TITLE	UNITS*					PRE REQUI SITE
			L	T	P	CU	CH	
1	ABT 402	Marine Biotechnology	1	0	3	2	60	
2	ABT 404	Microbial agro-biotechnology	1	0	3	2	60	
3	ABT 406	Intellectual Property Considerations in Biotechnology	2	0	0	2	30	
4	ABT 408	Computer Programming and Applications for Bioinformatics	1	0	3	3	60	
5	ABT 410	Bioprocess Engineering	2	0	3	3	75	
6	ABT 412	Genomics and Functional Genomics	2	0	3	3	75	
7	ABT 414	Bioinformatics	2	0	3	3	75	
8	ABT 416	Creativity, Innovation, Discovery and Invention in Agricultural Biotechnology	2	0	0	2	30	
9	ABT418	Seminar	0	0	6	2	90	
10	ABT 490	Final Year Project	0	0	18	6	270	
SUB-TOTAL							28	

HND GRADUATION REQUIREMENTS

S/N	Year/Semester	CREDIT UNITS
1	HND Year 1, Semester 1	23
2	HND Year 1, Semester 2	23
3	HND Year 2, Semester 3	30
4	HND Year 2, Semester 4	28
GRAND TOTAL		104

COURSE SYNOPSIS (ND & HND)

NATIONAL DIPLOMA: YEAR 1, FIRST SEMESTER

STB 111 Cell Biology (3 Units)

MTH 101 General Mathematics (3 Units)

PTD 111 Technical Drawing (3 Units)

AGR 101 Introduction to Agriculture (3 Units)

CME 122 Basic Workshop Practice (2 Units)

BCH 111 General and Physical Chemistry (3 Units)

**STB 112 Morphology and Physiology of Living Things
(3 Units)**

GNS 101 Use of English (2 Units)

COM 101 Computer Science (2 Units)

GNS 111 Citizenship Education I (2 Units)

NATIONAL DIPLOMA: YEAR 1, SECOND SEMESTER

ABT 108 Biomolecules and Macromolecules (3 Units)

Micro-molecules: Chemical foundation of biology; Principles of thermodynamics; Classes of organic Compounds and functional groups; Carbohydrates; Amino Acids and Peptides; Heterocyclic compounds and Secondary Metabolites; Lipids; Proteins; Separation techniques for lipids and carbohydrates. Micro-molecules: Macromolecules and super-molecular Assembly; Sequencing of Proteins and Nucleic Acids; Protein-Protein and Protein-Ligand Interactions; Conformational properties of polynucleotides; properties of double helical DNA; structure and properties of RNA; Structural Features of Proteins; Protein Assisted Folding; DNA Binding Proteins; Protein-Nucleic Acid Interactions; Physical and Chemical Methods for Immobilisation of Macromolecules and Enzymes; Glycoproteins; Lipoproteins; Chromatin Organisation; Ribosome Organisation and Function; Protein Denaturation; Nucleic Acid Hybridisation; Ribozymes and Catalytic Antibodies; Protein and Nucleic Acid Databases.

ABT 110 Reproductive Physiology of Farm Animals (3 Units)

Reproductive physiology including male and female reproductive processes: Productive cycles; Physiology of sperm and ovum; Structural and Functional Endocrinology of reproduction; Genetic physiology; Pregnancy; foetal development; fertility and sterility.

ABT 112 Agricultural Botany, Crop Science, Production and Breeding (3 Units)

Taxonomy, Characteristics and Distribution of plants; Weather and Climate effects on Plants. Physiology of crop growth and yield. Soil type; Structural and chemical basis of Soil type requirements of plants; Concepts and Terms in plant breeding. Genetic variation and exploitation in plant breeding. Heritability and genetic variance. Plant germplasm. Simple statistical tools in plant breeding.

BCH 121 Organic and Inorganic Chemistry (Units)

SUG 101/TSL 101 Basic Principles in Land Surveying (3 Units)

GNS 102 Communication in English (2 Units)

GNS 128 Citizenship Education II (2 Units)

EED 126 Introduction to Entrepreneurship (3 Units)

EEP 128 Skill Acquisition I (1 Units)

NATIONAL DIPLOMA: YEAR 2, FIRST SEMESTER

ABT 209 Agricultural Chemistry and Biochemistry (3 Units)

Analysis of Soils. Examination of Fertilisers and Manures. Proximate Analysis of Feeds and Feeding Stuffs. Analysis of Milk. Special Biochemical techniques. Some Instruments used in Biological Chemistry.

ABT 211 Forest, Wildlife, Fishery and Aquaculture Resources (3 Units)

Concept of forest resources encompassing timber, wildlife and fish. Basic structure of fishes and their adaptation to aquatic life. Ecology of aquatic systems. Fundamental links in the life cycle of fishes. Important species of fishes in West Africa. The fishery industry in Nigeria. Principles of fish farming. Definition of Agriculture. Agriculture and natural environment. Trends in the production, distribution and utilization of aquacultural products.

ABT 213 Animal Science and Production (3 Units)

Species and breeds of livestock and their world distribution. Morphology of farm animals. Feeding habits of farm animals. Management and disease. Problems of livestock farming in Nigeria, Anatomy and Physiology of Farm Animals. Animal Feeds and Feeding. Animal Production Techniques.

ABT 215 Molecular Biology (3 Units)

Introduction; Prokaryotic and Eukaryotic DNA replication; DNA repair and Recombination; Gene Transcription; Post transcriptional Modification of mRNA; Translation of mRNA into Proteins; Intracellular Protein sorting and localisation; Oncogenes and tumour suppressor genes; Antisense and Ribozyme Technology; Homologous Recombination; Molecular Mapping of the Genome; Genome Organisation;

EED 216 Practice of Entrepreneurship (3 Units)

GNS 201 Use of English II (2 Units)

Letter writing; Formal and Informal Letters, Report Writing, Types of Report, Grammatical Rules, Essay Writing, Denotation and Connotation, Comprehension and Summary Passages.

COM 201 Computer Package 1 (2 Units)

EEP 217 Skill Acquisition III (2 Units)

NATIONAL DIPLOMA: YEAR 2, SECOND SEMESTER

ABT 202 Recombinant DNA Techniques and Genetic Engineering (3 Units)

DNA and RNA composition and properties (Complementarity, Hybridisation and Denaturation). DNA and RNA Isolation, DNA fragment separation/resolution; Restriction Enzymes; Restriction Mapping of DNA Fragments and Map Construction; DNA ligation and Production of Chimaeric Molecules; DNA Vectors (types, cloning capacities, host specificities, functions); ; cDNA synthesis and cloning; Transformation of Bacterial, Yeast and Mammalian and Plant Cells; DNA libraries; DNA Library Screening; Polymerase Chain Reaction (PCR); DNA Sequencing. DNA Polymorphisms. Detection of DNA polymorphisms; Iternative strategies of gene cloning; Site directed mutagenesis and Protein Engineering; How to study gene regulation; Expression strategies for heterologous genes; Processing of recombinant proteins; Phage display; T-DNA and Transposon tagging; Transgenic and Gene Knockout Technologies; Gene Therapy.

ABT 204 Genetics for Biotechnology (3 Units)

Qualitative and quantitative characters. Chromosomes as the basis of inheritance. Karyotype diversity across species, Ploidy. Mitosis and Meiosis in Gametogenesis. Sex determination, phenocopies, penetrance and expressivity. Inheritance of single autosomal genes. Hardy-Weinberg Theory. Inheritance of single sex linked genes. Inheritance of Pairs of loci and Linkage Disequilibrium. Theory of evolution. Synteny and Conservation of Genes. Phylogenetics. Environment and heredity. Lethals. Heritability. Selection methods; breeding systems. Performance testing and improvement. Artificial breeding. Gene action and interaction. Mutation and lethal genes. Determination of genetic parameters. Improvement of Breeds by application of quantitative and population genetics. Breeding plans and development of new breeds.

AGT 124 Rural Sociology (2 Units)

EED 216 Practical Entrepreneurship (2 Units)

EEP 218 Skill Acquisition IV (2 Units)

ABT 290 Project (6 Units)

HIGHER NATIONAL DIPLOMA: YEAR 1, FIRST SEMESTER

AGR 302 Field Experimentation and Data Analysis (3 Units)

ABT 301 Cellular Biology (3 Units)

The Cell theory; Cell size and Shape diversity; Structure of prokaryotic and Eukaryotic Cells; Growth Media; Isolation and growth of Cells; Manipulation of Cultured Cells and Tissues; Microscopic techniques for Cell studies; Sub-cellular fractionation' Cellular organelles; Transport of Nutrients and Macromolecules across membranes; Cellular Energy Transactions; The cell cycle; Cellular response to environmental signals; Cellular differentiation; Tumour biology; Mitosis, Meiosis and Fertilisation; Protein Localisation; Receptor mediated Endocytosis; Apoptosis.

ABT 303 Molecular Pathology and Pest Management (2 Units)

Concept of Health and Disease in Plants and Animals. Molecular Biotechnological approaches to determination of health and disease.

ABT 305 Statistics for Agricultural Biotechnology (2 Units)

Population and Sample Size; Measures of Central Tendency; Measures of Dispersion; Data Representation; Probability Distribution; Distribution of Sample Means; Test of Significance; Group Comparison and Pairing Design Tests; Linear Regression and Correlation; The Chi squared test; Computer Assisted Statistical Calculations, sampling and bootstrapping.

ABT 309 GMOs, Ethics, Safety and Regulation of Agricultural Biotechnology (2 Units)

Legal Definition of Genetically Modified Organisms (GMOs). Introduction to Ethics in Biotechnology; International Codes and Declarations on use of Biotechnology (including GMO technology) in Microbes, Plants and Animals; Basis of Ethical Principles; Codes and Guidelines of Nigeria; Special Ethical Issues Resulting from recent Advances in the Agricultural Biotechnology Field. Multi-Agency Regulation of Genetically Modified Foods and Drugs.

ABT 315 Microbial Culture and Biology (2 Units)

Culture methods; Origin and Evolution of microbes; Microbial Diversity; Microbial Cell Structure; Microbial Growth; Carbon Metabolism, Metabolic Diversity among Microorganisms; Medical Microbiology (Host-Parasite Relationship; Microbial Diseases; Life Cycle and Molecular Biology; Chemotherapy and Antibiotics.

ABT 317 Biotechnology in Plant Breeding and Reproduction (2 Units)

Conventional plant breeding; Cell and Tissue Culture; Tissue Culture Media, Isolation and Maintenance of Callus and Suspension Cultures; Organogenesis and Somatic Embryogenesis; Shoot tip culture, clonal propagation and Production of virus-free plants; Embryo culture and Embryo rescue; Protoplast Isolation, Culture and Fusion, Anther, Pollen and Ovary Culture for production of Haploid and Homozygous lines; Cryopreservation, DNA Banks and Germplasm Conservation; Basic Techniques in Recombinant DNA Technology; Plant Transformation Technology; Application of plant Transformation of productivity and performance; Chloroplast Transformation; metabolic Engineering and Industrial Products including nutrient fortification; Molecular Marker Aided Breeding; Arid and Semiarid Plant Biotechnology; Green House Technology

ABT 319 Biotechnology in Animal Breeding and Reproduction (3 Units)

Introduction to Biotechnology assisted Animal Reproduction; Artificial Insemination; Multiple Ovulation and Embryo Transfer; Cryopreservation of Sperm; Ova and Embryos; Animal Cloning Technologies. Development of Molecular markers of Economically Valuable Traits by Whole Genome genetic Mapping and Candidate Gene Mapping and Association Approaches. Molecular Marker Assisted Trait selection (Single Marker and Genomic Selection). Applications of Biotechnology in reproduction and fertility; growth, milk and egg production.

EED 301 Entrepreneurship (2 Units)

GNS 301 Use of English III (2 Units)

Grammatical rules; Parts of Speech, Synonyms and antonyms, phrases, comprehension and Summary, Essay writing, Literary appreciation and Registers.

**HIGHER NATIONAL DIPLOMA:
YEAR 1, SECOND SEMESTER**

ABT 302 Biotechnology in Plant and Animal Health (2 Units)

Mendelian Inheritance of Susceptibility/Resistance to Communicable and Non-communicable diseases in Plants and Animals. Biotechnological approaches to modulation of communicable and non-communicable disease susceptibility in Plants and Animals through: introgression and selective enrichment of resistance genes; Knockout and knock down of susceptibility genes; Vaccine Development, Biological including antibody derived drugs. Applications in the control of Disease.

ABT 306 Biotechnology in Plant and Animal Identification, Ecology, Forensics/Food Safety. (2 Units)

Introduction; Technologies for plant and animal identification and verification. Applications of Plant and Animal Identification and verification Technologies in: the Plant and Animal Production Value Chain; Forensics; Food Safety; Ecology and Germplasm Conservation. Sample collection, preservation, and storage. Methods for Plant and animal verification; analysis of experimental data and report writing. Current Applications.

ABT 310 Biotechnology in Diagnostics and Epidemiology (2 Units)

Traditional Disease Diagnosis and Epidemiology Methods, Molecular Markers in Diagnostics and Epidemiology. Rapid, Sensitive and High Throughput Detection and Screening Methods.

ABT 312 Biological Control of Plant and Animal Diseases. (2 Units)

Traditional Methods of Biological Control. Biotechnology in Biological Control of Plant and Animal Disease. Safety of Biological Control, Ethos, Ethical considerations in use of biological control methods.

ABT 314 Enzymology (2 Units)

ABT 316 Bacterial and Yeast Genetics (2 Units)

Genes, Mutations and Mutagens. Bacterial Genetic Systems. Bacterial Viruses and their Genetic Systems. Rudiments of Yeast Genetics.

ABT 318 Immunology (3 Units)

AEM 314 Extension Methods (2 Units)

EED 302 Entrepreneurship Development Practical (2 Units)

GNS 302 Communication in English Language II (2 Units)

Correspondence, logical thinking, features of report writing, registers in communication.

GNS304 Citizenship Education (2 Units)

Definition of citizenship education, citizen and citizenship, Nigerian constitution about citizenship, duties of Nigerian citizens, Rights of citizens and constitution, the rule of law, equality and natural ethics.

**HIGHER NATIONAL DIPLOMA:
YEAR 2, FIRST SEMESTER**

ABT 401 Quality Control and Assurance in Biotechnology (2 Units)

Definitions. Introduction to Quality Control (QC) and Quality Assurance (QA); Principles; Techniques; Implementation; Total Quality Management; Benefits.

ABT 403 Applied Mycology (Mushroom Cultivation) (3 Units)

Classification of different varieties of fungi which are commonly eaten. Techniques used in the culture of edible mushrooms. Biotechnology in Genetic Improvement of Mushrooms. Harvesting and post-harvest preservation of mushrooms. Medicinal Mushrooms.

ABT 405 Synthetic Biology (2 Units)

Definition. Scope, including Construction of novel biological parts, devices, and systems, and re-design of existing biological systems for useful purposes. Concepts. Standards including Parts, Assembly of Biobricks and Abstraction Hierarch of Biobricks. Challenges. Methods used Synthetic Biology, including computational methods, statistics, machine learning approaches, artificial intelligence applications, standardization basics and, design principles. Aids to Synthetic Biology Design, including Bio-mimicry, bio-analogy, bio-innovation, and bio-invention.

ABT 407 Metabolic Pathways and Their Regulation (3 Units)

Introduction, Bioenergetics and Metabolism; Catabolic and Anabolic Pathways; Identification of metabolic sequences; Glycolysis; The Tricarboxylic Acid (TCA) cycle; The Glyoxilate Cycle; Alternate Routes of Glucose Catabolism; Biosynthesis of Carbohydrates; Biosynthetic pathways leading from Glucos-6-phosphate; Lipid Metabolism (synthesis and transport).

ABT 409 Biophysical Chemistry (2 Units)

Interactions in Biological Systems; Structure of Proteins; Multiple Equilibrium.

ABT 411 Instrumentation and Analytical Techniques (3 Units)

Ultraviolet and Visible light spectroscopy; Infrared spectroscopy; Raman Spectroscopy; Resonance Raman Spectroscopy; Circular Dichroism Spectroscopy; Viscosity; Centrifugation; Determination of Protein Structure; Electrophoresis; Fluorescence Spectroscopy; Mass Spectroscopy; Electron Cryomicroscopy.

ABT 413 Introduction to Proteomics (3 Units)

Proteome: Definition. Structural and functional basis of proteomic diversity. Techniques for systematic study of Animal, Plant and Microbial proteomes. Use of Proteomics in Discovery of the functional basis and correlates of heritable variation. Use of Proteomics in longitudinal prediction of Economic trait performance/ outcomes.

ABT 415 Environmental Biotechnology for Agriculture (3 Units)

Environment; Environment Pollution; Air pollution and control through biotechnology; Global water distribution and need for its management; Microbiology of wastewater treatment (aerobic and anaerobic processes); Treatment schemes for wastewaters and dairy, distillery, tannery, sugar and antibiotic industry; Microbiology of degradation of xenobiotics and environment; Bioremediation of contaminated soils and wasteland; Biopesticides in integrated pest environment; Solid waste; Global Environmental Problems.

GNS 401 Communication in English IV (2 Units)**AGR 401 Research Methodology (3 Units)**

Definition of Research: Steps in planning good research, types of research, Hypothesis, variables, Methods of data collection; personal interview, observation questionnaire, results of experiments, sampling and sampling techniques, Research Designs.

IIT 401 Industrial Internship Training (2 Units)**EED 401 Entrepreneurship and Development (2 Units)**

HIGHER NATIONAL DIPLOMA: YEAR 2, SECOND SEMESTER

ABT 402 Marine biotechnology (2 Units)

Application of Biotechnology to fish and marine invertebrates; macro- and micro-algae.

ABT 404 Microbial agro-biotechnology (2 Units)

Microbial agro-biotechnology and its application to: plant pest control; bio-fertilization, fermentation and bioremediation.

ABT 406 Intellectual Property Considerations in Biotechnology (2 Units)

Introduction; Forms of Intellectual Property Rights; Trade Related Aspects of Intellectual Property Rights (TRIPs) and Patent Law; Patents in Biotechnology; Other Biotechnology Patents (Monoclonal Antibody Technology, Stem Cell Technology); Plant Variety Protection.

ABT 408 Computer Programming and Applications for Bioinformatics (3 Units)

Programming language; Flow Charts and Programming Techniques; Introduction to Data structures and Database Concepts; Introduction to Web and Internet; Introduction to C and Q Basic languages; Microsoft Word; Microsoft Excel; Presentation Graphics Packages including Microsoft Power point and Corel Draw; PERL Language; R Language.

ABT 410 Bioprocess Engineering (3 Units)

Introduction; Component parts of a fermentation process; material balance; Bioreactors; Kinetics of Microbial growth; Heat Transfer; Dimension Analysis; Mass Transfer; Measurement and Control of Bioprocess parameters; Sterilisation; Media Design; Isolation and Preservation of Industrial Micro-organism; Downstream processing; Whole cell immobilisation and its Industrial Application; Industrial Production of Chemicals and Biomolecules; Mineral Beneficiation and Oil reparation; Food Technology.

ABT 412 Genomics and Functional Genomics (3 Units)

Whole Genome Analysis; Animal and Plant Genome Projects; Functional Genomics using Microarray Technology; Proteome Analysis.

ABT 414 Bioinformatics (3 Units)

Introduction; Biological Databases; Sequence Comparison; Multiple Sequence Alignment; Profile Motifs and Feature Identification; Phylogeny; Bioinformatics in Genomics; Rational Drug Design; Network Bioinformatics.

ABT 416 Creativity, Innovation, Discovery and Invention in Agricultural Biotechnology (2 Units)

Creativity, Innovation, Discovery and Invention: Definitions; Systems for application to Biotechnology; Protection of Intellectual Property; Capitalization of Intellectual Property.

ABT418 Seminar (2 Units)

ABT 490 Project (6 Units)

**DEPARTMENT OF ENVIRONMENTAL
TECHNOLOGY**

ENVIRONMENTAL TECHNOLOGY PROGRAMME

Programme goal

This programme is designed to produce technical personnel who will be able to understand and respond to ever-increasing changes which human have wrought in our world; be equipped with focused knowledge and methodological tools; informed and skilful in proffering advice and feasible practical solutions to social, aesthetic, ethical, scientific and technical aspects of environmental questions and challenges.

Programme Objectives

On completion of this programme, diplomats should be able to:

1. Understand how the natural and built environment shapes and are shaped by multiple socio-cultural and political factors.
2. Think across and beyond existing disciplinary boundaries, mindful of diverse forms of knowledge and experience that arise from human interactions with the world around them.
3. Live responsibly and appreciate the environmental and cultural histories of the places they inhabit.
4. Recognise the interconnectedness of multiple factors in environmental challenges.
5. Engage constructively with diverse knowledge and experience.
6. Identify the multiples scales, actors and stakes of an environmental issue.

7. Recognise and apply methodological approaches of the social sciences, natural and humanities in combating environmental challenges.
8. Evaluate and interpret various forms of evidence, including text, data and other media about the environment.
9. Work productively with those within and beyond the academy on interdisciplinary collaborative environmental project.
10. Communicate clearly and competently on matters of environmental concern and understanding to a variety of audiences in appropriate forms.
11. Capable of undertaking feasibility studies on Environmental impact Assessment projects.

Entry Requirements

As specified in the NTBE guidelines

Course Description, Codes and Units (See Tables)

NATIONAL DIPLOMA (ND) IN ENVIRONMENTAL TECHNOLOGY

YEAR 1 - FIRST SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	CU	CH	PRER EQUIS ITE
EVT 101	Biology of Algae	1	0	3	2	60	WASC/ GCE
EVT 103	Ecology and Ecosystem	2	0	3	3	75	WASC/ GCE
MTH101	Calculus I for Social and Life Science	2	0	0	2	30	WASC/ GCE
EVT 107	Environmental Chemistry	1	0	3	2	60	WASC/ GCE
EVT 105	Insects and Humans	2	0	3	3	75	WASC/ GCE
BPH 101	Introduction to Physics	1	0	3	2	60	WASC/ GCE
EVT 109	Plants and Society	2	0	3	3	75	WASC/ GCE
GNS101	Use of English	2	0	0	2	30	WASC/ GCE
GNS127	Citizenship Education	2	0	0	2	30	WASC/ GCE
COM111	Computer Science	1	0	3	2	60	WASC/ GCE
	TOTAL	16	0	21	23	555	

NATIONAL DIPLOMA (ND I) IN ENVIRONMENTAL TECHNOLOGY

YEAR 1 - SECOND SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	C U	CH	PRE REQUI SITE
FOT 111	Geology	2	0	3	3	75	WASC /GCE
EVT 102	The Biology of Behaviour	2	0	3	3	75	
MTH102	Calculus II for Social and Life Science	2	0	0	2	30	MTH 101
EVT 104	People, Places and Environment	2	0	3	3	75	EVT 103 & EVT 107
BCH 121	Organic and Inorganic chemistry	2	0	3	3	75	WASC / GCE
GNS 128	Citizenship Education 11	2	0	0	2	30	WASC /GCE
GNS 102	Communication in English	2	0	0	2	30	WASC /GCE
EED 126	Introduction to Entrepreneurship	2	0	3	3	75	WASC /GCE
	TOTAL	16	0	15	21	465	

**NATIONAL DIPLOMA (ND II) IN ENVIRONMENTAL
TECHNOLOGY
YEAR 2 - FIRST SEMESTER**

COURSE CODE	COURSE TITLE	L	T	P	C U	CH	PRE REQU ISITE
ABT 209	Agricultural Chemistry and Biochemistry	2	0	3	3	75	
EVT 201	Introduction to Environmental Science	2	0	3	3	75	
EVT 203	Climate Change and Sustainability	2	0	0	2	30	
EVT 205	Energy and Environment	2	0	0	2	30	
EVT 207	Introduction to Renewable Energy Technology and Assessments	2	0	3	3	75	
EVT 211	Environmental Research Method	2	0	0	2	30	
EVT 213	Geologic Hazards	2	0	3	3	75	
WEM121	Wildlife Ecology	2	0	0	2	30	
GNS 201	Use of English 1	2	0	0	2	30	WASC /GCE
GNS 127	Citizenship education 1	2	0	0	2	30	WASC /GCE
	TOTAL	20	0	12	24	480	

**NATIONAL DIPLOMA (ND II) IN ENVIRONMENTAL
TECHNOLOGY
YEAR 2- SECOND SEMESTER**

COURSE CODE	COURSE TITLE	L	T	P	C U	CH	PRE REQUI SITE
EVT 202	Soil to plate: world food and Agriculture	2	0	3	3	75	EVT 101
EVT 204	Environment and Human Health	2	0	0	2	30	EVT 101
EVT 206	Special topics in Environmental Technology and Management	1	0	0	1	15	
EVT 208	Environmental Education	2	0	0	2	30	EVT 101
EVT 210	Cancer causes and consequences	2	0	0	3	30	EVT 101
EVT 212	Introduction to environmental regulations	1	0	0	1	15	
GNS 128	Citizenship Education 11	2	0	0	2	30	WASC/ GCE
GNS 202	Communication in English	2	0	0	2	30	WASC/ GCE
EED 216	Practical Entrepreneurship	2	0	3	3	75	WASC/ GCE
EVT 226	Final year project	-	-	-	6	-	
	TOTAL	16	0	6	25	330	

COURSE SYNOPSIS FOR (ND) ENVIRONMENTAL TECHNOLOGY

YEAR 1 – FIRST SEMESTER

COURSE CODE	COURSE DESCRIPTION	UNITS
EVT 101	<p>Biology of Algae Ecology of the Algae, Physiology of the Algae, Cellular Biology of the Algae, Taxonomic diversity of the Algae, Effect of Algae on the environment and human Society</p>	2.0
EVT 103	<p>Ecology and Ecosystem Introduction to ecology. Population process. Inter-specific interaction (Competition, predation, parasitism and mutualism). Nature of community (Structure at the community level, concept of stability and role of disturbance, successional processes, constructing nature, food web in space and time, constructing and restoring nature). Ecosystems (energy flow, nutrient cycling, global climate landscape ecology).</p>	3.0
EVT 105	<p>Insects and Humans The Biology of Insect, Interaction between insect and Humans, The beneficial roles of insect in Agriculture, The negative impact of insect as pest and disease vector, Ways in which insect population and activities can be controlled.</p>	3.0
EVT 107	<p>Environmental Chemistry The origin, effect and fate of Chemical pollutants, Acid rain, Global warming, The Ozone hole, The problems of air and water environment.</p>	2.0

BPH 101	Introduction to Physics Mechanics, Thermodynamics, Sound, Light, Nuclear Physics, Application of Physics to modern problems and technology	2.0
EVT 109	Plants and Society The importance of plants to society: Plant biology, domestication of crop plants, plant breeding and genetic engineering, biological invasions, conservation, biodiversity and genetic resources, ecological implications of advances in modern plant sciences, macroevolution of plants, forest utilization.	3.0
MTH 101	Calculus I for Social/ Life Science Introduction to differential calculus of algebraic, logarithmic and exponential function. The emphasis is on the concept of the derivative and application of calculus to the life and social sciences. Pre-calculus topics are covered as needed.	2.0
GNS 101	Use of English I (See curriculum of GNS)	2.0
GNS 127	Citizenship Education I (See curriculum of GNS)	2.0
COM 111	Computer Science (See curriculum of GNS)	2.0
	TOTAL CREDIT UNITS	23

YEAR 1 - SECOND SEMESTER

COURSE CODE	COURSE DESCRIPTION	UNITS
BCH 121	Organic and Inorganic Chemistry (See curriculum of SLT)	3.0
EVT 102	The Biology of Behaviour The Biological Principles of Animal Behaviour i.e. the Physiological, Genetic, Developmental, Ecological and Evolutionary processes	3.0
FOT 111	Geography Physical features, vegetation and climate zones in Nigeria. Outline the demography of Nigeria. Measurement of climatic factors.	3.0
MTH 102	Calculus II for Social/ Life Science Introduction to integral calculus and multivariable calculus involving algebraic, logarithmic, and exponential functions, further application of the derivatives, the concept of the integral of a function of one variable, differentiation of multivariable functions and its application to the life and social sciences. Pre-calculus topics are to be covered as needed.	2.0
EVT 104	People Places and Environment Human-environment interaction; population dynamics; Agricultural and other land uses; Culture and identity; uneven development; cities and urbanization; geopolitics; globalization; different methods and tools used by geographers to better understand the complexity of social and environmental change in different places.	3.0

GNS 128	Citizenship Education II (See curriculum of GNS)	2.0
GNS 102	Communication in English (See curriculum of GNS)	2.0
EED 126	Introduction to Entrepreneurship (See curriculum of EED)	3.0
	TOTAL CREDIT UNITS	21

NATIONAL DIPLOMA (ND II) IN ENVIRONMENTAL TECHNOLOGY

YEAR 2 – FIRST SEMESTER

COURSE CODE	COURSE DESCRIPTION	UNIT
EVT 201	Introduction to Environmental Science Introduction to environment (definition, scientific method, Earth spheres etc.). Biosphere (properties and origin of life, evolution, taxonomy, etc.). Lithosphere (matter, minerals, rocks, rock cycle, soils, soil ecosystem and soil pollution/ contamination, Earth structure, plate tectonics, geomorphology/ glaciations, etc.). Hydrosphere (properties of water, distribution of water: surface water ecosystems, groundwater, water use and pollution/ contamination, fisheries and conservation, etc.). Atmosphere (structure and properties, weather, pollution, climate and climate change, etc.). Environmental systems (cycling of energy and matter, biogeochemistry cycles of hydrogen, carbon, nitrogen, phosphorous, etc.). Population (characteristics of population, models of single species populations, human population and	3.0

	demographics, etc.). Biodiversity (benefits, measuring biodiversity, factors affecting biodiversity, extinction rates, biological invasions, conservation, etc.). Community (species interactions, niche, disturbance, succession, trophic levels and food web biomes, etc.). Forest resources (forest ecosystem, harvesting, effect of deforestation, forest management, etc.). Agriculture (food production, green revolution, pest management, biotechnology, GMOs etc.). Energy resources (fossil fuels, nuclear, renewable, conventional vs non-conventional, etc.). Mineral resources (mineral uses, mineral deposit types, mining methods, impacts and remediation measures, etc.). Urban environment (urban ecology, urban growth, livable cities, etc.). Health and toxicology (infectious diseases, environmental hazards, risk management, etc.). Waste (solid /liquid and toxic/hazardous waste and management, etc.). Sustainability (definition, strategies, functioning, trends, etc.).	
EVT 203	Climate Change and Sustainability The relationship between humans and the environment with interdisciplinary content. Focus is on Past impact of climate change on human activities and The future prospects.	3.0
EVT 205	Energy and Environment The relationship between humans, energy and the environment with interdisciplinary content, Environmental impact of energy production, Distribution and use with discussion of new technologies, Analytical approach to solving environmental problems.	2.0
EVT 207	Introduction to Renewable Energy Technologies and Assessments Overview of various renewable energy assessment technologies, Biomass and biofuels,	3.0

	Geothermal systems, Solar thermal system, photovoltaics, wind energy, and hydroelectric.	
EVT 211	Environmental Research Method Fundamental research skills, including hypothesis definition, experimental design, data analysis and presentation.	2.0
EVT 213	Geologic Hazards Application of geosciences principles to understand interaction between human populations and physical Earth at the local, national and global scales. This course compares and contrasts geologic hazards created by tectonic activity (volcanic eruptions, earthquakes, and mass movement) with those created by hydrologic activity (flood, hurricanes, and tsunamis). Geologic controls on environmental health (water quality, metals in soil, radon, and/ or fibrous minerals) are investigated and analyzed. Introduction to federal environmental laws and policies to reduce the impact of these hazards.	3.0
WEM 121	Wildlife Ecology (See curriculum of WEM)	2.0
GNS 201	Communication in English I (See curriculum of GNS)	2.0
GNS 127	Citizenship Education 1 (See curriculum of GNS)	2.0
	TOTAL CREDIT UNIT	24

**NATIONAL DIPLOMA (ND II) IN ENVIRONMENTAL
TECHNOLOGY**

YEAR 2 – SECOND SEMESTER

COURSE CODE	COURSE DESCRIPTION	UNIT
EVT 202	<p>Soil to plate: World Food and Agriculture A critical interdisciplinary survey of food production around the world. All aspect of agriculture and food systems are explored: soil management and crop production, insect and pest management, energy and water requirements, food processing and preparation, food distribution and food justice, food politics and economics, culture, cooking, diet and health.</p>	3.0
EVT 204	<p>Environment and Health I Epidemiology and geographic information science as tools for assessing the links between the health of human populations and the health of the environment, and how to use the tools for environmental health research. Understanding of environment and human health challenges. Contemporary tools and techniques in environment and health. Literacy, numeracy and critical thinking skills as they apply to environment and health.</p>	2.0
EVT 206	<p>Special Topics in Environmental Technology and Management Special topics in Environmental Technology & management at the ND II level for offering courses on an experimental basis.</p>	1.0

EVT 208	Environmental Education Ethical approaches to determining the value of nature. Ecological implications of social values. The role of education in preserving and transforming social values. Systems (holistic) thinking and the development of ecological literacy are considered as approaches to achieving internationally accepted goals of environmental education. Theoretical concepts are applied to program design, implementation, assessment, and evaluation.	2.0
EVT 210	Cancer: Causes and Consequences What is cancer? Risk factors of cancer. Causes of cancer: (heredity, physical and chemical agents, lifestyle, hormones, infection and inflammation, radiation and rare causes). Cancer symptoms and signs. Types of cancer. Treatment of cancer. Prognosis for cancer. Prevention of cancer.	3.0
EVT 212	Introduction to Environmental Regulations Reviewing of all the major federal and state regulations and laws which addresses: water, air and soil pollution; solid, toxic and hazardous waste; occupational safety/ health and environmental management systems. For Environmental Technology majors only	1.0
EVT 226	Final Year Project	6.0
GNS 202	Communication in English II (See curriculum of GNS)	2.0
GNS 128	Citizenship Education II (See curriculum of GNS)	2.0
EED 216	Practical Entrepreneurship (See curriculum of EED)	3.0
	TOTAL CREDIT UNIT	25

**DEPARTMENT OF ENVIRONMENTAL TECHNOLOGY
HIGHER NATIONAL DIPLOMA (HND I) IN
ENVIRONMENTAL TECHNOLOGY
YEAR 1 - FIRST SEMESTER**

COURSE CODE	COURSE TITLE	L	T	P	C U	CH	PRE REQ UI SI TE
CPT 313	Agro-climatology	0	0	2	2	30	GNS 224
EVT 301	Fundamentals of air pollution	2	0	0	2	30	
EVT 303	Environmental technology laboratory I	0	0	3	1	15	
EVT 305	Environmental Informatics I	1	0	3	2	60	
WEM 321	Wildlife Ecology	2	0	3	3	75	
EVT 307	Environmental GIS I	3	0	3	4	90	
EVT 309	Toxic substances and society	2	0	3	3	75	
FWT 412	Forest Ecology	2	0	3	3	75	
GNS 302	Communication in English III	2	0	0	2	30	
	TOTAL	14	0	20	22	480	

YEAR 1 - SECOND SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	CU	CH	PRE REQ UI SI TE
EVT 302	Environmental Monitoring Analysis	2	0	3	3	75	
ABT 312	Biological Control of Plants and Animal Diseases	1	0	3	2	60	WEM 321
EVT 304	Introduction to Environmental Law	3	0	0	3	75	
EVT 306	World Regional Geography	3	0	0	3	75	
EVT 308	Environmental Technology Laboratory II	0	0	3	1	15	EVT 303
EVT 310	Environmental GIS II	3	0	3	4	90	EVT 305
EVT 312	Environmental Health	2	0	0	2	30	EVT 301 &309
EVT 314	Pathway to Sustainable Energy	3	0	0	3	75	
GNS 401	Citizenship Education II	2	0	0	2	30	
EED 326	Entrepreneurship Development	2	0	3	3	75	
	TOTAL	21	0	15	26	600	

**HIGHER NATIONAL DIPLOMA (HNDII) IN
ENVIRONMENTAL TECHNOLOGY
YEAR 2 - FIRST SEMESTER**

COURSE CODE	COURSE TITLE	L	T	P	C U	CH	PRE REQ UISI TE
AGR 302	Field Experimentation and Data Analysis	2	0	3	3	75	
AEM 410	Rural Sociology	2	0	0	2	30	
WEM 314	Wild Life Diseases	1	0	2	3	45	
ABT 305	Statistics for Agricultural Biotechnology	2	0	0	2	30	
EVT 401	Environmental Forensic	1	0	3	3	60	
EVT 403	International Environmental Law	3	0	0	3	45	
COM 215	Computer Packages	2	0	4	3	75	
GNS 311	International Relations	3	0	0	3	45	
GNS 401	Communication in English IV	2	0	0	2	30	
	TOTAL	16	0	12	²⁴	435	

YEAR 2 - SECOND SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	C U	CH	PRE REQ UISI TE
EVT 402	Environmental Impact Assessment	2	0	3	3	75	
EVT 404	Current Environmental Challenges	2	1	0	3	45	
EVT 406	Landscape Design and Management	3	0	3	4	90	
AEM 427	Rural Sociology	2	0	0	2	30	
EED 316	Practice of Entrepreneurship	2	0	0	2	30	
EVT 445	Seminar	0	0	0	2		
EVT446	Project	0	0	0	6		
	TOTAL	11	1	6	22	300	

**COURSE SYNOPSIS FOR HIGHER NATIONAL DIPLOMA
(HND I) IN ENVIRONMENTAL TECHNOLOGY
YEAR 1 – FIRST SEMESTER**

COURSE CODE	COURSE DESCRIPTION	UNITS
CPT 313	Agro-climatology. (See curriculum of CPT)	2.0
EVT 301	Fundamentals of Air Pollution Air pollution sources, and the influence of natural and anthropogenic processes on the atmosphere. Roles of local, state and federal governments in air pollution control and importance of clean air act and it amendments.	2.0
EVT 303	Environmental Technology Laboratory I Use of field and laboratory instrumentation for monitoring outdoor and indoor air quality. Management, analysis, interpretation, and oral and written reporting of complex environmental data sets. Hand-on, real-world experience in air quality monitoring and maintenance. Required field trips may extend beyond class time.	1.0
EVT 305	Environmental Informatics Information required for addressing environmental challenges, Contemporary tools and techniques in environmental informatics and application to promote sustainability.	2.0
EVT 307	Environmental GIS I An interdisciplinary examination of the theory and techniques used in the mapping and geographic analysis of environmental problems: Vector and	4.0

	raster data models, map registration and coordinate systems, data base design, data entry and editing, GPS data collection, aerial and satellite imagery data sources, query, visualization and spatial analysis, cartography	
EVT 309	Toxic Substances and Society Interdisciplinary evaluation of past, present and future effect of toxic substances in the environment. Addresses various dimensions of toxic substances; special emphasis on ways to minimize adverse effect in contemporary and future societies.	3.0
WEM 321	Wildlife Ecology (See curriculum of WEM)	3.0
FWT 412	Forest Ecology (See curriculum of FWT)	3.0
GNS 301	Communication in English III (See curriculum of GNS)	2.0
	TOTAL CREDIT UNIT	22

YEAR 1 – SECOND SEMESTER

COURSE CODE	COURSE DESCRIPTION	UNITS
EVT 302	Environmental Monitoring Analysis. Monitoring and analysis of chemicals, biological, and radiation impact to the environment. Theory of chemical, physical, biological, and ecological monitoring. Planning and conducting environmental sampling and monitoring programs. Management, analysis, and quality assurance and control. Risk assessment in environmental technology. Laboratory practice and safety.	3.0

ABT 312	Biological Control of Plant and Animal Diseases (See curriculum of ABT)	2.0
EVT 304	Introduction to Environmental Law The course will explore law as part of the fabric of society, including private and public law, sources of law, the rule of law, the relationship between the court and the government, environmental right, and the role of the constitution. Application of law to environmental issues at the federal and state levels, including, among others, species at risk, ground, water and air pollution; natural resources; and protected areas.	3.0
EVT 306	World Regional Geography An examination of the physical and human forces that shape governments, economies, and culture. Topics include: geology, soils, climate, agriculture, industry, politics, religion, history, and the arts. The course will investigate how these factors shape human interactions with the environment and influence people's interactions with one another in various regions and countries.	3.0
EVT 308	Environmental Technology Laboratory II Scientific and legal definitions of brownfield and EPA Superfund sites. Physical, chemical and biological methods of remediating contaminated sites. Impacts of hazardous waste management on public and private sector organizations. Field trips to to public and private brownfield and superfund remediation sites to examine real-world applications of principles.	1.0

EVT 310	<p>Environmental GIS II</p> <p>An interdisciplinary examination of the theory and techniques used in the advanced mapping and geographic analysis of environmental problems: Raster-based map algebra, special estimation, weighted and fuzzy overlay, network and terrain analysis, modelling and scripting, and data standards and quality.</p>	4.0
EVT 312	<p>Environmental Health</p> <p>Examine health issues, scientific understanding of causes, and possible future approaches to control of the major environmental health problems in industrialized and developing countries: How the body react to environmental pollutant. Physical chemical and biological agents of environmental contamination. Vectors for dissemination (air, water, soil). Solid and hazardous waste. Susceptible pollutant. Biomarkers, and risk analysis. The scientific basis for policy decision. The emerging global environmental health problems.</p>	2.0
EVT 314	<p>Pathways to Sustainable Energy</p> <p>Sustainable energy, taking a strong industry perspective. International, national, and sub-national policies that drive adoption of renewable energy, energy efficiency, and carbon capture and storage technologies. Technical understanding of how renewable energy, energy efficiency, and carbon capture and</p>	3.0

	storage technologies work, and the technological barriers to their widespread adoption. Administration of programs to overcome barriers to adoption. The big energy picture, renewable energy, and energy efficiency.	
GNS 401	Citizenship Education (See curriculum of GNS)	2.0
EED 326	Entrepreneurship Development (See curriculum of EED)	3.0
	TOTAL CREDIT UNIT	26

**COURSE SYNOPSIS FOR HIGHER NATIONAL DIPLOMA
(HND II) IN ENVIRONMENTAL TECHNOLOGY
YEAR 2 – FIRST SEMESTER**

COURSE CODE	COURSE DESCRIPTION	UNITS
AGR 301	Field Experimentation and Data Analysis (See curriculum of AGR)	3.0
AEM 410	Rural Sociology (See curriculum of AEM)	2.0
WEM 314	Wildlife Diseases (See curriculum of WEM)	3.0
ABT 305	Statistics for Agricultural Biotechnology (See curriculum of ABT)	2.0
EVT 401	Environmental Forensic Use of site assessment methodologies and state of the art technologies from analytical chemistry, molecular biology, biogeochemistry, and GIS to solve environmental cases with regards to soil / sediment, water, and air contamination.	3.0

EVT 403	International Environmental Law International law pertaining to the environment and what effect that has within state and the globe. Processes by which international law is formulated. The contribution of science to international environmental law. The distinctions and contributions of formal and informal interactions of governments and NGOs in the development of international environmental law. Law as not the answer but, rather, a mechanism for dealing with problems and as such a responsive instrument.	3.0
COM 215	Computer Packages (See curriculum of COM)	3.0
GNS 311	International Relations (See curriculum of GNS)	3.0
GNS 401	Communication in English IV (See curriculum of GNS)	2.0
	TOTAL CREDIT UNIT	24

YEAR 2 – SECOND SEMESTER

COURSE CODE	COURSE DESCRIPTION	UNITS
EVT 402	Environmental Impact Assessment (EIA) Application of an EIA frame work for projects to prepare an EIA. Detailed project descriptions for a range of projects and their phases. Identification of valued environmental components (VECs). Designing of a meaningful stakeholder participation program. Formulate	3.0

	<p>reasonable bounds for various impact categories. Environmental impact and risk methodologies. Predicting environmental impacts accurately. Designing environmental management plans which includes: mitigation, enhancement, compensation and monitoring. Assess and value residual impacts for decision makers. Construct a flow-up plan for accountability. Recommend project decision: acceptance, modification or rejection. Generate a strategic environmental assessment (SEA) framework for plans, programs and policies. Assess SEA impacts with extended spatial-temporal scales. Recommend appropriate management strategies to SEA decision-makers.</p>	
<p>EVT 404</p>	<p>Current Environmental Challenges Air pollution and its global impact. Earth's energy balance. The green house and enhanced greenhouse effect. The consequences of global climate change. The fundamentals of the first and the second law of thermodynamics. The cause and effect of ozone depletion. The formation of fossil fuels. How fossil fuels are used to generate energy. The environmental impact of using fossil fuels. The benefits and challenges associated with renewable energy options. The benefits and challenges associated with nuclear energy. The limitation of mainstream economics that make it an unsustainable model. Life cycle assessment as a tool to assess environmental impacts. Types of waste that humans generate, particularly in countries</p>	<p>3.0</p>

	like Nigeria. The ways we deal with solid waste and the trade-offs of each option. The global pattern of urbanization. The environmental trade-offs associated with cities or urban areas. The environmental and human health challenges presented by suburban sprawl.	
EVT 406	Landscape Design and Management Safety in landscape design and turf management. Lawns and turf areas (uses of lawns and turf areas; types of grasses; soil properties; site evaluation and ground preparation; lawn and turf maintenance). Irrigation (water needs of various landscape; various systems; water management). Landscape drawing and design. Principles of design. Architectural elements in landscape design. Selection of plant materials. Sustainable and environmentally sensitive landscape design. Quality Water Efficient Landscape (QWEL). Recreational park turf management techniques. Landscape project proposals. Urban planning. Agricultural interpersonal and leadership development. Design and build environmentally friendly landscape shed.	3.0
AEM 427	Rural Sociology (See curriculum of AEM).	2.0
EED 316	Practice of Entrepreneurship (See curriculum of EED)	2.0
EVT 444	Seminar	2.0
EVT 446	Project	6.0
	TOTAL CREDIT UNIT	22

**DEPARTMENT OF FOREST MANAGEMENT
AND WOOD TECHNOLOGY**

FORESTRY MANAGEMENT AND WOOD TECHNOLOGY PROGRAMMES

National Diploma (ND) and Higher National Diploma (HND) in Forest Management and Wood Technology

Programme Goal:

The National Diploma Programme in Forest Management and Wood Technology is designed to produce technologist who will contribute effectively in capacity building and manpower requirements for the development of forestry and wood industries.

Programme Objectives:

1. To produce middle level skilled graduate with strong practical knowledge in the area of Forestry and Wood Technology.
2. To train personnel with the requisite skill in the use of modern technology in forestry and wood technology business.
3. To produce middle level skilled manpower who will become entrepreneur in forestry business.
4. To produce graduate with the required skill in the management of the forest resources for the benefit of all.

Entry Requirements:

As provided by NBTE

Course Structure: (See Tables)

NATIONAL DIPLOMA (ND): YEAR 1, FIRST SEMESTER

S/ N	COURSE CODE	COURSE TITLE	L	T	P	C U	C H	PRE REQU ISITE
1	STB 112	Morphology and Physiology of Living things	1	0	2	2	45	
2	GNS 101	Use of English	2	0	0	2	30	WASCE /SSCE
3	MTH 102	Logic and Linear Algebra	2	0	0	2	30	WASCE /SSCE
4	BCH 101	General Physical Chemistry	2	0	0	2	30	WASCE /SSCE
5	AGT 101	Agro-Climatology	2	0	0	2	30	WASCE /SSCE
6	BPH 101	Mechanics, Properties of matter and Heat Energy	1	0	2	2	45	WASCE /SSCE
7	AGR 101	Introduction to Agriculture	2	0	0	2	30	WASCE /SSCE
8	FWT 111	Introduction to Forestry	1	0	3	3	60	WASCE /SSCE
9	COM101	Introduction to Computing	2	0	3	2	75	WASCE /SSCE
10	LIB 101	Use of Library	2	0	0	2	30	WASCE /SSCE
11	SAP 101	Skill Acquisition Practice	1	0	2	2	45	WASCE /SSCE
		TOTAL				23		WASCE /SSCE

NATIONAL DIPLOMA (ND):
YEAR 1 SECOND SEMESTER

S/ N	COURSE CODE	COURSE TITLE	L	T	P	C U	C H	PRE REQUI SITE
1	GNS 201	Use of English II	2	0	0	2	30	WASCE /SSCE
2	FWT 121	Forest Management	1	0	2	2	45	WASCE /SSCE
3	FWT 122	Introduction to Timber Harvesting	1	0	2	3	45	WASCE /SSCE
4	BCH 121	Organic and Inorganic Chemistry	1	0	2	2	45	WASCE /SSCE
5	FWT 123	Introduction to Wood Technology	2	0	3	3	75	WASCE /SSCE
6	FOT 121	Research Methodology and Statistics	2	0	0	2	30	WASCE /SSCE
7	FMP 121	Farming Practice	1	0	2	2	45	WASCE /SSCE
8	GNS 102	Communication in English I	2	0	0	2	30	WASCE /SSCE
9	GNS128	Citizenship Education I	2	0	0	2	30	WASCE /SSCE
10	EED 126	Introduction to Entrepreneurship	2	0	1	2	45	WASCE /SSCE
		TOTAL				22		

COURSE SYNOPSIS

NATIONAL DIPLOMA (ND): YEAR 1, FIRST SEMESTER

COURSE CODE	COURSE TITLE	UNITS
STB 112	Morphology and Physiology of Living things (See curriculum of SLT)	2
GNS 101	Use of English (See curriculum of GNS)	2
MTH 102	Logic and Linear Algebra (See curriculum of SLT)	2
BCH 101	General Physical Chemistry (See curriculum of SLT)	2
AGT 101	Agro-Climatology (see curriculum of Agric Tech.)	2
BPH 101	Mechanics, Properties of matter and Heat Energy (See curriculum of SLT)	2
AGR 101	Introduction to Agriculture (See curriculum of Agriculture)	2
FWT 111	Introduction to Forestry Introduction and concept in forestry: Definition of terms Benefit of forestry to the national economy, types of forest and sustained yield principles.	3
COM 101	Introduction to Computing (See curriculum of GNS)	2
LIB 101	Use of Library (See curriculum of GNS)	2
SAP 101	Skill Acquisition Practice (See curriculum of GNS)	2
	TOTAL CREDIT UNITS	23

NATIONAL DIPLOMA (ND): YEAR 1, SECOND SEMESTER

COURSE CODE	COURSE DESCRIPTION	UNITS
GNS 201	Use of English II (See curriculum of GNS)	2
FWT 121	Forest Management General introduction to forest management. Productive and protective functions of forest resources. Forest management planning: Types of written plan, components of forest management plan, forest land use planning and sustained yield principles.	3
FWT 122	Introduction to Timber Harvesting Basic principles of timber harvesting operations: Felling, logging techniques, equipment required for harvesting and logs haulage methods.	3
BCH 121	Organic and Inorganic Chemistry	2
FWT 123	Introduction to Wood Technology General practice and care of hand tools and equipment. Introduction to safe use of portable power tools, personal safety in wood working laboratory, wood joinery and shaping techniques. Basic wood working, furniture design and planning, wood identification, preparation and finishing.	3
FOT 121	Research Methodology and Statistics (See curriculum of SLT)	2
FMP 121	Farming Practice (See curriculum of Agriculture)	2
GNS 102	Communication in English I (See curriculum of GNS)	2
GNS128	Citizenship Education I (See curriculum of GNS)	2
EED 126	Introduction to Entrepreneurship (See curriculum of GNS)	2
	TOTAL CREDIT UNITS	23

NATIONAL DIPLOMA: YEAR 2, FIRST SEMESTER

S/ N	COURSE CODE	COURSE TITLE	L	T	P	C U	CH	PRER EQUI SITES
1	FWT 201	Introduction to Silviculture	2	0	3	3	75	
2	FWT 202	Basic Principles in Land Surveying I	1	0	2	2	45	
3	FWT 203	Forest Mensuration	1	0	2	2	45	
4	FWT 204	Forest Engineering and Timber Harvesting	2	0	3	3	75	
5	FWT 205	Forest Policy, Law and Administration	2	0	0	2	30	
6	FWT 206	Basic Workshop Technology and Practice	2	0	3	3	75	
7	GNS 201	Communication in English	2	0	0	2	30	
8	SIW 201	SIWES	0	0	0	4	00	
9	EED 201	Entrepreneurship	1	0	2	2	45	
		TOTAL CREDIT UNITS				23		

NATIONAL DIPLOMA: YEAR 2, SECOND SEMESTER

S/ N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH	PRER EQUI SITES
1	FWT 221	Wood Product Technology	1	0	2	2	45	
2	FWT 222	Basic Principles in Land Survey	2	0	3	3	75	
3	FWT 223	Principles of Plant Protection	2	0	0	2	45	
4	FWT 224	Silviculture	1	0	2	2	45	
5	FWT 225	Nursery Practice	1	0	2	2	45	
6	FWT 226	Wood Deterioration and Control	1	0	2	2	45	
7	FWT 227	Principles of Bee Keeping	1	0	2	2		
8	EED 216	Practice Entrepreneurship	2	3	3	3	75	
9	FWT 290	Project	0	0	0	6	00	
		Total Credit Units				26		

COURSE SYNOPSIS

NATIONAL DIPLOMA (ND): YEAR 2, FIRST SEMESTER

COURSE CODE	COURSE TITLE	UNITS
FWT 201	Introduction to Silviculture Concept and definition of terms, problems of raising tree crops. Ecological factors affecting tree growth: climatic factors, edaphic factors, biotic factor. Seed collection Technology: Seed collection methods, seed processing, seed testing, seed pre-treatment methods and seed storage methods. Water uptake and loss in tree, nutrient cycling in forest ecosystem. Principles underlying choice of species and provenance trial.	3
FWT 202	Basic Principles in Land Surveying I Basic principles in surveying, introduction, classification and types of surveying. Linear measurement, chain surveying, equipment used in chain surveying, precautions in using chain surveying instruments. General procedure in making criteria for selecting survey line/offsets. Methods of making linear measurements in surveying, methods of setting offsets to the chain line and methods of plotting the survey.	2
FWT 203	Forest Mensuration Forest resources: sampling and enumeration techniques, including timber and wildlife. Measurement and estimation of timber in logs and forest stands, Inventory instruments and their uses.	2

	Volume estimation and volume table construction. Construction of management.	
FWT 204	<p>Forest Engineering and Timber Harvesting</p> <p>Basic concepts in forest engineering practices: Road design methods, types of forest roads, equipment required for the construction of forest roads, drainage systems and design, maintenance of forest roads and drainages. Harvesting systems, types of harvesting, harvesting procedures and safety precautions, equipment required for timber harvesting, mechanics and haulage system of harvested timber.</p>	3
FWT 205	<p>Forest Policy, Law and Administration</p> <p>National and State policies on Forest resources. Concept of management and simple office administration procedure. Concept of laws and the relationship between the judiciary and the law enforcement agents in the apprehension and prosecution of those contravening forest laws. Procedure for investigation and prosecuting forest law cases Courts. Planning and effective use of forest resources, structure of forest administration.</p>	2
FWT 206	<p>Basic Workshop Technology and Practice</p> <p>General concept of workshop and practice, common tools in wood workshop, care and maintenance of wood workshop tools and equipment, hazards and safety in wood workshop and the workshop, basic process</p>	3

	in carpentry and joinery, uses of hand tools in preparing lumber and process of application, use of mortise and tenon joint, dove tail joints in furniture manufacture.	
GNS 201	Communication in English (see curriculum of GNS)	2
SIW 201	SIWES (see curriculum of SIWES)	4
EED 201	Entrepreneurship (see curriculum of GNS)	2
	Total Credit Units	23

NATIONAL DIPLOMA (ND): YEAR 2, SECOND SEMESTER

COURSE CODE	COURSE TITLE	UNITS
FWT 221	Wood Product Technology Basics concepts in wood products design and manufacturing process. Wood design methods and uses of engineered wood products. Test grades and design properties for lumber and round logs	2
FWT 222	Basic Principles in Land Survey II Concept of levelling: Levelling instrument, line of collimation, criteria for selecting levelling datum, construction and use of bench mark, procedure in levelling, uses of levelling, contour characteristics and uses of contour maps. Compass surveying, the prismatic compass and variations in declination. Interpretation of maps, layout and engineering survey plan. General requirement of a map/plan and principles of plan production in surveying	3

FWT 223	<p>Principles of plant Protection</p> <p>An introduction: symptoms spread and control of major local plant diseases; study of insect pests of major local crops: Strategies of integrated pest control and pest. Management, their significance and principles of control and study of the effects of diseases caused by abiotic (moisture, temperature. wind-pollution, nutrient deficiencies), various biotic agents (bacteria, Fungi and Nematodes; Parasitic flowering plants) and control of these diseases. Weeds of crops, and classification; effect of weeds on crops and livestock: principles and methods of control.</p>	2
FWT 224	<p>Silviculture</p> <p>Natural and Artificial Regeneration; Nursery Techniques; Application of Principles for the establishment and maintenance of forest. Taungya and other Silvicultural practices.</p>	2
FWT 225	<p>Nursery Practice</p> <p>General nursery principles and practice. Seed collection, handling of collected seeds, fruits and seed extraction. Nursery maintenance and management of seedlings</p>	2
FWT 226	<p>Wood Deterioration and Control</p> <p>General principles and causes of wood deterioration. Fungal attack, insects, termites and marine Effects of wood deterioration in wood utilization.</p>	2
FWT 227	<p>Principles of Bee Keeping</p> <p>Historical development of bee keeping,</p>	2

	types of honey bees caste, importance of bee keeping. Factors governing the establishment of an apicy, materials required for hive construction and the characteristics of a good bee hive. Methods of determining suitable bee habitat. Honey cropping and harvesting.	
EED 216	Practice Entrepreneurship (see curriculum of GNS)	3
FWT 290	Project Each student is required to choose and execute a special project under a supervisor. The duration of the project shall be two semester.	6
	Total Credit Units	26

Programme: HND Forestry Management and Wood Technology**HIGHER NATIONAL DIPLOMA: YEAR 1, FIRST SEMESTER**

S/ N	COURSE CODE	COURSE TITLE	L	P	CU	CH	PRE REQ UIS ITES
1	FWT 311	Forest Inventory	2	3	3	75	
2	FWT 312	Advance Forest Management	2	0	3	30	
3	FWT 313	Advance Forest Engineering	1	2	3	75	
4	AGT 313	Agro-Climatology	2	0	2	30	
5	AGR 302	Field Experimentation and Data Design	2	0	2	30	
6	FWT 314	Forest Soils	2	0	3	30	
7	FWT 315	Aerial and Ground Survey Techniques	1	2	3	45	
8	EEP 217	Skill Acquisition 111	1	2	2	45	
9	COM311	Operating System 1	2	0	2	30	
10	GNS 311	Communication in English1	2	0	2	30	
		TOTAL CREDIT UNITS			25		

HIGHER NATIONAL DIPLOMA: YEAR 1, SECOND SEMESTER

S/ N	COURSE CODE	COURSE TITLE	L	P	CU	CH	PRE REQ UIS ITES
1	FWT 321	Agro-Forestry Practice	2	3	3	75	
2	FWT 322	Forest Economics	3	0	3	45	
3	FWT 323	Forest Resources Extension Methods	1	2	3	45	
4	FWT 324	Forest Plantation Management	3	0	3	45	
5	FWT 325	Forest Biology	2	3	3	75	
6	EEP 218	Skill Acquisition IV	1	2	2	30	
7	COM312	Data Base Design	2	0	2	2	
8	GNS 302	Communication in English III	1	2	2	20	
		Total			24		

Course Synopsis

HIGHER NATIONAL DIPLOMA (HND): YEAR 1, FIRST SEMESTER

COURSE CODE	COURSE DESCRIPTION	UNITS
FWT 311	Forest Inventory Importance of sampling techniques in forest management including timber and wildlife. Statistical tools in the processing of data and application of sampling techniques in forest management. Measurement and estimation of lumber in logs and forest stands, Inventory instruments and their uses.	3
FWT 312	Advance Forest Management Organization of forest resources and management techniques. Morphology, taxonomy and ecology of tropical trees. Forest production activities. Introduction to operation research in forest management.	3
FWT 313	Advance Forest Engineering Road layout, construction and design of forest roads. Design and construction of bridges and stream culverts. Planning analysis and supervision of operations.	3
AGT 313	Agro-Climatology (see curriculum for Agric Tech)	2
AGR 302	Field Experimentation and Data Design (see curriculum for Agric Tech)	2
FWT 314	Forest Soils Understanding of soil dynamics and influence upon forest composition, stand regeneration, tree vigor and growth. Soil moisture movement, forest nursery soil management, forest soil fertility, maintenance and improvement with special reference to tropical conditions.	3

FWT 315	Aerial and Ground Survey Techniques Basic principles and scope of surveying. Concept and types of survey. Surveying instruments, Levelling instruments radial-line plotting and height determination. Drawing materials and instruments. Aerial photographs and satellite imagery.	3
EEP 217	Skill Acquisition 111 (see curriculum for GNS)	2
COM 311	Operating System 1 (see curriculum for GNS)	2
GNS 311	Communication in English 1 (see curriculum for GNS)	2
	Total Credit Units	25

**HIGHER NATIONAL DIPLOMA (HND): YEAR 1,
SECOND SEMESTER**

COURSE CODE	COURSE DESCRIPTION	UNITS
FWT 321	Agro-Forestry Practice Concept and definition of agroforestry. Essentials features of agroforestry systems, classification and practice. Eco-physiological relationship of mixed plants. Maintenance of Agro forestry plots.	3
FWT 322	Forest Economics Concept of forest goods and services, demand and supply, causes affecting demand and supply of forest good and services, application of economic principles to forest resources management; decision making in single and multiple resource use; cost benefit analysis of forest goods and services.	3

FWT 323	Forest Resources Extension Methods Management interpretation to include methods and techniques for communication values of forestry, parks, game reserves and other wildlife, the role of extension agent in providing organizational and administrative support in forestry, training programmes of extension workers in forestry and wildlife.	3
FWT 324	Forest Plantation Management Organization of Forest Resources. Morphology, taxonomy and ecology of tropical trees. Forest production activities, forest protection and the regulation of harvest for sustained yield. Preparation of working plan. Solving managerial problems. Introduction to Operation Research in Forestry.	3
FWT 325	Forest Biology Morphology, Taxonomy, Physiology and classification of trees. Ecology and basic principles of tree genetics	3
EEP 218	Skill Acquisition IV (see curriculum for GNS)	2
COM312	Data Base Design (see curriculum for GNS)	2
GNS 302	Communication in English III (see curriculum for GNS)	2
	Total	24

HIGHER NATIONAL DIPLOMA: YEAR 2, FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	L	P	C U	CH	PRE REQ UI SI TES
1	FWT 411	Wood Anatomy and Structures	1	2	3	45	
2	FWT 412	Forest Ecology	2	3	3	75	
3	AEM 410	Rural Sociology	2	0	3	30	
4	FWT 413	Sawmilling and Wood Machining	1	2	3	45	
5	FWT 414	Furniture Design and Production	1	2	3	45	
6	FWT 415	Wood Preservation Techniques	1	2	3	45	
7	FWT 416	Wood Processing Technology	1	2	3	45	
8	FWT 401	Research Methods	2	0	3	30	
9	COM321	Operating System II	2	0	2	30	
10	GNS 311	Research Methodology	2	0	2	30	
		TOTAL				28	

HIGHER NATIONAL DIPLOMA: YEAR 2, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	L	P	C U	CH	PRE REQ UI SI TES
1	FWT 421	Wood Product Engineering	1	2	3	45	
2	FWT 422	Forest Resources Conservation and Social Forestry	2	0	2	30	
3	CPT 444	Seed Production Techniques	1	2	3	45	
4	FWT 423	Remote Sensing Techniques	1	2	2	45	
5	FWT 424	Wood Adhesive and Fasteners	1	2	2	45	
6	FWT 425	Natural Ecosystem	2	0	2	30	
7	FWT 426	Herbarium Techniques	1	2	2	45	
8	COM 322	Data Base Design II (see curriculum of GNS)	2	0	3	30	
9	GNS 311	International Relations (see curriculum of GNS)	3	0	0	30	
10	FWT 498	Seminar	0	0	2	00	
11	FWT 499	Special Project	0	0	6	00	
		TOTAL				27	

Course Synopsis

HIGHER NATIONAL DIPLOMA (HND): YEAR 2, FIRST SEMESTER

COURSE CODE	COURSE DESCRIPTION	UNITS
FWT 411	Wood Anatomy and Structures Introduction to wood anatomy, characteristics common to hardwood and softwood species. Tree structure and composition. Anatomical features of wood development.	3
FWT 412	Forest Ecology Ecosystem concept, functions and services; Biodiversity: levels and types. Nigeria's major ecosystems – forest, mangrove, freshwater and savanna, etc Ecosystem rehabilitation and restoration. Biodiversity indices and ecological studies. Environmental Impact studies. Basic concept of Environmental Impact Assessment (EIA). The EIA processes vis-a-vis the essential elements in the EIA process.	3
AEM 410	Rural Sociology (see curriculum of AEM)	3
FWT 413	Sawmilling and Wood Machining General overview on sawmilling and wood machining. Sawmilling processes, operation and techniques. Sawmill classification, design and layout techniques, factors affecting sawmill establishment and evaluation of mill performance	3
FWT 414	Furniture Design and Production General principle and basis of structural design in furniture manufacturing. Machine required in furniture: Planner and matcher, ground to pattern knife, mill to pattern knife, sharper, router, turning lathe	3

	machine, sanding machines. Furniture design and production methods.	
FWT 415	Wood Preservation Techniques Basis of wood preservation. Preservatives types and application methods i.e. pressure and non-pressure methods of chemical preservatives application. Qualities of desirable wood preservatives.	3
FWT 416	Wood Processing Technology Basic wood processing technology practices, machines and equipment required in wood processing technology, wood machining, gluing and finishing of furniture and other wood products types. Charcoal production technology, traditional and modern techniques in charcoal production, utilization and uses of finished wood products.	3
FWT 401	Research Methods (see curriculum of GNS)	3
COM 321	Operating System II (see curriculum of GNS)	2
GNS 311	Research Methodology (see curriculum of GNS)	2
	Total	28

HIGHER NATIONAL DIPLOMA (HND): YEAR 2, SECOND SEMESTER

COURSE CODE	COURSE DESCRIPTION	UNITS
FWT 421	Wood Product Engineering General overview of engineer wood products such as plywood, particle board, fibre board etc. Design methods and manufacturing process. Determination of engineered wood product quality and standard control measures.	3

FWT 422	Forest Resources Conservation and Social Forestry History and roles of forest resources conservation. Concept of socio-forestry/community forestry and community based forest management/joint forest management. Issues of forestry/wildlife and livelihood enhancement. Principles and formulation of social forest projects.	2
CPT 444	Seed Production Techniques (see curriculum of Crop Tech.)	3
FWT 423	Remote Sensing Techniques Remote sensing techniques. Data acquisition and interpretation. Construction of Field Reconnaissance and topographical maps.	2
FWT 424	Wood Adhesive and Fasteners Introduction to nature of adhesives: Structure, properties, application methods and uses of adhesives in bonding wood products. Testing and characterization of bonded wood products. Types and application of wood adhesives and fasteners.	2
FWT 425	Natural Ecosystem The major natural ecosystems in Nigeria and their ecological characteristics. Distribution, structure and dynamics of land and fresh water ecosystem. Energy Flow and Nutrient Cycling through natural ecosystems. Biodiversity and Conservation.	2
FWT 426	Herbarium Techniques General principles of collection and preservation of biological materials in forestry and wildlife studies. Trees identification and preparation of Taxonomic keys.	2

COM 322	Data Base Design II (see curriculum of GNS)	3
GNS 311	International Relations (see curriculum of GNS)	0
FWT 498	Seminar Each student is expected to prepare and deliver seminar in the final year as requirement for graduation	2
FWT 447	Final Year Project Each student is required to choose and execute a special project under a supervisor. The duration of the project shall be two semester.	6
	TOTAL	27

**DEPARTMENT OF WILDLIFE AND
ECO-TOURISM MANAGEMENT**

WILDLIFE AND ECO-TOURISM MANAGEMENT PROGRAMMES

National Diploma (ND) and Higher National Diploma (HND) in
Wildlife and Eco-tourism Management

Programme Goal:

The National Diploma Programme in Wildlife and Eco-tourism Management is designed to produce technologists who will be able to design, plan, develop and manage wildlife resources and ecotourism potentials.

Programme Objectives:

On completion of this programme, the graduate should be able to:

1. Use modern techniques in the domestication of wildlife
2. Establish game farming
3. Propagate extension and eco-tourism awareness
4. Carryout conservation practices and utilize wildlife resources
5. Organize recreation activities such as guided tour, sport fishing etc.

Entry Requirements:

As provided by NBTE

Course Structure: (See Tables)

NATIONAL DIPLOMA: YEAR 1, FIRST SEMESTER

S/ N	COURSE CODE	COURSE TITLE	L	T	P	C U	C H	PREREQ UISITES
1	STB 112	Morphology and Physiology of Living things	1	0	2	2	45	WASCE/ SSCE
2	LTM 111	Introduction to Leisure Recreation and Tourism	2	0	0	2	30	WASCE/ SSCE
3	LTM 112	Transportation	2	0	0	2	30	WASCE/ SSCE
4	COM 101	Introduction to Computing	2	0	2	3	75	WASCE/ SSCE
5	AGT 124	Rural Sociology	2	0	0	2	30	WASCE/ SSCE
6	HTM 111	Introduction to Hospitality Management	2	0	0	2	30	WASCE/ SSCE
7	WEM 111	Introduction to Wildlife Management	2	0	0	2	30	WASCE/ SSCE
8	WEM 112	Tour of Zoological Gardens in the Locality and Reports	-	0	-	4	-	WASCE/ SSCE
9	GNS 101	Use of English I	2	0	0	2	30	WASCE/ SSCE
		TOTAL				21		WASCE/ SSCE

NATIONAL DIPLOMA: YEAR 1, SECOND SEMESTER

S/ N	COURSE CODE	COURSE TITLE	L	T	P	C U	C H	PRERE QUISIT ES
1	STB 122	Plant and Animal Taxonomy		0		2	30	WASCE /SSCE
2	FOT 111	Geography	2	0	0	3	30	WASCE /SSCE
3	AGT 212	Agro- Climatology	2	0	1	3	45	WASCE /SSCE
4	COM 123	Computer Application Packages	1	0	2	2	45	WASCE /SSCE
5	LTM 113	Geography of Tourism	1	0	3	2	60	WASCE /SSCE
6	LTM 114	Tourism Marketing	2	0	0	2	30	WASCE /SSCE
7	LTM 123	Information Technology and Tourism	1	0	0	2	45	WASCE /SSCE
8	WEM 121	Wildlife Ecology	1	0	2	2	45	WASCE /SSCE
9	WEM 122	Tour of Zoological Garden and Tourism Sites and Reports (2)	-	0	-	-	-	WASCE /SSCE
10	GNS128	Citizenship Education I	2	0	0	2	30	WASCE /SSCE
11	EED 126	Introduction to Entrepreneurship	1	0	2	2	45	WASCE /SSCE
		Total				22		

Course Synopsis

NATIONAL DIPLOMA (ND): YEAR 1, FIRST SEMESTER

COURSE CODE	COURSE TITLE	UNITS
STB 112	Morphology and Physiology of Living things (see curriculum of SLT)	2
LTM 111	Introduction to Leisure Recreation and Tourism (see curriculum for LTM)	2
LTM 112	Transportation (see curriculum for LTM)	2
COM 101	Introduction to Computing (See curriculum of GNS)	3
AGT 124	Rural Sociology (see curriculum of AEM)	2
HTM 111	Introduction to Hospitality Management (see curriculum of HTM)	2
WEM 111	Introduction to Wildlife Management Basic concept of wildlife management: Definition of terms: wildlife (fauna and flora), conservation, population, management, utilization, exploitation. Differences between wildlife and domestic animals. History of wildlife management in Nigeria and its role in National economy, reasons for global domestication of wildlife. Classification of wildlife animals into vertebrates and invertebrates. Vertebrates animals: Mammals, Aves, Reptiles, Amphibians, Pisces with specific examples of each class. Invertebrates animals: Insect, Mollusca, Crustacean,	2

	Arthropod with specific examples of each class. Wildlife conservation methods: National Park management, Game Reserve management, Forest Reserve management, Game Sanctuaries management, Man and Biosphere (Nature Reserve, Zoo, Botanical Garden).	
WEM 112	Tour of Zoological Gardens in the Locality and Reports I Excursion to zoological gardens and tourism sites in the state. Students should write a report on their visit to these zoological garden and tourist sites.	4
GNS 101	Use of English I	2
	TOTAL CREDIT UNITS	23

NATIONAL DIPLOMA (ND): YEAR 1, SECOND SEMESTER

COURSE CODE	COURSE DESCRIPTION	UNITS
STB 122	Plant and Animal Taxonomy (see curriculum of SLT)	2
FOT 111	Geography (see curriculum of FOT)	3
AGT 212	Agro- Climatology (see curriculum of AGR)	3
COM 123	Computer Application Packages (see curriculum of GNS)	2
LTM 113	Geography of Tourism (see curriculum of LTM)	2
LTM 114	Tourism Marketing (see curriculum of LTM)	2
LTM 123	Information Technology and Tourism	2

WEM 121	<p>Wildlife Ecology Definition of ecology, differences between plant and animal ecology. Wildlife habitat: types and major form of wildlife habitat. Aquatic habitat (marine, fresh water and brackish water), Terrestrial habitat (Arboreal and Subterranean). Classification of wildlife according to vegetation zones (mangrove forest, rain forest, riparian forest). Concept of niche, ecosystem and factors of ecological environment. Primary form and types of energy (Radiant energy, chemical energy and mechanical energy). Production process in the forest, food chain (grazing food chain and detritus food chain), ecological pyramids (pyramid of number, pyramid of biomass and pyramid of energy). Natural and biological agents of ecological disturbance and succession.</p>	2
WEM 122	<p>Tour of Zoological Garden and Tourism Sites and Reports (2) Excursion to zoological gardens and tourism sites in the state. Students should write a report on their visit to these zoological garden and tourist sites.</p>	-
GNS128	<p>Citizenship Education I (see curriculum of GNS)</p>	2
EED 126	<p>Introduction to Entrepreneurship (see curriculum of GNS)</p>	2

NATIONAL DIPLOMA: YEAR 2, FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	L	P	CU	CH	PRE REQUI SITES
1	WEM 211	Wildlife and Eco-tourism Extension	1	2	2	45	
2	WEM 212	Administration, Law and Egonometrics	2	0	2	30	
3	WEM 213	Natural History of Herbivores	1	2	2	45	
4	WEM 214	Ballistics	1	2	2	45	
5	WEM 215	Range Management I	2	3	3	75	
6	WEM 216	Ornithology	1	2	2	45	
7	GNS 201	Use of English II	1	2	2	45	
8	LTM 212	Leisure and Tourism Management	2	0	2	30	
9	GNS 228	Research Methods	2	0	2	30	
		Total	12	12	24	310	

NATIONAL DIPLOMA: YEAR 2, SECOND SEMESTER

S/ N	COURSE CODE	COURSE TITLE	L	P	CU	CH	PRE REQUI SITES
1	WEM 221	Wildlife Management Techniques	2	3	3	75	
2	WEM 222	Park Planning and Development	1	2	2	45	
3	WEM 223	Zoo and Museum Management	1	2	2	45	
4	WEM 224	Wildlife Product Processing and Utilization	1	2	2	45	
5	WEM 225	Game Farming Techniques	1	2	2	45	
6	LTM 115	Tourism Marketing	1	2	2	45	
7	LTM 222	Arts, Heritage and Culture	1	2	2	45	
8	SUG 102	Basic Surveying	2	3	3	75	
9	EED 216	Practice Entrepreneurship	2	3	3	75	
10	WEM 227	Final Year Project	-	-	6	-	
		TOTAL			27		

COURSE SYNOPSIS

NATIONAL DIPLOMA (ND): YEAR 2, FIRST SEMESTER

COURSE CODE	COURSE TITLE	UNITS
WEM 211	Wildlife and Eco-tourism Extension Concept of wildlife extension; Purpose of wildlife extension, principles of wildlife extension, equipment used in extension work, types of personnel contact used in wildlife extension. Scope of conservation education and public enlightenment in school programme. Strategies in eco-tourism extension (Consumer awareness and education, tourism industry action, destination planning and development, concept of marketing eco-tourism)	2
WEM 212	Administration, Law and Ergonomics Concept of management and simple office administration procedure. Concept of laws and the relationship between the judiciary and the law enforcement agents in the apprehension and prosecution of those contravening wild animals law. Procedure for investigation and prosecuting wildlife cases in Law Courts. Wildlife conservation legislation. Scope of ergonomics and the importance of safety at work.	2
WEM 213	Natural History of Herbivores Vertebrates and its classification, evolution, anatomy, physiology and production of typical mammals. Natural history of selected herbivores, carnivores and primates. Wild animals identification	2

	techniques i.e. droppings, prints and tracks. Practice in the preservation of common, rare, threatened and endangered African mammals.	
WEM 214	Ballistics Basic skills in handling and operating main types of firearms. Maintenance of firearms and use of various shooting ranges. Types of firearms and ammunitions	2
WEM 215	Range Management I Concept of range management. Measurement of primary productivity of rangeland, fire as an ecological factor management tool in range land. Concept of range improvement, food type and feeding habits of named animals, crop residue management, and effect of pollution on range land. Classification of range land in Nigeria, taxonomic and physiognomic structure of rangeland, biotic and abiotic factors affecting rangeland structure and productivity.	3
WEM 216	Ornithology Classification of birds into their order, families and genera. Process of identification of birds and the materials required, general anatomy and physiology of birds. Process of migration of birds and management of game birds. Economic importance of game in food and recreation, insect control, plant pollination, vermin, harbouring and transmitting parasites.	2

GNS 201	Use of English II (see curriculum of GNS)	2
LTM 212	Leisure and Tourism Management (see curriculum of LTM)	2
GNS 228	Research Methods (see curriculum of GNS)	2
	Total Units	24

NATIONAL DIPLOMA (ND): YEAR 2, SECOND SEMESTER

COURSE CODE	COURSE DESCRIPTION	UNITS
WEM 221	Wildlife Management Techniques Basic concept of wildlife management. Definition of wildlife terms such as conservation, population, endangered species, resistant species, pest species, parks, game reserves, refuge game controlled areas and game sanctuaries. Importance of wildlife management. Population dynamics, management of wildlife areas, techniques for capturing and transportation of wild animals, wildlife conservation ethics.	3
WEM 222	Park Planning and Development Concept of park; Historical origin of park and criteria for establishing parks. Role of international and national organizations in parks establishment, Park system and administration. Physical planning of parks, types of parks and steps in park planning process.	2
WEM 223	Zoo and Museum Management Concepts of zoological gardens and its management, physical planning of	2

	zoological gardens, sources of income and expenditure in a zoological garden, general laboratory equipment required in taxidermy and steps in skinning process. Techniques for mounting specimen, techniques of museum management of natural history.	
WEM 224	Wildlife Product Processing and Utilization Processing of wildlife products, types of wildlife processing methods. Meaning and importance of wildlife utilization, preservation of wildlife products and methods of preserving wildlife products, socio-economic importance of wildlife products. Wildlife product processing and its relationship to eco-tourism.	2
WEM 225	Game Farming Techniques Concept and measuring of game farming, importance of game farming, game farming techniques. Design of paddocks, animal house and cages, inventory selection and management of game materials, food habits/food preferences for wild animals. Health case of animals in captivity and animal husbandry techniques. Medicinal importance of game farming for local and commercial values.	2
LTM 115	Tourism Marketing General advertisement of eco-tourism centre and public awareness. Use of different media in publicity such as newspaper, bulletin, radio and television. Methods of information generation and	2

	dissemination. Ecotourism marketing techniques in Nigeria. Marketing communication mix through advertising, sales promotion, public relation, media advertising, merchandising, signage and training	
LTM 222	Arts, Heritage and Culture (see curriculum of LTM)	2
SUG 102	Basic Surveying (see curriculum of surveying/Geo-informatics)	3
EED 216	Practice Entrepreneurship (see curriculum of GNS)	3
WEM 227	Final Year Project Each student is required to choose and execute a special project under a supervisor. The duration of the project shall be two semester.	6
	Total Units	27

PROGRAMME: HND Wildlife and Eco-Tourism Management

HIGHER NATIONAL DIPLOMA (HND): YEAR 1, FIRST SEMESTER

S/ N	COURS E CODE	COURSE TITLE	L	T	P	C U	C H	PRE REQUI SITES
1	WEM 311	Ethno Botany	1	0	2	3	45	
2	WEM 312	Field Engineering	1	0	3	3	60	
3	WEM 313	Fisheries and Recreational Planning	1	0	2	3	45	
4	WEM 314	Wildlife Diseases	1	0	2	3	45	
5	WEM 315	Tour of zonal parks and reports (2)	0	0	0	4	00	
6	LTM 311	Tourism Planning	2	0	0	2	30	
7	LTM 313	Tourism Catering	2	0	2	3	60	
8	HTM 315	Hospitality French	1	0	2	3	60	
9	COM 311	Operating System 1	2	0	1	1	15	COM 123
10	GNS 311	Communication in English 1	2	0	0	2	30	
		Total				27		

HIGHER NATIONAL DIPLOMA (HND): YEAR 1, SECOND SEMESTER

S / N	COURSE CODE	COURSE TITLE	L	T	P	C U	CH	PRE REQ UISI TES
1	WEM 321	Wildlife Ecology	1	0	2	3	45	
2	WEM 322	Wildlife Ecotourism Economics	2	0	0	2	30	
3	WEM 323	Wildlife Management III	2	0	3	3	75	
4	WEM 324	Snailery	2	0	3	3	75	
5	LTM 321	Tourism Development	2	0	0	2	30	
6	LTM 322	Recreation and Park Management II	2	0	0	2	30	
7	AEM 446	Rural Sociology	2	0	3	3	75	
8	COM312	Data Base Design	2	0	0	2	30	
9	GNS 302	Communication in English III	2					
		TOTAL	17		11	20	390	

COURSE SYNOPSIS

HIGHER NATIONAL DIPLOMA (HND): YEAR 1, FIRST SEMESTER

COURSE CODE	COURSE DESCRIPTION	UNITS
WEM 311	Ethno Botany Medicinal values of plants, taxonomic characteristics of common classes of plant in Nigeria. Herbarium and herbarium techniques: Aims and objectives of establishing herbarium, specimen types and steps in acquiring them. Importance of indigenous and exotic high forest flora species, medicinal values/uses of some flora species.	3
WEM 312	Field Engineering Scope of wildlife management engineering, Types of wildlife management roads, road alignment, steps to be taken in road construction. Construction of simple wildlife management building: Building materials types, types of walls and floors. Types and minor repair work of automobile used in the parks.	3
WEM 313	Fisheries and Recreational Planning Importance of fish recreation, type of fish ponds, experimental and ornamental ponds, methods of ponds construction. Design and production of various methods of fishing gear. The origin and development of wildlife and fisheries management in Nigeria. Ecological background of tourism. Principles of wildlife and fisheries management, ecological background of tourism management in Nigeria.	3

WEM 314	Wildlife Diseases Major wildlife diseases and methods of identifying them, methods of preventing and controlling the main wildlife diseases, mode of transmission and treatment of some wildlife diseases, symptoms of wildlife diseases. Zoonotic diseases of wildlife, mode of transmission, symptoms and control..	3
WEM 315	Tour of zonal parks and reports (2) Excursion to zonal parks, gardens and tourism sites in the state. Students should write a report on their visit to these zoological garden and tourist sites.	4
LTM 311	Tourism Planning (see curriculum of LTM)	2
LTM 313	Tourism Catering (see curriculum of LTM)	3
HTM 315	Hospitality French (see curriculum of HTM)	3
COM 311	Operating System 1 (see curriculum of GNS)	1
GNS 311	Communication in English 1 (see curriculum of GNS)	2
	Total	27

HIGHER NATIONAL DIPLOMA (HND): YEAR 1, SECOND SEMESTER

COURSE CODE	COURSE DESCRIPTION	UNITS
WEM 321	<p>Wildlife Ecology Ecological terms in savannah ecology (desertification, hydrology, drought etc) and management of climatic factors (precipitation, temperature, relative humidity). Relationship existing between ecological environment and natural resources. Man relationship with the environment, effects of world human population growth on the environment, effects of human pressure on the environment and the natural sources of energy. Ecological basis for environmental conservation,</p>	3
WEM 322	<p>Wildlife Eco-tourism Economics Concept and basic knowledge of economics (micro economics, macroeconomics, production economics, econometrics, financial and business management, project analysis evaluation etc). Demand and supply concept (factors affecting demand and supply of wildlife products) marketing concept. Concept of economic production, types of natural resources. Wildlife and ecotourism economics, economic benefit of wildlife and ecotourism.</p>	2
WEM 323	<p>Wildlife Management III Principles of wildlife management, wildlife and ecotourism management and problems, techniques of wildlife habitation</p>	3

	improvement. Wildlife population dynamics in Nigeria, the use of photography in wildlife and ecotourism management, basic first aid measures in wildlife and ecotourism management. Strategies in ecotourism extension: consumer awareness and education, tourism industry, aestivation, planning and development. Steps in wildlife domestication and methods for improving depleted wildlife habitat.	
WEM 324	Snailery Basic principles of snail production and management, classification of snails, feed and feeding habit of snails. Snail farming techniques, traditional and modern methods of snail farming. Factors to be considered in snail farming. Diseases and parasites of snail and their control.	3
LTM 321	Tourism Development (see curriculum of LTM)	2
LTM 322	Recreation and Park Management II	2
AEM 446	Rural Sociology (see curriculum of AEM)	3
COM312	Data Base Design (see curriculum of GNS)	2
GNS 302	Communication in English III (see curriculum of GNS)	20
	Total	

HIGHER NATIONAL DIPLOMA (HND): YEAR 2, FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH	PRE REQ UI SITE
1	WEM 411	Eco-tourism Management	1	0	2	2	45	
2	WEM 412	Park Planning, Development and Management	2	0	3	3	75	
3	WEM 413	Range Management II	1	0	2	3	45	
4	WEM 414	Ethno-Zoology	2	0	3	3	75	
5	WEM 415	Game Ranching and Recreation	1	0	2	2	45	
6	WEM 416	Cane Rat Farming	1	0	2	2	45	
7	LTM 413	Tourism Operations	2	0	0	2	30	
8	LTM 414	Transportation and Tourism	1	0	2	2	45	
9	COM 321	Operating System II	1	0	2	2	45	
9	GNS 311	Research Methodology)	2	0	0	2	30	
		TOTAL				23		

HIGHER NATIONAL DIPLOMA (HND): YEAR 2, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH	PRE REQ UISI TE
1	WEM 421	Apiculture	1	0	2	2	60	
2	WEM 422	Park Design and Interpretation	2	0	3	3	75	
3	WEM 423	Wildlife Domestication and Multiplication	2	0	3	3	75	
4	LTM 423	Tourism Operation Management (see curriculum of LTM)	2	0	0	2	30	
5	LTM 424	Tour of Wildlife Tourism Parks in Nigeria. (see curriculum of LTM)	0	0	0	4	00	
6	COM 322	Data Base Design II (see curriculum of GNS)	2	0	3	3	75	
7	GNS 311	International Relations (see curriculum of GNS)	3	0	0	3	45	
8	WEM 418	Seminar	2	0	0	2	00	
9	WEM 447	Final Year Project	0	0	0	6	00	
		TOTAL				28		

COURSE SYNOPSIS

HND: YEAR 2, FIRST SEMESTER

COURSE CODE	COURSE DESCRIPTION	UNITS
WEM 411	Eco-tourism Management Concept and definition of management, historical evolution of eco-tourism, importance of eco-tourism management, eco-tourism resources, impartment of eco-tourism on the environment. Carrying capacity management approach to eco-tourism, social impacts of eco-tourism on	2

	the environment, Institutional strategies of solving social problems of ecotourism on the environment. Role of tourism concern in ecotourism management, role of green globe in eco-tourism management and ecotourism community management.	
WEM 412	<p>Park Planning, Development and Management</p> <p>Concept of master plan: Types of master plan, objective of establishing a park, management objective in park planning, tourism as an integral part of park planning and management. Setting and management of natural museums: Features of National park as a tourist centre, criteria for locating museum in National park.</p>	3
WEM 413	<p>Range Management II</p> <p>Physical features affecting the use of range land, history of development of range management and grazing areas in Nigeria. Morphology and physiology of plants in relation to range management. Process of range inventory and evaluation, range ecology in relevance to grazing and browsing. Animal feeding habits. Planning and use of range land, management of wildlife in relation to wildlife and /or livestock production.</p>	3
WEM 414	<p>Ethno-Zoology</p> <p>Concept of ethno zoology and taxonomy; Taxonomy in relation to wildlife, taxonomy in relation to animal classification, concept of taxonomic characteristics. Taxonomic keys, Types of taxonomic keys and their</p>	3

	applications. Museum establishment: Aims and objectives of establishing a museum. Medicinal values of wildlife animals and simple uses.	
WEM 415	Game Ranching and Recreation Factors of environment as they affect wildlife animal population, game ranching and the planning of a new ranch, management of game ranch, methods of capturing game animals, procedures for transporting game animals. Common husbandry diseases, control and treatment measures.	2
WEM 416	Cane Rat Farming Basic concept of cane rat farming, acquisition and rehabilitation processes of cane rat, food and feeding of cane rat, nutritional requirement of cane rat, husbandry techniques of cane rat, research values of cane rat farming, processing and marketing of cane rat. Hygiene management in cane rat farming, diseases of cane rat. Economic importance of cane rat farming in food security.	2
LTM 413	Tourism Operations (see curriculum of LTM)	2
LTM 414	Transportation and Tourism (see curriculum of LTM)	2
COM 321	Operating System II (see curriculum of GNS)	2
GNS 311	Research Methodology (see curriculum of GNS)	2
	Total	23

**HIGHER NATIONAL DIPLOMA (HND): YEAR 2,
SECOND SEMESTER**

Course Code	Course Description	Units
WEM 421	Apiculture Historical development of bee keeping, types of honey bees caste, importance of bee keeping. Factors governing the establishment of an apicy, materials required for hive construction and the characteristics of a good bee hive. Methods of determining suitable bee habitat. Honey cropping and harvesting.	2
WEM 422	Park Design and Interpretation Concept of park planning and design, process of planning and design. Importance of inventory and site analysis in park planning, factors to consider in park planning and design (ecological factors, socio economic factors, cultural factors). Park interpretation and role of park interpretation in wildlife conservation.	3
WEM 423	Wildlife Domestication and Multiplication History of wildlife domestication, benefits of wildlife domestication. Techniques for domestication of wild animals, care and treatment of a sick and domesticated wild animals	3
LTM 423	Tourism Operation Management (see curriculum of LTM)	2
LTM 424	Tour of Wildlife Tourism Parks in Nigeria. (see curriculum of LTM)	4
COM 322	Data Base Design II (see curriculum of GNS)	3
GNS 311	International Relations (see curriculum of GNS)	3

WEM 418	Seminar Each student is expected to prepare and deliver seminar in the final year as requirement for graduation	2
WEM 447	Final Year Project Each student is required to choose and execute a special project under a supervisor. The duration of the project shall be two semester.	6
	Total	28