

**OLUSEGUN AGAGU UNIVERSITY OF SCIENCE AND
TECHNOLOGY, OKITIPUPA**



SCHOOL OF AGRICULTURE, FOOD AND NATURAL RESOURCES

UNDERGRADUATE DEGREE PROGRAMMES CURRICULA

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1.0 PHILOSOPHY OF THE SCHOOL

The philosophy of the Faculty is to widen the educational base for a more practical and functional training in the various areas of Agriculture. The curricula are designed to include the generation of skilled and production-oriented human resources to combat food shortages, provide raw materials for agro-based industries, and generate foreign exchange earnings from agricultural export. The Faculty of Agriculture, Food and Natural Resources will be one of the Faculties of the Ondo State University of Science and Technology. The Faculty is organized into six different Departments namely:

- (1) Agricultural Economics and Extension
- (2) Animal Production and Health
- (3) Crops, Soil and Pest management
- (4) Fisheries and Aquaculture Technology
- (5) Food Science and Technology
- (6) Forestry and Natural Resources Management

Each Department in the Faculty will operate a five-year undergraduate training programme leading to the award of the Bachelor's degree. All Departments have common 100 and 200 level courses. As from 300 level, students separate to their individual Departments, where they are required to take core courses in their respective Departments as well as elective courses in other Departments. The intention is that graduates of the Faculty will be equipped with sufficient theoretical and practical knowledge needed to combat the myriad of technological challenges confronting the different areas of Agriculture. The programmes are designed in such a way that the graduates are trained to be technologically self-reliant, entrepreneurial and efficient managers of natural resources, including food, feed and fibre. This is to encourage them to set up themselves in agricultural production as a means of reducing graduate unemployment and increasing agricultural productivity. Already there is a servicing Teaching & Research Farm.

1.1 Objectives

Within the broad mission of the University, the Faculty has the following objectives:

1. To provide education in the Science and Technology of Agriculture that will be functional and of academic excellence. Such education shall be at the sub-degree, degree and higher degree levels.
2. To provide continuing opportunities for Agriculturists- Foresters, Farm Management and Agricultural Extension experts, Fisheries and Wildlife, Crops Livestock and Animal Health specialists – and related discipline in their areas of expertise and to make such training relevant to national needs.
3. To improve agricultural potentials of local farmers by providing:

- (i) extension services that will bring the results of research to their use and benefits.
 - (ii) opportunities for visits by local farmers to teaching, research and commercial farms of the University for mutual and beneficial interaction, and
 - (iii) relevant short-term training for those involved in production and management of farm products for the acquisition of techniques for improved production.
- 4. To provide opportunities for goal-oriented research in Agriculture and Agricultural Technology relevant to the country's needs in general and local needs in particular.
- 5. To collaborate with Federal, State and Local Governments, parastatals, Institutes and private organizations in the areas of research into Crop Production, Animal Production and Health, Farm and Soil Management, Fisheries, Forestry, Ecotourism, Wildlife Production and Management.
- 6. To get involved in actual production of food both for the needs of the University and for its immediate environment, and
- 7. To work in close cooperation with other Schools within the University and complete or supplement their efforts in order to achieve the set goals of the University.

2.0 Common courses for 100 level Students in the Faculty

100 LEVEL, FIRST SEMESTER							
S/N	COURSE CODE	COURSE STATUS	COURSE TITLE	L	T	P	Units
1	BIO 101	C	General Biology 1	2	-	-	2
2	BIO 103	C	Practical Biology 1	0	0	3	1
3	CHM 101	C	General Chemistry 1	2	-	-	2
4	CHM 151	C	Practical Chemistry 1	0	0	3	1
5	PHY 101	C	General Physics I	2	-	-	2
6	PHY 103	C	General Physics III	2	-	-	2
7	PHY 107	C	Practical Physics I	-	-	3	1
8	MTH 101	C	Introductory Mathematics 1	2	1	-	2
9	MTH 105	C	Introductory Statistics	2	-	-	2
10	CSC 101	C	Introduction to Computer Science	2	-	3	3
11	GST 101	C	Use of English 1	2	-	-	2
12	GST 113	C	Philosophy and Critical Thinking	2	-	-	2
13	GST 111	C	Use of Library and Study Skills	2	-	-	2
			TOTAL				24

100 LEVEL, SECOND SEMESTER							
1	BIO 102	C	General Biology II	2	-	-	2
2	BIO 104	C	Practical Biology 11	0	0	3	1
3	CHM 102	C	Introductory Organic Chemistry	2	-	-	2
4	CHM 152	C	Practical Chemistry 11	-	-	3	1
	CHM 104	C	Introductory Physical Chemistry	2	-	-	2
5	PHY 102	C	General Physics II	2		-	2

6	PHY 108	C	Practical Physics	0	0	3	1
7	MTH 102	C	Introductory Mathematics II	2	1	-	2
8	CSC 102	C	Introduction to Computer Programming	2	-	3	3
9	GST 112	C	Nigerian People and Culture	2	-	-	2
10	GST 102	C	Use of English 2	2	-	-	2
			TOTAL				20

2.1 COURSE DESCRIPTION

CHM 101: Introductory Inorganic Chemistry (2 Units)

Atoms, molecules and their structure. Hybridization and shapes of simple molecules (simple AB, AB₂ etc type of compounds). Modern electronic theory of atoms and electronic configuration. Periodicity and building up of periodic table. Variation in physical properties with atomic numbers across the 2nd and 3rd periods. Variation in first ionization energies, atomic radii, melting points and explanation in terms of structure and bonding in the elements. Comparative chemistry of Gp 1A (Alkali metals), Gp 11A (Alkaline earth metals) and Gp IVA (Carbon group) elements. Chemistry of first transition metals. Extraction of metals. Acids, bases and salts. Introduction to radio-nuclear chemistry.

CHM 151: Practical Chemistry I (1 Unit)

Acid base titrations, Oxidation reduction titrations, pH measurements, Buffer preparation, Determination of heat of neutralization, solution and reaction, Rate of chemical reaction measurement, Partition co-efficient determination.

CHM 102: Introductory Organic Chemistry (2 Units)

Hybridization of Carbon. Classification of organic compounds on the basis of functional group. Empirical and molecular formulae. Determination of elemental composition of organic compounds (Sodium fusion test). Introduction to stereoisomerism. Chemistry of hydrocarbons (aliphatic and cyclic) including crude oil. Chemistry of benzene, alcohols, phenols, aldehyde, ketones, acids, amines and amides. Structures of simple sugars, polysaccharides such as starch and cellulose, peptides and proteins, fats and oils. Mechanisms of reactions to be discussed where applicable and the uses of the compound emphasized.

CHM 152: Practical Chemistry II (1 Unit)

Qualitative analysis and confirmatory tests for anions and cations; Melting point determination, Functional group identification

BIO 101: GENERAL BIOLOGY I (2 Units)

Cell structure and organization functions of cellular organelles, diversity, characteristics and classification of living things general production, interrelationships of organisms, heredity and evolution, elements of ecology and types of habitats.

BIO 103: PRACTICAL BIOLOGY I (1 Unit)

Use of hand lens and microscope; cells; simple staining techniques; bryophyta; angiosperms; the movement of ions and molecules into and out of cells; stomata; enzymes; test for carbohydrate, protein and lipids; determination of water potential; detection of starch in leaves

BIO 102: GENERAL BIOLOGY II (2 Units)

A generalized survey of the plant and animal kingdom based mainly on study of similarities and difference in the external features, ecological adaptation of these forms.

BIO 104: EXPERIMENTAL BIOLOGY II (1 Unit)

Animal classification ; histology; and collecting plants and animals samples.

CSC 101: INTRODUCTION TO COMPUTER SCIENCE (3 UNITS)

History of computing and computers; evolution of ideas and machines, social context and impact of computers and internet. Introduction to computing system: hardware, software, auxiliary equipment and consumables. Trends in computing technology: centralized computing and distributed computing, computer, data, information and communications. Applications of computer in business, science and engineering. Evaluation of computer awareness, application and utilization. Computer professionalism, codes of ethics and responsible conduct, copyrights, intellectual property and software piracy.

CSC 102: INTRODUCTION TO COMPUTER PROGRAMMING (3 UNITS)

Problem solving methods and algorithm development, designing, writing, debugging and documenting; structured algorithm design: stepwise refinement, structured design techniques. Teaching of a general purpose high level language. E.g. BASIC, PASCAL, C language.

MTH 101: INTRODUCTORY MATHEMATICS I (3 UNITS)

Elementary set theory, subsets, union, intersections, complement, Venn diagrams. Real numbers; integers, rational and irrational numbers, mathematical induction, real sequences and series, theory of quadratic equations, binomial theorem. Circular measure, trigonometric functions of angles of any magnitude, addition and factor formulae.

MTH 102: INTRODUCTORY MATHEMATICS II (3 UNITS)

Function of a real variable, graphs, limits and idea of continuity. The derivative, as limit of rate of change. Techniques of differentiation. Extreme curve sketching, integration as an inverse of differentiation. Methods of integration, definite integral. Applications areas, volumes areas, e.t.c.

MTH 105: INTRODUCTORY STATISTICS (2 UNITS)

Measure of location and dispersion in simple and grouped data, Elements of probability distribution, normal, binomial, poisson, geometric, Negative binomial distribution. Estimation and tests of hypothesis concerning the parameters of f-distribution. Regression and analysis of variance, contingency table. Non parametric inference.

PHY 101: GENERAL PHYSICS I (MECHANICS) (2 UNITS) Space and time, frame of references. Units and dimensions. Kinematics. Fundamental laws of mechanics. Statics and dynamics. Galilean invariances: universal gravitation: work and energy, rotational dynamics and angular momentum: conservation laws.

Pre-requisite: MTH 101.

**PHY 102: GENERAL PHYSICS II (ELECTRICITY AND MAGNETISM)
(2 UNITS)**

Electrostatics: conductors and currents: dielectrics: magnetic fields and induction; Maxwell's equations: electro-magnetic waves: applications. Pre-requisite MTH 102.

PHY 103: GENERAL PHYSICS III (2 UNITS)

Molecular treatment of properties of matter, elasticity. Hooke's law. Young's, shear and bulk moduli. Hydrostatic: Pressure: Buoyance. Archimede's principles. Hydrodynamics: Streamline Bernoulli and continuity equations, turbulence. Reynolds's number viscosity: laminar flow, Poiseuille's. surface tension. Adhesion, cohesion, capillarity, drops and bubbles. Temperature: the zeroth law of thermodynamics: heat: gas laws of thermodynamics: kinetic theory of gases. Applications. Pre-requisite in O/L Physics and Mathematics.

**PHY 107/108: PRACTICAL PHYSICS LABORATORY I & II (1 UNIT EACH)
(1 Unit each)**

This introductory course emphasizes quantitative measurements, the treatment of measurement errors and graphical analysis. A variety of experimental techniques will be employed. The experiments are to include studies of meters, the oscilloscope, mechanical systems, electrical

and mechanical resonant systems, light, heat, viscosity, etc. covered in PHY 101, PHY102 and PHY 103.

GST 101: THE USE OF ENGLISH I (2 Units)

Principles and practice of communication; concord in English; Answering Essay Questions; Language Skills; Note-taking and Note-making; Comprehension; Sentence Construction; Outlines and paragraphs; The Mechanics of Written English; The Novel in English.

GST 102: THE USE OF ENGLISH II(2 Units)

Logical Presentation of papers; Word Formation; Phonetics; Speech Making; English Registers; Reported Speech; Figures of speech; Summarization; Report writing; The Long Essay

GST 111: USE OF LIBRARY AND STUDY SKILLS (2 Units)

Brief history of libraries; Library and education; University libraries and other types of libraries; Study skills (reference services). Types of library materials; Using library resources including e-learning, e-materials, Using library resources including e-learning, e-materials etc. Understand library catalogues (card, OPAC, etc.) and classification; copyright and its implications; Database resources; Bibliographic citation and referencing.

GST 112: NIGERIAN PEOPLE AND CULTURE (2 Units)

Concepts of Culture and Civilization: The Dynamics of Culture Change in Africa: Nigeria as a Case Study.

The concept of Material Culture and Contemporary Issues in Nigeria.

African philosophy and world-view; Sources for the study of Nigerian culture and History; A survey of Early Nigerian people and History; pre-colonial political Institutions and Governance in Nigeria; Traditional Kingdoms in Nigeria: impact of indirect Rule on Traditional Governance in Nigeria; Evolution of Modern Nigeria as a political Unit; African Indigenous political systems and the search for Recognition in Contemporary politics; Aspects of Traditional Nigeria: Africa Traditional Education: Nigerian Experience; Traditional Religion in Nigeria: The Yoruba Experience; Management practices in Nigerian Traditional Agriculture; Cultural Rebirth, National values and the “New” Nigeria; Towards a Cultural Revival: A Critique of Nigerian Traditional Values; Nation-Building and the search for Nigerian National Identity; An Alternative platform for Sustainable Development: A Social-Reform Agenda for Nigerian intellectuals; Citizen’s Rights and Duties as Nigerians: Nigerian Constitution in perspective.; Major Landmarks in the 1993 Nigerian Constitution; Social justice, Democratic Dialogue and the Quest for National Security in Nigeria; The independent Corrupt practices and Other Related Offences Commission (ICPC) and the Nation Values Curriculum: Nigeria in the context of Globalization; Nigeria’s Foreign policy; Nigerian Culture and Technological change; Nigeria’s Economy: Response to Global Opportunities and Costs.

GST 113: PHILOSOPHY AND CRITICAL THINKING (2 units)

Philosophical Foundations of human existence; A survey of the main branches of philosophy ; Nature of philosophical problems and evolution of human institutions: Science, Politics, Religion, morality. E.t.c Types, sources and foundations of knowledge and non- scientific knowledge: Truth, belief and opinion ; Foundations of logic and critical thinking; Types of discourse ;Nature of arguments;validity and soundness; Techniques for evaluating arguments; Distinction between inductive and deductive inferences , etc. ; illustration for this course will be taking from familiar texts, including literature materials, Novels, Law reports and Newspaper publications.

GST 221: HISTORY AND PHILOSOPHY OF SCIENCE (2 credits)

Man – his origin and nature; Man and his cosmic environment; scientific methodology ; science and technology in the society and service of man; Renewable and non- renewable resources, Man and his energy resources; Environmental effects of chemical plastics, textiles, wastes and other materials.; chemical and radiochemical hazards; introduction to the various areas of science and technology.

GST224: PEACE STUDIES AND CONFLICT RESOLUTION (2 credits)

Basic concepts in peace studies and conflict Resolution; conflict; crisis;violence ;Dispute settlement; Resolution; peace ; Creative and Destructive Conflict motivations; Conflict Contexts ; Conflict Types; Conflict Resolution Styles.Theories of conflict; indigene / Settler phenomenon in Community conflict; conflict Management ; concept of management; third – party intervention; Theory and practice of Mediation; Management of international Conflicts; united Nations and Global peace ; Conflict Resolution ; Resolution of conflict; problems of Conflict ResolutionConflict Transformation: The Concept of conflict Transformation; Factor Responsible for Conflict Transformation ; Conflict Transformation Workshops.

Conflict Issues:

The state of Israel and Middle East ; Nigeria and Cameroun on the Bakassi peninsula;

Root Causes of Conflicts and Violence in Africa;

Poor Management of Ethnic Diversity; Struggle for State Control; Struggle for Economic Resources ; peace- building ; peace as Vehicle for unity and development; National Security: The imperatives of social justice and democratic dialogue.

GST 229: INTRODUCTION TO VOCATIONAL SKILLS (1 CREDIT)

Every student should mandatorily be exposed to the following vocations at 200 level: fish farming; fish smoking and preservation technology; animal farming: goats, sheep, grass cutter, pigs, etc; poultry; crop farming and modern irrigation technology; Landscaping and Horticulture; Palm oil and palm kernel oil extraction and applied technology; Tailoring and

fashion designing; beadsworks and fireworks for jewellery ; soap and cosmetic productions; drum making and traditional/ cultural performance; Tie and dye cloth technology; bee keeping and honey production technology; Traditional cloth weaving technology(Asoofi production);Drama/ Dance performance and Wood carving.

In the first part of the course, which comes up in the first semester, the student's engagement is based on 60% of the score of 100%. Every student is expected to choose one of the vocational skills and develop it for assessment to make up for the remaining 40% of the total score of 100%.

GST 331: INTRODUCTION TO ENTREPRENEURIAL SKILLS (2 CREDITS)

Introduction to entrepreneurship and new venture creation; entrepreneurship in theory and practice; The Opportunities; Forms of Business; Staffing, Marketing and the new venture; Determining- Capital requirements; Raising Capital; Finance Planning and management; Starting a new business; Feasibility Studies; Innovation; Legal Issues; Insurance and Environmental considerations and possible business opportunities in Nigeria.

3.0 DEPARTMENT OF AGRIC. ECONOMICS AND EXTENSION

3.1

PHILOSOPHY OF THE PROGRAMME

The philosophy of the Ondo State University of Science and Technology, Okitipupa is to produce practical-oriented graduates. In line with this philosophy, the Department, is designed to train graduates with broad-based knowledge of the various aspects of agriculture with a bias towards Agricultural Economics and Extension. Graduates of the Department are exposed to the rudiments (basic) knowledge of solving real life socioeconomic problems associated with sustainable agricultural production and rural development. Different quantitative techniques of addressing agricultural problems with regards to micro- and macroeconomic theories, project planning and appraisals, marketing problems, managerial economics, applied statistics and farm management are taught.

It also has as its concern, the responsibility of improving the agricultural potentials of local farmers by providing extension services that bring the results of its research to the use and benefit of local farmers. The programme also provides opportunities for visits by local farmers to the Teaching and Research Farm of the University for mutual and beneficial interaction. It introduces relevant short-term training for those involved in production and management of farm products for the acquisition of techniques for improved production. Through the programme, there are collaborations with the Federal and State Government, Parastatals, Agencies and other organization in the areas of research in agricultural production and extension services. The graduates of the programme are suitable for employment in all areas of human endeavours, including financial and academic institutions, ministries, consultancy outfit, among others.

OBJECTIVES OF THE PROGRAMME

The objectives of the programme are to:

- a. Train undergraduate students in the field of Agricultural Economics and Extension with emphasis on the application of economic principles to the management of agricultural business;
- b. Extend modern farming techniques to the farmers through extension services
- c. Train undergraduate students in basic research techniques in agricultural economics and extension;
- d. Prepare undergraduate students for self-employment in all aspects of agriculture;
- e. Provide services in the economics of Science and Technology of Agriculture that will be of practical use to farmers, policy makers, government and the international community; and

f. Collaborate with communities, Local, State and Federal Governments, parastatals, as well as other national and multinational agencies in the areas of research, consultancy and advisory services.

ADMISSION REQUIREMENTS

a) UTME Admission

Admission into the first year (100 level) of the programme is through JAMB. In order to be eligible for admission, candidates are expected to sit and pass the UTME. Candidates must possess five credit passes in WASCE or NECO or GCE (O/L) or equivalent at a maximum of two sittings in the following subjects: English Language, Mathematics, Chemistry, Biology or Agricultural Science and Economics or Geography. At least a pass in Physics is required.

UTME subjects: English Language, Chemistry, Biology or Agricultural Science, Mathematics or Physics.

b) Direct Entry

Candidates may be admitted into the second year (200 level) of the programme through direct entry if they:

- i) have a National Diploma with a minimum of Upper Credit or equivalent from recognized Polytechnics and Colleges of Technology in relevant disciplines (Agricultural Sciences), or
- ii) possess GCE (A/L) or equivalent with passes in at least two of the following subjects:
Chemistry, Biology and Physics.

Direct entry candidates must also meet the requirements for UTME admission specified in 'a' above.

DURATION OF PROGRAMME

The duration of the programme is five academic sessions for students admitted through the UTME and four for Direct Entry students. If a student admitted through the UTME fails to

graduate in five academic sessions, he or she will NOT be allowed to exceed a total of fourteen (14) academic semesters. For Direct Entry students, the maximum residence period is twelve (12) academic semesters.

REQUIREMENTS FOR GRADUATION

To be eligible for the award of B. Agric. Tech. (Agricultural Economics and Extension), a student must have:

- a) passed all core courses as well as all University and Faculty required courses and electives recommended for specialization.
- b) accumulated a minimum of 191 Units for UTME students, 148 for Direct Entry students and obtained a CGPA of not less than 1.5, and
- c) successfully completed all field practicals, industrial attachment training, seminars and projects.
- d) Direct entry students (A/L and JUPEB) are expected to audit and pass GST 101, 102, 111, 113 and 112. In the event that they fail any of the courses, they will have to register for and pass it.

100 LEVEL FIRST SEMESTER

S/ N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	MTH 101	Introductory Mathematics I	C	2	1	0	2
2	PHY 101	General Physics I	C	2	0	0	2
3	PHY 103	General Physics III	C	2	0	0	2
4	BIO 101	General Biology I	C	2	0	0	2

5	BIO 103	Practical Biology I	C	0	0	3	1
6	PHY 107	Practical Physics I	C	0	0	3	1
7	CHM 101	Introductory inorganic Chemistry	C	2	0	0	2
8	CHM 151	Practical Chemistry I	C	0	0	3	1
9	GST 101	Use of English I	C	2	0	0	2
10	STA 111	Introductory Statistics	C	2	0	0	2
11	CSC 101	Introduction to Computer Science	C	2	0	3	3
12	GST 113	Logical and Critical Thinking	C	2	0	0	2
13	GST111	Use of Library and study skills	C	2	0	0	1
		TOTAL					23

100 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	PHY 102	General Physics II	C	2	0	0	2
2	PHY 108	Practical Physics	C	0	0	3	1
3	BIO 102	General Biology II	C	2	0	0	2
4	BIO 104	Practical Biology II	C	0	0	3	1
5	CHM 102	Introductory Organic Chemistry	C	2	0	0	2
6	CHM 104	Introductory Physical Chemistry		2	0	0	2
7	CHM 152	Practical Chemistry II	C	0	0	3	1
8	MTH 102	Introductory Math. II	C	2	1	0	2
9	GST 112	Nigerian Peoples and Culture	C	2	0	0	2

10	CSC 102	Introduction to Computer Programming	C	2	0	3	3
11	GST 102	Use of English II	C	2	0	0	2
		TOTAL					20

S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	APH 201	Introduction to Animal Production	C	1	- 3	2	2
2	CSP 201	General Agriculture (Theory)	C	1	-	-	1
3	CSP 205	Basic Meteorology for Agricultural Science	C	2	-	-	2
4.	CSP 207	Principles of Farmshops	C	2	-	3	3
5	FAT 201	Introduction to Fisheries and Aquaculture Technology	C	2	-	-	2
6	AEE 201	Introduction to Agric. Economics	C	2	-	-	2
7	FRM 201	Introduction to Ecotourism and Wildlife Management	C	1	-	3	2
8	FST 201	Introduction to Food Science and Technology	C	2	-	-	2
9	APH 203	Introductory Agricultural Biochemistry	C	2	-	3	3
10	GST 229	Introduction to Vocational Skills	C	2	-	-	2

11	GST 221	History and Philosophy of Science	C	1	-	3	1
		TOTAL					22

Required courses for Direct entry students (New students)

1	GST 101	Use of English I	C	2	0	0	2
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200 LEVEL, SECOND SEMESTER			200 LEVEL, SECOND SEMESTER				
S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	APH 202	Anatomy and Physiology of Farm Animals	C	2	-	-	3
2	CSP 202	Basic Soil Science	C	1	-	3	2
3	CSP 204	Botany of Economic Crops	C	1	-	3	2
4	CSP 210	General Agriculture (Practical)	C	-	-	6	2
5	FRM 202	Introduction to Forest Resources Management & Agroforestry	C	2	-	3	2
6	AEE 204	Agricultural Statistics and Field Experimentation	C	2	-	3	3
7	AEE 210	Introduction to Agricultural Extension and Rural Sociology	C	3	-	-	3
9	GST 224	Peace Studies and Conflict Resolution	C	2	-	-	2
		TOTAL					19

Required courses for Direct entry students (New students)

1	GST 102	Communication in English II	C	2	-	-	2
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2	GST 112	Nigerian Peoples and Culture	C	2	-	-	2
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300 LEVEL FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	AEE 301	Principles of Agricultural Economics	C	2	1	-	3
2	AEE 303	Principles of Rural Sociology and Agricultural Extension	C	2	1	-	3
3	AEE 305	Introduction to Microeconomics	C	2	1	-	3
4.	AEE 307	Mathematical Economics	C	2	-	3	3
5	AEE 309	Introduction to Rural Life	C	2	-	3	3
6	AEE 311	Community Organization and Leadership	C	3	-	-	3
9	GST 331	Introduction to Entrepreneurial Skills	C	2	-	-	2
10		TOTAL					20

Required courses for Direct entry students (New Students)

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	GST 113	Philosophy and Critical Thinking	C	2	-	-	2
2	GST 111	Introduction to Microeconomic Theory	C	2	-	-	2

300 LEVEL, SECOND SEMESTER**300 LEVEL, SECOND SEMESTER**

S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	AEE 302	Elements of Agricultural Economics	C	2	1	-	3
2	AEE 304	Elements of Agricultural Extension	C	2	1	-	2
3	AEE 306	Farm Records and Analysis	C	2	1	-	3
4	AEE 308	Principles of Farm Management	C	2	1	-	2
5	AEE 310	Introduction to Macroeconomic Theory	C	2	1	-	3
6	AEE 312	Introduction to Rural Sociology	C	2	1	-	2
7	AEE 314	Extension Programme Development	C	-	-	6	2
8	AEE 306	Farm Records and Accounting	C	2	-	-	2
		TOTAL					19

ELECTIVE FOR NEW CURRICULUM

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FAT 306	Fish Farming Technique	E	1	3	2	3

S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
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1	AEE 401	Agricultural Finance	C	1	1	-	2
2	AEE 403	Agricultural Production Economics and Resource Use	C	2	1	-	3
3	AEE 405	Extension Training and Curriculum Development	C	2	1	-	2
4.	AEE 407	Seminar in Agricultural Economics and Extension	C	-	-	6	2
5	AEE 409	Farm Business Analysis	C	2	-	-	2
6	AEE 411	Social Relationship and Behavioural Change	C	2	1	-	3
7	AEE 413	Project Appraisal and Planning	C	1	1	-	2
8	FAQ 433	Production and Utilization of Seaweeds and Freshwater Plants	C	3	-	-	2
		TOTAL					18

ELECTIVE FOR NEW CURRICULUM							
COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units	
CSP 401	Crop Preservation, Processing and Storage	E	2	-	3	3	
APH 409	Beef Cattle, Sheep and Goat Production	E	2	-	3	3	
APH 413	Poultry Production	E	2	-	3	3	

400 LEVEL, SECOND SEMESTER

400 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	FAQ 402	Industrial-Based /OSUSTECH Supervisor's Assessment	C	-	-	-	4
2	AEE 404	Assessment of Log Book	C	-	-	-	4
3	AEE 406	Student Technical Report and Oral Presentation	C	-	-	-	4
		TOTAL					12

500 LEVEL FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	AEE 501	Personnel and Labour Management	C	2	-	-	2
2	AEE 503	Rural Development and Adoption of Improved Technology	C	2	-	-	2
3	AEE 505	Agricultural Marketing	C	2	-	-	2
4.	AEE 509	Introductory Econometrics	C	2	1	-	3
5	AEE 511	Introduction to Agricultural Administration and Supervision	C	2	1	-	2
6	AEE 513	Extension Psychology	C	2	-	3	2
7	AEE 599	Final Project	C	-	-	1	6
		TOTAL					19

500 LEVEL, SECOND SEMESTER				500 LEVEL, SECOND SEMESTER			
S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	AEE 500	Students' Seminar	C	2	-	-	2
2	AEE 502	Extension Methods and Communication	C	3	-	-	3
3	AEE 504	Agricultural Development Administration	C	2	1	-	3
4	AEE 506	Industrial Visits	C	-	-	6	2
5	AEE 508	Agribusiness Management	C	1	1	-	2
6	AEE 510	Elements of Comparative Agricultural Extension	C	1	1	-	2
	AEE 512	Introduction to Operations Research	C	2	-	-	3
		TOTAL					17

COURSE DESCRIPTIONS

AEE 201: INTRODUCTION TO AGRICULTURAL ECONOMICS (2 units)

The nature of economics and economic problems, scope and method, price theory and functions of the market with particular reference to agriculture. Concept of opportunity cost, supply and demand and their application to agricultural problems. Production functions, cost analysis and functions. Concept of elasticities. Type of markets, perfect competition, monopoly, oligopoly, price theory and some applications. Cost and revenue theories. Theory of distribution, the component of agriculture in National income, resource allocation on farms. Aggregate income, expenditure, investment, interest rate, savings, employment, inflation, international trade, commodity agreements, and balance of payments. Money and banking.

AEE 202: INTRODUCTION TO AGRICULTURAL EXTENSION AND RURAL SOCIOLOGY (3 Units)

The need for agricultural extension. Agricultural extension in the world and in Nigeria. Basic philosophies of agricultural extension. Institutional setting of agricultural extension. Basic concepts and principles of rural sociology to an understanding of importance of rural communities and institutions, social stratification, social processes and social changes in rural areas. Leadership in rural communities, role and functions of rural leaders. Development of rural community leaders. Extension agent and rural community. Communication techniques and strategies of change. Various agricultural extension teaching methods, aids and their uses.

AEE 204: AGRICULTURAL STATISTICS AND FIELD EXPERIMENTATION (3 UNITS)

Elements of statistics – Data collection, assembling, and analysis and interpretations. Sampling techniques. Probability and non-probability sampling. Simple random sampling; stratified sampling; purposive sampling. Representation of data on charts. Computation of arithmetic mean, mode and median. Variance and standard deviation. Rules of probability. Probability theory. Joint probability and conditional probability. Statistical independence. Permutation and combination. Hypothesis testing. Test of significance in agricultural research and experimentation design. Review of research methods, Research methodology.

AEE 301: PRINCIPLES OF AGRICULTURAL ECONOMICS (3 UNITS)

The scope of Agricultural Economics. Concept of Agricultural Economics. Demand and supply, Equilibrium price and quantity. Basic economics Principles applied in agricultural production and marketing. Application of concept of economics in agricultural production and marketing. Efficient organization of scarce resources and factors of agricultural production. Discussions of principles and philosophies involved in Agricultural Economics. Cyclical theory in agricultural production and marketing. Agricultural projects. Tools of farm financial analysis. Farm efficiency measures.

AEE 302: ELEMENTS OF AGRICULTURAL ECONOMICS (3 UNITS)

Role of agriculture in the Nigerian economy. Concept of agriculture and agricultural development. The theories of agricultural development. Mellor's model of agricultural transformation and its significance in the Nigerian situation. Role of 'accelerators' and 'essentials' in the process of agricultural modernization in Nigeria. Role of government in agricultural marketing. Basic problems of Nigerian agriculture. Elementary consideration of agricultural policy. Constituent of an agricultural policy in Nigeria. Capital formation in agriculture. Agricultural labour. Institutional agencies in agricultural credit.

AEE 304: ELEMENTS OF AGRICULTURAL EXTENSION (2 UNITS)

Meaning, philosophy, scope, process and principles of extension. Introduction of major concepts in extension such as administration, leadership, motivation and sustainability. History

of agricultural extension in Nigeria. Supporting structures for agricultural extension. Introduction to planning, monitoring and Evaluation of extension programs. Principles of planning, steps in planning, annual plan of work and calendar of work. Extension teaching methods and aids. Research – Extension –Farmer linkage. Problems of Agricultural Extension in Nigeria.

AEE 303: PRINCIPLES OF RURAL SOCIOLOGY AND AGRICULTURAL EXTENSION (3 UNITS)

Definition of sociology, Branches of Sociology, Concept of Rural and Urban areas. Importance of studying Rural Sociology to Agricultural Extension. Concept in rural studies Rural Sociology to Agricultural Extension Education. Inter-relationship between them. Community development and extension services. The role of External Extension Education in integrated Rural Development Programmes. Communication and information transfer to rural people. Farmers' participation in rural project identification and development. Farm visits and appraisal. Indigenous knowledge in agricultural development.

AEE 306: FARM RECORDS AND ACCOUNTING (3 UNITS)

Principles of record keeping. Types of farm record analysis: crops, livestock and machinery records. Enterprise analysis. Basic data needed for preparing farm records. Uses of farm records in modern agriculture. Trial balance, Income Statements and Net worth preparation and their usefulness in farm business analysis. Computer aided farm record analysis. Farm Accounting aspect- definition of farm financial accounting, source documents, farm account process, double entry system, subsidiary books of farm account. Treatment of cash discount and trade discount in farm cash book. Farm inventory valuation – definitions, classifications and methods of farm inventory. Farm financial analysis.

AEE 305: INTRODUCTION TO MICRO – ECONOMIC THEORY (3 UNITS)

Introduction. Microeconomics. Definition and Scope. The theory of the firm. Basic Concept. The production function, product curves, isoquants, elasticity of substitution. Optimism behaviours: Constrained output maximization, constrained cost maximization, profit maximization input demand functions. Cost functions: Short run cost functions, long run functions, constrained revenue maximization/profit maximization. The theory of consumer behavior: Nature of the utility function, indifference curve, the rate of commodity substitution and the existence of the utility function. The maximization of utility: first and second order conditions, the choice of the utility index. Demand functions: ordinary demand functions, compensated demand functions, demand curves, price and income elasticities of Demand, income and leisure, substitution and income effects, the Slutsky equation. Demand functions: Market demand/producer demand. Supply function: the very short period, the short run, the long run, external economies, diseconomies. Commodity – market equilibrium. Stability of equilibrium. Market Competition. Duopoly, oligopoly, monopoly & monopsony.

AEE 308: PRINCIPLE OF FARM MANAGEMENT (2 UNITS)

Farm Management: identification and scope. The role and functions of management. Economic principles involved in managing factors of production. Production relationship. Factor- factor relationship. Profit maximization in different production relationships. Concept of marginal returns. Increasing marginal returns, decreasing marginal returns and constant marginal returns. Land, Labour and Capital. The farmer and his management ability. Risk Uncertainties in management of farms.

AEE 307: INTERMEDIATE MATHEMATICS FOR AGRICULTURIST/MATHEMATICAL ECONOMICS (3 UNITS)

Economic theory and hypotheses. Relationship between economic theory and mathematics. Review of the use of Mathematics in economic analysis. Linear models and Matrix algebra and its application in agriculture. Demand and Supply. Application of mathematics in determination of equilibrium price and quantity. Differential calculus and its application to agricultural economics. Mathematics in microeconomics, optimization problems – equilibrium analysis, exponential and logarithmic functions, equality constraints and with several variables. Functions and functions forms in mathematics. Analysis involving time, probability and regression analysis in agriculture. Dynamic analysis – economic dynamics and integral calculus, first order differential equations, higher order differential equations. Discrete time: first order equations, higher order difference equations. Optimal control theory.

AEE 310: INTRODUCTION TO MACROECONOMIC THEORY (3 UNITS)

Introduction to macroeconomics. Objectives of macroeconomic policy. Methodology of Macroeconomics. Actual and Potential GNP: fluctuations and Growth. A review of the national income and product accounts. Introduction to income determination; the multiplier. National income determination: the static equilibrium model. Sectoral demand functions and extensions of static model: consumption and consumer expenditure, investment demand, the demand for money, supply of money, monetary and fiscal policy in the extended model and the foreign sector and balance of payment. The IS-LM Model for a closed economy and for an open economy. Full employment, Price Stability, Economic Growth. Distribution aims. Policies for reducing inflation. Productivity. The Phillips Curve. Unemployment; Theories of unemployment, types of unemployment, Taxation and Price Support. Public expenditure. Public revenue. Business cycle or trade cycle.

AEE 309: INTRODUCTION TO RURAL LIFE (2 UNITS)

Concept of rural life. Meaning of rurality. Semi- urban and urban life. Characteristics of each. Types of rural communities. Study of the rural communities; settlement patterns and village organizations, social life, economic life and poverty issue. Quality of life and its measurement. Land tenure in rural communities. Rural migration; causes of movement, effects of movement, patterns of movement, population trend. Rural development in Nigeria.

AEE 312: INTRODUCTION TO RURAL SOCIOLOGY (2 UNITS)

Meaning, Nature and Scope of Rural Sociology. Organization of Societies: basic sociological concepts, society, culture, etc. Major social institutions such as family and community. Social groups and social processes. Group participation in community activities. Inequality in rural areas of Nigeria. Social Stratification and social mobility. Social change and diffusion process in agriculture in agricultural innovation adoption. Challenges of rural development in Nigeria.

AEE 311: COMMUNITY ORGANIZATION AND LEADERSHIP (2 UNITS)

Definition of a community, characteristics of communities. Methodologies of community studies. Concept of community organization and development. Basis for community development activities. Principles of community development. Benefits of community development. Stages/process of community development. Community development agents, characteristics, functions and principles of operation. Concept of leadership, types of leaders, styles of leadership, functions of leaders. Theories of leadership. Role of agriculture and agricultural extension in community development. Extension agents in providing administrative organization for rural development. Agric. Extension and community development programme. Leadership structure in rural Community, legitimization of programmes and diffusion of innovation.

AEE 314: EXTENSION PROGRAMME DEVELOPMENT (2 UNITS)

Definition of Programme. Levels and types of programs. Concept of programme development and stages in programme development. Assumption in programme development. The course is expected to provide insight into the major Approaches to programme development and Clientele participation in programme development. Strategies for clientele participation. Levels of participation. Sustainability issues in programme development. Monitoring of programmes, Types of monitoring, Principles of monitoring, Process of monitoring. Evaluation of programmes. Types of evaluation, Process of evaluation, Principles of evaluation.

AEE 316: APPLICATION OF COMPUTER IN AGRICULTURE (2 UNITS)

Consideration of improvement in the different fields of agriculture as a result of computer application. Introduction to computer programmes in relation to agriculture- spreadsheet programmes and word processing programmes; Programmes for graphics presentation; Statistical packages; Analytical models in agriculture; Computer softwares for data analysis in agriculture; Different functional forms in agriculture and application of computer. Analysis of agricultural data using computer software.

AEE 401: AGRICULTURAL FINANCE (2 UNITS)

Role of agricultural finance in development. Credit and its role in farm production. Credit Utilization, sources of finance, loan acquisition, repayments and credit instrument. Principles of farm accounting, farm planning, budgeting and financial control. Farm record keeping and preparation of financial statements. Profit and loss account and balance sheet. The organization of resources and enterprises. Enterprises and resources combinations and control. Types of finance records in agriculture. Role of government in agricultural finance. Role of private sector in agricultural finance. Multilateral and international organizations and agencies and

agricultural finance. Case study of World Bank and international fund for Agriculture in agricultural finance.

AEE 402/404/406: STUDENTS' INDUSTRIAL WORK EXPERIENCE (12 UNITS)

Students are attached to industries, firms research stations etc., with a view to making these students develop more skills in farm management, Agribusiness, and related areas, and providing additional opportunity for them to learn to write field reports. Students are supervised during the training period and are expected to keep logbooks and other records designed for the purpose of monitoring their performances. Students are to write reports on their activities on site and present such report at a seminar on the department. The logbook, report and seminar presentation will contribute to the final grades in the course.

AEE 403: AGRICULTURAL PRODUCTION ECONOMICS (3 UNITS)

Concept of the production function, functional forms. Profit maximization in production. Input – output relationships, Resources in Agriculture: Land, Labour, Capital, and Management resources. Law of the diminishing returns. Problem of resources. Marginal analysis. Concept of an agricultural production. Steps in project introduction, appraisal, analysis and implementation. Methods of project appraisal, NPV, cost benefit ratios DCF, Financial and Economic Analysis, Linear programming.

AEE 405: EXTENSION TRAINING AND CURRICULUM DEVELOPMENT (2 UNITS)

Meaning of Extension Training. Importance of extension Training in Agricultural Development. Objectives of the different types of training. (e.g pre – service and in- service training) programmes for different categories of Extension personnel. Need assessment in training programmes. Methods of need assessment. Methods of Extension Training, Farmers Training programme, Curriculum development processes, Course organization, Evaluation of training programme.

AEE 407: SEMINAR IN AGRICULTURAL ECONOMICS AND EXTENSION (2 UNITS)

Students are expected to undertake studies of contemporary issues in agriculture, and write a term paper on a topical agricultural issue, to be presented in a class seminar. Students are expected to be supervised by instructors assigned to them during preparation of papers. Presented reports will be graded. Performance at the seminar presentation will also contribute towards grading of course.

AEE 409: FARM BUSINESS ANALYSIS (2 UNITS)

Nature and types of farm business. Characteristics of farm business. Decision making process, economic principles, tools of decision – making, farm management information and analysis, the farm budget, the computer as a farm management tool. Managing the organized farm.

Relationship between farm and non-farm business. Family farm business management. Corporate farm business and management. Case studies of corporate farm business.

AEE 411: SOCIAL RELATIONSHIP AND BEHAVIOURAL CHANGE (3 UNITS)

Social relationship as an analytical unit in Agricultural extension system. Social relationship as an indicator of individuals and groups, Innovation process, Major theories of behavior change in agriculture. Social interactions: cooperation, competition, conflicts resolution, acculturation and assimilation. Sources of social and behavioural change in the society. Diffusion and adoption of agricultural innovations. Factors influencing adoption. Categories of adopters. Stages of adoption.

AEE 413: PROJECT APPRAISAL AND PLANNING (2 UNITS)

Project cycles, Project appraisal techniques. Capital Budgeting – Basic risk concepts, sensitivity analysis of risk, measuring project risk; risk and time, risk and values. Principles and procedures in planning enterprises combination, objective, scarce resources. Programme planning and evaluation. Concept of feasibility reports. Internal rate of return. Net present value. Introduction to linear programming. Project management and appraisal.

AEE 415: RESEARCH METHODS IN SOCIAL SCIENCE (2 UNITS)

Types of empirical research in social science. Steps in empirical research- setting of objectives; hypothesis formulation and testing; sampling technique, design of questionnaire. Analytical techniques – descriptive and quantitative methods. Interpretation of result. Application of econometrics in data analysis. Use of inferential statistics in data analysis. Research report writing and presentation. Development of research proposal for grant application.

AEE 500: STUDENTS' SEMINARS (2 UNITS)

Preparation, presentation and review of important agricultural issues in Nigeria and globally. Such review will cover the following areas: Agricultural development, finance, Women in Agriculture, Children in Agriculture, Gender matters, Rural development, Agricultural marketing, Resource use, production economics, environment, diffusion of innovation, project appraisal, programme planning, policy and agricultural commodity marketing, climate change.

AEE 501: PERSONNEL AND LABOUR MANAGEMENT (2 UNITS)

Introduction to labour management. Labour law and administration. Work schedule combination and timing, Labour relationships. Internal labour organization. Nigerian Labour laws. Method study and work study techniques. Labour productivity issue and management. The concept of motivation in labour management. Labour management and industrial actions. Dispute resolution in labour management. Labour arbitration panel. Labour law and the Nigerian environment.

AEE 502: EXTENSION METHODS AND COMMUNICATION (3 UNITS)

Meaning and elements of the communication process. Learning situation and experiences, communication models. Social and mental factors influencing personality development. Concept of education .learning, teaching, intelligence motivation. Steps in extension teaching – classification and description of teaching methods e.g demonstration, meeting campaigns, agric shows, field trips and individual contracts, mass, group and individual methods. Audio – Visual aids in extension communication. Production and use of audio – visual teaching aids. Types of media for extension activities. Merit and demerit of each.

AEE 503: RURAL DEVELOPMENT AND ADOPTION OF IMPROVED TECHNOLOGY (2 UNITS)

The Rural Development process – objectives of rural development, problems of rural development. Strategies for rural development. Approaches of rural development globally. Rural development strategies in Europe and Asia. Role of government and private sector in rural development. Focus of appropriate technology, imitation, indigenous etc. Problems relating to transfer of technology. Technology and Nigerian small farmers. Pre- requisites for the acceptance of technology types.

AEE 504: AGRICULTURAL DEVELOPMENT ADMINISTRATION (3 UNITS)

Comparative study of agricultural development administration globally. Agricultural legislation. Overview of agricultural legislation in Nigeria. Agricultural legislation and implication on agricultural development. A review of land tenure and land laws in Nigeria. Identification of land tenure problems in Nigeria. Introduction and concept development plans in Nigeria. Plans and plan implementation in Nigeria. Agricultural development programmes. Problems of development plans. Roles of Federal, State, and Local government in planning. Development policy.

AEE 505: AGRICULTURAL MARKETING (2 UNITS)

Definition and scope of marketing. Distinctions between marketing and markets. Concepts in marketing: Market functions; Market efficiency. Types of market and objectives, the importance of marketing, characteristics of marketing problems, the role of marketing in agricultural business. Agricultural Demand and Supply as they relate to marketing. Determination of equilibrium price and quantity. Price analysis. Agricultural marketing and agricultural development. Market infrastructure and development. Agricultural marketing and global issues: economic meltdown; price fluctuation; climate change.

AEE 506: INDUSTRIAL VISIT (2 UNITS)

Class visit to farms, agro – industries, research institutions and other vrelatedestablisementss, on a weekly or bi-weekly basis, to acquaint students with the organization structure and processes of these establishments. Students are to note the raw materials used, their sources,

the products of such companies, their by- products and their markets. They are to assess personnel management and welfare. Impact of the industry to the immediate environment is to be assessed. Opportunities for linkages after their graduation are to be explored. Each visit is to be followed by a written report by each student. Which is to be graded.

AEE 508: THE CONCEPT OF AGRIBUSINESS (2 UNITS)

Farm business and Agribusiness methods; Consumer Concept in marketing; concept of rationality vs irrationality in Agribusiness. Product oriented and consumer oriented production. Cooperation in marketing, rules and regulations governing cooperative societies. Cooperative societies vs producers vs consumers. The firm (or industrial) approach to marketing. The farm and location of industry. Identification of success factors in Agribusiness. Agribusiness development.

AEE 509: INTRODUCTORY ECONOMETRICS (3 UNITS)

Econometrics and economic theory. Basic statistical concepts: simple and multiple correlation, normal and t- distribution, hypotheses testing and confidence intervals. The simple regression model, estimation of regression parameters. Properties of least square estimators, statistical inference in regression model, violation of basic assumptions and their consequences. The multiple regression model; estimation of regression parameters, statistical inference problems of auto correlation and multi – colinearity, analysis of variance(ANOVA). Regression analysis of cross sectional and time series data.

AEE 510: ELEMENTS OF COMPARATIVE AGRICULTURAL EXTENSION SYSTEM (2 UNITS)

Agricultural extension and agricultural development. Highlights of the existing types of Agric. Extension strategies in Nigeria and globally, e.g ministry type; private extension, T.V etc. Constraints, weaknesses, achievements and merits of such system are to be discussed. Agricultural extension strategies and organization in selected countries. Comparison of those systems with that of Nigeria. Emerging extension strategies of the 21st – century in use across the world.

AEE 511: INTRODUCTION TO AGRIC.EXTENSION ADMINISTRATION AND SUPERVISION (3 UNITS)

Concepts, theories, principles and guidelines of agricultural extension administration. Organization and supervision as applied to the Agricultural Extension Services in Nigeria. Administrative functions and responsibilities in Agricultural Extension. Staff recruitment, selection, placement and supervision, budget development and fiscal control. Assessment of Extension Work accomplishments. Role of effective supervision in agricultural extension. Comparison of administration and supervision in public and private agricultural extension system.

AEE 512: INTRODUCTION TO OPERATIONS RESEARCH (3 UNITS)

Role of operation research in economic analysis. Links between economic theory and quantitative analysis. Introduction to optimization problems. (a) Minimization; (b) Maximization. Introduction to inventory models. Types of inventory models. Concept of allocation problems in operation research. Types of allocation problems. Optimization process in allocation problem. Models in allocation problems. Linear Programming: simplex and graphical models, Games Theory. Input- output analysis. Optimization in linear models. Dynamic, linear and integer programming techniques. Linear and integer techniques in solving allocation problem.

AEE 513: EXTENSION PSYCHOLOGY (2 UNITS)

Meaning of psychology, Nature of psychology; fields of psychology. Concepts in psychology: Intelligence, Individual Differences, Teaching, Learning, Motivation, attitude, values, etc. concept of Human Development, stages of human development and implication for extension activity. Personality development. Emotion related to Extension Education. Application of psychology in agricultural extension. Psychology and rural development.

AEE 599: FINAL YEAR STUDENT PROJECT (6 UNITS) Students are to undertake supervision study on identified agricultural/economic related problems requiring empirical data collection, analysis and report writing. Students are also required to give both oral and written presentation. Students must apply the theory learnt in Research Methodology and econometrics in the implementation of their projects. Assessment of the course will involve grading of the project write – up, oral presentation and oral defense.

4.0 DEPARTMENT OF ANIMAL PRODUCTION AND HEALTH

4.1 Programme Philosophy

The philosophy of the Ondo State University of Science and Technology, Okitipupa is to produce practical-oriented graduates who are ready for self-employment at graduation. In line with this philosophy, the Department considers it appropriate to train graduates who have a broad-based knowledge of the various aspects of agriculture, and with emphasis in animal production.

The intention is that these graduates should be so practically trained as well as theoretically knowledgeable as to encourage them to set up themselves in agricultural production as means of reducing graduate unemployment and increasing agricultural productivity. The Department further holds that a deeper knowledge of animal health problems than is normally imparted to undergraduates of Animal Science will better prepare a graduate of Animal Production and Health for the challenges of intensive livestock production that he/she would encounter on the field.

4.2 Objectives of the Programme

The objectives of the programme are to:

1. train undergraduates broadly in the field of agricultural production with emphasis on animal production;
2. emphasize the role of animal diseases in animal production through general disease diagnosis and elaboration of preventive measures;
3. train undergraduates in basic research techniques; and
4. prepare undergraduates for self-employment in general agriculture, especially in animal production.

4.3 ADMISSION REQUIREMENTS

a. UTME Admission

Admission into the first year (100 level) of the programme is through the UTME. Candidates must have credits at WASSCE or NECO or GCE O/L or equivalent examinations at a minimum of two sittings in the following subjects: English language, mathematics, chemistry, biology or agricultural science and one of Geography, Physics and Economics. Candidates must have at least a pass in physics.

UTME Subjects: English language, mathematics or physics, chemistry, biology or agricultural science.

b. Direct entry

Candidates may be admitted into the second year (200 level) of the programme through direct entry if:

- i) They have the national diploma with a minimum of lower credit from recognized polytechnics or colleges of technology or the Nigerian certificate in education (NCE) or equivalent in relevant agriculture- based disciplines such as agricultural education and crop production technology; or
- ii) They possess at least two GCE advanced level/JUPEB passes in biology and any of the following subjects: chemistry, physics and mathematics.

Direct entry candidates must also meet the requirement for UTME admission in ‘a’ above.

4.4 Programme Duration

The duration of the programme is five academic sessions for students admitted through the UTME and four academic sessions for Direct Entry students. If a student fails to graduate in five academic sessions, he or she will not be allowed to exceed a total of 14 Semesters.

4.5 REQUIREMENTS FOR GRADUATION

To be eligible for the award of B.Agric.Tech. (Animal Production and Health), a student must have:

- a. passed all core (compulsory) courses as well as all University and School required courses and electives recommended for specialization;
- b. accumulated a minimum of 188 units for UTME, 150 units for Direct Entry, and obtained a CGPA of not less than 1.50 for 2017/18 session only and not less than 1.0 for subsequent sessions;
- c. successfully completed all field practicals, industrial attachment, training seminars and projects;
- d. All Direct Entry students(A/L and JUPEB) are expected to register and pass the following General studies courses: GST 101, 102, 111, 112 and 113; and
- e. Passed minimum of 7 units of elective courses

2.0 Course Outlines

100 LEVEL, FIRST SEMESTER

S/N	COURSE CODE	COURSE STATUS	COURSE TITLE	L	T	P	Units
1	BIO 101	C	General Biology 1	2	-	-	2
2	BIO 103	C	Practical Biology 1	-	-	3	1
3	CHM 101	C	General Chemistry 1	2	-	-	2
4	CHM 151	C	Practical Chemistry 1	-	-	3	1
5	PHY 101	C	General Physics 1	2	-	-	2
6	PHY 103	C	General Physics III	2	-	-	2
7	PHY 107	C	Practical Physics I	-	-	3	1
8	MTH 101	C	Introductory Mathematics 1	2	-	-	2
9	STA 111	C	Descriptive Statistics	2	-	-	2
10	CSC 101	C	Introduction to Computer Science	2	-	3	3
11	GST 101	C	Use of English 1	2	-	-	2
12	GST 113	C	Philosophy and Critical Thinking	2	-	-	2
13	GST 111	C	Use of Library and Study Skills	2	-	-	2
			TOTAL				24

100 LEVEL, SECOND SEMESTER							
1	BIO 102	C	General Biology II	2	-	-	2
2	BIO 104	C	Practical Biology 11	-	-	3	1
3	CHM 102	C	Introductory Organic Chemistry	2	-	-	2
4	CHM 152	C	Practical Chemistry 11	-	-	3	1
5	CHM 104	C	Introductory Physical Chemistry	2	-	-	2
6	PHY 102	C	General Physics II	2	-	-	2
7	PHY 108	C	Practical Physics	-	-	3	1
8	MTH 102	C	Introductory Mathematics II	2	-	-	2

9	CSC 102	C	Introduction to Computer Programming	2	-	3	3
10	GST 112	C	Nigerian People and Culture	2	-	-	2
11	GST 102	C	Use of English 2	2	-	-	2
			TOTAL				20

200 LEVEL, FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	APH 201	Introduction to Animal Production and Health	C	1	-	3	2
2	CSP 201	General Agriculture (Theory)	C	1	-	-	1
3	CSP 205	Basic Meteorology for Agricultural Sciences	C	2	-	-	2
4	CSP 207	Principles of Farm shop	C	2	-	3	3
5.	FAT 201	Introduction to Fisheries and Aquaculture	C	2	-	-	2
6	AEE 201	Introduction to Agric. Economics	C	2	-	-	2
7	FWM 201	Introduction to Ecotourism and Wildlife Management	C	1	-	3	2
8	FST 201	Introduction to Food Science and Technology	C	2	-	-	2
9	APH 203	Introduction to Agricultural Biochemistry	C	2	-	3	3

10	GST 221	History and Philosophy of Science	C	2	-	-	2
11	GST 229	Introduction to Vocational Skill	C	1	-	3	1
		TOTAL					22

Required courses for Direct Students (A/L and JUPEB)

S/N	COURSE CODE	COURSE TITLE	COURSESTATUS	L	T	P	Units
1	GST 101	Use of English 1	C	2	-	-	2

200 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSESTATUS	L	T	P	Units
1	APH 202	Anatomy and Physiology of Farm Animals	C	2	-	3	3
2	CSP 202	Basic Soil Science	C	1	-	3	2
3	CSP 204	Botany of Economic Crops	C	1	-	3	2
4.	CSP 210	General Agriculture (Practical)	C	-	-	6	2
5	FWM 202	Introduction to Forest Resources Management and Agroforestry	C	1	-	3	2
6	AEE 204	Agricultural Statistics and Field Experimentation	C	2	-	3	3
7	AEE 202	Introduction to Agricultural Extension and Rural Sociology	C	2	-	3	3
8	GST 224	Peace Studies and Conflict Resolution	C	2	-	-	2
		TOTAL					19

Required courses for Direct Students (A/L and JUPEB)

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	GST 102	Use of English 2	C	2	-	-	2
2	GST 112	Nigerian people and culture	C	2	-	-	2

300 LEVEL, FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	APH 301	Animal Breeding and Genetics I	C	2	-	-	2
2	APH 303	Animal Behaviour and Handling Techniques	C	1	-	3	2
3	APH 305	Principles of Animal Nutrition	C	2	-	3	3
4.	APH 307	Computer Application in Animal Production and Health	C	2	-	3	3
5	AEE 301	Principles of Agricultural Economics	C	2	-	-	2
6	FAT 313	Fish and Fishery Products	C	1	-	3	2
7	GST 331	Introduction to Entrepreneurial Skills	C	2	-	-	2
		TOTAL					16

Required courses for Direct Students (A/L and JUPEB)

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	GST 113	Philosophy and Critical Thinking	C	2	-	-	2
2	GST 111	Use of Library and Study Skills	C	2	-	-	2

ELECTIVE							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	CSP 311	Introductory Plant Physiology	E	1	-	3	2
2	AEE 309	Introduction to Rural Life	E	2	-	3	3

300 LEVEL, SECOND SEMESTER							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	APH 300	Students' Work Experience Programme (SWEP)	C	-	-	3	1
2	APH 302	Livestock Statistics and Data Processing	C	1	-	3	2
3	APH 304	Pasture and Fodder Crop Production and Preservation	C	1	-	3	2
4.	APH 306	Feeds and Feeding	C	1	-	3	2
5	APH 308	Muscle Biology and Meat Science	C	1	-	3	2
6	APH 310	Animal Microbiology and Parasitology	C	1	-	3	2
7	APH 312	Livestock Diseases and Control	C	1	-	3	2
8	AEE 306	Farm Records and Accounting	C	2	1	-	3
9	FAT 306	Fish Farming Techniques	C	1	-	3	2
		TOTAL					18

ELECTIVE

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	AEE 304	Elements of Agricultural Extension	E	2	-	-	3
2	CSP 304	Agronomy of Cereal and Legume Crops (Theory)	E	1	-	3	2
3	CSP 306	Fundamentals of Horticulture	E	1	-	3	2

400 LEVEL, FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	APH 401	Monogastric Animal Nutrition	C	1	-	3	2
2	APH 403	Ruminant Animal Nutrition	C	1	-	3	2
3	APH 405	Rabbit and Micro-livestock Production	C	1	-	3	2
4.	APH 407	Swine Production	C	1	-	3	2
5	APH 409	Beef Cattle, Sheep and Goat Production	C	2	-	3	3
6	APH 413	Poultry Production	C	1	-	3	2
7	APH 415	Hatchery Technology	C	1	-	3	2
8	APH 417	Dairy Cattle Production and Dairying	C	1	-	3	2
9	APH 419	Research Techniques in Animal Production	C	1	-	3	2
		TOTAL					19

ELECTIVE

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
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1	APH 423	Introduction to Embryology of Farm Animals	E	1	-	3	2
2	APH 411	Feed Milling Technology	E	1	-	3	2
3	AEE 401	Agricultural Finance	E	1	1	-	2
4	APH 421	Introduction to Bioinformatics	E	2	-	3	2

400 LEVEL, SECOND SEMESTER LONG VACATION

STUDENTS' INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	APH 402	Industry-Based/OSUSTECH Supervisor Assessment	C	-	-	-	4
2	APH 404	Assessment of Log Book	C	-	-	-	4
3	APH 406	Student Technical Report and Oral Presentation	C	-	-	-	4
		TOTAL					12

500 LEVEL, FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	APH 501	Animal Product and By-product Technology	C	1	-	3	2
2	APH 505	Livestock Economics	C	2	1	-	3
3	AEE 501	Personnel and Labour Management	C	2	-	-	2
4	AEE 503	Rural Development and Adoption of Improved Technology	C	2	-	-	2

5	APH 515	Animal Sciences Professional Practice	C	2	-	3	3
6	APH 517	Seminar in Animal Production and Health	C	2	-	-	2
7	APH 519	Animal Production Systems	C	3	-	-	3
		TOTAL					17

ELECTIVE

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	AEE 505	Agricultural Marketing	E	2	-	-	3
2	APH 507	Introduction to Immunogenetics	E	1	-	3	2
3	APH 503	Basic Immunology and Serology	E	1	-	3	2
4	APH 509	Artificial Insemination in Farm Animals	E	1	-	3	2
5	APH 511	Digestion and Metabolism of Carbohydrates and Lipids	E	1	-	3	2
6	APH 513	Instrumentation and Feed Analysis	E	1	-	3	2

500 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	APH 510	Public Health, Farm Hygiene and Disease Prevention	C	1	-	3	2

2	APH 504	Reproductive and Environmental Physiology	C	1	-	3	2
3.	APH 506	Principles of Animal Biotechnology	C	2	-	-	2
4	APH 508	Animal Breeding and Genetics II	C	1	-	3	2
5	APH 598	Project in Animal Production and Health	C	-	-	18	6
6	AEE 508	Concept of Agribusiness	R	1	1	-	2
		TOTAL					16

ELECTIVE							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	APH 516	Nutritional Toxicology	E	2	-	1	2
3	APH 514	Metabolism of Minerals and Vitamins	E	2	-	-	2
4	APH 512	Digestion and Metabolism of Protein and Nucleic Acid	E	2	-	-	2

3.0 COURSE DESCRIPTION

APH 201: INTRODUCTION TO ANIMAL PRODUCTION AND HEALTH (2 UNITS)

Introduction to farm animals, their breeds and brief history of their origin. Modern production, management and health practices especially with respect to cattle, swine, poultry, small ruminants and rabbits. Constraints to commercial production and concept of health maintenance in farm animals.

APH 202: ANATOMY AND PHYSIOLOGY OF FARM ANIMALS (3 UNITS)

Study of the morphology of parts of farm animals. Anatomical differences in relation to prehension, digestion, and locomotion. Anatomy and physiology of the different cell types, tissues and the systems. Review of all the systems of farm animals using the finer details of tissue/organs to emphasise the functions of these systems in relation to improved farm animal production. Homeostasis, nutrition, reproduction and digestion, temperature, regulation of body functions in the tropical environment and some aspects of reproductive endocrinology

APH 203: INTRODUCTION TO AGRICULTURAL BIOCHEMISTRY (3 UNIT)

Basic pathway chemistry of carbohydrates, lipids, proteins and nucleic acids Vitamins and their coenzyme functions. Minerals. The nature, classification and function of enzymes and hormones. Bioenergetics.

APH 300: STUDENTS' WORK EXPERIENCE PROGRAMME (SWEP) (1 UNIT)

An Early Morning Animal Agriculture Farm Practical to develop in students, basic habits of early attendance to livestock on the farm. Students are supervised during the period and are expected to keep log-books. A written report will be submitted at the end of the exercise. Assessment will be based on attendance, performance and written report.

APH 301: ANIMAL BREEDING AND GENETICS I (2 UNITS)

History of genetics and animal breeding, chromosome structure, number and variations. The gene and genotype, genetic code, Mendelism; fundamental principles of inheritance, types of gene actions, values and means, repeatability and heritability, variations in farm animals and selection principles. Breeding methods – in – breeding types of in – breeding, cross – breeding and types of cross – breeding, estimation of breeding values.

APH 302: LIVESTOCK STATISTICS AND DATA PROCESSING (2 UNITS)

Basis concepts of statistics in animal agriculture: Frequency distribution, measures of location, measures of variation. Probability distribution, normal and binomial distribution. Histograms, means, mode and median, sampling, data collection, data processing techniques, statistical inference, test of significance, F-Test, t-Test, Chi-square, analysis of variance, analysis of co-variance, correlation and regression analysis, Goodness of fit. Practical application to livestock research data using statistical packages.

APH 303: ANIMAL BEHAVIOUR AND HANDLING TECHNIQUES (2 UNITS)

Effects of domestication on animal behaviour. Causes of behaviour responses in animals. Types of behaviour. Learning of behavioural responses; behavioural adaptations of animals to their environments and ways of life. Abnormal behaviour. Various techniques for handling farm animals.

APH 304: PASTURE AND FODDER CROP PRODUCTION AND PRESERVATION (2 UNITS)

Geographical distribution of natural pasture in Nigeria, adaptation and botany of indigenous and introduced pastures and forage plants, characteristics and composition of grasses, legumes and shrubs for livestock feeding, establishment, production and seed multiplication of pasture plants. The utilization and maintenance of pasture fields and fodder crop farms. Grazing systems and management, forage conservation, dry season feeds.

APH 305: PRINCIPLES OF ANIMAL NUTRITION (3 UNITS)

Review of the digestive tracts and the digestion process in ruminants and non-ruminants, bioenergetics, water in relation to nutrition, basic nutritional and metabolic processes of carbohydrates, fats and proteins, nutritional requirements for maintenance, growth and production, nutrient inter-relationships. Non-protein nitrogen utilization, elements of human nutrition, food survey and food balance sheet.

APH 306: FEEDS AND FEEDING (2 UNITS)

Types of livestock feeds - roughages, succulents and concentrates, feed additives/supplements. The characteristics, chemistry and nutritive value of some Nigerian feeds and feeding stuffs. Factors affecting the nutritive value of feeds. The concept of feeding standards. Toxins and potential toxins in some feeding stuffs. The concept of alternative feed ingredients. Ration formulation, the concept of balanced ration evaluation, digestive experiments, economic livestock feeding and feedmill industry.

APH 307: COMPUTER APPLICATION IN ANIMAL PRODUCTION AND HEALTH (3 UNITS)

Introduction to the computer: Hardware, Software, Peripherals, Operating systems. Microsoft office Suite, Statistical and Database Packages, especially in relation to animal agriculture. Introduction to the internet: Wired LAN, Wireless LAN, Browsers, Virtual Libraries, other On-line Agricultural Resources and their uses. On-line communications, websites and website management, interactive on-line tools. Practical general problem solving with the computer; data entry and editing.

APH 308: MUSCLE BIOLOGY AND MEAT SCIENCE (2 UNITS)

Nigerian meat and allied industries. Growth and development of meat animals. Pre-slaughter handling and stress. Ante and post mortem factors affecting meat quality. Slaughtering and dressing techniques. Carcass yield and evaluation. Meat selection and grading. Structure, composition and function of muscle. Conversion of muscle to meat. Nutritional qualities of meat. Characteristics of fresh and processed meat. Meat processing and preservation. Consumer acceptability / sensory characteristics. Meat microbiology, inspection and sanitation. Tissue lipid oxidation. By-products handling and utilization. Abattoir/meat shop establishment and management. Meat marketing.

APH 310: ANIMAL MICROBIOLOGY AND PARASITOLOGY (3 UNITS)

The history and development of microbiology, general characteristics of micro-organisms including bacteria, viruses, chlamydiae, mycoplasma, rickettsiae and fungi of animal health importance, principles of sterilization and disinfection. Principles of bacterial isolation and cultivation. Identification of pathogenic bacteria and fungi and the diseases they cause in animals. The process of inflammation and healing of lesions associated with infections. The pathogenesis of infectious diseases. Production and helminth parasites and arthropods of importance to domestic stock, especially in the tropics. Their morphology, distribution, life-cycle, transmission, harmful effects and control.

APH 312: LIVESTOCK DISEASE AND CONTROL (3 UNITS)

The economic impact of diseases on livestock, signs of health disease, principles of disease control in livestock, maintenance of health on livestock farms, transmission, epidemiology, prevention and control of common livestock diseases, with emphasis on those prevalent in Nigeria. Nutritional and metabolic disease resistance and their practical application. Vaccination schedules in livestock, drug administration. Practical instructions on sample collection for laboratory diagnosis of animal diseases, routine farm visits for on-the-spot assessment of farm animals for production, observation of farm animals for signs of health and disease(s).

APH 401: MONOGASTRIC ANIMAL NUTRITION (2 UNITS)

Review of the digestive tracts and the digestion process in non-ruminants. Energy, protein, mineral and vitamin metabolism. Structure and nutritional significance of non-starch polysaccharides. Nutrient inter-relationships and non-protein nitrogen utilization. Nutrient requirements of monogastric animal species for health, maintenance, growth and productive functions. *In vivo* and *in vitro* digestive experiments.

APH 402/404/406: STUDENTS INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES) (12 UNITS)

Students are attached to industries, farms, research stations, etc with a view to making students develop more skill in their various disciplines and providing additional opportunity for students to learn to write field reports. Students are supervised during the training period and are expected to keep log-books and other records designed for the purpose of monitoring their performance.

APH 403: RUMINANT ANIMAL NUTRITION (2 UNITS)

Ruminant digestive physiology. Rumen microbiology. Metabolic processes and pathways. Determination of digestion coefficients, balance trials. Energy, protein, mineral and vitamin nutrition in relationship to the nutritional needs and practical feeding of beef cattle, dairy cattle, sheep and goats. Nutrient requirements of ruminant species for health maintenance, growth and

productive functions. New developments in feeding systems, feed additives and the prevention and treatment of metabolic disorders. *In vitro* and *in vivo* digestive experiments.

APH 405: RABBIT AND MICRO-LIVESTOCK PRODUCTION: (2 UNITS)

Historical background, World production; distribution and importance of rabbit characteristics of rabbits as important meat producing small livestock. Limitations to rabbit production; rabbit breeds and breeding; breeding characteristics, selection. Reproduction Anatomy and Physiology of reproduction. Three basic reproduction rates (extensive, semi-intensive and intensive rates). Nutrition and feeding: Feeding behaviour, nutritional needs, types of feed. Housing and equipment. Biological consideration, rabbit behaviour and environment. Building, caging watering, feed troughs and racks nest box. Pathology and health care. Diseases-intestinal, respiratory, nutritional, etc. Prevention and control. Other micro-livestock for consideration : guinea pigs, snails and laboratory animals.

APH 407: SWINE PRODUCTION (2 UNITS)

Importance of swine in livestock production, breeds, breeding selection and nutritional requirements, housing and health care of swine, techniques of establishing a commercial herd of swine, production plans, environmental requirements, production equipment and improvisation.

APH 409: BEEF CATTLE, SHEEP AND GOAT PRODUCTION (3 UNITS)

The beef industry in Nigeria, breeds of beef cattle, sheep and goats, equipment for beef cattle, sheep and goat production, housing requirements, feeding and management of beef cattle, sheep and goats. Calf rearing methods, common operations on cattle ranches – dehorning, castration, etc. Growing and finishing management practices, feedlot operation, breeding, herd record keeping, herd health management. Techniques for establishing large beef cattle, sheep and goat ranches. Judging and marketing of beef cattle, sheep and goats.

APH 411: FEED MILLING TECHNOLOGY (2 UNITS)

Overview of the Nigerian feed-mill industry. Feed-mill establishment and operation. Feed milling machine designs, components and maintenance operations. Feedstuff sourcing, storage, processing and quality control. Animal by-products processing and utilization. Finish feed quality. Principles and techniques of manual and computerized feed formulation. Economics and management of feed-mill operations. Marketing and sales promotion in feed-mill industry. Safety regulations pertaining to feed manufacture.

APH 413: POULTRY PRODUCTION (2 UNITS)

The areas of poultry production business, brooding of chicks and rearing of growers techniques of keeping layers, breeders, broilers and some other poultry species e.g. turkeys, ducks, geese and guinea fowls commercially and semi commercially. Practical ways of establishing a poultry farm

– provision of land, housing, equipment and labour. Poultry production plans and feasibility studies.

APH 415: HATCHERY TECHNOLOGY (2 UNITS)

Procedure for setting up and running a hatchery-hatchery layout, housing, equipment and labour management. Technical details about the types, parts, installation and handling of incubators. Production or purchase of good quality hatchable eggs. Incubation procedures, embryology. Hatchery hygiene. Handling and marketing of hatched chicks.

APH 417: DAIRY CATTLE PRODUCTION AND DAIRYING (2 UNITS)

Dairy-type cattle and their characteristics. Production and management practices in rearing dairy cattle. Judging of dairy cattle. Milk and milking techniques. Composition of milk. Processing and preservation of milk. Milk products-butter, cheese, whey. Procedure for establishing a commercial dairy plant.

APH 419: RESEARCH TECHNIQUES IN ANIMAL PRODUCTION (2 UNITS)

Techniques and procedures in animal experimentation in context of the research objectives. Basic statistical designs in animal production research problems. Animal welfare issues in relation to global best practices. Interactive animal field experimentation. Sample collection, and data collection and processing.

APH 421: INTRODUCTION TO BIOINFORMATICS (2 UNITS)

Bioinformatics: the meeting point between molecular biology and small fast computers. Review of eLearning, Elluminate and eDesktop packages. Programming strategies. Introduction to dynamic websites. An overview of recent developments in genomics and proteomics. Introduction to databases: case studies in informatics-based research, securing data access, verifying data deletion. The GENBANK database. DNA and protein sequence alignment (Representing and reasoning about sequence data). Sequence motifs/patterns. DNA and RNA sequencing, simulating a DNA sequence by programming randomization. The genetic code. Phylogenetic trees and genetic distances. Protein structures: prediction, alignment and classification. Microarray data analysis: normalization and clustering Biological networks.

APH 423:INTRODUCTORY EMBRYOLOGY OF FARM ANIMALS (2 UNITS)

General introduction and definition of terms:Embryology, embryo, fertilization, syngamy, zygote, zonapellucida etc.Important developmental processes: Cleavage and growth within the zonapellucida and formation of blastula.Morphogenesis: Gastrulation and the development of three germ cell layers-the ectoderm, mesoderm and endoderm. Cellular differentiation. Structure of vertebrate embryo:The neural tube, notochord, somite, ectoderm, mesoderm, endoderm, coelom, gastrocoele/primitive gut/archenteron.Germ layers and their derivatives:Ectoderm (skin; nervous system; enamel of teeth; lining of nose, mouth and anus; adrenal medulla; pituitary

gland); Mesoderm (Vertebral column, dorsal muscles formed by the somites, kidneys, lining of coelomic or body cavity, reproductive organs like the testis, ovaries, penis, vagina etc; circulatory system, skeletal system); Endoderm (Digestive organs like stomach, intestine etc, lining of digestive tract, lung, liver, thyroid gland, thymus gland, pancreas, parathyroid gland and urinary bladder). The concept of induction. The extra-embryonic membranes – amnion, allantois, chorion and yolk sac and their functions. Embryonic development in selected livestock: Chicken, rabbit, pig, sheep and goat, cattle.

APH 517: SEMINAR IN ANIMAL PRODUCTION AND HEALTH (2 UNITS)

Instruction on the preparation, presentation and discussion of critical reviews of topics important to animal agriculture, to be followed by student presentation of above reviews.

APH 501: ANIMAL PRODUCTS AND BY-PRODUCTS TECHNOLOGY (2 UNITS)

Products and by-products of various livestock animals including their characteristics and economic importance. Carcass yield and evaluation. Processing procedures, products handling, preservation, storage and marketing – microbiology of products and by – products, techniques of establishing processing plants.

APH 519: ANIMAL PRODUCTION SYSTEMS (3 UNITS)

Analyses of Livestock Production Systems for the different non-ruminant and ruminant animal species. Mixed Crop-Livestock Production Systems. Appropriate enterprise mix in livestock production. Management at farm, Regional and Policy Level. Traditional Technologies in Animal Production. Crop-Livestock Technologies. Livestock production in Tropical farming systems. Potentials for integrated commercial livestock and crop farming in Nigeria. Homestead/subsistence crop-livestock production.

APH 503: BASIC IMMUNOLOGY AND SEROLOGY (2 UNITS)

Concepts of self and non-self. Innate and Acquired immunity. Antigens and antibodies. Humoral and cellular response to foreign protein invasion of the body, Phagocytosis and pinocytosis. Hypersensitive reactions. Antigen-antibody reactions. Serological methods of disease diagnosis: Agglutination, hemagglutination, precipitation flocculation and neutralization reactions in vitro and in vivo, immuno fluorescent and enzyme-linked techniques. Vaccines and vaccinations; Use of vaccines. Practical exercises on antigen-antibody reactions.

APH 504: REPRODUCTIVE AND ENVIRONMENTAL PHYSIOLOGY (2 UNITS)

Functional anatomy of male and female reproductive systems. Sperm and ovum anatomy and physiology. The oestrus cycle in mammalian species. Oestrus detection and synchronization. Fertilization, pregnancy and foetal development. Physiology of parturition. Hormones of

reproduction. Artificial insemination in farm animals; semen collection, evaluation, preservation and storage. Insemination techniques. Physiology of egg production.

APH 505: LIVESTOCK ECONOMICS (3 UNITS)

The place of livestock in the Nigeria Economy; consumer and consumption patterns of livestock products; micro and macro-economics in animal production; agricultural production functions including data collection and analysis. Capital investment and depreciation of capital. The economics of egg, meat and milk production. Livestock feed economics. Input return relationship in livestock production. The economics of herd health management.

APH 506: PRINCIPLES OF ANIMAL BIOTECHNOLOGY (2 UNITS)

Definition of biotechnology/recombinant DNA technology/genetic engineering. Animal cell and tissue culture. Cloning, species hybridization, interspecies, embryo transfer, DNA sequence, blood group analysis and genetic polymorphism; electrophoretic techniques. Gene and gene markers. Applications in animal and feed production, nutrition, reproduction, genetics and breeding, disease and metabolic control pollution abatement and environment management. Use of DNA tests for meat quality genotype identification, paternity testing, disease diagnostics, etc... Conservation of animal genetic resources, *ex situ* and *in situ*.

APH 507: INTRODUCTION TO IMMUNOGENETICS (2 UNITS)

Immunology: Historical perspectives (Edward Jenner, Elie Metchnikoff, etc). The immune system: The innate immune response. Pathogenic recognition, barriers to infective agents-the skin and mucous membranes and their secretions. The cells of the immune system: the granulocytes, lymphocytes, mononuclear phagocytes and dendritic cells. Cell communication: surface receptors, cytokines, adhesion molecules. Sensor systems: Toll-like receptors and NOD proteins, the complement system. Phagocytosis. Inflammatory response and apoptosis. The adaptive immune response: Humoral and cellular immunity. The lymphoid system and organs. The antigens, antibodies and immunoglobulins. Applications of immune responses: Immunization, vaccination, immunological testing. The genetic bases of auto-immune diseases.

APH 508: ANIMAL BREEDING AND GENETICS II (2 UNITS)

Production characteristics in various farm animal species. Determination of genetic parameters. Breeding systems, selection methods, sex determination. Foundation stock in livestock production, Breeding and selection of beef and dairy cattle; performance and progeny testing in beef and dairy cattle and poultry. Improvement of sheep and goats. Gene mutation and variance and co-variance, heritability and repeatability.

APH 509: ARTIFICIAL INSEMINATION IN FARM ANIMALS (2 UNITS)

The meaning and significance of artificial insemination (AI). Review of basic terminologies associated with AI (ART, TFNAC, IVF, ICSI, ET, GIFT, IUI etc). Advantages and disadvantages

of artificial insemination. Breeding soundness evaluation. AI protocols: Semen collection, composition, processing and preservation. Oestrus detection, ovulation and insemination of the female stock. Species differences in AI protocols (cattle, sheep, goat, swine, horse, poultry etc.). Emerging trends in AI (Biomimetic sperm selection, density gradient centrifugation, single layer centrifugation, sperm sexing, embryo splitting etc.).

APH 510: PUBLIC HEALTH AND ANIMAL HYGIENE (2 UNITS)

Principles of sanitation and farm hygiene as applied to the control of common diseases of livestock; disinfection, sanitation procedures, including waste and carcass disposal methods. Occupational diseases with respect to the livestock industry, principles of zoonosis and study of specific zoonotic diseases with emphasis on prevention and control on livestock farms and in humans. Visits to slaughter slabs, abattoirs and institutions of public health importance.

APH 511: DIGESTION AND METABOLISM OF CARBOHYDRATES AND LIPIDS (2 UNITS)

Concepts in carbohydrate and lipid digestion, absorption and metabolism in farm animals. Disturbances in carbohydrate and lipid metabolism in farm animals. Energy partition and metabolism in ruminant and non-ruminant animals.

APH 512: DIGESTION AND METABOLISM OF PROTEIN AND NUCLEIC ACID (2 UNIT)

Biosynthesis and utilization of amino acids, nucleic acids and their precursors. The role of nucleic acids in protein synthesis, structure and functions. Disturbances in proteins and nucleic metabolism in farm animals.

APH 513: INSTRUMENTATION AND FEED ANALYSIS (2 UNITS)

A theoretical and practical approach on the use of different instruments. Demonstration and the use of colorimeter, spectrophotometer, fluorimeter, calorimeter, electrophoretic apparatus and chromatographic separation of compounds and mixtures.

APH 514: METABOLISM OF MINERALS AND VITAMINS (2 UNITS)

Detailed study of metabolic roles of vitamins and minerals in animals. Relationships among vitamins and their respective enzymes. The roles of essential minerals in farm animal nutrition. The intra and interrelationship of minerals and vitamins in metabolism of nutrients. Vitamins and minerals bioavailability as influenced by their forms and existence.

APH 515: ANIMAL SCIENCES PROFESSIONAL PRACTICE (3 UNITS)

The professional practice of Animal Sciences in Nigeria: History, Enabling Law. Development of Animal Sciences professional practice. Career prospects and job opportunities in Animal Sciences (Professional profiles reports to be submitted). Consultancy services in Animal Sciences: Animal

Sciences professional ethics; preparation of feasibility and environmental impact assessment reports for animal production investments. Information Technology applications in livestock operation and in Animal Sciences careers.

APH 516: NUTRITIONAL TOXICOLOGY (2 UNITS)

The science of dietary toxins and their interrelationships with nutrition. General principles of toxicology, mode of action and metabolism of toxic chemicals that occur in foods and animal feedstuffs.

APH 598: PROJECT IN ANIMAL PRODUCTION AND HEALTH (6 UNITS)

Supervised study of an identified problem, requiring both oral and written presentation, students must attend tutorials on research techniques and scientific writing as well as an oral presentation relating to students project in the school.

5.0 DEPARTMENT OF CROP, SOIL AND PEST MANAGEMENT

5.1 PROGRAMME PHILOSOPHY

The department has as its philosophy, the training of the required manpower in the crop production technology and advancing its frontiers through teaching, research and extension. The academic programme of the department takes into consideration the fundamental principles and practices of the different areas of crop production, including product harvesting, processing, preservation and consumption. By placing adequate emphasis on adaptable technologies in crop and soil management, crop improvement and protection, post-harvest operations and consumption, the department abridges current inadequacies of similar programmes existing in conventional universities. Further, the department focuses attention on the establishment of sound technologies for sustainable crop production, protection, management, processing, renewal and product management. Graduates from this department can be gainfully employed in self-sustaining enterprises such as small-scale crop farms and crop processing factories. Also, the graduates can find suitable employment in government establishment (ministries and parastatals), agro based companies (food and chemical), private farms and banks.

5.2 OBJECTIVES OF THE PROGRAMME

The objectives of the programme are to;

- a) Train undergraduates broadly in the field of agricultural production with emphasis on crop production, soil management and pest management;
- b) Emphasize in the course of training , appreciation of the role of insect pests, diseases and weeds in crop production through diagnosis of pest attack and elaboration of preventive and curative measures;
- c) Train undergraduates in basic field experimentation techniques; and
- d) Prepare undergraduates for self-employment in general agriculture, particularly in the various spheres of crop production, including soil and pest management.

5.3 ADMISSION REQUIREMENTS

c. UTME Admission

Admission into the first year (100 level) of the programme is through the UTME. Candidates must have credits at WASSCE or NECO or GCE O/L or equivalent examinations at a minimum of two sittings in the following subjects: English language, mathematics, chemistry, biology or agricultural science and one of Geography, Physics and Economics. Candidates must have at least a pass in physics.

UTME Subjects: English language, mathematics, chemistry, biology or agricultural science.

d. Direct entry

Candidates may be admitted into the second year (200 level) of the programme through direct entry if:

- iii) They have the national diploma with a minimum of upper credit from recognized polytechnics or colleges of technology or the Nigerian certificate in education (NCE) or equivalent in relevant agriculture- based disciplines such as agricultural education and crop production technology; or
- iv) They possess at least two GCE advanced level/JUPEB passes in biology and any of the following subjects: chemistry, physics and mathematics.

Direct entry candidates must also meet the requirement for UTME admission in 'a' above.

5.4 PROGRAMME DURATION

The duration of the programme is five academic sessions for students who enter in by UTME admission but for direct entry students it is four. If a student fails to graduate in five academic sessions, he or she will NOT be allowed to exceed a total of fourteen semesters in the case of students admitted through the UTME and twelve semesters in the case of direct entry students.

5.5 REQUIREMENTS FOR GRADUATION

To be eligible for the award of B.Agric. Tech. (Crop, soil and pest management), a student must have:

- a) Passed all core courses as well as University and School Required courses and any elective recommended for specialization;
- b) Accumulated at least 194 credit units for the five year programme and 151 credit units for direct entry programme and obtained a CGPA of not less than 1.5 for 2017/2018 session only, and not less than 1.0 for subsequent sessions.
- c) Successfully completed all field practical, industrial attachment training, seminars and projects.
- d) Direct entry student (A level, JUBEB) are expected to register and pass the following general studies courses GST 101, 102, 111, 112 and 113.

100 LEVEL, FIRST SEMESTER							
S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	Units
1	BIO 101	General Biology I	C	2	-	-	2
2	BIO 103	Practical Biology I	C	-	-	3	1
3	CHM 101	Introductory Inorganic Chemistry	C	2	-	-	2
4	CHM 151	Practical Chemistry I	C	-	-	3	1
5	PHY 101	General Physics	C	2	-	-	2
6	PHY 103	General Physics III	C	2	-	-	2
7	PHY 107	Practical Physics I	C	-	-	3	1
8	MTH 101	Introductory Mathematics I	C	2	-	-	2
9	STAT 111	Descriptive Statistics	C	2	-	-	2
10	CSC 101	Introduction to Computer Science	C	2	-	-	2
11	GST 101	Use of English I	C	2	-	-	2
12	GST 113	Philosophy and Critical Thinking	C	2	-	-	2
13	GST 111	Use of Library and Study	C	2	-	-	2
		TOTAL					23

Course Outlines

100 LEVEL, SECOND SEMESTER							
S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	BIO 102	General Biology II	C	2	-	-	2
2	BIO 104	Practical Biology II	C	-	-	3	1
3	CHM 102	Introductory Organic Chemistry	C	2	-	-	2
4	CHM 152	Practical Chemistry II	C	-	-	3	1
5	CHM 104	Introductory Physical Chemistry	C	2	-	-	2
6	PHY 102	General Physics II	C	2	-	-	2
7	PHY 108	Practical Physics	C	-0	-	3	1
8	MTH 102	Introductory Math. II	C	2	-	-	2
9	CSC 102	Introduction to Computer Programming	C	2	-	3	3
11	GST 112	Nigerian Peoples and Culture	C	2	-	-	2
11	GST 102	Use of English II	C	2	-	-	2
		TOTAL					20

200 LEVEL, FIRST SEMESTER							
S/N	COURSE CODE	COURSE TITLE	COURSESTATUS	L	T	P	Units
1	APH 201	Introduction to Animal Production and Health	C	1	-	3	2
2	CSP 201	General Agriculture (Theory)	C	1	-	-	1
3	CSP 205	Basic Meteorology for Agricultural Sciences	C	2	-	-	2
4.	CSP 207	Principles of Farmshop	C	2	-	3	3
5	FAT 201	Introduction to Fisheries and Aquaculture Technology	C	2	-	-	2
6	AEE 201	Introduction to Agric. Economics	C	2	-	-	2
7	FRM 201	Introduction to Ecotourism and Wildlife Management	C	1	-	3	2
8	FST 201	Introduction to Food Science and Technology	C	2	-	-	2
9	APH 203	Introductory Agricultural Biochemistry	C	2	-	3	3
10	GST 221	History and Philosophy of Science	C	2	-	-	2
11	GST 229	Introduction to Vocational Skills	R	1	-	3	1
		TOTAL					22

Required courses for Direct Students (New students)

S/N	COURSE CODE	COURSE TITLE	COURSESTATUS	L	T	P	Units
1	GST 101	Use of English 1	C	2	-	-	2

200 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSESTATUS	L	T	P	Units
1	APH 202	Anatomy and Physiology of Farm Animals	C	2	-	3	3
2	CSP 202	Basic Soil Science	C	1	-	3	2
3	CSP 204	Botany of Economic Crops	C	1	-	3	2
4.	CSP 210	General Agriculture (Practical)	C	-	-	6	2
5	FRM 202	Introduction to Forest Resources Management and Agroforestry		1	-	3	2
6	AEE 204	Agricultural Statistics and Field Experimentation	C	2	-	3	3
7	AEE 202	Introduction to Agricultural Extension and Rural Sociology	C	2	-	3	3
8	GST 224	Peace Studies and Conflict Resolution	C	2	-	-	2
		TOTAL					19

Required courses for Direct Students (New students)

S/N	COURSE CODE	COURSE TITLE	COURSESTATUS	L	T	P	Units
1	GST 102	Communication in English II	C	2	-	-	2
2	GST 113	Nigerian people and culture	C	2	-	-	2

300 LEVEL, FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSESTATUS	L	T	P	Units
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1	CSP 301	Agronomy of Tuber & Fibre Crops	C	1	-	3	2
2	CPS 311	Weed Biology and Ecology	C	1	-	3	2
3	CSP 313	Insect Morphology and Physiology	C	1	-	3	2
4.	CSP 303	Land and Soil Management	C	1	-	3	2
5	AEE 303	Principles of Rural Sociology and Agri. Extension	C	2	1	-	3
6	CSP 305	Introductory Plant Physiology	C	1	-	3	2
7	CSP 309	Crop Mycology and Bacteriology	C	1	-	3	2
8	CSP 307	Vertebrate Pests of Crops and Control	C	1	-	-	1
9	GST 331	Introduction to Entrepreneurial Skills	C	2	-	-	2
		TOTAL					18

ELECTIVE

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FWM 301	Principle of Silviculture	E	2	-	3	2
2	FAT 301	Aquatic Ecology	E	1	-	3	2
3	APH 305	Principles of Animal Nutrition	E	2	-	3	3

Required courses for Direct entry students (New students)

1	GST 113	Philosophy and Critical Thinking	C	2	-	-	2
2	GST 111	Use of Library and Study Skills	C	2	-	-	2

300 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
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1	CSP 302	Agronomy of Cereal & Legume Crops	C	1	-	3	2
2	CSP 304	Fundamental of Horticulture	C	1	-	3	2
3	CSP 312	Insect Taxonomy & Ecology	C	1	-	3	2
4.	CSP 306	Weed Management	C	1	-	3	2
5	CSP 308	Crop Nematology & Virology	C	1	-	3	2
6	CSP 310	Crop Ecology	C	2	1	-	2
7	AEE 302	Elements of Agric. Economics	C	2	1	-	3
8	AEE 308	Principles of Farm Management	C	2	-	-	2
		TOTAL					17

CSP 390 R- Students' Work Experience Programme (SWEP) 4

ELECTIVE							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	APH 306	Feeds and Feeding	E	1	-	3	2
2	FAT 306	Fish Farming Techniques	E	1	-	3	2
3	FWM 304	Forest Survey	E	1	-	3	2

400 LEVEL, FIRST SEMESTER							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	CSP 401	Crop Preservation, Processing & Storage	C	2	-	3	3
2	CSP 403	Plant Disease Control	C	1	-	3	2
3	CSP 405	Insect Pests of Crops & Control	C	1	-	3	2

4.	CSP 407	Soil Fertility & Plant Nutrition	C	2	-	3	3
5	CSP 409	Plant Genetics	C	2	-	3	3
6	CSP 411	Soil Physics	C	2	1	-	3
7	CSP 413	Fundamentals of Agricultural Mechanism	C	2	-	3	3
		Electives					2
		TOTAL					21

ELECTIVE							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	AEE 403	Agricultural Production Economics & Resource Use	E	2	1	-	3
2	AEE 409	Agricultural Finance	E	1	1	-	2
3	APH 407	Beef Cattle, Sheep & Goat Production	E	2	-	3	3
4	APH 415	Hatchery Technology	E	1	-	3	2
5	FAT 401	Fisheries Management & Conservation	E	2	-	-	2
6	FRM 419	Ecological Survey	E	1	-	3	3
7	APH 413	Poultry Production	E	1	-	3	2

400 LEVEL, SECOND SEMESTER PLUS LONG VACATION STUDENTS' INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	CSP 402	Industry-Based/OSUSTEC Supervisor Assessment	C	-	-	-	4
2	CSP 404	Assessment of Log Book	C	-	-	-	4
3	CSP 406	Student Technical Report and Oral Presentation	C	-	-	-	4

		TOTAL					12
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500 LEVEL, FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSESTATUS	L	T	P	Units
1	CSP 501	Soil Water Management	C	2	-	3	3
2	CSP 503	Agronomy of Tree Crops	C	2	-	3	3
3	CSP 505	Crop Protection Technology	C	2	-	3	3
4.	CSP 507	Biotechnology in Crop/Pest Management	C	2	-	-	2
5	CSP 511	Plant Physiology	C	2	-	3	3
6	CSP 509	Biostatistics & Field Experimentation	C	1	-	3	2
7	CSP 513	Plant Improvement	C	2	-	3	3
8	CSP 515	Seminar in Crop, Soil and Pest Management	C	-	-	6	2
		TOTAL					21

ELECTIVE

S/N	COURSE CODE	COURSE TITLE	COURSESTATUS	L	T	P	Units
1	FWM 405	Agro Forestry Practical	E	1	-	3	1
2	APH 409	Beef, Cattle, Sheep and Goat Production	E	2	-	3	3

500 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSESTATUS	L	T	P	Units
1	CSP 506	Farming Systems	C	2	-	3	3
2	CSP 504	Seed Production Technology	C	2	-	3	3
3	CSP 510	Soil Survey & Classification	C	1	-	3	3

4	CSP 598	Project in Crop, Soil and Pest Management	C	-	-	18	6
5	AEE 508	The Concept of Agribusiness	R	1	1	-	2
		TOTAL					17

ELECTIVE							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	CSP 508	Fertilizer Use Technology	E	2	-	3	3
2	CSP 514	Crop/Pest Management & the Environment	E	1	-	3	2
4	FAT 306	Aquaculture and Fish Farming Techniques	E	1	-	3	2

5.7 COURSE DESCRIPTION

CSP 201 GENERAL AGRICULTURE (THEORY) (1 UNIT)

Importance and scope of agriculture. Land and its uses with particular reference to agriculture. Introductory Crop Production. Agricultural ecology of Nigeria, Agronomy of some arable crops, Land preparation. Farm tools machinery. Basics farm Management Techniques. Fisheries and Wildlife Production. Forest products. General Introduction to Livestock Production and Health.

CSP 202 Basics Soil Science (2 Units)

Definition and function of soil. Rocks and minerals, weathering. Soil forming factors. Soil composition, texture, structure, soil water, suction characteristic curve, moisture constants, water movement, hydraulic conductivity, infiltration. Soil air, aeration, temperature. Soil colloids. Alumino-silicate. Organic matter. Laboratory exercises.

CSP 204 Botany of Economic Crops (2 Units)

Plant structure and function including the cell, tissue and the organs, the stem, roots, leaves, flowers, fruits and seeds; photosynthesis and respiration, and translocation of materials. Plant growth and development. Plant classification. Agriculturally important plant families.

CSP 205 Basic Meteorology for Agricultural Sciences (2 Units)

Preview of basic meteorological variables as they relate to agriculture (precipitation, evaporation, evapotranspiration, solar radiation, winds, visibility, temperature, pressure, clouds and weather etc.)

Definition and Scope of agrometeorology, significance and economic benefits of applications of agrometeorological methods. Meteorological conditions within crop canopies. Effect of weather on crops, fisheries and animal husbandry, Microclimate conditions for crop and animal production. Effects of weather parameters on food storage. Climate variability and climate change and their possible effect on crops and livestock performance, pest and disease. Modification of microclimate for increased animal production and crop. (Tillage, Mulching, irrigation, evaporative cooling.) Climate change and variability and deforestation. , Simple crop- climate models. Application of weather forecasting to Agriculture. Applications of remote sensing in agrometeorology (phenology, forestry, soil moisture, etc). Climate change and variability and deforestation.

CSP 207: PRINCIPLES OF FARM SHOPS (3 UNITS)

General introduction to farm shop, farm shop activities: preventive and corrective maintenance. Lubrication; Battery maintenance; Tyre maintenance; cooling system. Farm tools, equipments and machines. Machine shop practices: fabrication: heat treatment of metals: other forms of heat treatment metal work: Industrial and workshop Accidents. Methods of joining metals riveting; self secured joints: soft soldering: Hand soldering: Welding farming operations. Introduction to the Tractor: Functions of the tractors; types, criteria for classifying tractors; system/components of the tractor: Power transmission elements.

CSP 210: General Agriculture Practical (2 Units)

This will involve field planting. Each student will be allocated a field plot for the planting management of an arable crop. Students will be exposed to practical work in animal production and health, fisheries and wildlife management and crop and forestry nurseries.

CSP 301: Agronomy of Tuber and Fibre Crops (2 Units)

Prerequisite to CSP 304 & 503

Origin, distribution, taxonomy, botany ecology, and methods of cultivation, harvesting, processing and storage of major tuber and fibre crops of Nigeria yams, cocoyams, cassava, potatoes, ginger, cotton, sisal, hibiscus, jute etc. detailed study of the methods of pests and diseases and soil fertility management, processing, storage, marketing and use of the products of each crop.

CSP 302: Agronomy of Cereals and Legume Crops (2 Units)

Origin, distribution, taxonomy, botany, ecology and methods of cultivation of major cereal and legume crops of Nigeria (West Africa) – maize, rice, guinea corn, wheat, millet, cowpeas, groundnut, the various beans, pigeon pea, (Cajanus cajan), Bambara nuts, soybeans, and the legume covers. Detailed study of the methods of harvesting, processing, storage and the use of the products of each crop.

CSP 303: Land/Soil Management (2 Units)

Need the soil conservation practices. Effects of deforestation , soil problems affecting crop production, methods of land clearing, effect of bush clearing. Tillage implements, soil tillage and the tillage techniques; effects of tillage methods on soil and crop. Soil structure formation and improvement, structure deformation

and measures to prevent it. Maintenance and improvement of soil fertility natural and artificial processes. Application of Global Positioning System (GPS) in topographical mapping. Field trip. Prerequisite to CSP 407 & 509

CSP 304: Fundamentals of Horticulture (2 Units)

Principles, practices and techniques in tropical horticulture. Tools equipment and materials. Landscaping. Origin, distribution, taxonomy, botany, principles of cultivation, harvesting, processing, storage, marketing and use of major fruits leafy vegetables and ornamental plants of Nigeria.

CSP 305 Introductory Plant Physiology (2 Units)

Pre-requisite to CSP 515.

Principal life processes of higher plants e.g. water relation, mineral absorption, translocation and utilization, photosynthesis and respiration. Agricultural and ecological significance of life processes.

CSP 306: Weed Management (2 Units)

Principles of weed management; general methods of weed control including mechanical, cultural, biological, legislative and chemical. Classification and chemistry of herbicides, their residual effects on crop plants, soil flora and fauna. Methods of herbicide use and safety precautions, weed control in arable, vegetable and plantation crops.

CSP 307 Vertebrate Pest of Crops and Control (1 Unit)

Different animal pests of crops apart from microorganisms and arthropods. Birds, rodents and mammals and their damage and control, their damage and control

CSP 308 Crop Nematology and Virology (2 Units)

Importance of nematodes and virus as disease causing agents in plants. Features, isolation and identification of plant nematodes and viruses. Pathogenesis, procedures for plant disease diagnosis specifically those incited by nematodes and viruses. Plant virus replication and plant infection. Nematode development/life cycle and plant infection.

CSP 309 Crop Mycology and Bacteriology (2 Units)

Pre-requisite to CSP 403

Diseases concept in plants. Importance of plant diseases in history. Symptoms, signs and other basic terminologies. The classes of fungi and their nomenclature. Classes of bacteria and their nomenclature. Features, isolation and identification of fungi and bacteria- causing diseases in plants, pathogenesis, procedure for plant disease diagnosis specifically those incited by fungi and bacteria.

CSP 310: Crop Ecology (2 Units) Basic factors in ecological classification. Major ecological zones in West Africa and their agricultural activities, including ecological crop distribution. Ecological factors of

crop production. Plant interference. Population growth and regulation; evolutionary strategies in plants. Community composition and structure, dorminance and diversity. Ecosystem functioning.

CSP 311: Weed Biology and Ecology (2 Units)

The weed concept: importance of weeds, classification of weeds, survival and persistence characteristics: reproduction and seed features; weed succession inorganic, chemical and integrated agriculture; weed-crop associations; competition, allelopathy; importance of weed biology; biology and identification of major tropical weeds; preparation of weed and seed album; weed reproduction and growth studies.

CSP 312: Insect Taxonomy and Ecology (2 Units)

Insect classification – importance of classification; various insect orders – their principal features for identification and agricultural or medical significance. Insect population dynamics including factors regulating insect abundance. Insect population prediction and monitoring systems. Insect behaviour, insect communication, insect phylogeny and arthropods relations.

CSP 313: Insect Morphology and Physiology (2 Units)

The arthropod plan, the external structure of insects: the integument, tagmosis- the head, thorax and abdomen, the internal structure of insects: consideration of the various body systems Insect nutrition and digestive system, Insect sensory and nervous system. Insect growth, development, and other mechanisms of survival.

CSP 401: Crop Preservation, Processing and Storage (3 Units)

Meaning and importance of crop preservation, processing and storage. Factors causing crop deterioration in storage. Types of storage losses in crops. Traditional methods of storing crops. Modern improved methods of storing crops. Storage pathology and entomology.

CSP 402, 404 and 406 Students Industrial Work Experience Scheme (12 Units)

Students are to be posted to different farms or agroallied industries for-on-the job experience. Student's performances are to be monitored and graded by site supervisors (CSP 402) and School supervisor (CSP 404) following established guidelines. Students are to present seminars and comprehensive reports about work undertaken during the period which will be graded (CSP 406).

CSP 403: Plant Disease Control (2 Units)

Pre-requisite to CSP 505

Principles of plant disease control; general methods of plant disease control, including mechanical, cultural, biological use of host-plant resistance, legislative and chemical. The set-up operation of plant quarantine as a method of global disease control strategy. Classification, chemistry and mode of action of fungicides. Formulation of fungicides.

CSP 405: Insect Pests of Crops and Control (2 Units)

Major reasons why insects become pest. Types of damage cause by insect to agricultural plants. Pest status. The concept of economic injury level. General methods of insect pests control; including biological, legislative, cultural, physical and mechanical, use of host plant resistance, the use of plant botanicals and the use of chemical insecticides. Chemical insecticidal classification based on chemical composition of the insecticide and mode of action.

CSP 407: Soil Fertility and Plant Nutrition (3 Uints)

Nutrients and mineral nutrition of plants. Soil organic matter and functions. Essential plant nutrients-form, functions, chemistry, deficiency symptoms, sources. Fertilisers and fertilizer calculation. Characteristics of alumina-silicate clays and organic colloids. Cation and anion exchange. Soil PH. Active and reserve acidity. Liming. Practical (Soil Analysis).

CSP 409: Plant Genetics (3 Units)

Eukaryotic cells, structure and components. Mitosis and meiosis chromosome structure and variation in structure and number. Biochemical nature of genetic material. Gene function and mutation. Basic concepts of Mendelian and polygenic inheritance Genetic interaction. Linkage and crossing over. Qualitative inheritance. Chimeras Polyploidy. Genetic basis of breeding. Pre-requisite to CSP 502.

CSP 411: Soil Physics (3 Units)

Introduction to soil physics. Soil texture (particle size distribution; variability of soil physical properties, soil structure (genesis, description and importance) and soil compaction (crusting and sealing), causes, remedies and significance. Total porosity and pore-size distribution, soil air and aeration porosity, and significance. Soil consistency and strength. Thermal properties of soil: soil temperature, heat (thermal) flow, conductivity and diffusivity. Forces on soil water: soil water energy (potential) and its components. Soil water movement. Soil tillage practices and significance. Introduction to solute movement in soil. Soil water infiltration and evaporation.

CSP 413: fundamentals of mechanization (2 units)

Sources of farm power; Internal combustion engines, the tractor as a power source. Land preparation. Principles of operation, application, maintenance of farm machines; tillage equipment for fertilizer application and crop protection, harvesting equipment: forage harvester, equipment for harvesting cereals, root crop harvesters, combined harvester, thresher, other threshing equipment. Size reduction machines and handling materials. Agricultural mechanization in Nigeria – problem, constraints, solutions. Global trend in Agricultural mechanization

CSP 501: Soil Water Management (3 Units)

World water resources, nature of soil water potential capillary rise and infiltration, movement in saturated and unsaturated soil. Forms of irrigation, assessment of water requirements for crops and critical stages for water, time of irrigation and agronomic management of irrigated crops. Maintenance of irrigation equipment. Soil erosivity and erosion control. Soil drainage. Evaporation and control. Soil water-plant-atmosphere relationships.

CSP 503: Agronomy of Tree Crops (3 Units)

Origin, distribution, botany, taxonomy, ecology and methods of cultivation of the major tropical tree and fruit crops – cocoa cola, coffee, latex producing plants, cashew, oil palm, coconut, mango, tea, citrus, pawpaw, pineapples. Their cultivation, processing, preservation, marketing and uses.

CSP 504: Seed Production Technology (3 Units)

A review of seed structure, formation and development. Seed availability, vigour, dormancy and deterioration. Technology for seed production, processing, drying treatment, packaging and storage. Evaluation and seed quality, seed certification. Seed marketing. Seed programme in Nigeria. Components of an effective seed industry.

CSP 505: Crop Protection Technology (3 Units)

Pre-requisite CSP 403

Crop pests and diseases; their principles and methods of control; selectivity and selective use of pesticides; pesticides toxicology; pesticides and application technologies – their efficacies; cost/benefit relationships in respect of small and large scale farms; impact of pesticides on components of the agro-ecosystem other than the target species. Integrated pest management.

CSP 506: Farming Systems (3 Units)

Tropical farming systems –mixed farming, shifting cultivation and fallowing, alley cropping, crop rotation, relay cropping, multiple cropping and intercropping. Livestock production in tropical farming systems. Potential for integrated livestock and crop farming in Nigeria. Alley cropping of fodder for livestock feeding. Ruminant animal production in permanent crop farming. Homestead gardening using crops comparable with livestock rearing.

CSP 507: Biotechnology In Crop/Pest Management (2 Units)

Introduction to Agricultural Biotechnology, Micro propagation. Production of pest resistant varieties. Improvement of crop yields; nitrogen fixation, nutritional quality and chemical composition. Mutation Biofertilizers, Molecular markers.

CSP 508: Fertilizer Use Technology (3 Units)

Need for fertilizer, soil and fertilizer nitrogen, soil and fertilizer phosphorus, soil and fertilizer potassium, magnesium, calcium and sodium. Sulphur and micro elements in soil and fertilizer. Fundamentals of the manufacture of nitrogen, phosphorus and potassium fertilizers. The manufacture and properties of mixed fertilizers. Liming. Fundamentals of fertilizer application. Global positioning system (GPS). Application in soil fertility investigation.

CSP 509: Biostatistics and Field Experimentation (2 Units)

Hypothesis testing (Type I and Type II errors). Experimental designs: Completely Randomized Design, Randomized Complete Block Design, Latin Square and Split-plot design. Factorial experiments. Post Hoc tests; t tests, least significant difference test. Duncan's Multiple Range Test, Turkey test and Planned F tests. Data transformations (square root, logarithmic, arcsine). Nonparametric analysis of variance and tests (chi square, Mann-Whitney U test, Wilcoxon test, Kruskal-Wallis test, Friedman's test). Correlation and Regression analysis. Use of computer software packages (SPSS, Genstat, SAS, Stata, etc) for data acquisition and analysis.

CSP 510: Soil Survey and Classification (3 Units)

Factors of soil formation. Soil survey methods, definition of mapping units, classification systems, soil description, classification of Nigeria soils. Soil survey interpretations for potential uses of soils, land capability classification. Introduction to Geographic Information System (GIS). Field and Laboratory exercises.

CSP 511: Plant Physiology (3 Units)

Crop growth and development. Environmental influences on crop growth, development and yield. Seed dormancy and germination. Crop growth indices and forms of crop growth analysis. Distribution and accumulation of dry matter. Transpiration, soil water uptake. Xylem transport/conduction and canopy water losses.

CSP 512: Crop/Pest Management and the Environment (2 Units)

Crop production and protection activities that are beneficial to the environment. Crop production and protection activities that adversely affect the environment. Environmental quality indicators. Environment impact assessment. Crop growth and development. Environmental influences on crop growth, development and yield. Seed dormancy and germination. Crop growth indices and forms of crop growth analysis. Distribution and accumulation of dry matter.

CSP 513: Plant Improvement (3 Units)

Centres of origin of major tropical crops; land races; introduction of plant breeding materials. Genepools (germplasm pools). Sexual and asexual reproduction; inbreeding; cross-breeding; hybridization; back-crossing; Polyploidisation and aneuploid techniques induction of variability in plants: selection methods including progeny testing. Synthetic varieties.

CSP 515: Seminar in Crop, Soil and Pest Management (2 Units)

Instructions of the preparation, presentation and discussion of critical reviews of topics important to agriculture. This is to be followed by students presentation of reviews prepared by them.

CSP 598: Final Year Student's Project (6 Units)

Supervised study on an identified problem requiring both oral and written presentation. Students must attend tutorials on research techniques and scientific writing as well as oral presentation relating to students projects in the School.

6.0 DEPARTMENT OF FISHERIES AND AQUACULTURE TECHNOLOGY,

6.1 PHILOSOPHY OF THE PROGRAMME

The philosophy of this programme is to produce graduates who are adequately trained and equipped with comprehensive knowledge and skills required for self-reliance in fish production technology as may be necessary for meeting current societal and economic needs. The curriculum is structured to meet the demands of academic activities, training, research and community development services for application to other similar situations locally and internationally. Students are to be trained in an environment provided with highly relevant human and material resources using effective methods of instruction and exposure to the actual practice of fisheries management and aquaculture production. As a result, students are given opportunities for formal training at the undergraduate and postgraduate levels for the acquisition of basic and higher degrees. Such training programmes are executed through classroom instructions, laboratory and field practical demonstrations, seminars, workshops, excursions to fisheries research institutes and Students' Industrial Work Experience Scheme (SIWES). The programme prepares graduates who are to be self-reliant in fish production and can be employed in any fisheries establishments and other related industries locally and internationally.

6.1 OBJECTIVES OF THE PROGRAMME

The objectives of the programme are to:

- a. produce graduates with adequate scientific knowledge of fisheries and aquaculture technology and entrepreneurial ability for self-employment and wealth generation.
- b. produce graduates who can easily exploit fisheries and aquaculture resources for domestic and industrial uses as well as for the improvement of the environment.
- c. train students as skilled fisheries and aquaculture scientists and instructors for undergraduate and postgraduate programmes in tertiary institutions in Nigeria and beyond.
- d. provide relevant training in attaining of self-sufficiency in fisheries management and aquaculture production.
- e. provide opportunities for result-oriented research in fisheries and aquaculture to meet local, national and international needs.

- f. disseminate the results of research output to the public and facilitate the practical application of these results.
- g. assist in the attainment of significant increase in fish production and provision of raw materials to support the growth of industries.
- h. facilitate rural employment opportunities and improvement in the standard of rural livelihood.
- i. participate effectively in sustainable fish production through collaboration with Federal, State and Local governments, government ministries, agencies and parastatals, fisheries research institutes and other international organizations in the field of fisheries and aquaculture.

ADMISSION REQUIREMENTS

a) UTME Admission

Admission into the first year (100 level) of the programme is through JAMB. In order to be eligible for admission, candidates are expected to sit and pass the UTME. Candidates must possess five credit passes in WASCE or NECO or GCE (O/L) or equivalent at a maximum of two sittings in the following subjects: English Language, Mathematics, Chemistry, Biology or Agricultural Science and Economics or Geography. At least a pass in Physics is required.

UTME subjects: English Language, Chemistry, Biology or Agricultural Science, Mathematics or Physics.

b) Direct Entry

Candidates may be admitted into the second year (200 level) of the programme through direct entry if they:

- i) have a National Diploma with a minimum of Upper Credit or equivalent from recognized Polytechnics and Colleges of Technology in relevant disciplines (Agricultural Sciences), or
- ii) possess GCE (A/L) or equivalent with passes in at least two of the following subjects:
Chemistry, Biology and Physics.

Direct entry candidates must also meet the requirements for UTME admission specified in 'a' above.

DURATION OF PROGRAMME

The duration of the programme is five academic sessions for students admitted through the UTME and four for Direct Entry students. If a student admitted through the UTME fails to graduate in five academic sessions, he or she will NOT be allowed to exceed a total of fourteen (14) academic semesters. For Direct Entry students, the maximum residence period is twelve (12) academic semesters.

REQUIREMENTS FOR GRADUATION

To be eligible for the award of B. Agric. Tech. (Fisheries and Aquaculture Technology), a student must have:

- a) passed all core courses as well as all University and Faculty required courses and electives recommended for specialization.
- b) accumulated a minimum of 195 Units for UTME students, 154 for Direct Entry students and obtained a CGPA of not less than 1.5 for 2017/18 session only and not less than 1.0 for subsequent sessions.
- c) successfully completed all field practicals, industrial attachment training, seminars and projects.
- d) Direct entry students (A/L and JUPEB) are expected to register and pass the following General studies courses; GST 101, 102, 111, 112 and 113.

100 LEVEL, FIRST SEMESTER							
S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	BIO 101	General Biology I	C	2	-	-	2
2	BIO 103	Practical Biology I	C	-	-	3	1
3	CHM 101	General Chemistry I (Introductory inorganic Chemistry)	C	2	-	-	2
4	CHM 151	Practical Chemistry I	C	-	-	3	1
5	PHY 101	General Physics I	C	2	-	-	2
6	PHY 103	General Physics III	C	2	-	-	2
7	PHY 107	Practical Physics I	C	-	-	3	1
8	MTH 101	Introductory Mathematics I	C	2	1	-	2
9	STA 111	Descriptive Statistics	C	2	-	-	2
10	CSC 101	Introduction to Computer Science	C	2	-	3	3
11	GST 101	Use of English I	C	2	-	-	2
12	GST 111	Use of Library and study skills	C	2	-	-	2
13	GST 113	Philosophy and Critical Thinking	C	2	-	-	2
		TOTAL					24

Keys: L= Lecture, T= Tutorial, P= Practical, U= Unit, C= Compulsory

100 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	BIO 102	General Biology II	C	2	-	-	2
2	BIO 104	Practical Biology II	C	-	-	3	1
3	CHM 102	Introductory Organic Chemistry	C	2	-	-	2
4	CHM 104	Introductory Physical Chemistry	C	2	-	-	2
5	CHM 152	Practical Chemistry II	C	-	-	3	1
6	PHY 102	General Physics II	C	2	-	-	2

7	PHY 108	Practical Physics	C	-	-	3	1
8	MTH 102	Introductory Math. II	C	2	1	-	2
9	CSC 102	Introduction to Computer Programming	C	2	-	3	3
10	GST 102	Use of English II	C	2	-	-	2
11	GST 112	Nigerian Peoples and Culture	C	2	-	-	2
		TOTAL					20

Keys: L= Lecture, T= Tutorial, P= Practical, U= Unit, C= Compulsory

200 LEVEL, FIRST SEMESTER							
S/ N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	APH 201	Introduction to Animal Production and Health	C	1	-	3	2
2	APH 203	Introduction to Agricultural Biochemistry	C	2	-	3	3
3	AEE 201	Introduction to Agric. Economics	C	2	-	-	2
4	CSP 201	General Agriculture (Theory)	C	1	-	-	1
5	CSP 205	Basic Meteorology for Agricultural Science	C	2	-	-	2
6	CSP 207	Principle of Farmshop	C	2	-	3	3
7.	FAT 201	Introduction to Fisheries & Aquaculture	C	2	-	-	2
8	FST 201	Introduction to Food Science & Technology	C	2	-	-	2
9	FWM 201	Introduction to Ecotourism & Wildlife Management	C	1	-	3	2
10	GST 221	History and Philosophy of Science	C	2	-	-	2
11	GST 229	Introduction to Vocational Skills	C	1	-	3	1
		TOTAL					22

Keys: L= Lecture, T= Tutorial, P= Practical, U= Unit, C= Compulsory

Required courses for Direct entry (A/L/JUPEB) students

1	GST 101	Use of English I	C	2	-	-	2
2	GST 111	Use of Library	C	2	-	-	2
3	GST 113	Logical and Critical Thinking	C	2	-	-	2

200 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	APH 202	Anatomy and Physiology of Farm Animals	C	2	-	3	3
2	CSP 202	Basic Soil Science	C	1	-	3	2
3	CSP 204	Botany of Economic Crops	C	1	-	3	2
4	CSP 210	General Agriculture (Practical)	C	-	-	6	2
5	FWM 202	Introduction to Forest Resources Management & Agroforestry	C	1	-	3	2
6	AEE 202	Introduction to Agricultural Extension and Rural Sociology	C	2	-	3	3
7	AEE 204	Agricultural Statistics and Field Experimentation	C	2	-	3	3
8	GST 224	Peace Studies and Conflict Resolution	C	2	-	-	2
		TOTAL					19

Keys: L= Lecture, T= Tutorial, P= Practical, U= Unit, C= Compulsory

Required courses for Direct entry (A/L/JUPEB) students

1	GST 102	Communication in English II	C	2	-	-	2
2	GST 112	Nigerian People and Culture	C	2	-	-	2

300 LEVEL, FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	FAT 301	Aquatic Ecology	C	1	-	3	2
2	FAT 303	Limnology	C	1	-	3	2
3	FAT 305	Ichthyology	C	2	-	3	2
4.	FAT 307	Pond Construction and Maintenance	C	1	-	3	2
5	FAT 309	Fish Feed Technology	C	1	-	3	2
6	FAT 311	Fish Physiology and Behaviour	C	1	-	3	2
7	FAT 313	Fish and Fishery Products	C	1	-	3	2

8	FAT 315	Ornamental and Recreational Fisheries	C	2	-	3	2
9	FAT 317	Fish Biology	C	2	-	3	2
10	FAT 319	Aquatic Flora & Fauna (Hydrobiology)	C	2	-	3	2
11	GST 331	Introduction to Entrepreneurial Skills	C	2	-	-	2
		TOTAL					22

Keys: L= Lecture, T= Tutorial, P= Practical, U= Unit, C= Compulsory

ELECTIVE							
S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	Units
1	CSP 309	Land/Soil Management	E	1	-	3	2
2	AEE 305	Introduction to Microeconomic Theory	E	2	1	-	2
3	MCB 303	Immunology & Immunochemistry	E	2	-	-	2

Keys: L= Lecture, T= Tutorial, P= Practical, U= Unit, C= Compulsory, E= Elective

300 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	FAT 302	Fish Population Dynamics	C	1	-	3	2
2	FAT 304	Fish and Shellfish Nutrition	C	1	-	3	2
3	FAT 306	Fish Farming Techniques	C	1	-	3	2
4	FAT 308	Water Quality and Aquatic Toxicology	C	1	-	3	2
5	FAT 310	Practical Field Trip	C	-	-	6	2
6	FAT 312	Fish Biochemistry	C	1	-	3	2
7	FAT 314	Larval Food Production	C	1	-	3	2
8	FAT 316	Nigerian Feeds and Feeding Stuffs	C	1	-	3	2
9	FAT 318	Elementary Seamanship & Navigation	C	1	-	3	2
10	FWM 304	Forest Survey	C	1	-	3	2
		TOTAL					21

Keys: L= Lecture, T= Tutorial, P= Practical, U= Unit, C= Compulsory

ELECTIVE							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	APH 310	Animal Microbiology and Parasitology	E	1	-	3	2
2	APH 312	Livestock Diseases and Control	E	1	-	3	2
3	AEE 306	Farm Records and Accounting	E	2	1	-	3

Keys: L= Lecture, T= Tutorial, P= Practical, U= Unit, C= Compulsory, E= Elective

400 LEVEL, FIRST SEMESTER							
S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	FAT 401	Fisheries Management and Conservation	C	2	-	-	2
2	FAT 403	Fisheries Economics	C	1	1	-	2
3	FAT 405	Fish Gear Technology	C	2	-	3	3
4.	FAT 407	Fish Pathology and Health Management	C	2	-	3	3
5	FAT 409	Production and Marketing of Marine Fish Products	C	1	1	-	2
6	FAT 411	Statistics and Experimentation in Fisheries	C	2	1	-	3
7	FAT 413	Production and Utilization of Seaweeds and Freshwater Plants	C	1	-	3	2
8	FAT 415	Fish Breeding and Laviculture	C	2	-	3	3
9	FAT 417	Marine Fisheries Resources	C	1	-	3	2
		TOTAL					22

Keys: L= Lecture, T= Tutorial, P= Practical, U= Unit, C= Compulsory

ELECTIVE						
COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
APH 413	Poultry Production	E	1	-	3	2

Keys: L= Lecture, T= Tutorial, P= Practical, U= Unit, C= Compulsory, E= Elective

400 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	FAT 402	Industrial-Based /OSUSTECH Supervisor's Assessment	C	-	-	-	4
2	FAT 404	Assessment of Log Book	C	-	-	-	4
3	FAT 406	Student Technical Report and Oral Presentation	C	-	-	-	4
		TOTAL					12

Keys: L= Lecture, T= Tutorial, P= Practical, U= Unit, C= Compulsory

500 LEVEL, FIRST SEMESTER							
S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	FAT 501	Fisheries Extension and Cooperatives	C	1	1	-	2
2	FAT 503	Seminar in Fisheries and Aquaculture	C	-	-	6	2
3	FAT 505	Population Regulation in Fisheries Management	C	1	-	3	2
4.	FAT 507	Aquaculture Engineering	C	2	-	3	3
5	FAT 509	Crustacean Culture	C	2	-	3	3
6	FAT 511	Fish Genetics and Biotechnology	C	2	1	-	3
7	FAT 513	Post – Harvest Technology	C	2	-	3	3
		TOTAL					18

Keys: L= Lecture, T= Tutorial, P= Practical, U= Unit, C= Compulsory

500 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	STATUS	L	T	P	U
1	AEE 508	Concepts of Agribusiness	C	1	1	-	2
2	FAT 502	Aquatic Resources Biodiversity	C	2	-	3	3
3	FAT 504	Fisheries Policy and Administration	C	2	-	-	2
4	FAT 506	Marine and Physical Oceanography	C	2	-	3	3
6	FAT 598	Project in Fisheries and Aquaculture	C	-	-	18	6
		TOTAL					16

Keys: L= Lecture, T= Tutorial, P= Practical, U= Unit, C= Compulsory

COURSE DESCRIPTIONS

FAT 201: Introduction to Fisheries and Aquaculture (2 Units)

Definition and types of aquaculture practices. History and status of aquaculture in Nigeria. Importance of aquaculture. Management and conservation of West African fish resources. Principles of aquaculture, culturable fish species in Nigeria.. The important fishes of West Africa with emphasis on Nigerian species. Classification, evolution, morphology and basic structure of fishes. The adaptation of fish to aquatic life. Life cycle of principal species of fishes. Identification of common aquatic and terrestrial organisms of food value in fisheries Significance of fishes in the diet of Nigerians. The fish industries in Nigeria. Fundamental Principles of fish and production.

FAT 301: Aquatic Ecology (2 units)

Ecology of fishes with special references to distribution and natural history. Characteristics of the aquatic environment, organic production in aquatic fauna and flora, algal blooms and eutrophication; benthos biomass assessment. Niche concept; habitat studies of fish communities in major aquatic ecosystems of Nigeria. Distributions, structures and dynamics of aquatic ecosystems in tropical Africa. Food interrelationship in fish populations. Fish behaviour, marine fish and invertebrate community and behavioral ecology, energy exchange between habitats through fish-invertebrate migrations and use of fish vocal patterns as a tool to study their behavioural ecology and to identify essential fish habitats.

FAT 302: Fish Population Dynamics (2 units)

Definition of fish stock assessment. Primary objectives of fish stock assessment. The stock concept. Estimation of growth parameters. The von Berthalanffy growth equation. Variability and applicability of growth parameters. Age/length composition data from a single survey and multiple surveys. Methods for estimation of growth parameters from length and age data. Fishing efforts and catch per unit effort. Population estimation: age and growth, sex ratio, natality (recruitment) and mortality. Computation of yields from given recruitments.

FAT 303: Limnology (2 units)

Properties of natural and man-made lakes. Aquatic chemistry. Transport and exchange process. Thermal properties and stratifications. Physico-chemical properties of fresh, brackish and marine waters. Hydrology and water cycle.

FAT 304: Fish and Shellfish Nutrition (2 units)

Principles of fish nutrition. Requirements for energy, protein, vitamins and minerals, and non-nutrient components; feed computation and formulation methods; feed pelleting; fish feed habits; feed evaluation; practical considerations in fish feed. Natural and artificial feeds, supplementary feeds, concentrates, purified, semi-purified and practical diets.

FAT 305: Ichthyology (Systemics of Fish) (3 units)

Principles of systematics. Phylo-genetic relationships. Taxonomy and detailed study of major commercial fish species in Nigeria's inland, estuarine and marine waters, Identification of fish species using keys and monographs. Morphology of bony and cartilaginous fishes. Important world species; sardine, tuna, anchovies e.t.c. biological attributes of fish population

FAT 306: Fish Farming Techniques (2 units)

Fish culture methods, their merits and demerits. Integrated fish culture. Principles and problems of production, Water recirculatory system and other enclosures for fish culture. Principles and methods of stocking, feeding, liming and fertilization. Introduction of exotic species and their implications. Water quality requirements. Types and application of organic and inorganic fertilizers. Harvesting practices

FAT 307: Pond Construction and Maintenance (2 units)

Site selection, survey and selection of fish for aquaculture. Design and construction of earthen production, breeding and nursery ponds. Fish pond accessories - spillway, monks, water inlet, monk boards and screen. Construction of other fish culture enclosures (concrete tanks, cages, pens, raceways). Construction of simple hatchery units, drainage facilities and flow-through system for fish production. Maintenance of ponds, channels and drainage facilities. Fish farm design and facilities.

FAT 308: Water Quality and Aquatic Toxicology (2 Units)

Physical properties of water bodies and water chemistry. Nutrient cycles and aquatic productivity. Sampling methods and analyses. Effect of pesticides and industrial contaminants on fish, crustaceans and molluscs within Nigerian coastal waters. Ecological toxicology. Responses of aquatic species to excess nutrients, diseases and chemical stressors. Pollution and its effects on aquatic life. Ecological characteristics of polluted waters and methods for maintaining and improving water quality (chemical, mechanical, biological). Fate and biomagnifications of micro pollutants. Nutrient behaviour, phytoplankton and algal nuisance.

FAT 309: Fish Feed Technology (2 units)

Conventional and non-conventional sources of feedstuffs. Processing of fish feeds. Toasting, autoclaving, extrusion, pelleting and physical and biological evaluation. Importance of fishmeal in fish feeds and development of alternatives to fishmeal and fish oil. Factors affecting fish growth and importance of anti-nutritional factors. Use of plant and animal wastes in fish feeds and other products as substitutes in fish diet. The fish feed industry; components of a feed mill. Packaging and storage of aquafeeds.

FAT 310: Practical Field Trip (2 units)

Students at 300 Level go for two (2) weeks' training at Fisheries and Aquaculture establishments to acquaint themselves with the operation methods in fish farms. Students are to write and submit Technical report at the end of the field trip for assessment by the panel of academic staff in the Department.

FAT 311: Fish Physiology and Behaviour (2 units)

Fish growth and development. Reproduction and factors affecting both growth and reproduction in fish. Growth and reproduction in shellfish and their measurements. Different shapes and designs of fish in relation to aquatic environment. Natural environmental adaptations and physiological basis for navigation, migration, respiration, reproduction, feeding, temperature, salinity and light.

FAT 312: Fish Biochemistry (2 units)

Fish physiology, their composition and food value. Water metabolism, chemistry and metabolism of carbohydrates, lipids, proteins, hormones, vitamins, minerals and antibiotics, energy transfer systems, general enzyme systems, general cell molecular biology to include membrane, processes. Biochemistry of fish organs, tissues and cells, structure of organs, tissues, cells and organelles related to their functions, osmotic, ionic, respiratory and excretory homeostasis, nerve and muscle physiology; endocrinology, biochemistry of growth maintenance and reproduction, endocrine chemistry and biochemistry. Biochemical and physiological effects of toxicants.

FAT 313: Fish and Fishery Products (2 units)

a) Fishery Zones; Inland fishery zones (freshwater - floodplains, rivers, lakes), coastal and brackish water fishery and marine fishery zones. b) Fishing: inland fishing, marine fishing (offshore fishing, inshore fishing and coastal fishing). c) Fishery product processing (frozen products, dried products, smoke-dried products, canned products, fish sausage or cake, fishmeal, fish egg or jam, fish oil, flavourants, algal products (agar); crafts (pearl production). d) Fishery product trade.

FAT 314: Larval Food Production (2 Units)

Introduction to larval cultivation of finfish and shellfish and the necessity to produce live food. Production methods and environmental conditions for cultivating marine and freshwater finfish and shellfish larvae. Principles and practices of larval food production. Plankton aquaculture - *Chlorophycota*, *Bacillariophyta*, *Cyanophycota*, *Rhodophyta*, *Chrysophyta*. Rotifer, copepod and micro-algal culture parameters and production level reliability. Cost reduction and ongoing development on commercial scale production of live feeds for larvae of finfish and shellfish. Preparation, culture and feeding of algae, rotifers and brine shrimp artemia. Artemia biology and ecology applications in aquaculture. Intensive cultivation of artemia.

FAT 315: Ornamental and Recreational Fisheries (2 units)

Identification, management and nutrition of ornamental fishes. Design, construction and maintenance of fountains, aquaria and ponds for ornamental fishes. Culture and breeding of aquarium fishes. Aquarium fish trade. Sport fishing in recreation and tourism. Management techniques and daily routine operations in the culture of ornamental and recreational fisheries. Economic importance of ornamental and sport fishes, especially tropical fish species.

FAT 316: Nigerian Feeds and Feeding Stuff (2 units)

Classification of foods, feeding stuffs and feed supplements. An extensive coverage of the chemistry and nutritive values of succulent feeding stuffs, concentrate feeds (cereals and legumes). Chemistry and Nutritive values of some Nigerian grasses and legume species. Consideration of methods of their biological value evaluation.

FAT 317: Fish Biology (2 units)

The gross external and internal anatomy of a typical bony and a typical cartilaginous fish. The different types of anatomical systems and basic functions of each system of organs in the embryology and life history of fish. Special reference to commercially important fish e.g. Tilapia, Clarias and Mullet.

FAT 318: Elementary Seamanship and Navigation (2 Credits)

Important sea terminology; parts of a boat, strength of wind and state of sea. Coast lights and light vessels. Measures for distance, depth, speed etc. launching and boarding of small boats. Life saving and fire fighting equipments and methods. Swimming.

FAT319: Aquatic flora and fauna (Hydrobiology) (2 units)

Study and identification of the characteristics flora and fauna of importance in the fresh water and coastal swamps of the tropics. The ecology; utilization and management of aquatic flora and fauna, control of aquatic weeds in ponds – chemical, mechanical and biological

FAT 401: Fisheries Management and Conservation (2 units)

Basic concept of fisheries development and management (unexploited, under-exploited, over-exploited fisheries resources). Basic and practical objectives of fish management and conservation

in Nigeria. Fisheries administration and legislation: problems of enforcing laws. Development and management of lakes, rivers, brackish and marine waters. Traditional methods of fisheries management, administration and conservation in Africa e.g. taboos, superstition, festivals and the roles of traditional heads. Government policy in fisheries administration and management. Roles and activities of federal, state and local governments in fisheries development and management in Nigeria.

FAT 402, 404 and 406 Students' Industrial Work Experience (SIWES) (12 units)

FAT 402: Industrial-based/OSUSTECH Supervisor Assessment (4 units)

This is one of the three components of the Students' Industrial Work Experience Scheme (SIWES) where Industry-based Supervisors do assess students' performance: punctuality to work, commitment and contribution of students to the operations in the industries to which the students are attached. Such assessment is submitted to the Department to form part of the SIWES overall grading.

FAT 403: Fisheries Economics (2 units)

Economic constraints in fisheries development; free access to fishery, sustainable yield curve and total revenue curve. Bionomic equilibrium, factor rents, welfare economic theory and its relevance for fisheries. Externalities in fisheries capital investment and depreciation of equipment; consumer and consumption patterns; fishery resources and right of ownership. Feasibility reports' writing and assessment reports of fishery facilities. Cost studies in Fisheries and Aquaculture Technology. Demand and Supply of fish products in Nigeria. Traditional and modern methods of marketing fisheries products in Nigeria. Capital Investment, depreciation of equipment and costs of distribution. Cooperative organizations, social acceptances of fish among the local communities.

FAT 404: Assessment of Log Book (4 units)

This is the second component of the SIWES overall grading. This is the assessment of the students by the University Supervisors, who visit the students at the places of attachment and evaluate their logbooks and as well interact with the Industry-based Supervisors.

FAT 405: Fishing Gear Technology (3 units)

Definition of fishing gear and craft. Concept of fishing gear technology and trends of development. Classification of fishing activities and gear. Types of fishing gear and fishing craft, properties of the materials used in the construction of hooks, traps and nets. Fishing gear construction materials, netting gear, non-netting gear, twine notation and numbering system. Floats, sinkers and their characteristics and properties. Assessment of efficiency of fishing gear. Design and construction of different types of fishing gear and their maintenance.

FAT 406: Student Technical Oral Presentation (4 units)

This is the assessment of the report and evaluation of student's reports and seminar presentation. The assessment is based on the quality of the write-up and student's ability to present and defend the report, which shall be graded accordingly.

FAT 407: Fish Pathology and Health Management (3units)

Identification, morphology, taxonomy, life history of fish parasites. Ecological effects of parasite population in water body. The ecological and pathological effects of parasites and diseases of fish, common bacterial, fungi, and viral diseases and their control. General preventative methods and prophylaxis against the occurrence of diseases. Good pond management practices – eco-friendly and sustainable aquaculture. Quarantine. Methods of pathological examination of fish and

infectious diseases. Production of disease free seeds. Evaluation criteria of seeds. Good feed management for healthy organisms. Zero water exchange. Nutritional pathology. Antibiotics and chemotherapeutants, immunology defense mechanism in fish and shell fish, application and development of vaccine.

FAT 409: Production and Marketing of Marine Fish Products (2 units)

Mollusc culture; biology, systematic, evolution and reproduction. Life history, genetics of gastropods, bivalves, cephalopods, etc. Production techniques of oysters, pearl, production techniques for mussels, scallops, clams and abalones. Systematic, evolution, ecology of larval and early post larval gastropods, cephalopods, community ecology, cultivation and farming. Harvesting, utilization, processing and marketing of octopuses, squids, Nautilus, etc.

FAT 411: Statistics and Experimentation in Fisheries (3 units)

Review of biometrical concepts in agriculture: planning of experiment: analysis of variance: transformation of data; experimental designs such as completely randomized design. Least square, missing values, multiple comparisons, nested designs, factorial experiments. Split-spot and split-split-plot designs; analysis of data from qualitative variables; application of correlation and regression analyses in agricultural experiments.

FAT 413: Production and Utilization of Seaweeds and Freshwater Plants (2 units)

Ecology, life histories of edible seaweeds and freshwater plants. Deep sea and shore farming of some plants. Utilization; harvesting techniques, processing, and preservation of seaweeds and freshwater plants. Economic importance of coral reefs. Aquatic weeds of economic importance, identification, propagation and utilization. Factors affecting aquatic weeds, disposal and utilization in the tropics.

FAT 415: Fish Breeding and Larviculture (3 units)

Fish seed production in aquaculture, artificial propagation, selection, rearing and management of brood fish, induced spawning of cultivated fish species in Nigeria. Hormone administration, artificial fertilization, incubation and hatching of eggs. Synthetic hormone production for induced breeding. Techniques of larval rearing of fry and fingerlings. Monitoring of fish seeds. Hatchery equipment and support facilities. Design, maintenance, construction and management techniques of indoor and outdoor hatcheries. Disease management in fish hatcheries, transportation of fish seeds. Sales and economics of fish seed production, organizing, planning and record keeping in fish hatcheries, larval cultivation of tropical marine and freshwater fishes.

FAT 417: Marine Fisheries Resources (2 units)

Marine environment and its physical features. Ocean basins and its distribution, Fauna distribution along the various ecological zones. Plankton resources, primary production, food chain relationships. Factors influencing primary and secondary production. Principal marine fisheries of Nigeria. Benthic and reef fishes, coastal pelagic fishes, oceanic pelagic fishes, demersal fishes. Status and trends of major fish resources in the region. Sharks, turtles, marine birds, marine mammals. EEZ policy and fish production.

FAT 501: Fisheries Extension and Cooperatives (2 units)

Principles and methods of programme planning, extension need, educational objectives, learning experience, clientele participation, plan of work, etc. organizing associations and cooperatives, concepts of evaluation applied to fisheries and wildlife extension, dissemination of research findings to field workers. Types of cooperatives, importance, formation, functions, rules and accessibility to loan for credit facilities.

FAT 502: Aquatic Resources Biodiversity (2 units)

Definition and need for aquatic resource biodiversity protection in Nigeria. Goals, vision, obstacles and threats to biodiversity conservation. Use and management of biodiversity, genetic and species diversity. Current status of Nigerian aquatic resource biodiversity. Aquatic ecosystem diversity and characterization, ecological niches, parity profile. Impact assessment and minimizing adverse impacts. Socio-economic and dynamics of aquatic resource diversity exploitation strategies for Nigeria.

FAT 503: Seminar in Fisheries and Aquaculture (2 units)

Oral preparation of reviewed papers on specific topics of importance to Fisheries and Aquaculture Technology by the 500 level students. Students shall be assessed by panel of departmental academic staff during oral presentation and the write-up shall also be assessed.

FAT 504: Fisheries Policy and Administration (2 units)

Fisheries legislation in Nigeria. National laws regarding aquatic resources management. National and state policies on fisheries planning and use. Administrative structure of fisheries management in Nigeria. Problems of fisheries conservation in Nigeria. Fisheries institutions, conservation strategies, fisheries policy and laws of Nigeria. International laws. Laws of the sea– maritime zones of high seas, legal regime of marine environment protection and scientific research.

FAT 505: Population Regulation in Fisheries Management (2 units)

Population dynamics, factors affecting fish population, single and multiple fish species. Population control methods in aquaculture: mechanical, biological and chemical control of fish population. Management practices for regulating fish population. Density-dependent and density-independent factors in fish population regulation. Fishing and capturing effects on fish population movement. Cropping, sport fishing and hunting as methods of fish population regulation, causes of migration, emigration and immigration in fish, Territorial behaviour and aggression in fish.

FAT 506: Marine and Physical Oceanography (3 units)

Study of the temperature and chemistry of sea water. Biological activities and their distribution. Salinity, chlorinity, currents, tides, waves, sound and radiation in the sea, conductivity, diffusion, viscosity and dynamics of sea water. Distribution and behavior of plankton. Brackish water conditions and fauna. Interrelationship and physiological adaptations of marine organisms. Instrumentation and measurement of physical, chemical and biological properties of ocean. Echo-sounding, navigation and seamanship.

FAT 507: Aquaculture Engineering (3 units)

Hydrological information for design and operation of aquaculture systems. Soil engineering for designs of ponds, canals and dams. Design and construction of fish farms, hydraulic formulas used in designing fish farms, maintenance of fish farms. Pond construction engineering, design and construction of fish cages, tanks, and other impounding structures, classification and design of different types of water pumps, types of aeration and filtration devices, their design and construction. Waste management techniques in aquaculture production, biofiltration system, types of aerators, degassing, etc. Water recirculatory systems and aquaponics.

FAT 509: Crustacean Culture (3 units)

Production and management of decapods. Reproductive biology, pathology, endocrinology. Production of tropical shrimp and prawn species; culture of commercially important crustaceans. Penaeid shrimp culture, freshwater shrimp culture, marine and freshwater crab culture. Extensive, semi-intensive and intensive techniques. Harvesting and marketing of portunid crabs, lobsters and crayfish. Crustacean health, pests and diseases.

FAT 511: Fish Genetics and Biotechnology (3 units)

Types of reproduction and reproductive cycles in bony and cartilaginous fishes. Principles of hybridization and polyploidy in fish. Gametogenesis. Monohybrid and dihybrid inheritances. Cytological bases of inheritance. Probability and goodness of fit. Linkage, crossing-over and genetic mapping of chromosomes. Polygenic inheritance. Sex determination, inheritance related to sex in ornamental fishes. Identification of genetic material. Protein synthesis code. Principal and practical systematic, nomenclature and identification. Recombinant DNA technology, determination of DNA application, cloning, vectors, transformation, hybridization. Use of PCR for the detection of white spot. Biotechnological tools for aquaculture, gene manipulation in fish, transgenic fish production, chromosome manipulation in fish and shell fishes- triploidy, polyploidy, gynogenesis and androgenesis. Cryopreservation. Monosex production, super male and super female fish production techniques.

FAT 513: Post-Harvest Technology (3 units)

The structure of fish muscle, the principal components of fish muscle and factors affecting their composition, major causes of fish spoilage, physical and chemical changes in fish muscle during and after rigor mortis. Techniques of fish preservation and processing; salt curing and fish fermentation, fish drying, fish smoking, chilling of fish, fish freezing, cold storage of fish, fish canning, fish preservation by irradiation, chemical and physical methods of fish quality assessment, organoleptic measurement of fish spoilage, international standards for fisheries products.

FAT 598: Project in Fisheries and Aquaculture (6 units)

Supervised study on identified problems, requiring both oral and written presentations. Students must attend tutorials on research techniques and scientific writing as well as oral presentation relating to students' project in the Department. Project reports are to be submitted by the students at the end of the project. The reports shall be orally examined and graded by a panel of examiners headed by an External Examiner.

7.1 PROGRAMME PHILOSOPHY

Food is one of the basic needs of life, while science and technology brings positive advancement to human condition. Philosophy of Food Science and Technology programme is to contribute innovatively to advancement in the nation food sector through postharvest processing of agricultural product to ensure food and nutritional security; and produce competent Food Scientist and Technologist who are empowered with technological and entrepreneurial skills that enhance problem solving through workable research, job creation and self-employment in food sector of the nation and internationally. This shall be achieved through quality and outstanding teaching, scientific and societal values, research and community development.

7.2 OBJECTIVES OF THE PROGRAMME

The objectives of the programme are to:

- (i) train students to understand/study the composition and behaviour of agricultural food material under diverse processing and storage conditions; and capable to apply the knowledge in production of safe and nutritious foods;
- (ii) trained students capable of introducing new innovation and apply appropriate technology to process, preserve and package food for reduced drudgery, postharvest loses and food security;
- (iii) train students who are competent to maintain and design food process equipment and innovatively develop locally made equipment for food production; and
- (iv) ultimately, produce graduate with expertise and technological competency to establish and manage food industries, provide and formulate policy leading to food security; and able to transfer knowledge in food related higher institutions of learning.

7.3 ADMISSION REQUIREMENTS

a. UTME

Candidate seeking admission into the five-year programme in food science and technology programme should possess the WASC or WASSC or GCE (O/L) or NECO or equivalent with credit passes in five subjects including English language, mathematics, chemistry, physics biology or agricultural science, at not more than two sittings. In addition, application must obtain an acceptable pass in the unified tertiary matriculation examination (UTME).

UTME subjects: English language, mathematics or physics, chemistry, biology/agricultural science.

b. Direct Entry

Candidates may be admitted to 200 level if they have:

- (i) satisfied the general entry requirements for the University as specified in (a) above
- (ii) obtained National Diploma (with a minimum of Upper Credit) or equivalent in Food Science and Technology or any other course adjudged relevant by the Department; or
- (iii) good passes at GCE (Advanced Level), JUPEB or its equivalent in any two of the following subjects: Physics, Chemistry and Mathematics. In addition, candidates in this category may be required to audit and pass some first year courses to remedy deficiencies. These courses include GST 101, GST 111, AGP 102 and GST 102. If a student fails any of the courses, he/she will be required to offer it formally.

7.4 PROGRAMME DURATION

The bachelor of technology programme in food science and technology runs normally for 5 academic sessions for UTME candidates and 4 sessions for direct entry candidates. However, if the student fails to graduate within the normal number of sessions, he/she will not be allowed to exceed a total of 7 academic sessions in the case of UTME candidates and 6 for direct entry students.

REQUIREMENTS FOR GRADUATION

To be eligible for the award of B.Tech Degree in food science and technology, a student must have:

- a. Passed all core (compulsory) courses as well as all university and school required courses and electives recommended for specialization;
- b. Accumulated at least 202 units for students through UTME and 168 for those by direct entry, and obtain a CGPA of not less than 1.5 for 2017/18 session only; and not less than 1.0 for subsequent sessions.
- c. Successfully completed all class works; industrial attachments, seminars and projects.

As part of the programme, students take part in the long vacation industrial practical work (SWEP-Student Work Experience Programmes), in the second semesters of 200 and 300 levels, to enable them reconcile the theoretical knowledge with what obtains in the industries and farms. In the second semester of 400 levels (4th year), they also go on a six-month students' industrial work experience scheme (SIWES) in a food industry.

Direct entry students (A' level and Jupeb) are expected to register and pass the following general studies courses; GST 101, 102, 111, 112 and 113; GET 101 and 102

DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY

100 LEVEL, FIRST SEMESTER							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	BIO 101	General Biology I	C	2	-	-	2
2	BIO 103	Practical Biology I	C	-	-	3	1
3	CHM 101	General Chemistry (Introduction to Inorganic Chemistry)	C	2	-	-	2
4	CHM 151	Practical Chemistry I	C	-	-	3	1
5	PHY 101	General Physics I	C	2	-	-	2
6	PHY 103	General Physics III	C	2	-	-	2
7	PHY 107	Practical Physics I	C	-	-	3	1
8	MTH 101	Introductory Mathematics I	C	2	-	-	2
9	STA 111	Descriptive Statistics	C	2	-	-	2
10	CSC 101	Introduction to Computer Science	C	2	-	3	3
11	GET 101	Engineering Drawing I	C	2	-	3	3
11	GST 101	Use of English I	C	2	-	-	2
13	GST 111	Use of Library and Study Skills	C	2	-	-	1
		TOTAL					24

100 LEVEL, SECOND SEMESTER							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	BIO 102	General Biology II	C	2	-	-	2
2	BIO 104	Practical Biology II	C	-	-	3	1
3	CHM 102	Introductory Organic Chemistry	C	2	-	-	2
4	CHM 152	Practical Chemistry II	C	-	-	3	1
5	CHM 104	Introductory physical chemistry	C	2	-	-	2
6	PHY 102	General Physics II	C	2	-	-	2
7	PHY 108	Practical Physics II	C	-	-	3	1
8	MTH 102	Introductory Mathematics II	C	2	-	-	2
9	CSC 102	Introduction to Computer Programming	C	2	-	3	3
10	GST 112	Nigerian People and Culture	C	2	-	-	2
11	GST 102	The Use of English II	C	2	-	-	2
12	GET 102	Workshop Practices	C	2	-	3	3
		TOTAL					23

200 LEVEL, FIRST SEMESTER							
S/ N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FST 201	Introduction to Food Science and Technology	C	2	-	-	2
2	FST 205	Physical and Colloidal Properties of Food Materials	C	2	-	-	2
3	APH 201	Introduction to animal production and health	C	1	-	3	2
4	CSP 201	General Agriculture (theory)	C	1	-	-	1
5	MTH 201	Mathematical Methods	C	2	1	-	3
6	MCB201	General Microbiology	C	2	-	3	3
7	BCH 201	General Biochemistry	C	2	-	3	3
8	AEE 201	Introduction to Agricultural Economics	C	2	-	-	2
9	GST 221	History and Philosophy of Science	C	2	-	-	2
10	GST 229	Introduction to Vocational Skills	C	1	-	3	1
10	GST 113	Philosophy and critical thinking	C	2	-	-	2
		TOTAL					23

Additional University Required Course for A' Level and JUPEB Students

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units

200 LEVEL, SECOND SEMESTER							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FST 200	Student Work Experience Programme (SWEP) 4 weeks	C	-	-	3	1
2	FST 202	Unit Operations in Food Processing	C	2	-		2
3	FST 292	Unit Operations in Food Processing Practical	C	-	-	3	1
4	FST 208	Fluid Mechanics in Food Processing	C	2	-	-	2
5.	CSP 210	General Agricultural (Practical)	C	-	-	6	2
6.	CSP 204	Botany of Economics Crops	C	1	-	3	2
7	GST 224	Peace Study and Conflict Resolution	C	-	-	-	2
8	AEE 204	Agricultural Statistics and Field Experience	C	2	-	3	3
9	GET 206	Basic Thermodynamics	C	2	-	3	3
10	CHM 218	Introductory Analytical Chemistry	C	1	-	3	3
		TOTAL					21

Additional University Required Course for A' Level and JUPEB Students

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	GST 102	Use of English II	C	2	-	-	2
2	GST 112	Nigerian People and Culture	C	2	-	-	2

300 LEVEL, FIRST SEMESTER							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FST 301	Food Chemistry I	C	2	-	-	2

2	FST 391	Food Chemistry Practical	C	-	-	3	1
3	FST 303	Food Microbiology	C	2	-	-	2
4	FST 393	Food Microbiology Practical	C	-	-	3	1
5.	FST 305	Principles of Human Nutrition	C	2	-	-	2
6.	FST 395	Principles of Human Nutrition Practical	C	-	-	3	1
7	FST 307	Instrumental Methods of Food Analysis	C	1	-	3	2
8	FAT 313	Fish and Fishery Products	C	1	-	3	2
9	GET 201	Basic Electrical Engineering I	C	2	-	3	3
10	GST 331	Introduction to Entrepreneurship	C	2	-	-	2
		TOTAL					18

Additional University Required Course for A' Level and JUPEB Students

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	GST 101	Use of English	C	2	-	-	2
2	GST 111	Use of Library and Study Skills	C	2	-	-	2

300 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FST 300	Student Work Experience Programme (6 weeks)	C	-	-	3	1
2	FST 302	Food Chemistry II	C	2	-	-	2

3.	FST 392	Food Chemistry II Practical	C	-	-	3	1
4	FST 304	Principles of Food Processing and Preservation	C	2	1	-	2
5	FST 394	Principles of Food Processing and Preservation Practical	C	-	-	3	1
6.	FST 306	Fundamental of Processing and Engineering in Food Storage	C	2	-	-	2
7	FST 396	Fundamental of Processing and Engineering in Food Storage Practical	C	-	-	3	1
8	FST 308	Cereals, Root and Tuber Technology	C	2	-	-	2
9.	FST 398	Practical in Cereal, Root and Tuber Technology	C	-	-	3	1
10	FST 310	Food Machinery	C	2	-	-	2
11	GET 304	Technical Report Writing and Presentation	C	1	1	-	2
12	GET 202	Basic Electrical Engineering II	C	2	-	3	3
		TOTAL					20

ELECTIVE

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FAT 306	Fish Farming Techniques	E	1	-	3	2
2	AEE 308	Principle of Farm Management	E	2	-	-	2

Students must take at least 2 units of elective

Additional University Required Course for A' Level and JUPEB Students

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	GST 112	Nigerian People and Culture	C	2	-	-	2

400 LEVEL, FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FST 401	Food Process Plant Design	C	2	-	-	2
2	FST 491	Food Process Plant Design Practical	C	-	-	3	1
3	FST 403	Food Process Engineering	C	2	-	-	2
4	FST 405	Food Standard, Laws and Quality Control	C	1	-	-	2

5	FST 495	Food Standard, Laws and Quality Control Practical	C	-	-	3	1
6	FST 407	Food Fermentation Processes	C	2	-	-	2
7	FST 497	Food Fermentation Processes Practical	C	-	-	3	1
8	FST 409	Food Analysis	C	2	1	-	2
9	FST 499	Food Analysis Practical	C	-	-	3	1
		TOTAL					14

ELECTIVE							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	AEE 403	Agricultural Production and Economics and Resources used	E	2	1	-	3
2	APH 413	Poultry Production	E	1	-	3	2

Student must take at least 2 units of electives

400 LEVEL, SECOND SEMESTER PLUS LONG VACATION							
STUDENTS' INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FST 402	Industry-Based Supervisor's Assessment	C	-	-	-	4
2	FST 404	Osustech Supervisor's Assessment	C	-	-	-	4
3	FST 406	Students' Report and Seminar Presentation	C	-	-	-	4
		TOTAL					12
500 LEVEL, FIRST SEMESTER							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FST 501	Post-harvest Physiology & Storage	C	2	-	-	2
2	FST 503	Food Packaging	C	2	-	1	3
3	FST 505	Fruit and Vegetable Processing	C	2	-	-	2

4	FST 595	Fruit and Vegetable Processing Practical	C	-	-	3	1
5.	FST 507	Milk and Dairy Technology	C	2	-	-	2
6	FST 597	Milk and Dairy Technology Practical		-	-	3	1
7	FST 509	Processing of Miscellaneous Food Commodities	C	2	-	-	2
8	FST 599	Practical in Miscellaneous Food Commodities	C	-	-	3	1
9	FST 511	Research Methodology	C	2	-	-	2
10	FST 515	Final Year Students' Project	C	-	-	18	6
		TOTAL					22

500 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FST 500	Food Science and Technology Seminar	C	2	-	-	2
2	FST 502	Food Product Development	C	2	-	-	2
3.	FST 592	Food Product Development Practical	C	-	-	3	1
4	FST 504	Oilseed Production and Utilization	C	2	-	-	2
5.	FST 506	Meat Technology	C	2	-	-	2
6.	FST 596	Meat Technology Practical	C	-	-	3	1
7	FST 508	Food Industrial Waste Management	C	2	-	-	2
8	FST 510	Food Toxicology	C	2	-	-	2
9	FST 512	Processing of Selected Indigenous Food Commodities	C	2	-	-	2
10	FST 514	Food Biotechnology	C	2	-	1	3
		TOTAL					19

Students must take at least 2 units of elective

ELECTIVE							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FST 516	Engineering Properties of Plant and Animal Materials	E	2	1	-	2
2	FST 518	Nutrition Evaluation of Food and Processing	E	2	-	-	2

COURSE DESCRIPTION

FST200: STUDENT WORK EXPERIENCE PROGRAMMES (SWEP) -4 (ITP) (1UNIT)

Students will spend four weeks in the food processing ventures within the university and in the farm to acquaint themselves with the operations in the food industries. Evaluation of Technical report submitted by students.

FST 201: INTRODUCTION TO FOOD SCIENCE AND TECHNOLOGY (2 UNITS)

Review of global food situation with emphasis on Nigeria. Foods of plant and animal origin. Introduction to the microflora of foods. Proximate chemical composition and some natural chemical constituents of foods. The nutritional status of different foods. Basic physical, chemical and biological principles of food processing and preservation. Engineering units and dimensions applicable to the food industry. The use of flow charts, equations and stoichiometry.

FST 202: UNIT OPERATIONS IN FOOD TECHNOLOGY (2 UNITS)

Particle size reduction, drying and mixing, extraction, distillation, evaporation, crystallisation, leaching absorption and membrane separation.

FST 203: INTRODUCTORY FOOD BIOCHEMISTRY (2 UNITS)

Mechanisms of natural synthesis of major components of food materials, e.g. carbohydrates, proteins, lipid, etc. Structures of carbohydrates, lipids, and nucleic acid. Primary, secondary, tertiary, and quaternary

structures of proteins. Derivatives of proteins. Structures and functions of major cell components, e.g. Cellulose, hemi cellulose, pentosans, etc.

GET 206: BASIC THERMODYNAMICS

Definition of basic thermodynamic terminologies; system, boundary, state (p,v,T,s and other property diagrams and their uses.), properties (intensive and Extensive) process and cycles. Energy and energy conversion; work, heat, non-flow processes. Zeroth law. First Law of thermodynamics and applications to closed and open systems. The steady flow energy equation and its applications. Otto, diesel, turbine and dual cycles. Second Law of thermodynamics; consequences and applications of the second Law. Classifications. Limits and fits using ISO and other standards. Bearing Design, selection and stress analysis; rolling element, plain etc. theory of Lubrication including elements of tribology (water, corrosion and lubrication) causes, effects and reduction methods. Power transmission elements; belts, chain, gears and sprockets. Design of simple mechanical systems and machines. And reduction methods. Power transmission elements; belts, pulley, chain, gears and sprockets. Designs of simple mechanical system.

FST205: PHYSICAL AND COLLOIDAL PROPERTIES OF FOOD MATERIALS (2 UNITS)

Geometric properties of the food: Shape, uniformity of shape, freedom from surface irregularities, size and weight of food units, specific surface of food units, colour properties, textural properties, Aero and hydro dynamic properties, frictional properties, Resistance to processing stresses some properties of sugars, starches, cellulose and hemicelluloses, pectin, gums, proteins and fats. Interaction of biochemical constituents of food with water.

FST 208: FLUID MECHANICS IN FOOD PROCESSING (2 UNITS)

Fluid and its properties. Newtonian and Non-Newtonian fluids including plastics, pseudo plastics. Bingham plastic and rheopetic fluids. Boundary layer effect. Visco-elastic properties of fluids. Newtonian equation of fluid. Shear stress in static fluid. Fluid flow: compressible and incompressible flows, turbulent and laminar flows, uniform and non-uniform flows. Equations of fluid flow: continuity, energy and Bernoulli's equation. Flow in pipes in series and parallel connections.

GET 201: BASIC ELECTRICAL & ELECTRONICS ENGINEERING 1 (3 UNITS)

Ideal sources and Passive Components: Resistor, Switch, Voltage Sources, Current Sources, Dependent sources and their constitutive relations, power dissipation and power relations. Linear Resistive Networks with DC Sources: Kirchhoff's Current Law. Kirchhoff's Voltage Law, network topology, equivalent circuits, series and parallel connection of resistances. Linearity and

superposition , Thevenin and Norton's equivalent circuits. Loop and node methods of solving network problems. Transient response of RC, RL and RLC Circuits. Introduction of Electronics. Elementary discussion of Semiconductors – pn junction diode, npn and pnp transistors. Full – wave and half – wave rectification circuits and smoothing circuits.

GET 202: BASIC ELECTRICAL & ELECTRONICS ENGINEERING II (3 UNITS)

Basic AC theory- Periodic wave forms, average instantaneous, peak, mean and RMS values, form and peak factors , single phase series alternating current circuits and Application of complex numbers to series AC networks, single phase parallel alternating current (Admittance, conductance and Susceptance) circuits and Application of complex numbers to parallel AC networks, Series and parallel Resonance, Bandwidth and Q factor, Power in AC circuits and Power factor Correction/improvement, Delta-star and star-delta transformations, Three phase system: balanced wye-wye connection, balanced delta-delta connection, balance delta-wye connection, balanced wye-delta connection, power in a 3-phase balanced system, unbalanced 3-phase system. Magnetic circuit, mutual inductance. **Introduction to electrical machines;** - DC generators and motors. Introduction to Electrical and Electronic Power measuring instruments and equipment, A.C. and D.C. bridges

FST 292: PRACTICAL IN UNIT OPERATIONS OF FOOD PROCESSING (1UNIT)

Particle size reduction using various mills such as Kenwood blender, Attrition or Electric motor milling machine and mortar and pestle. Then carrying out their particle size analysis at different sieve mesh sizes. Drying of food materials using oven to determine their wet bulb temperature, equilibrium moisture content (EMC) and their falling rate. Extraction with particular reference to oil extraction from groundnut and palm kernel using electric motor oil expeller and determining their efficient-y rate. Distillation processing techniques using distillation method to separate two miscible liquids. Evaporation procedure as a process of concentrating liquid food substances using evaporating device and determine the level of concentration. Demonstration of principles and guidelines governing the design and construction of pipelines in food industries.

FST 300: STUDENT WORK EXPERIENCE PROGRAMMES (SWEP) (1 UNIT)

Long vacation industrial training programme of 2-month participation and exposure to food processing factory. Evaluation of technical report submitted by the students.

FST 301: FOOD CHEMISTRY I (2 UNITS)

Naturally occurring constituents of foods such as water, proteins, Lipids, and carbohydrates vitamins and minerals. Their structures, chemical and physical properties and significance. Chemical, physical and

biochemical changes that occur in food during handling, processing and storage. Browning reaction in foods, enzymic and non enzymic browning, significance uses in food industry. Natural food colour, biochemical changes during processing of climateric fruits. Synthetic vitamins and minerals used in food fortification, food toxicants and significance.

FST302: FOOD CHEMISTRY II (2UNITS)

Further studies on naturally occurring constituents of foods: vitamins, colours, minerals, and enzymes. Toxic constituents: phytic acid, trypsin inhibitor, their structures, chemical and physical properties and significance. Chemical, physical and biochemical changes that occur in these components during handling, processing and storage of foods. Effect of processing on chemical constituents of foods freezing dehydrate boiling.

FST 303: FOOD MICROBIOLOGY (2 UNITS)

Aspect of genetics and biochemistry, classification and growth characteristics of microorganisms mould, yeast and bacteria. The micro flora of foods and its relation to food preservation. Food infections and poisoning, toxins and its detoxification. Public health significance of food infections and food poisoning, food sanitation.

FST 304: PRINCIPLES OF FOOD PROCESSING AND PRESERVATION I (2 UNITS)

Traditional methods of food processing and preservation as applicable to different food products. Winnowing, sun drying, smoking, salting, fermentation, oil extraction, etc. Basic scientific methods of food processing and preservation including fermentation, dehydration, concentration and thermal processes. Basic principles of drying constant and falling rate drying. Thin and deep layer drying. Heat and mass transfer during drying process. Solar dryer: mode of heat collection, flat plate collector and concentrator, inclination of collectors, heat storage in solar dryers, heat distribution in the drying chamber, lagging of the walls of solar dryer. Basic equipment essential for food processing and preservation.

Milling technology as applicable in food industry. Types of mills: burr, hammer and roller mills. Design features and design analyses for mills. Cold storage and freezing in food industry. Determination of size and power rating of cold store and freezer. Irradiation and its applications in food industry. Extrusion Technology and its application in food industry. Design features and parameters for extruder. Principles of operation of extruder. Use and choice of chemical preservatives. Positive and negative effects of preservatives in food.

FST 305: PRINCIPLES OF HUMAN NUTRITION (2 UNITS)

Nutritional situation in Nigeria. Protein calories malnutrition. Metabolism of carbohydrates, protein, lipids, basal metabolism. Important mineral and vitamin deficiencies, their aetiology and control. Ant

nutritional factors in food. Food balance sheets, food composition tables and recommended dietary allowance. Principles of Food Toxicology, Acute Toxicity and Evaluation of LD, Common Toxicants in foods and methods of detoxifications.

FST 306: FUNDAMENTALS OF PROCESSING AND ENGINEERING IN FOOD STORAGE (2 UNITS)

Techniques and equipment for safe handling, transportation, drying, shelling, threshing, dehusking, cracking, etc. of important durable agricultural products, both food and export crops in Nigeria. The basic principles and requirements of various traditional and modern methods of storing durable agricultural products, maintenance of quality, pre and post-harvest protection from deterioration. Pest control equipment. Storage structures and mechanism. The role of engineering in food storage. Parameters and factors affecting storage. Instrumentation in storage.

FST 307: INSTRUMENTAL METHODS OF FOOD ANALYSIS (2 UNITS)

UV/visible spectrophotometry, Atomic Absorption spectrophotometry, flame photometry chromatographic techniques in Food Analysis (Paper chromatography. Thin layer chromatography, Gas-Liquid chromatography, HPLC), Electrophoretic techniques, ultracentrifugation techniques in protein analysis and other macronutrients. Enzymatic analysis of food components (sugar, alcohol citric acid etc).

FST308: CEREAL, ROOT AND TUBER TECHNOLOGY (2 UNITS)

Processing and utilization of major cereals. Milling of grains, particle size analysis, utilization of products and by-products. Baking processes, rheological properties of dough and ingredients. Protein-enriched cereal products. National considerations for the conservation, processing and preservation of roots and stem tubers and their products. Harvesting storage and processing of roots and tubers. Nutritional enrichment of root and tuber food products.

FST 310: FOOD MACHINERY (2 UNITS)

Design features, fabrication and readily available construction materials with particular reference to Nigeria. Functions of equipment used in the food industry for cleaning, sorting, grading, size reduction, mixing, homogenisation, filtration, distillation, centrifugation, etc. Electric motors and pumps used in Food Industries.

FST 391: FOOD CHEMISTRY PRACTICAL (1 UNIT)

Structures of starches. Sugar rotation. Determination of melting point, flame point of oil and fats. Determination of benzoic acid in beverages. Phenolase, peroxidase and catalase tests. Phosphates test/determination. Hydrogen cyanide determination. Non-protein nitrogen determination.

FST 392: FOOD CHEMISTRY II PRACTICAL (I UNIT)

Sampling of various foods for analysis flour, cocoa beans, cashew, beverages, milk. Proximate composition determination of moisture content using various methods moisture meter, Dean and start, oven method. Protein determination using Kjeldahl method, dye binding method Fat determination by Soxhlet extraction and Garber methods. Ash Determination, Total ash, water soluble ash, acid insoluble Ash. Crude fibre determination. Determination of vitamin C using spectrophotometer and titrimetric methods. Polarimetric determination of sugar. Total solids, dissolved solids, pH, acidity of beverages. Water analysis hardness and alkalinity of water from different sources. Water analysis for pH, total solids, and residual chlorine. Determination of fatty acids of oil using GLC.

FST 393: FOOD MICROBIOLOGY PRACTICAL (1 UNIT)

Introduction to the Food Microbiology laboratory including studies on the various equipment. Drawings would be done where applicable. Various media and all other materials used in the laboratory' would be shown to the students Studies on the preparation of media, media dispensation and aseptic methods would be done.

Also techniques of isolation of microorganisms mainly bacteria and fungi would be carried out. Various staining; techniques and Biochemical tests used in identifying microorganisms would be carried out. Microbiological studies of food substances would be carried out. Food substances include, water, fish, meat, egg, cereals, roots & tubers, flour (wheat, yam, *etc.*). Cases of spoilage would be established and the isolation and characterization of the organisms responsible would be carried out, Studies on food infection and poisoning would be carried out. Samples of water and cooked foods would be collected from hostels and cafeteria in the school and be subjected to microbiological analysis.

FST 394: PRACTICAL IN FOOD PROCESSING AND PRESERVATION (1UNIT)

Tutorials and experimentations in food processing methods to preserve food commodities including dehydration, concentration, canning, smoking, irradiation, fermentation, salting, pickling etc. Particle size distribution using Tyler sieves. Determination of fineness modulus and uniformity index. Comparison of particle size distribution on the materials obtained from burr mill, hammer mill and roller mill

FST 395: HUMAN NUTRITION PRACTICAL (1 UNIT)

Isolation of glycogen from rat liver. Enzymatic hydrolysis of glycogen. Acid hydrolysis of glycogen. Characterization of glycogen. Measurement of food intake. Determination of energy values of foods (bomb calorimeter). Estimation of daily energy (calories) needs. Estimation of daily needs for other nutrients (proteins, some vitamins and some minerals).

FST 396: FUNDAMENTALS OF PROCESSING AND ENGINEERING IN FOOD STORAGE PRACTICAL (1 UNIT)

Tutorial on Quality assessment in food material such as grain legume, tuber, cereal, fruits and vegetable. Moisture content determination using oven method and other indirect methods. Determination of insect infestation by counting method. Determination of mould growth and infestation. Sorption isotherm and its importance in food storage. Determination of moisture isotherm and local isotherm using desiccator. Control of fruit ripening. Experimentations on biological properties of food and agricultural materials.

FST 398: PRACTICAL IN CEREAL, ROOT AND TUBER TECHNOLOGY (1 UNIT)

Particle size analysis of flour and interpretation using calculation and graphs. Analysis of different flour for ash, insoluble ash, and protein. Damaged starch determination. Functional properties of flour. Chemical analysis of amylose/ amylopectin. Extraction and determination of gluten using formulation and bolograph. Bread baking and quality assessment. Determination of bromate in bread/flour. Determination of HCN in cassava and sorghum products; Gari, Lafun, Fufu etc. Production of biscuits cracker/cookies using composite flour/quality assessment of biscuit.

FST 401: FOOD PROCESS PLANT DESIGN (2 UNITS)

Plant lay-out in the food industry. Economics of process design and optimization techniques. Optimum design of food processing plants. The principles of methods of process design. The factors determining optimum operating conditions for different processes. Methods of preparing design project report. Sanitation in design. Students to design and fabricate food processing machine.

FST 402, 404 AND 406: STUDENTS' INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES) (12 UNITS)

FST 402 (2 Units) is one of the three components of the Students Industrial Work Experience Scheme (SIWES) where Industry-based Supervisors do assess students' performance: Punctuality to work, Availability, commitment and contribution of students to the operations in the industries where attached. Such assessment are submitted to the School to form part of the SIWES overall grading.

FST 404 (4 Units) is the assessment of the students by the University Supervisors who visit the students at the places of attachment and evaluate their logbook and as well interact with the Industry based supervisor. This form the second component of the SIWES overall grading

FST 406 (4 Units) is the assessment of the report and defence by students. Here, the evaluation is based on the quality of the write-up and the student's ability to defend the report. This is the third and final component of the SIWES overall assessment,

FST 403: FOOD PROCESS ENGINEERING (2 UNITS)

Basic concepts of heat transfer by conduction, convection, and radiation. Heat transfer coefficients. Heat exchange and condenser design. Mass transfer. Mass transfer coefficients. Concept of diffusivity. Momentum and mass transfer. Application of the theory of heat, mass momentum transfer in the food industry.

FST405: FOOD STANDARDS, LAWS & QUALITY CONTROL (4UNITS)

Definition and importance of food standards and legislations. Food and drug decrees of Nigeria. Codex Alimentarius Commission. Food standards and regulations and legislation of Nigeria. Principles and methods of food quality control. Quality control charts. Parametric and non-parametric experiments. Sensory evaluation. Taste theories. Taste testing and panels. Food quality, quality control and quality assurance, quality costs, total quality management of food quality assurance. Choice of panelists in sensory evaluation. Data analysis, M.Q.C. Management, HACCP. Principles of adulteration. Principles of misbranding. Food standards and legislation. The Nigerian Food and Drug decree. Roles of food inspectors, analysts, the commissioner advisory council, etc. Other definitions with the food and drug laws e.g. sales, safe, food, devices, expiry dates, etc.

FST 407: FOOD FERMENTATION PROCESSES (2 UNITS)

Biotechnology and genetic engineering of beneficial organisms. Isolation, preservation and improvement of industrial microorganisms. Unifying principles of the processing operations involved in enzyme products, yeast, beverage, alcohol, antibiotics and microbial products. Fermentation processes in food processing and preservation. Fermented foods including traditionally fermented foods of importance in Nigeria. Fermentation in waste utilization.

FST 409: FOOD ANALYSIS (2 UNITS)

Sampling and treatment of food samples for proximate analysis. Principles of analytical methods such as photometry, colorimetry, gravimetry, refractometry and chromatographic methods for food analysis. Principles of physical and chemical analytical methods of water and other major components of foods. Theoretical determination of vitamins in foods Vit C, Vit. B., B2. Use of HPLC for determination of vitamins. Determination of toxic constituents in foods, HCN, Phytic acid, Non protein Nitrogen etc. Sugar analysis, starch, Amylose and amylopectin in foods, damaged starch.

FST 491: PLANT DESIGN PRACTICAL (1 UNIT)

Design and fabrication of basic processing equipment using locally available materials such as evaporators, distiller, crystallizer, spray dryers, mixing equipment Heat jacketed vessel, liquid fillers, thermocouple device, heat exchanger, etc.

FST495: FOOD STANDARD, LAWS AND QUALITY CONTROL PRACTICAL (1UNIT)

Screening of panelists for sensory evaluation of food products. Organoleptic assessment of food using samples. Triangle test on beverages. Multiple comparison test on composite bread, Hazard Analysis of critical control points (HACCP). Test design using local foods. ANOVA for analysis and general use of computer for data analysis and interpretations.

FST497: PRACTICAL IN FOOD FERMENTATION PROCESSES (1 UNIT)

Monitoring of various biochemical changes occurring during the fermentation of various traditional food products such as garri,'iru', ogi, palm wine. ogiri, cocoa beans, etc. The biochemical changes include pH, amino acids, fatty acids, acidity, simple sugars, etc.

FST 499: FOOD ANALYSIS PRACTICAL II (1 UNIT)

Determination of vitamins using HPLC. Protein analysis, Total Volatile Nitrogen in meat and fish. Fat analysis — FFA, TEA, Acidity, peroxide value. Dirts in oil, saponification value, unsaponifiable matter. Carbohydrate analysis — Sugar determination using Lane and Eynon method. Starch determination — using phenol-sulphuric acid method. Determination of Beta Carotene and lycopene. Nutritionally important metals — iron in flour, heavy metals — Hg P, Na & K using flame photometer. Determination of pesticides/insecticide residue in foods e.g. organ chlorine DDT. Aflatoxin in foods (groundnut).

FST 500: FOOD SCIENCE AND TECHNOLOGY SEMINAR (2 UNITS)

Oral presentation of prepared reviewed papers on specific topics in Food Science and Technology by the students.

FST 501: POST-HARVEST PHYSIOLOGY AND STORAGE TECHNOLOGY (2 UNITS)

Post-harvest physiology of horticultural commodities, e.g. tuber, fruits and vegetables. Control of post-harvest losses. Refrigeration and cooling systems. Tropical environment including climacteric, physical and chemical indices of quality in fruits and vegetables. Controlled environment for long-term storage and transportation.

FST 502: FOOD PRODUCT DEVELOPMENT (2 UNITS)

Objectives of product development. Reasons why products fail in the market. Food Product Planning and marketing mix strategies product, pricing, promotion and distribution. Consumer goods-convenience, shopping, specialty and unsought goods. Industrial goods-installation, accessories, components, raw materials and services. Stages of Food product Development- idea generation, screening, concept testing and test marketing, development and commercialization. Product life cycle. Return on Investment and Business analysis-Pay back index, annuity, Discounting, forecasting of product opportunities. Types of opportunities and activities in the market. Development and assessment of food products. Research and development,

engineering design, development of laboratory samples, testing in the market, revision of product specification, pilot production, carrying out production and Quality Control tests, real market testing; Product variation. Packaging and labelling designs. Pilot plant establishment and assessment - Equipment design and selection, feasibility study; Industrial plant establishment and assessment - Equipment design and selection feasibility study. Industrial plant, installation and optimization - Plant location, factors affecting plant location. Processing equipment selection. Plant layout and equipment installation. Optimization of production operations. Legal aspect of Food Product Development-Intellectual property; Patenting and industrial designs. Patentable inventions, duration and lapse of patents, surrender of patents, nullity of patents. Licensing, acquisition and franchise- advantages and disadvantages, Trade mark and registration-registrability and validity of registration-deceptive, identical and resembling trademarks; procedure and duration of registration. Company registration-registration of business name, incorporation, partnership. Registration of product with National Agency for Food and Drug Administration (NAFDAC).

FST 503: FOOD PACKAGING (2 UNITS)

History of packaging. Functions of Packaging. Selection and consideration for packaging materials. Types and characteristics of packaging materials. Food containers-flexible - Paper; Plastics; Glass; Metal cans. Composite packaging materials. Corrosion of containers (T in plate). Food packages-bags, pouches, wrappers, cartoon and other traditional package, wooden boxes, crates, plywood and wire bound boxes, corrugated and fibre board boxes, textile and paper sacks aseptic and restorable paunches. Flexible and laminated pouches, aluminium as packaging material. Biodegradable packaging. Active packaging. Modified atmospheric package - for fresh and processed foods for local and foreign markets Operations in packaging- filling, closing and sealing Safety in packaging - aseptic packaging, Pasteurization and Sterilization, Interactions between packaging materials and product and their effects. Properties of packaging materials -permeability and measurement, testing of structural qualities and performance, moisture and gas movement across packages. Shelf life testing and prediction. Traditional packaging materials. Strength of properties of packaging materials. Water vapour and gas transmission rate of flexible packaging materials. Identification and chemical resistance of plastic films. Pre-packaging of vegetables. Estimation of shelf-life of packaged food stuff. Familiarization of types of packaging material.

FST 504: OILSEED PROCESSING AND UTILIZATION (2 UNITS)

An Overview of oil seeds of commercial importance in Nigeria i.e. (cocoa, oil palm castor oil, coconut, soybean, sheer butter, sunflower, linseed cornophor oil seed, groundnut, cotton seed melon). The detail method of processing, treatment to remove antinutritional factors and the refining of the oil to edible forms.

Utilization of oil seed by products i.e. cake and oil sediment for soap making and ingredients on food systems. Protein isolates production from the oil seed cake, utilization of the oil seed protein isolate in food industry. Detail discussion on the functional properties of the oil seeds (full fat, defatted and protein isolates), i.e. emulsification, WAC, OAC, Whipping properties etc.) and their implication in food system Novel food product production using oil seeds.

FST 505: FRUIT AND VEGETABLE PROCESSING (2 UNITS)

Preservation of fruits and vegetables by canning, freezing, concentration, dehydration, fermentation and irradiation. Harvesting and pre-processing operations and equipment including mechanical harvesting, soaking and washing, sorting and grading, peeling and cooling. Cutting, trimming and blanching. Use of chemicals to control enzymatic and non-enzymatic changes in processed fruits. Adaptable techniques to local handling and storage of perishables.

FST 506: MEAT TECHNOLOGY (2 UNITS)

Types of meat. Production and consumption of meat in the developing countries. Post-mortem changes in meat and meat quality. Nutritional value of meat. Processing of meat (beef, pork, poultry, etc). Ageing, tenderization, and curing of meat. Preservation of meat (e.g. smoking, freezing, canning, dehydration, irradiation, etc.). Meat by-products (e.g. sausage, corned beef, burgers, etc.). Miscellaneous processing and preservation of fish, sea foods and eggs. Application of HACCP in meat processing.

FST507: MILK AND DAIRY TECHNOLOGY (2 UNITS)

Technology of milk and milk products, (e.g.) liquid milk, filled milk, ice-cream, cheese, cultured milk, butter, etc.). Milk production practices including site, building and equipment selection. Organization and operation of the milk processing unit including milk collection, reception, standardization and heat-treatment of milk. Whey as a by-product in milk processing. Cleaning and disinfecting operations in dairy industry. Dairy waste management and application of HACCP in dairy industry.

FST 508: FOOD INDUSTRIAL WASTE MANAGEMENT (2 UNITS)

Various wastes of food industries i.e. solid waste and waste water, their treatment and disposal. Effect of solid waste on environment, utilization of waste as fuel, fertilizer, animal feed and cellulose acetate. Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD). Calculation in waste effluents from food processing plants. Physical treatment of waste i.e. sedimentation, centrifugation, concentration, flotation methods, absorption processes, ultra-filtration, reverse osmosis and electrolysis. Chemical treatment of waste water i.e. coagulation, emission-breaking process, trickling filter, aerated lagoons, stabilization ponds, anaerobic biological processes, aerobic, facultative anaerobic process.

FST 509; PROCESSING OF MISCELLANEOUS FOOD COMMODITIES (2 UNITS)

Processing of cocoa- cocoa butter, liquor, powder. Coffee and tea technology-instant soluble coffee and instant tea manufacture. Carbonated non-alcoholic beverages, mineral water, fruit juices-types of fruit juices, technology of extraction and processing. Quality. Soft drinks - Different types, principles of formulation, roles of ingredients, processing, quality assurance and control, microbiology of soft drink. Sugar confectioneries and chocolate manufacture - Hard boiled sweets, toffees, gums, chocolate manufacture-types of chocolate and uses. Types of chocolate, imitation chocolate. Sugar and sugar products - cane sugar extraction and refining, syrup, molasses, glucose syrup, liquid glucose, honey. Nutraceuticals- roles, functions uses; Functional foods and probiotics as nutraceuticals. Extrusion cooking technology - Types of Extruders, comparison of single and double screw extruders. Uses of extruders for breakfast cereal foods, pasta products, oilseed extrusion and texturised vegetable (soy) proteins; texturization and reactions taking place during extrusion cooking. Food Irradiation principles- Radurization, Radicidation, and Radappertization and their dosage levels. Effects of irradiation on foods. Dielectric heating and microwave processing.

FST 511: RESEARCH METHODOLOGY (1 UNIT) Setting of objectives, hypothesis formulation and testing experimental design and sampling procedure. Quantitative method of analytical technique. Questionnaire and choice of test for products. Preparation and presentation of scientific-report. Interpretation of results. Statistical techniques of data analysis.

FST 512: PROCESSING OF SELECTED INDIGINOUS FOOD COMMODITIES (2 UNITS)

Technology involved in the processing of various categories of local food products from different food groups: Cereals, roots and tubers, oil seeds, etc. The technology and processing will be aimed towards commercial production.

FST 514: FOOD BIOTECHNOLOGY (3 UNITS)

Meaning of Biotechnology. History, processes and products of biotechnology, principles of biotechnology and- implication for food production. Replication, transcription and translation. Genetic procedure for strain improvement, selection, mutation, cloning with plasmids and Recombinant DNA technology and its application. Bioreactors. Application of Biotechnology food ingredient formulation, functional foods and food waste remediation.

FST 592: PRACTICAL IN FOOD PRODUCT DEVELOPMENT (1 UNIT)

Students will be made to form groups (e.g. 4-6students per group) in the development of various categories of new and novel food products. Analysis and sensory evaluation of the developed products will be carried out.

FST 595: PRACTICAL IN FRUIT AND \TGETABLE PROCESSING (1 UNIT)

Processing of fruits and vegetables into various products — production of jam from fruits (orange, paw paw, mango etc): canning of fruits and vegetables like pineapple, sweet corn, tomato etc; production of spices as dry products blanching and freezing of vegetables; comparison of water and steam blanching and their effectiveness using peroxidase and catalase test. Peeling methods in vegetable processing- lye, brine, steam and hand peeling.

FST 596: MEAT TECHNOLOGY PRACTICAL (1 UNIT)

Evaluate shell eggs for quality using destructive methods, yolk index, albumen index, Haugh unit. Production of egg powder and fortified eggs. Quality evaluation. Production and quality test of frozen chicken. Meat canning and testing for Clostridium botulism. Production and evaluation of sausage rolls. Frozen meat production and quality evaluation. Smoked fish/meat evaluation. Chemical preservation of egg using coating and brining.

FST 597: PRACTICAL IN DAIRY TECHNOLOGY (1 UNIT)

Chemical analysis of milk (fat, alcohol, resazurine and acidity. Physical analysis (cryoscopic point, density, dry residue, pH). Bacteriology test (coliform. Total count, mould and yeast). Production of milk-based product such as yogurt, icecream, warankasi, etc.

FST 599: PRACTICAL IN MISCELLANEOUS FOOD COMMODITIES (1 UNITS)

Laboratory scale processing of cocoa, tea and coffee into beverages, confectionery, fruit drinks and caramel production. Production of sweet, chocolate and the likes. Analysis of relevant parameters during the processing of the commodities e.g. Theobromine in cocoa, tannin in coffee, reducing sugar, FFA in cocoa butter, moisture content of foods, etc.

FST 515: FINAL YEAR STUDENTS PROJECT (6UNITS)

Final year research project is undertaken by individual students under the supervision of members of staff. A report of the research work will be presented in form of a dissertation to be followed by an oral examination.

FST 516: ENGINEERING PROPERTIES OF PLANT AND ANIMAL MATERIALS (2 UNITS)

Basic characteristic of plant and animal materials. Basic Engineering properties of biological materials: physical, mechanical, thermal, optical, electrical, magnetic and electro mechanical properties. Physical properties.: Moisture content, colour, size, shape, roundness, sphericity, etc. Mechanical properties: Strength characteristics such as impact, compression, shear strength. Special classes of mechanical properties.: Visco elasticity, aerodynamics and hydrodynamics. Thermal, electrical and optical properties and their applications. Textural and Rheological measurements including instrumental and

sensory methods. Applications of the engineering properties of biological materials in the design and development of food processing and storage machines and equipment.

FST 518: NUTRITIONAL EVALUATION OF FOOD PROCESSING (2 UNITS)

Processing of foods by blanching and the consequent losses of Vitamins and Minerals. Also the process of foods by Drying and Dehydration leading to Enzymatic and non-Enzymatic browning. The losses of nutrients such as proteins, amino acids, Vitamins etc. are discussed. The application of irradiation and nutrient losses in foods, formation of radicals and by-products are also discussed. The effects of long storage of foods (especially meat and fish) under Freezing conditions with the concepts of reversible and irreversible denaturation of proteins, colloidal changes in such foods and other organoleptic changes are discussed.

FST 520: ADVANCED FOOD ANALYSIS (2 UNITS)

Use of Instrumental methods in Food Analysis. Use of Gas liquid chromatography GLC - details structure of GLC, principle of operation. Treatment of samples for GLC. E.g. oil for fatty acid determination. Principles of Atomic Absorption Spectroscopy (AAS). Detail structure of AAS. Use of AAS to determine mineral elements in foods limitation of the method and computation of results. Principles of flame photometry and the detail structure and functions. Determination of mineral elements Na, K, Mg in foods using flame photometry. Spectrophotometry, Principle and uses, UV Visible spectrophotometry and its uses on the determination of P. Vit. C, phytic acid and food column of total carotenoid content of food, oils etc. Chromatography principles and detail discussion on ion-exchange chromatography gel exclusion chromatography and use of ICP - OES and ICP -MS in food analysis. Use of enzyme on food analysis, isomerase and, P amylases, peptase, tryptase in the analysis of starch, sugars and protein digestibility. Use of linamarase enzyme in cyanide determination of food.

8.0 DEPARTMENT OF FORESTRY, WILDLIFE AND ENVIRONMENTAL MANAGEMENT

WITH OPTIONS IN:

ECOTOURISM RESOURCES MANAGEMENT

FOREST RESOURCES MANAGEMENT

WILDLIFE RESOURCES MANAGEMENT

11.1 PROGRAMME PHILOSOPHY

The Primary philosophy that guides the training of students is the production of skilled manpower that is adequately furnished with the comprehensive information required, for engaging in Forestry, Wildlife and Environmental Management in an environment characterized by rural setting and adequate land endowment. Such knowledgeable professional manpower has to be produced in an atmosphere with the widest possible human and material resources, through the adoption of effective techniques of instruction, and exposure to the actual practice of forestry. Consequently, this programme provides opportunities for formal training at the undergraduate level for the acquisition of basic degree. These training programmes are mounted through classroom instruction, laboratory practicals, field demonstration, and workshop practice.

11.2 THE OBJECTIVES OF THE PROGRAMME

- (i) To produce graduates with sufficient practical background to create employment from utilization of Forestry, Wildlife and Ecotourism resources. The graduates are also expected to be able to undertake local sourcing of industrial raw materials, to produce animal protein through demonstration and ranching of farm wildlife and also engage in food production through agroforestry.
- (ii) To produce the required manpower which will not only be used in staffing forestry and wildlife establishments nationally but which also would be able to carry out relevant, mission oriented researches into all aspects of Forestry Wildlife, and Ecotourism the yet unexplored benefits and products which can serve as bases for newer industries.

11.3 ADMISSION REQUIREMENTS

(a) UTME

Candidate seeking admission into the five-year programme in Forestry, Wildlife and Environmental Management must possess at least five credits in WASC, SSCE, GCE (Ordinary level), or equivalent at not more than two sittings in Chemistry, Biology or Agricultural Science, Mathematics, English language and one of Geography, Physics and Economics. Candidate must have at least a pass in Physics. In addition, applicants must obtain an acceptable pass on Unified Tertiary Matriculation Examination (UTME).

UTME Subjects: The U.M.E subjects are English language, Chemistry, Biology or Agricultural Science, Mathematics or physics.

(b) Direct Entry

For admission by direct entry (into second year of the programme), candidate must possess in addition to (a) above any of the following requirements:

- (i) National Diploma (ND with Lower credit) or equivalent, or Higher National Diploma (lower credit) in Forestry or Agriculture from recognized institutions.
- (ii) GCE Advanced level or equivalent at one sitting in at least two of the following subjects: Physics, Chemistry and Biology with a minimum of 6 (six) points.
- (iii) Holders of National Certificates in Education with Agriculture double major and at credit pass level

11.4 PROGRAMME DURATION

The programme is normally for a duration of five (5) academic sessions for UTME candidates and four (4) academic sessions for direct candidates. A student should under normal circumstances spend five academic sessions to obtain the bachelor degree. However, if the student fails to graduate within the

normal number of sessions, he/she will not be allowed to exceed a total of seven (7) academic sessions.

11.5 REQUIREMENTS FOR GRADUATION

To be eligible for the award of B.Agric.Tech. (Forestry, Wildlife and Environmental Management) degree, students must have:

- Passed all core courses prescribed by the Department, as well as the University and Faculty required courses and electives recommended by the department for specifications;
- Accumulated a minimum of 194 course units for the five year programme or 1.50 course units for direct entry and obtained a CGPA of not less than 1.50; and for 2017/2018 session only and not less than 1.00 for subsequent session.
- Successfully completed all field practical, Industrial Work Experience Scheme and undergraduate project based on supervised research.
- Direct entry students (A/Level and JUPEB) are expected to register and pass the following general studies courses GST 101, 102, 111, 112 and 113. In the event that they fail any of the courses, they will have to register for and pass it.

11.6 COURSE OUTLINES

200 LEVEL, FIRST SEMESTER							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	APH 201	Introduction to Animal Production And Health	C	1	-	3	2
2	CSP 201	General Agriculture	C	1	-	-	1

3	CSP 205	Basic Metrology For Agricultural Sciences	C	2	-	-	2
4	CSP 207	Principles of Farmshop	C	2	-	3	3
5.	FAT 201	Introduction to Fisheries and Aquaculture	C	2	-	-	2
6	APH 203	Introduction to Agricultural Biochemistry	C	2	-	3	3
7	FST 201	Principles of Food Science and Technology	C	2	-	-	2
8	FWM 201	Introduction to Ecotourism and Wildlife Management	C	1	-	3	2
9	AEE 201	Introduction to Agricultural Economics	C	2	-	-	2
10	GST 221	History and Philosophy of Science	C	2	-	-	2
11	GST 229	Introduction to Vocational Skills	C	1	-	3	1
		TOTAL					22

Required courses for Direct Entry Students (A/L and JUPEB)

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	GST 101	Use of English 1	A	2	-	-	2
2	GST 111	Use of Library and Study Skills	A	2	-	-	2
3	GST 113	Philosophy and Critical Thinking	A	2	-	-	2

200 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
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1	APH 202	Anatomy and Physiology of Farm Animals	C	2	-	3	3
2	CSP 202	Basic Soil Science	C	1	-	3	2
3	CSP 204	Botany of Economic Crop	C	1	-	3	2
4.	CSP 210	General Agriculture (Practical)	C	-	-	6	2
5	AEE 204	Agricultural Statistics and Field Experimentation	C	2	-	3	3
6	FWM 202	Introduction to Forest Resources Management and Agroforestry	C	1	-	3	2
7	FWM 204	Use of Computer in Natural Resources	C	2	-	3	1
8	FWM 206	Principle of Wildlife and Range Management	C	2	-	3	2
9	GST 224	Peace Studies and Conflict Resolution	C	2	-	-	2
		TOTAL					19

Required courses for Direct Entry Students (A/L and JUPEB)

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	GST 102	Use of English 2	A	2	-	-	2
2	GST 113	Logic and Philosophy	A	1	1	-	2
3	GST 112	Nigerian People and Culture	A	1	1	-	2

300 LEVEL, FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FWM 301	Principles of Silviculture	C	2	-	3	2
2	FWM 303	Natural Ecosystems	C	2	-	3	3

3	FWM 305	Introduction to Forestry and Wildlife Management	C	2	-	3	2
4.	FWM 307	Introduction to Forestry and Wildlife Extension	C	2	-	3	2
5	FWM 309	Wood Anatomy, Formation and Properties	C	1	-	3	2
6	FWM 311	Zoo Planning and Museum Management	C	1	-	3	2
7	FWM 313	Forest Resources Inventory and Mensuration	C	2	-	3	2
8	GST 331	Introduction to Entrepreneurial Skill	C	0	0	2	2
9	FWM 315	Wildlife Production Techniques	C	1	-	3	2
10	FWM 319	Remote Sensing and GIS application forestry & wildlife management	C	1	-	3	2
		TOTAL					21

300 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FWM 302	Forest Economics	C	2	-	3	2
2	FWM 304	Forest Survey	C	1	-	3	2
3	FWM 306	Wildlife Ecology and Management	C	2	-	3	2
4.	FWM 310	Forest and Wildlife Biometrics	C	2	-	3	2
5	FWM 312	Herpetology	C	1	-	3	2
6	FWM 314	Principle of Conservation in Tropical Africa	C	1	-	3	2

7	FWM 316	Seed and Forest Nursery Technology	C	1	-	3	1
8	FWM 318	Wildlife Population Analysis	C	1	-	3	2
9	FWM 308	Medicinal Plants (Ethnobotany)	C	-	-	3	1
10	FWM 322	Environmental Impact Assessment	C	1	-	3	2
11	FWM 324	Introduction to Landscaping	C	1	-	3	2
		TOTAL					20

400 LEVEL, FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FWM 401	Forest Inventory and Management	C	2	-	3	2
2	FWM 403	Silviculture Techniques	C	-	-	3	2
3	FWM 405	Agroforestry Practical	C	1	-	3	1
4.	FWM 407	Training in Firearms and Ballistics	C	2	-	3	3
5	FWM 411	Harvesting, Processing and Wood Utilization	C	1	-	3	2
6	FWM 413	Forest Operations	C	2	-	3	2
7	FWM 415	Zoo and Parks Management Techniques	C	1	-	3	2
8	FWM 419	Ecological Survey	C	1	-	3	3
9	CSP 503	Agronomy of Tree Crops	C	2	-	3	3
		TOTAL					20

INDUSTRIAL ATTACHMENT

400 LEVEL, SECOND SEMESTER							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FWM 402	Quantitative Production Ecology					1
2	FWM 404	Processing and Preservation of forest Produce					1
3	FWM 406	Forest and Wildlife population field survey					2
4.	FWM 408	Wood ban Industrial Processes					1
5	FWM 410	Practical field survey in the forest and savannah zones					2
6	FWM 412	Natural and man-made (Forest Plantation Techniques)					1
7	FWM 414	I. T. Report and Assessment					4
		TOTAL					12

ECOTOURISM RESOURCES MANAGEMENT OPTION

500 LEVEL, FIRST SEMESTER							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	ERM 501	Economics of Ecotourism	C	-	-	2	2
2	ERM 503	Principles of Recreation and Ecotourism	C	1	-	1	2
3	ERM 505	Ecotourism Planning and Management	C	1	-	1	2

4.	ERM 507	Eco-toxicology in Biodiversity	C	1	-	1	2
5	ERM 509	Hotel and Catering Management	C	1	-	1	2
6	ERM 511	Tourism Organization and Travel Planning	C	1	-	-	2
7	ERM 597	Seminar in Ecotourism Resources Management	C	-	-	-	2
8	ERM 513	Ecotourism Publicity and Marketing	C	2	-	1	3
9	ERM 515	Impact of Ecotourism on Ecosystem	C	2	-		3
		TOTAL					20

500 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	ERM 502	Management of Wetland and Ornithology	C	1	-	1	2
2	ERM 506	Ecotourism and Hospitality Management	C	2	-	-	2
3	ERM 510	Environmental Laws, Policy and Administration	C	1	-	1	2
4	ERM 512	Food and Beverage Management	C				2
5	ERM 514	Wildlife Physiological Adaptation and Behaviour	C	-	-	-	2
6	ERM 598	Project in Ecotourism Resources Management	C				6
		TOTAL					16

FOREST RESOURCES MANAGEMENT OPTION

500 LEVEL, FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FRM 501	Multiple Land Use	C	1	-	3	2
2	FRM 505	Forest Soils	C	1	-	3	2
3	FRM 507	Forest Genetics, Tree Breeding and Conservation	C	1	-	3	2
4	FRM 509	Forest Pest, Diseases and Forest Protection	C	1	-	3	2
5	FRM 511	Natural Resources Economics	C	1	-	3	2
6	FRM 503	Ecological Disaster and Control	C	2	-	3	2
7	FRM 513	Forest Management Techniques	C	1	-	3	2
8	FRM 515	Urban Forestry	C	1	-	3	1
9	FRM 597	Seminar in Forest Resources Management	C	-	-	-	2
		TOTAL					17

500 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FRM 502	Forest Industries, Timber Quality Control & Marketing	C	1	-	3	2
2	FRM 504	Wood Processing and Pulling Process	C	1	-	3	2
3	FRM 506	Forestry Extension and Education	C	1	-	3	2
4.	FRM 508	Forestry Resources Utilization	C	1	-	3	2
5	FRM 510	Forest Policy, Law and Administration	C	1	-	3	2

6	FRM 512	Advanced Silviculture	C	1	-	3	2
7	FRM 598	Project in Forest Resources Management	C	-	-	18	6
		TOTAL					18

ELECTIVE							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FRM 514	Quantitative Ecology	E	1	-	3	2
2	FRM 516	Herbarium and Taxonomic Techniques	E	1	-	3	2
3.	FRM 518	Forest Engineering	E	1	-	3	2

WILDLIFE RESOURCES MANAGEMENT OPTION

500 LEVEL, FIRST SEMESTER							
S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	FRM 501	Multiple Land Use	C	1	-	3	2
2	WRM 503	Wildlife Management	C	1	-	3	2
3	WRM 507	Game Ranching and Domestication	C	1	-	3	2
4.	WRM 505	Wildlife Policy, Law and Administration	C	1	-	3	2
5	WRM 509	Wildlife Genetics, Breeding and Conservation	C	1	-	3	2
6	WRM 511	Wildlife Recreational Planning	C	1	-	3	2
7	WRM 597	Seminar in Wildlife Resources Management	C	-	2	-	2
8	WRM 513	Wildlife Management and Utilization	C	1	-	3	2

9	WRM 515	Natural History of African Mammals	C	1	-	3	2
		TOTAL					18

500 LEVEL, SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE STATUS	L	T	P	Units
1	WRM 502	Ornithology	C	1	-	3	2
2	WRM 504	Wildlife Pests, Diseases and Control	C	1	-	3	2
3.	WRM 506	Wildlife Nutrition	C	1	-	3	2
4	WRM 510	Concept of Park and Zoo Management	C	1	-	3	2
5	WRM 512	Wildlife Extension & Education	C	1	-	3	2
6	WRM 598	Project in Wildlife Resources Management	C			18	6
		TOTAL					16

11.7 COURSE DESCRIPTION

FWM 201: Introduction to Ecotourism and Wildlife Management (2 Units)

Definition and scope of ecotourism in Nigeria, development trend in ecotourism, management worldwide, identification and management of important tourist sites in Nigeria, Tourist suppliers and activities (wildlife viewing), bird identification, visiting cultural and historical sites, camping, sport fishing, swimming, etc.)importance of tourism to Nigerian economy. Ethics of tourism, tourism planning, organization, and community partnership. Renewable natural resources, availability, distribution and potential. The importance of wildlife species (with emphasis on Nigerian species), classification, morphology and distribution of Game reserves, National parks, and other conservation areas in Nigeria and West African countries. Significance of wildlife management and production. Field techniques in wildlife management. Introductory Game ranching and domestication

FWM 202: Introduction to Forest Resources Management and Agroforestry (2 Units)

Renewable natural resources, availability, distribution and potential. The important forest trees and wildlife (with emphasis on Nigerian species) Classification, Morphology, distribution and ecology of important forest tree, forest and game reserves in Nigeria. Silviculture; afforestation characteristics of major timber and their uses. Felling and log transportation. Importance of forest in the national economy. Organisation of forest resources, non-timber resources. Forest protection and conservation, regulation of harvest and sustained yield. The concept of agroforestry, genesis, current development, prospects and problem. Interlink between crop, tree animal husbandry. Biological integration of agro/silvo/pastoral practices. Roles of component crops/animals in land utilization and site conservation, socio-economic feasibilities and limitations.

Fwm 204: Introduction to use of Computer in Natural Resources (2 Units)

Introduction to computer hardware components and their functions; operating systems and applications packages such as Microsoft Office, File management, opening and saving files, creating folders, and sub-folders, searching for and retrieving saved files, working with the mouse and keyboard, use of computer software for word processing, use of spread sheets, preparation of powerpoint presentation; introduction to desktop publishing and use of the internet, Application of computer to natural resources (Forestry, Wildlife, Ecotourism etc), scheduling forestry operation, user needs analysis; designing forest information systems, working with data base, introduction to customised software for natural resources management planning (e.g PROGNOSIS, VMDY etc), Open source software use in natural resources management.

FWM 206: Principles of Wildlife and Range Management

(2 Units)

Principle range types in West Africa. Application of ecological principle in the management of grazing lands. Objectives of range management, grazing system. Manipulation of animal numbers for desired management objective.

FWM: 301: Principle of Silviculture (2 UNITS)

Meaning of Silviculture, importance of Silviculture in forestry practices. Analysis and study of problem of raising the tree crops. Climate and Edaphic factors affecting tree growth. Tropical forest regeneration methods- Natural and artificial. Application for establishment and maintenance of forest for various purpose. Taungya and other Silviculture practices. Plantation establishment: choice of species, species and provenance trials, tree crop production practices, manipulation of natural forest. Major forest types in the tropics and silvicultural management system.

FWM 302: Forest Economics (2 UNITS)

Definition of Forest goods and service; application of economic principle to forest resource; decision making in single and multiple resource use forestry. cost-benefit analysis. Concept of

production functions (input and output relationships). Resources in forestry production, land labour, capital and management resources. Problems of resources, concept and methods of forestry production projects. (2 hours lecture and 3 hours practical)

FWM 303: Natural Ecosystems (3 UNITS)

Distribution, structure and dynamic of lands and freshwater ecosystems. The flow of energy and materials through natural ecosystems. The importance of conservation: conservation techniques. Tree identification. Forest ecosystem concept, energy dynamics at producer and consumer trophic levels. Photosynthetic efficiency of forest; nutrient cycling in forest ecosystem (geochemical and biological nutrient cycling). Tropical forest communities (vertical and horizontal structures), Classification of forest trees (families of trees) and their relationships to ecological zones, morphology, taxonomy and ecology. Variation and modifications of plant morphology and biodiversity indices. Plant collection and herbarium techniques.

FWM 304: Forest Survey (2 UNITS)

Procedures in ground survey and ground survey instruments. Chain surveying (open and close traversing) and triangulation. Obstacles in chain survey, how to overcome them and sources of errors. Compass survey: function, limitations use during survey exercise and sources and sources of errors. Plotting around survey maps, plans and methods of area calculations. Lettering and conventional signs. Levelling and contours. Plane tabling. The theodolite: uses in tacheometry and forest roads alignments

**FWM 305: Introduction to Forestry and Wildlife Management
(2 Units)**

Organisation of forest and Wildlife Resource, morphology, taxonomy and ecology of tropical trees and wildlife. Forest and wildlife Protection Activities, Forest and wildlife Protection and the regulation of harvest for sustained yield. Preparation of Management plans. Solving managerial problems. Introduction to operations research in Forestry and wildlife.

FWM 306: Wildlife Ecology and Management (2 UNITS)

Organisation of wildlife Resources. Wildlife in relation to their environment. Factors affecting distribution and abundance of wildlife. Wildlife population characteristic of mortality, movement, life cycles food and food habits. Wildlife capture techniques; objective traps and consideration for; immobilization by drugs. Handy, care and feeding of captured animals field exercises of different capture methods.

FWM 307: Introduction to Forest and Wildlife Extension (2 UNITS)

The need for forest and wildlife extension .Forest and Extension in the world and Nigeria. Basic Philosophies behind Forestry and wildlife Extension .Basic concepts and principle of rural sociology to an understanding of rural institution. Importance of rural sociology to an institution,

social stratification social processes and social change in rural areas, leadership in rural communities, roles and functions of rural leaders. The extension agent and rural community. Communication techniques and strategies of change. Various Forestry and Wildlife extension teaching method, aids and their uses.

FWM 308: Medicinal Plants (Ethno-Forestry) (1 UNITS)

Medicinal importance of different species of plants.

FWM 309: Wood Anatomy, Formation and Properties (2 UNITS)

Gross and microscopic structure of wood and its chemical composition. Wood formation, structure and properties. Anatomical characteristics of wood for identification. Physical and chemical properties of wood.

FWM 310: Forest and Wildlife Biometrics (2 UNITS)

Practical concept in the design and analysis of experiment on tree crops and wildlife survey techniques as they relate to forestry problems. Processing of resource inventory and mensuration data for management purposes distribution, sampling and test of hypothesis. Application of multivariate analysis to forestry and wildlife, basic techniques in survey and design.

FWM 311: Zoo Planning and Museum Management (2 Units)

Basic objective of Zoo and Park Planning. Design of zoo and park facilities, capture and transportation of wild animals. Animal health, handling and care of wild animals in captivity. Amusement infrastructure for zoo and nature simulation, feeding of zoo animals, Zoo sanitation and visitors control. Collection and preservation of animal specimen for educational and recreational purposes.

FWM 312: Herpetology (2 UNITS)

Classification and characteristic of important West African reptiles. Anatomy, physiology and reproduction of African reptiles. Food and feeding habit. Distribution and economic importance.

FWM 313: Forest Resources Inventory and Mensuration (2 UNITS)

Forest mensuration- meaning and aims, Measurement and instruments for measuring diameter and height, tree taper and form, stand measurement, forest resources inventory measurement, etc.

FWM 314: Principles of Conservation in Tropical Africa (2 UNITS)

The need for conservation. Aims and objectives of conservation. Target species, courses of migration and emigration in fish and wildlife species. Conservation methods and techniques for critical ecosystems such as watersheds, hilly areas, grazing lands, open pit mining, area of broken topography and marginal environment preservation of endangered plants and animals.

FWM 315: Wildlife Production Techniques (2 UNITS)

Wildlife Domestication and Multiplication Projects. Wildlife farming (e.g. Grasscutter farming, snailery, Guinea fowl production and wildlife ranching programmes). Raising of herpetological, avifaunal, insects and other wildlife macro and micro species. Research techniques. Wildlife based eco-tourism. Exploration and utilization of non-timber forest products.

FWM: 316 Seed and Forest Nursery Technology (1 UNITS)

Seed and its importance, seed collection and procurement, seed certification, records, seed storage, packaging and transport, seed testing, seed dormancy, pre-germination test. Nursery establishment; types of forest nurseries planning, forest nurseries, nursery site selection preparation, nursery layout; seed sowing ; care, protection, conditioning of seeding, quality control, pricking out and transplanting seedlings, raising non-seedling planting stock.

FWM 318: Wildlife Population Analysis (2 UNITS)

Methods of studying animal numbers and distribution. Ground and aerial censusing methods in wildlife stock assessment. Capture-recapture techniques, tagging marking. Population Structure. Reproduction and survival rate. Age sex determination. Life tables years class determination, length, weight studies and their interrelationship. Practical evaluation of Wildlife resource of selected projects areas.

FWM 319: Remote Sensing and GIS Application in Forestry & Wildlife Management (2 UNITS)

Basics of remote sensing, importance of remote sensing in forestry and wildlife, remote sensing system, Electromagnetic spectrum, Aerial photograph, uses of aerial photography, aerial camera and films, stereoscopy, photo-interpretation, mapping from aerial photographs; Aerial and Satellite sensor imageries; microwave sensing, thermal, thermal infra-red sensing, Landsat multi-spectral application of remote sensing. Concept of Geographical Information Systems (GIS) and review of different applications areas of GIS; hardware and software; raster and vector- based GIS systems; creating and editing spatial data; working on geospatial projects, adding and editing themes and attributes tables; querying data; creating land use and vegetation maps; map projections; image analysis and interpretation.

FWM 320: Practical Field Survey (2 UNITS)

Practical field survey to high forest ecological zones of Nigeria. Biodiversity inventory, identification and utilization. Study tours of savannah ecological zones of Nigeria. Wildlife and range management areas of the country. National parks, forest and game reserves, wildlife protected areas, in-situ and ex-situ conservation areas in Nigeria (e.g. zoo, botanical gardens, Nigeria conservation foundation, savannah conservation projects).

FWM 322: Environmental Impact Assessment (2 UNITS)

Characteristics of forestry projects, Environmental issues and impacts, Assessment methodology, and mitigation measures. Preparation of environmental management plans, preparation and evaluation of environmental impact assessment reports, case studies of selected forestry and forestry related projects for assessment of their environmental impacts.

FWM 324: Introduction to Landscaping (2 UNITS)

Survey of the practice and philosophy of landscape. Definition of landscaping. Natural versus man-made landscape. Scope and historical sketches of landscaping: to enhance property right, beauty and value; to provide screening – effect from security and privacy, etc. types of landscaping, industrial, institutional, parks, gardens, private property, recreational areas e.g. sporting arena. Elements of landscaping, colour, texture, etc. principles of landscaping design, selection criteria for plants. Review of soft and hard landscaping. Land scape management theories, policies and practices.

FWM 401: Forestry Inventory and Management (3 Units)

Application of basic biometric techniques to problem in forest resources management. Distribution, sampling and tests of hypothesis; working plan as management tools, Components of working plans. Survey techniques as they relate to forestry problems. Processing of resource inventory and mensuration data for management purposes. Evaluation of the wood resources of selected areas. Preparations of management plans for such areas.

FWM 403: Silviculture Techniques (2 Units)

Seed tests, Nursery operations. Plantation tending operations beating up pruning, thinning etc.

FWM 405: Agroforestry Practical (1 Units)

Design of Agroforestry farms.

FWM 407: Training in Fire Arms and Ballistics (3 UNITS)

Study of firearms, types and specification and firearms and ammunition, maintenance of firearms, type of shooting ranges, animal hunting methods, aspect of hunting sociology (hunting/Landowner relationship).

FWM 411: Harvesting, Processing and Wood Utilization (2 UNITS)

Theory of road construction, drainage and maintenance, logging and transportation, bridge and dam construction planning analysis and supervision of operations. Forestry roads. Terms used in road construction, forest bridges and culverts-bridge project operations and machines, forest building structures-building and construction: maintenance and protection of these structures.

FWM 415: Zoo and Parks Management Techniques (2 UNITS)

Basic objectives of zoo and park planning. Design of zoo and parks facilities, capture and transportation of wild animals. Animal health, handling and care of wild animals in captivity. Amusement infrastructures for zoo and nature simulation. Feeding of zoo animals. Zoo sanitation and the control of zoo visitors.

FWM 419: Ecological Survey (3 UNITS)

Field studies of the vegetation, fauna and soil and water types of selected terrestrial and aquatic project areas.

FWM 414: Students' Industrial Work Experience Scheme (SIWES) (12 UNITS)

IT Report and Assessment

500 LEVEL

ECOTOURISM RESOURCES MANAGEMENT OPTION

ERM 501: Economics of Ecotourism (2 UNITS)

Basic concepts in economics and its application in Ecotourism, concept of economic development and the roles of Ecotourism and the economic benefits of ecotourism operation. Evaluation of natural areas values using fundament of economic valuation. Impact of monetary economy on Ecotourism. Economics impact of Ecotourism on property rights and human behavioural changes. Utilization and marketing of different components of ecotourism. Pollution effects and cost benefits of ecotourism in the environment.

ERM 503 Principles of Recreation and Ecotourism (2 Units)

Tourism and recreation travel, origins, present characteristics and societal impact, implication of non-business travel in Nigeria, and merging importance of international recreation. Components of the tourism-park and recreation center development system and the concepts of planning resources use at the larger-than-site scale. Physical and programme factors important to development for visitors' use. Computer techniques for land assessment. Liaises with the Nigeria Embassy of the prospective visitors' home country.

ERM 505 Ecotourism Planning and Management (2 Units)

Concepts of Ecotourism and its diversities. Tourism resources and potential; Identification of the resources areas:- Forest reserves and Game reserves. Guidelines on Ecotourism and development. Environmental impacts and management and relationship with biological diversities (both flora and fauna). Integrated approach to tourism. Implication for information dissemination. Multiplier effects; green house effect and the effect on general status of threatened wildlife species.

ERM 507 Eco-toxicology in Biodiversity (2 Units)

Principles of environmental toxicology, environmental pollution and control; waste management; types of waste (domestic, municipal, industrial).Waste disposal, techniques of minimizing waste generation, waste treatment and processing.Nature and sources of environmental pollutants, extent of environmental impact, effects of pollutants on the ecosystems.Regional aspects of pollution and its attendant implication in biological resources.Pollution monitoring in aquatic and terrestrial environment and mitigation methods.Administration and legal aspect of pollution.

ERM 509 Hotel and Catering Management (2 Units)

Defination of an hotel; maintenance and care in the hotel; identification; preparation and use of cleaning agents and materials; hotel costing; catering organization, types and management; kitchen planning and management; equipment; materials; tools; safety and food hygiene; cooking, methods and types of heat transfer. Proprietors obligation to receive all travelers; provide accommodation, refreshment to guests, care of guest and their properties. Laws of contract; liquor licensing laws, food and drug decree; hygiene regulation, cancellation of hotel booking either by proprietor or guest and remedy for breach of contract.

ERM 511: Tourism Organization and Travel Planning (2 Units)

Tourism and recreation travel, origins, present characteristics and societal impacts, implication of non-business travel in Nigeria and the merging importance of international recreation. Components of the tourism – park and recreation center development system and the concept of planning resources use at the larger-than-site scale. Physical and programme factors importance to development for visitors. Use of computer techniques for land assessment. Liaises with the Nigeria Embassy of the prospective visitors home country.

ERM 515 Impact of Ecotourism on Ecosystem (3 Units)

Design of the tourism facilities into paths and routes. Distribution of tourist activities within the ecosystems in order of compatibility. Maintenance of tourist facilities and control of wastes generated as well as tourist activities. Assessment of rate of movement of tourists in and out of the preserved areas. Assessment of tourist population on the flora and fauna resources of the reserve; this involves checking level of damages done to various species of flora and fauna resource during the period of tourist visit. Effect of tourist services on introduction of diseases and parasites into parks. Assessment of impact on park infrastructural facilities.

ERM 597: Seminar in Ecotourism Resources Management (2 Units)

Instruction on the preparation, presentation and discussion of critical reviews of topics important to Ecotourism management to be followed by students' presentation of reviews.

ERM 598: Project Ecotourism Resources Management (6 Units)

Supervised study on an identified problem requiring both oral and written presentation. Students must attend tutorial on research techniques and scientific writing as well as oral presentation

relating to student's project in School. Students will be graded from the assessment of the Project Supervisor, the External Examiner's Assessment and oral presentation before the Panel of Examiners. The students are mandated to submit four bound copies of the project after the External Examiner's Assessment.

ERM 502 Management of Wetland and Ornithology (2 Units)

Analysis of interface between terrestrial and coastal wetland ecosystems, fauna and flora composition as well as the ecological functioning process of the two types of ecosystem. Wetlands and their economic importance and coastal wetland management. The importance of avian to mankind environment and science world. Morphological and physiological character for identification of avian in the field movement patterns in avian and its management implication to conservation. Study of ecology of selected birds of prey game bird and water fowls.

ERM 514 Ecotourism Publicity and Marketing (3 Units)

Advertisement of ecotourism centre in different parts of Nigeria. Use of different media in publicity namely: newspaper, bulletin, radio and television; meeting with different interest groups in the country i.e Cooperative society; Churches and student organization; workshops; seminar and public lectures. Methods and techniques of information generation and analysis in ecotourism publicity and marketing. Factors of market fluctuation. Role of government and NGO's in ecotourism publicity and marketing techniques in Nigeria.

ERM 506 Ecotourism and Hospitality Management (2 Units)

Tourism accommodation; types of accommodation; Hotel and guest-house; grade levels of Hotels and types of the available facilities. Tourists care: health facilities; clinic; health centre availability. Transportation types i.e Air travel availability and accessibility to Airport; road and rail travel opportunities

ERM 510: Environmental Law, Policy and Administration (2 Units)

Environmental conservation laws and regulations based on the ecological concepts of environment. Particularly, as it affects the natural resources components of the environment, resulting from human anthropogenic activities. The maritime laws and its effect on marine and other aquatic natural resources, land-use laws, mining law, petroleum exploitation laws and forestry laws. The Enforcement tools and the institutions, the Government policies as well as the various agencies saddled with the responsibilities of taking the custodian of the environment natural resources of the country. Reference would be made of the international environmental natural resources conservation interest groups and environmental conservation treaties and agreements to which Nigeria is a signatory.

ERM 512: Food and Beverages Management (2 Units)

Classification, characteristics and properties of food commodities. Alcoholic/non-alcoholic beverage production; non-alcoholic beverages, juice extraction and preservation; ranges and characteristics of beverages. Cocktail making; menu planning; importance, types, quality and control, control standard; purchase; marketing, storage management techniques; preparation; dishing, service operators in different classes of restaurant and general sanitary system. Hazard Analysis of Critical Control Point (HACCP).

ERM 514: Wildlife Physiology Adaptation and Behaviour (2 Units)

Different shape and adaptive physiological and morphological design in wild animals in relation to their environments. Natural environmental adaptation and physiological basis for migration, reproduction, feeding, temperature, pressure, lights and noise. The effects and limitations of temperature, photoperiod and the other environmental factors in the distribution and movement of animal's comparative behavioural and physiological indices such as reproduction, changes in metabolites, hepatic and extra-hepatic enzymes of wild animals. Emphasis on selected individual animal species behavioural pattern in relation to body anatomy and physiology and in turn in relation to their food; feeding techniques and the habitat requirements and behaviour such as sociability and tolerance.

500 LEVEL FOREST RESOURCES MANAGEMENT OPTION

FRM 501: Multiple Land Use (2 Units)

Nigeria's land resources, attitude and conflicts, Integrated policies for land areas. Decision making in the allocation of land for forestry, Wildlife and agriculture, legislation relating to land and environmental planning.

FRM 502: Forest Industries and Timber Quality Control (2 Units)

Forest based industries including furniture, sawmills, ply mill, fiberboard, chipboard and particle board while determination of timber quality and its control, inspection, sampling and grading, wood protection, minor forest based industries e. g charcoal production, cellulose derivatives industry; marketing of forest resources, sitting of forest industries.

FRM 503: Ecological Disaster and Control (2 Units)

Nature of Ecological Disaster and implication for resource conservation and management. Ecological consequence of management of natural resource. Definition, types and causes of floods. Effects of floods in cities, agricultural lands, roads, rail line etc.

Flood control measure: Engineering measure reservoir detention basis, reservoir design and control, etc requirement design of dykes, location and drainage. Flood diversion and channel improvement. Administrative measure Flood forecasting, flood plain zoning practice of green belt establishment in cities, industrial area and shelter belt establishment in and coastal areas. Origin

and causes, types and forms of Erosion. Mechanics of erosion. Erosion forecasting, soil water drainage, leaching and water disposal. Economic and benefits of erosion control.

FRM 504: Wood Processing and Pulping Process (2 Units)

Evaluation of quality of standing trees, felling and logging techniques, wood conservation and processing, wood seasoning and preservation; machining, gluing, preservation and finishing; charcoal production, chemical processing of pulp and paper.

FRM 505: Forest Soils (2 UNITS)

Understanding of soil dynamic and influence upon composition stand regeneration, tree vigour and tree growth rate, forest soil physics, chemistry and microbiology, soil moisture movement, forest nursery soil management forest soil fertility determination, maintenance and improvement with special reference to tropical conditions.

FRM 506: Forestry Extension and Education (2Units)

Management interpretation to include methods and techniques for communicating values of forest, Parks game reserves and other wildlands. The role of the extension agency in providing organisation and administrative support in forestry. Training programmes for extension workers in forestry and Wildlife.

FRM 507: Forest Genetic, Tree Breeding and Conservation (2 Units)

Inventory, selection and conservation of basic genetic material for mass production of improved strain for silviculture. Theory, practice, method of consequences of breeding tree crops, principle underlying choice of species, quantitative genetics in forest tree improvement. Economic of tree breeding, tree breeding programme, principle, establishment and management of seed orchards. In situ and Ex-situ conservation.

FRM 508: Forest Resources Utilization (2Units)

Taxonomy, nomenclature, identification, geography and ecological characteristics of major Nigeria Fruit Tree. Domestication and multiplication and utilization of fruit trees, woody and non-woody Forest resources.

FRM 509: Forest Pests, Diseases and Forest Protection (2 Units)

Scope, importance, taxonomy and biology of major pest and disease of forest trees. Principle underlying disease and pest control, biological, chemical, genetic and environmental control, forest entomology-leaf eaters, sap feeders. Wood and cambial borers, root feeders, population dynamic and forest insect, forest pathology-nature of disease organism, nematodes, virus, fungi, damping off, leaf spot, rots, malformation, blight, mildews, rusts, smuts, the parasite in relation to the host, factor influencing infection fungal pathogen of importance in forestry e.g. *Armillariella* (a most destructive plant fungi), *Polyporus* (heartrot fungus) Control

measures. Nematology Plantparasitic nematode, symptoms of hematode infection. Virology Symptoms and control, virus disease identification. Fire protection and control.

FRM 510: Forest Policy, Law and Administration (2 Units)

Forest and related natural resource policies, planning effective use of forest resources, structure of forest administration, problems of conserving forest and endangered species. Nigerian law in natural resources management, inter-relationship of forestry departments.

FRM 511: Natural Resources Economics (2 Units)

Renewable and non-renewable resources, introduction to operations research, Demand and supply of natural resource, market trends of demand and supply, application of economic principle to decision making in natural resource, project evaluation, natural resource and economic development.

FRM 512: Advanced Silviculture (2 Units)

Major forest types of the tropics and silviculture system employed in their management, plantation and nursery practice, procedure for introducing exotic species. Forest Nursery technology. Plantation establishment and maintenance. Plantation establishment and maintenance thinning and pruning operation, rotation regeneration and protection.

FRM 513: Forest Management Techniques (2 Units)

Principles of sustained yield; yield control and management for optimization of set objectives. Systems approach to forest management and Utilization decisions.

FRM 514: Quantitative Ecology (2 Units)

Description of vegetation, sampling, tests of comparison and application of Quadrat measure. Vegetational changes, plant succession and the climate. Correlation and the causal factors of positive and negative association between species. Plant population dynamics.

FRM 515: Urban Forestry (1Units)

Concepts of urban Forestry, difference between Urban Forest and Urban Forestry, Prospect of Urban Forestry. Benefits of Urban Forestry sources of Urban NTFP's, Urban NTFP's collectors, Tree-planting guides in Urban Forestry.

FRM 516: Herbarium and Taxonomic Techniques (3Units)

Definition of plant taxonomy, aims and objectives of Taxonomy, Importance of plant taxonomy, Units of Classification, Plant nomenclature, systems of classification. Field characters in tree identification: the leaf structure, types of leaf, arrangement of leaves on the stem, the shape or form of the leaf/leaflets, tips and margin of leaves vestiture-the covering (hairy/glabrous), the leaf basis, texture. The flower, floral formula, aestivation, inflorescence, fruits: classification of fruits. Tree identification using a key, types of keys. Herbarium: Definition of forest herbarium, functions of forest herbarium. Botanical specimen, collection and preservation.

FRM 518: Forest Engineering (3 Units)

Introduction to Forest engineering, Timber Testing, Timber Mechanics, Wood drying and defects, Forest roads, roof and bridges trusses.

FRM 598: Project in Forest Resources Management (6 Units)

Each student is required to choose and execute a special research project under a supervision. Duration of project is a minimum of two semesters. Typed and bound project report to be submitted at the end of project.

FRM 597: Seminar in Forest Resources Management (2 Units)

Instruction on the preparation, presentation and discussion of critical reviews of topics important to Forest resources, to be followed by students' presentation of reviews.

WILDLIFE RESOURCES MANAGEMENT OPTION**FRM 501: Multiple Land Use (2 Units)**

Nigeria's land resources, attitude and conflicts, strategies for resolution of conflict, Integrated policies for land areas. Decision making in the allocation of land for forestry, Wildlife and agriculture, legislation relating to land and environmental planning.

WRM 503: Wildlife Management Techniques (2 Units)

Observation and records, capturing and marking wild animals necropsy in birds and mammals, physiological indices of reproduction, sex and age structure, estimating population, habitat study, improvement and evaluation, elementary wildlife telemetry, human factor in wildlife management.

WRM 505: Wildlife Policy, Law and Administration (2 Units)

Wildlife and related natural resources policies; planning effective use of wildlife resources; structure of wildlife administration; wildlife conservation for economic and recreational uses, problems of wildlife conservation in Nigeria. Nigeria law in natural resources management; interrelationship of Wildlife Departments.

WRM 507: Game Ranching and Domestication (2 Units)

Need for animal domestication; History of Ranching and domestication; Type of levels domestication. Basis for selection of species; Experimental approach to ranching and domestication; Planning and design of cage for various game species. Growth behavior and reproduction of game species Food preference, Health care and game husbandry techniques.

WRM 509: Wildlife Genetics Breeding and Conservation (2 Unit)

Basic concept of genetics. Law of inheritance. Natural and induced breeding. Artificial insemination techniques for rodent, game birds, snail, antelope and other animal in captivity. Wildlife improvement through crossbreeding. Practical experience in artificial insemination and induced breeding.

WRM 511: Wildlife Recreational Planning (2 Unit)

Master plan, level of planning, historical origin of park development in Nigeria, types of parks, purpose and criteria for establishment, major step in planning process, zoning, carrying capacity in recreation, recreational activities and development, safety in recreation.

WRM 502: Ornithology (2 Units)

Classification structure, ecology and economic of birds and avifauna of Africa, distribution and identification of game birds, management techniques.

WRM 504: Wildlife Pests, Diseases and Control (2 Units)

Major pests and diseases of wildlife, Taxonomy and biology of major pests and diseases of wildlife. Epidemiology of parasite population. Principles of diseases and pest control. International restrictions binding transportation of wildlife across country boundary.

WRM 506: Wildlife Nutrition (2 Units)

Principles of nutrition of wildlife, nutrient composition of Wildlife food, nutrient requirement of Wildlife for various physiological process, feed formulation, ration preparation and general methods of feeding wildlife species. The role of nutrition in the survival and population dynamics of wildlife in their natural habitats. Diets and feeding programmes for selected wildlife species (artiodactyla, Insectivora, Lagomorphs, Elephantidae, Artiodactyla).

WRM 513: Wildlife Management and Utilization (2 Units)

Wildlife production, harvesting strategies and problem of game cropping “bush meat” processing methods, traditional uses of wildlife and wildlife products, hunting techniques, game ranching and domestication, growth behaviors and reproduction of animals in captivity, food habit and food preferences, Design of paddocks, animal houses on cage. Husbandry techniques and health care in captivity, Bee keeping.

WRM 510: Park Interpretation and Wildlife Extension (2 Units)

Principle of interpretation and extension, interpretive media, personal and non-personal services, conducted activities audio device, exhibits, photography in interpretation and extension. Target audience and public.

WRM 515: Natural History of African Mammals (3 Units)

Characteristic of Vertebrate, Order of African Mammals, General taxonomy characteristic, History of Special animal in the five major orders that are predominant in Africa's protected

ecological ranges; Proboscidea African Elephant; Perissodactyla: Zebra, Rhinoceros etc. Artiodactyla- Antelopes, Bovids, etc. Carnivora: Lion, Cheetah, Hyena, Leopards and carnivores with Omnivorous Characteristics. Primate: Primate – Gorilla, Chimpanzee, Monkeys.

WRM 597: Seminar in Wildlife Resources Management (2 Units)

Instruction on the preparation , presentation and discussion of critical reviews of topics important to Wildlife resources, to be followed by students' presentation of reviews.

WRM 599: Project in Wildlife Resources Management (6 Units)

Supervised study on an identified problem requiring both oral and written presentation. Students must attend tutorial on research techniques and scientific writing as well as oral presentation relating to student's project in School. Students will be graded from the assessment of the Project Supervisor, the External Examiner's Assessment and oral presentation before the Panel of Examiners. The students are mandated to submit four bound copies of the project after the External Examiner's Assessment.