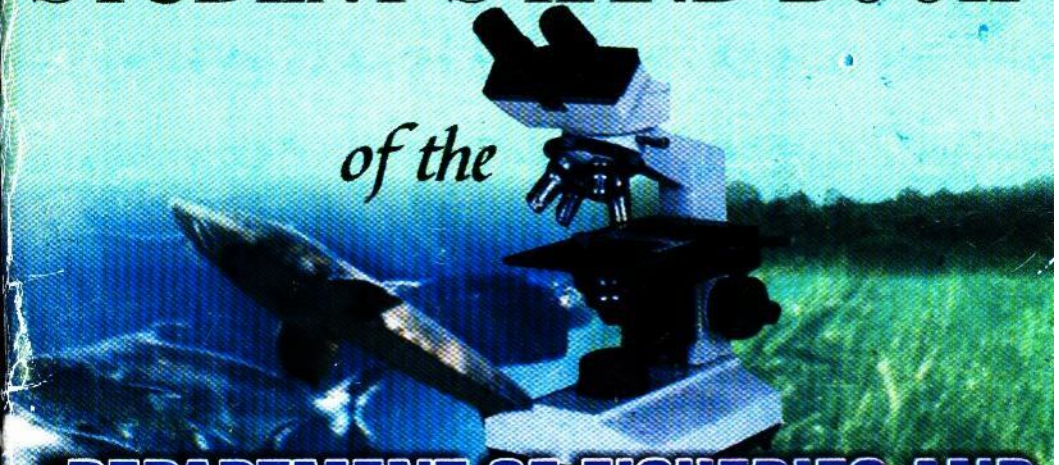
FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI (FUTO)

STUDENT'S HAND BOOK

of the



DEPARTMENT OF FISHERIES AND AQUACUITURE TECHNOLOGY

SCHOOL OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY

FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI (FUTO)

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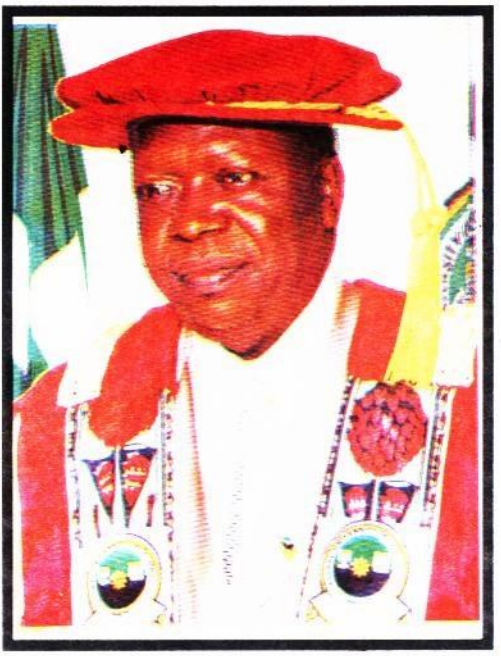

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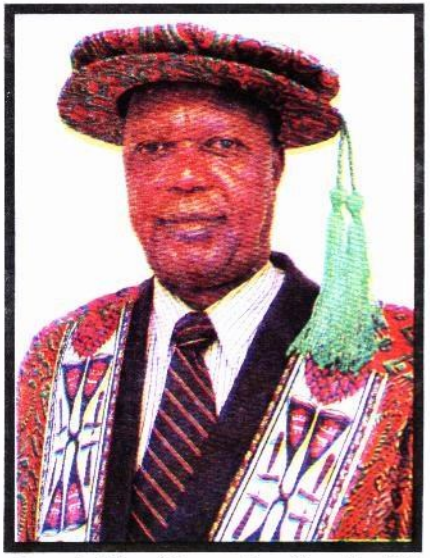

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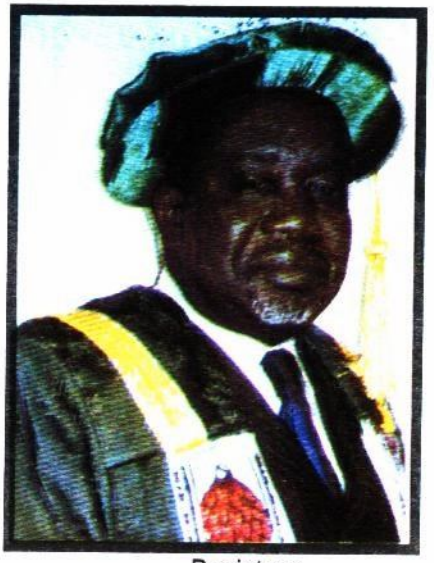
B.Sc., M. Phil, Ph.D. (Nigeria), FSESN

Deputy Vice-Chancellor (Administration)
Prof. (Mrs.) Rose N. Nwabueze
B.Sc. *(Nigeria), Ph, D.(Newscastle) Upon-Tyre*



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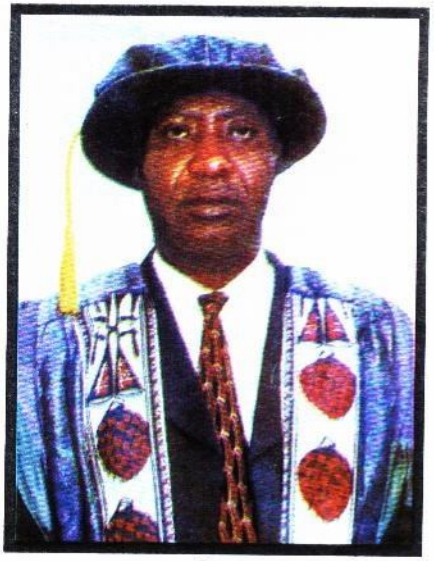

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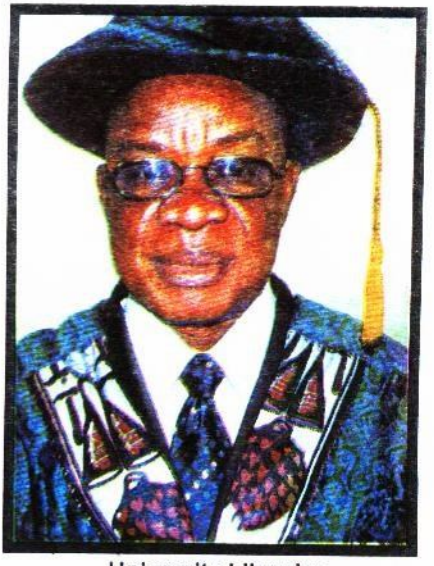

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22. Prof. N. C. Nwaezeaku	Vocational & Entrepreneurial Studies	Director
23. Prof. F. C. Ezeh	Centre for Nuclear Energy Studies and Training	Director

TABLE OF CONTENTS

1. **Introduction:** Fresh students are faced with a number of information problems during their course of study in tertiary institutions; most of them are fresh from secondary schools while others are leaving home for the first time. This student's handbook has been prepared to provide the student with vital information for successful academic performance. The student is also advised to read the Federal University of Technology. Owerri (FUTO) "Academic Regulations 2007 -2012" provided by the office of the Registrar along with other Registration materials. Returning undergraduates are also advised to refresh their memories with the handbook from time to time.

2. **Brief History of the University:** The Federal University of Technology Owerri, Imo State of Nigeria was founded in 1980 followed by the enactment of the statute, Federal University of Technology Act of July 1986 (Cap. 143, Laws of the Federal Republic of Nigeria of 1990). The university is owned and controlled by the Federal Government of Nigeria with the President of the Federal Republic of Nigeria as the Visitor. The Vice Chancellors from inception are as follows:

1st Prof Umaru D. Gomwalk: 1 980-1 987
2nd: Prof. A. Nduka: 1987-1991
3rd : Prof. C.O.G. Obah: 1992-1999
4th : Prof. J. E. Njoku: 1999-2005
5th: Prof: C. O. E Onwuliri, FAS, 2006-2011
6th : Prof C.C. Asiabaka – 2011 – date

3. The structure and organization consists in descending order of authority, of
   i. Chancellor
   ii. Pro-Chancellor/Chairman of Governing Council
   iii. Vice Chancellor/Chairman of Senate
   iv. Deputy Vice Chancellors

v. Senate, Principal Officers, Directors of Institutes/Centers, Deans, Head of Academic Departments, Elective Representatives, Professors
vi. Congregation
vii. Convocation
viii. Schools, Institutes, Academic Unit Heads, Research Institutes

4. Brief Information on the Department:

The Department of Fisheries & Aquaculture Technology is one of the two youngest departments in the School of Agriculture and Agricultural Technology; the other being the Department of Forestry & Wildlife Technology (FWT). Although Senate had approved its establishment prior to the 2006/2007 academic session, the department took off in September/October 2006 with a formal nod from the National Universities Commission in November 2007. The first set of 12 undergraduates were admitted in the 2007/2008 session. At present, there are 186 students enrolled in the **2011/2012** session, The acronym of the department is "FAT as a short abbreviation for the Department of Fisheries and Aquaculture Technology. The 5-year undergraduate programme offered is titled B. Tech. Agric. (Fisheries & Aquaculture Technology) in line with the practice and philosophy of the School of Agriculture & Agricultural Technology (SAAT) where it is domiciled

5. The nature and scope of the science of Fisheries and Aquaculture Technology

Contrary to the understanding of the non- fisheries scientific public, natural wildlife fisheries resources science is highly interactive and integrative of all components of the aquatic ecosystem and the complexity of the food chain. No component can be taken in isolation of the other as you focus on the fisheries. That explains why you must look into all the components before you can produce the fish or conceive a

development/production/management strategy.

Fisheries and aquaculture are applied biological natural sciences concerned with the biology, production, population dynamics and management of fisheries, shellfisheries and other related aquatic plants and animals used as food by man. Fisheries domiciles its activities in natural water bodies – rivulets, rivers, streams, ponds, swamps, estuaries, lagoons, coastal waters, inshore and offshore, marine ecosystems, oceans and lagoon, natural and floodplain lakes. Aquaculture emphasis is on fisheries activities in man-made aquatic basins or fabrications. Fisheries uses and manipulate existing and developing knowledge of target exploitable fish species and other aquatic organisms in relation to their aquatic environment *sensu lato* to increase production (either in terms of biomass or numbers) and their catchability to man (fishermen) based on the effectiveness and technology of man's fishing gears. Fisheries could be artisanal (subsistence low technology level), medium scale (motorized, dug-out canoe-based fisheries) and industrial trawler- based offshore fisheries. The same scaling applies to aquaculture production where in 1,000, 10,000 and 100,000m^2 of pond surface basins refer to small scale (homestead), medium and commercial scale aquaculture ventures respectively. Fisheries and aquaculture are very multi-disciplinary sciences – drawing on physics and chemistry and microbiology for water quality assessment of the medium of production, algae and aquatic plants (macrophytes) for the fish and fisheries primary productivity food and feeding stuff, secondary level producer foods either planktonic or benthic – zooplanktonic rotifers, micro and macro crustacea, fish eggs, detritus and even tertiary producers such as fish fry, juveniles or fingerlings. These aspect constitute the hydrobiology, limnology or oceanography that are usually inevitable adjuncts of fisheries/aquaculture sciences giving the broad scope of the discipline. In these, the fisheries scientist/manager like his colleagues in crop agriculture, poultry, goatery, piggery etc must, should and does concern himself with diseases that can and do militate against his anticipated production to optimal and maximum realizable levels. These apply to both his wildlife

capture fisheries and in particular, the aquaculture/fish farming systems. In the later, ascertaining the type and quality of feed to be used to grow and fatten his target cultural species is a major concern for which immense expertise is required.

All in all, fisheries, not different from aquaculture is predicated on the basic sciences of the "fish"- taxonomy, biology, anatomy, morphology, ecology, etiology, geography/distribution, breeding & genetics etc.

6. Objectives and philosophy

Philosophy

The Department aims at providing an environment where inquiries in fisheries and related fields are conducted by scholars congnisant of local, national and international needs. The outcome of such studies will be imployed in training students with a view to upgrading the current technologies and meeting the manpower needs of the fisheries sector

Objectives

The main objectives of the programme are to;

i) Provide functional education in the science of fisheries and related fields for skilled manpower needs

ii) Provide opportunities for research in fisheries and related fields to meet local, national and international needs

iii) Foster application of the research results to the benefit of the larger society through pilot demonstration and schemes,

iv) Collaborate with Federal, State and International Agencies in areas of fisheries research, conservation and production

v) Create awareness among youths of career opportunities in the fisheries sector.

7. **Admission Requirements**

a. **5-year degree programme via admission through the University Matriculation Examination (UTME and post UTME)**

i Candidates with credit passes at SSCE/WAEC/GCE 'O' Level in five subjects including the following at not more than two settings. Biology/Agricultural science, Chemistry , Mathematics/Physics and either Geography, Economics, Health Science or Home Management and with credit in English Language.

ii Subjects to be offered at the University Matriculation Examination (UME) should include English Language, Biology/Agricultural Science, Chemistry and any other Science subject preferable Physics or Mathematics

b **4 – Year Degree Programme by direct entry:**

i. Candidates with five credit passes at SSCE/WAEC/GCE/ 'O' level in five subjects, including the following at not more than two setting:
Biology/Agricultural Sciences, Chemistry, Mathematics/Physics and one of Geography , Economics, Health or Home Management and with credit in English Language.

ii. In addition to (i) above, candidates should have at least two 'A' level passes or their equivalent in any of Biology, Botany, Agricultural Sciences, Zoology, Mathematics/statistics/Physics, Economics and Geography.

iii. In addition to (i) above, candidates should have OND or ND (Upper credit)/ HND (Lower Credit)/ NCE (Credit in relevant subject(s) in Fisheries/Aquaculture, Biology/Agricultural Science, Wildlife Management, Animal Husbandry, Veterinary Science, Food Science,

Biology Education and other closely related discipline.

8. **Eligibility for the award of the Degree of B. Agric. Tech.** in Fisheries and Aquaculture Technology: to be eligible for the award of the Degree of B. Agric. Tech. (Fisheries and Aquaculture), the candidates must earn a minimum of 200 credits for the 5- year programme and 161 credits for the 4- year programme. All direct entry candidates will fit directly into the year 2 courses except where three is evidence that such courses were previously taken and passed. In addition to the above requirements, candidates must satisfy the conditions as stipulated by the School of Agriculture and Federal University of Technology Owerri.

9. **Courses to be taken in the B. Tech. Agric. (Fisheries & Aquaculture Technology Programme) at various years/levels of study and semesters.**

100 LEVEL
HARMATTAN SEMESTER

COURSE CODE	Tiled	L.T.D.	Units
MTH 101	Elementary Mathematics 1	3, 1, 0	4
PHY 101	General Physics 1	2, 1, 1	4
CHM 101	General Chemistry	2, 1, 1	4
BIO 101	Biology for Agric Studies	2 ,0,1	3
ENG 101	Workshop Practice 1	0,0,1	1
ENG 103	Engineering Drawing 1	0,0,1	1
GST 101	Use Of English	1,1,0	2
GST 103	Humanities, Logic & Philosophy	1,0,0	1
IGB 101	Introduction To Igbo Grammer, Composition & Comprehension Or	1,0,0	1
FRN 101	French Language	1,0,0	1
		Total	21

100 LEVEL
RAIN SEMESTER

COURSE CODE	Title	L.T.P	Units
MTH 102	Elementry Mathematics Ii	3,1,0	4
PHY 102	General Physics Ii	2,1,1	4
CHM 102	General Chemistry Ii	2,1,1	4
BIO 104	Biology For Agric Students Ii	2,1,1	2
ENG 102	Workshop Practice Ii	1,0,1	1
GST 102	Use Of English Ii	1,1,0	2
GST 108	Polity And Economy Of Nigeria	1,1,0	2
GST 110	Philosophy Of Science, Technology & Society	1,0,0	1
IGB 102	Introduction To Igbo History, Culure & Literature Or	1,0,0	1
FRN 102	French Language Ii	1,0,0	1
		Total	21

200 LEVEL
HARMATTAN SEMESTER

COURSE CODE	Title	L.T.P	Units
AGR 203	Introduction to Agriculture	1,0,0	1
AGR 205	Agric Chemistry	1,0,1	2
AGR 207	Agric Biotechnology	1,0,1	2
AEX 201	Agric. Ext. & Rural Sociology	2,0,0	2
AST 201	Principles of Animal Prod. I	1,0,1	2
CST 201	Crop Anatomy, Taxonomy & Physiology	1,0,1	2
CSC 201	Computer & Applications	2,1,1	4
MTH 211	Statistics	2,1,0	3
GST 201	Nigerian & African Cultural Dev.	1,0,0	1
		Total	19

200 LEVEL
RAIN SEMESTER

COURSE CODE	Title	L.T.P	Units
AGR 202	Farm Practice 1	0,0,1	1
AGR 204	Agric. Biochemistry	1,0,1	2
FAT 202	Intro To Fisheries & Aquaculture	1,0,1	2
AST 202	Principles Of Animal Prod. Ii	1,0,1	2
CST 204	Field Crop Production	2,0,1	3
CST 206	Agro-Climatology & Biogeography	1,0,1	2
SST 202	Principles Of Tropical Soils	1,0,1	2
AEC 202	Principles Of Micro & Macro Econs	2,0,0	2
FWT 202	Princ. Of Forestry & Wildlife Resource Management	1,0,1	2
LONG VACATION			
SIWES 200	Industrial Attachment		2
		Total	20

300 LEVEL
HARMATTAN SEMESTER

COURSE CODE	Title	L.T.P	Units
AGR 301	Farm Practice Ii	0,0,1	1
AGR 303	Agric. Genetics	1,0,1	2
FAT 301	Aquatic Flora (Microphytes /Algae)	1,0,1	2
FAT 303	Principles Of Aquaculture	1,0,1	2
FAT 305	Limnology	1,0,1	2
FAT 307	Ichthyology (Fish Systematics)	1,0,1	2
FAT 309	Fish Nutrition	1,0,1	2
FAT 311	Aquatic Fauna	1,0,1	2
AGE 301	Farm Planning & Structures	1,0,1	2
ENX 301	Introduction To Entrepreneurship Innovation	2,0,0	2

AEX 301	Community Agric Extension	1,0,0	2
		Total	21

300 LEVEL
RAIN SEMESTER

COURSE CODE	Title	L.T.P	Units
AGR 302	Farm Practice Iii	0,0,1	1
AGR 304	Agric. Statistics	1,1,0	2
AGR 306	Processing & Storage Of Agric Products	1,0,1	2
AGR 308	Gis In Agriculture	1,01	2
FAT 302	Oceanography	1,0,1	2
FAT 304	Hatchery & Fish Farming Tech	1,0,1	2
FAT 306	Fish Biology	1,0,1	2
FAT 308	Fish Pond Constr. & Mgt	1,0,1	2
AGE 302	Agric. Machinery & Mechanization	1,0,2	3
ENX 302	Business Creation, Growth & Cooperative Governance	1,0,1	2
		Total	20

400 LEVEL
HARMATTAN SEMESTER

COURSE CODE	Title	L.T.P	Units
AGR 401	Farm Practice Iv	0,0,1	1
AST 405	Anatomy & Physiology Of Farm Animals	2,0,1	3
FAT 401	Fishing Gears And Craft Tech.	1,0,1,	2

FAT 403	Integrated Aquaculture	1.0.1	2
FAT 405	Fish Diseases And Control	2.0.1	3
FAT 407	Aquatic Macrophytes (Higher Aquatic Plants)	1.0.1	2
FAT 409	Prod. Of Other Aquactic Products	2.0.1	3
FAT 411	Water Quality Mgt And Pollution Control	1.0.1	2
MGT 405	Technical Report Writing	1.0.1	2
		Total	20

400 LEVEL
RAIN SEMESTER

COURSE CODE	Title	L.T.P	Units
SIWES 400	Industrial Attachment	0.0.4	4
SIWES 401	Industrial Attachment	0.0.2	2
		Total	6

500 LEVEL
HARMATTAN SEMESTER

COURSE CODE	Title	L.T.P	Units
AGR 501	Farm Practice V	0.0.1	1
FAT 501	Fisheries Stock Assess & Conservation	2.0.1	3
FAT 503	Aquaculture Eng. & Systems	1.0.1	2
FAT 505	Fish Spoilage And Preservation	2.0.1	3
FAT 507	Aquatic Invertebrates	1.0.1	2
FAT 509	Nigerian Feeds And Feed Stuff	1.0.1	2
AEX 503	Agric Extension Admin., Org. & Supervision	2.0.0	2
AEC 515	Agric Business Mgt & Finance	2.0.0	2
FAT 511	Research Project 1	0.0.2	2
		Total	19

500 LEVEL

RAIN SEMESTER

COURSE CODE	Title	L.T.P	Units
FAT 502	Seminar (On Selected Topic)	0.0.1	1
FAT 504	Elements Of Seamanship & Navigation	1.0.1	2
FAT 506	Fisheries Policy, Laws & Legislation	2.0.0	2
FAT 508	Ornamental Fisheries & Aquarium Design & Construction	1.0.1	2
FAT 510	Fish Breeding And Genetics	1.0.1	2
FAT 512	Fish Taxonomy, Systematics & Ichythyogeography & Museum Operations	1.0.1	2
FAT 514	Fishery Economics	1.0.1	2
FAT 516	Shellfish Culture	1.0.1	2
FAT 518	Research Project Ii	0.0.4	4
		Total	19

10 Computation of Grade Point Average (GPA) and the cumulative Grade Point Average (CGPA): This section is designed to acquaint students and all concerned with the procedure for computing the grade Point Average (GPA) for a set of examinations and for upgrading the computations to obtain the Cumulative Grade Point Average (CGPA) at any point in time. By computing and keeping a record of CGPA a student will be fully aware of what effort to put in to remain in the University or to graduate in a desired class.

Definition of terms: It is necessary to first understand and be thoroughly familiar with certain terminologies and abbreviations that are commonly used in the computation of Grade Point Averages such as

(a) Student Workload: This is defined in terms of course unit system. One unit represents one hour of lecture or one hour of tutorial or 3 hours of practical work per week throughout a semester. Thus for example, a course in which there are 2 hours

of lectures and 1 hour of tutorial per week is a 3-unit course.

(b) Grade Point (GP): The grade point derives from the actual percentage or raw score for a given course; the raw score is converted into a letter ranging from A to F and a grade ranging from 5 to O.

(c) Total Grade Point (TGP): This is derived from multiplying the grade point by the units per course and summing up the grade points for all the courses registered.

(d) Total Number of Units (TNU): This is obtained by adding up all the Course units taken by the student in a semester. For example, a student who is carrying 6 courses of 3 units each has TNU of 18 for that semester.

(e) Grade Point Average (GPA): Performance in any semester is reported as a grade point average. This is the average of weighted grade points earned in the Courses taken during the semester. The GPA is obtained by dividing the TGP by the TNU.

(f) Cumulative Grade Point Average (CGPA): This is the up-to date average of the grade points earned by the student in a programme of study. It is an indication of the student's overall performance at any point in the programme. To compute the CGPA, the GPAs for all the semesters are added and then divided by the TNU's for all Courses registered by the student. Note that is not the summation of GPA's for all semesters. Both GPAs and CGPA's obtainable range from 0 to 5. Consider that the results of a 100 level Harmattan semester courses taken by a student are as follows:

Course	Unit	%Score	G	GP	TGP
MTH	4	70-100	A	5	20
PHY 101	4	60-69	B	4	16
CMT 101	4	60-69	B	4	16
B10 101	2	50-59	C	3	6
ENG 101	1	45-49	D	2	2
ENG 103	1	40-44	E	1	1
GST 101	2	70-100	A	5	10
GST 103	1	50-59	C	3	3
	19				74

From above, the total number of units of courses taken (TNU) is the sum of the 2nd column i.e. 19. The grade point average (GPA) = 74/19 = 3.9 = TGP/Total Number of units. This represents the summary of his 1st semester result. If for another set 2nd semester, results are the same, he then has a GPAof3.9 and so his GPA, + GPA_2 divided by 2= CGPA of 3.9
However, students are strongly advised to consult with their Class Advisers before registering for courses and for guidance on GPA and CGPA computations and other academic problems they may have.

Examination Results Grading: Performance in a course shall be recorded in letter grades (after due conversion from percentage scores) as follows:

%Score	Grade	Grade Point	Equivalent
70-100	A	5	Excellent
60-69	B	4	Very Good
50-59	C	3	Good
45-49	D	2	Pass
40-44	E	1	Poor Pass
00-39	F	0	Failure

CLASS OF DEGREE CUMMULATIVE GRADE POINT

1st	Class Honours	4.50-5.00
2nd	Class Honours (Upper Division)	3.50-4.49
2nd	Class Honours (Lower Division)	2.40-3.49
3rd	Class Honours	1.50-2.39
Pass		1.00-1.49
Fail		0.00-0.99

11. Concise Descriptions of Courses to be taken/Registered for at Various Levels/Semesters

DEPARTMENT OF FISHERIES AND AQUACULTURE TECHNOLOGY (FAT)

11. 1 MTH 101: ELEMENTARY MATHEMATICS I (3, 1, 0) Set theory: fields, union, intersection, complements, functions and their inverses. Real Number systems: Integers, rational and irrational numbers, mathematical induction; sequences and series, arithmetic and geometric sequences; theory of quadratic equations, absolute values, identities, inequalities and partial fractions, permutations and combinations-binomial theorem. Trigonometry: Circular measure, trigonometric functions and their properties, additional and factor formulae, solution of triangle. Complex Numbers: Algebra of complex numbers, the Argand diagram, De Movie theorem nth roots of unity. Calculus and Real Analysis: Elementary functions of a single variable and their graph, limits and continuity. Rates of change, tangents and normal of a curve, differentiation of elementary functions-product, quotient, function of a function. Implicit differentiation, maxima, minima and points of inflection, geometrical and physical applications of the derivative, mean value theorem, parametric equations, polar coordinates, Anti derivative, integration, various techniques of integration. Volume of revolution, area of surface of revolution.

PHY 101 GENERAL PHYSICS I (2, 1, 1): Elementary mechanics, Galilian invariance, work, energy, momentum, angular momentum, conservation laws: harmonic oscillator; rigid bodies, inverse square law forces: ideal fluid: heat and thermodynamics, introduction of kinetic theory of matter. Prerequisites: O' level Physics. MTH 101 should be taken concurrently with PHY101.

CHM 101 GENERAL CHEMISTRY I (2, 1 ,1): Fundamental concepts, including atomic and molecular structure: states of aggregation of matter, acid-base reactions; homogen, nuclear chemistry and descriptive aspects of inorganic chemistry, kinetic and treatment of chemical reactions in terms of acid-base concepts, physical and chemical principles, state of matter.

BIO 103 BIOLOGY FOR BIOLOGICAL & AGRICULTURAL

SCIENCES I (2,0,1): Common life forms and processes: The nature, characteristics and diversity of living organisms, along with a general treatment of the process of evolution, cell structure and cellular metabolism including respiration, growth and cellular transport. A general treatment of ecology and how living organisms relate to their environment and to each other. Form and function in Plants: A general classification of plants with emphasis on the families of higher plants that are of economic importance; general angiosperm morphology and anatomy. The process of photosynthesis, reproduction, inorganic nutrition, growth and development in higher plants

ENG 101 WORKSHOP PRACTICE I (0,0,1): General: Use of engineering measuring instruments, e.g calipers, gauges etc. introduction to hand tools eg practice in wood planers, saws, sanders and pattern making; sampling and sizing techniques of raw materials. Sheet-metal work: Production of metal products layout, cutting and shaping, welding, soldering, brazing, fastening and assembly. Woodwork: Basic woodworking principles and tools-layout methods, cutting and shaping, finishing and evaluation; finished products.

ENG 103 ENGINEERING DRAWING (0, 0, 1): Introduction to the use of drawing/drafting instruments, descriptive geometry and geometric construction. Drawing, measuring, lettering and dimensioning objects in various positions. Principle of orthographic projection in the first and third angle

GST 101 USE OF ENGLISH (1, 1 ,0): Use of library, use of words and sentence construction. Functions of sentences: purpose structure, correct use of verbs (Action words) word order and punctuation. Essay/composition writing, paragraphs structure, function, links and style. Deposition-description and explanation. Specials types of exposition e.g. letter writing layout of a business letter, technical report-including terms of reference, drafting and editing of reports.

GST 103: HUMANITIES PHYLOSOPHY AND LOGIC (1, 0, 0): Introduction to humanities: Definition and rationale Role of literature in humanities: Aspects of the contemporary African novel, significant example of African/western poetry, dramatic art

role and relevance in modern Nigeria with practical demonstrations/performances. Role of philosophy in humanities: Man and his quest for certainty, materialism, idealism, the meaning and significance of selected concepts, freedom, responsibility , obligation, the "good life," art, beauty, values relatives and not relative, inductive arguments and scientific researching. Exposure to African history, its role and relevance. African art and music, its history and development, religion and meaning of life past, present and future.

IGB 101: INTRODUCTION OF IGBO GRAMMAR COMPOSITION AND COMPREHENSION (1, 0, 0).
This course will equip the student with the basic language skills: listening, speaking, reading and writing in the approved 1961 orthography as the basic for standard Igbo.

FRN 101: FRENCH LANGUAGE I (1, 0, 0)
This course will introduce the student to the basic of French Language such as greeting in French, French alphabets, vowels, pronunciations and accents. The students will also learn the components of French grammar as the article, verb etc.

RAIN SEMESTER
MTH 102-ELEMENTARY MATHEMATICS II (3, 1, 0): Vectors and geometry: Representation of vectors. Vector addition and multiplication of a vector by a scalar. Components of a vector and direction cosines. Linear dependence and interdependence of vectors, Scaler and vector products of two vectors. Scaler and vector products of three vector. Plane analytic geometry of the straight line, conics (circle, parabola, ellipse, hyperbola). Differential Equations: Occurrence of differential equations. Differential equations of the first degree and first order. like variables separable, exact, homogeneous with constant coefficients. Statistics: introduction of statistics. Diagrammatic representation of descriptive data. Meaures of location and dispersion for discrete and grouped data. Problems of grouping and associated graphs. Introduction to probability sample space

and events. Addition law, conditional probability and multiplication rule. Bayes theorem. Use of permutation and combination in evaluating probability. Binomial distribution. Linear correlation, scatter diagram, product moment and rank correlation. Linear regression.

PHY 102 GENERAL PHYSICS II (2, 1, 1) Electrostatics, conductors and dielectrics: Magneto-statics, magnetic fields and induction, magnetic materials, maxwell's equations; waves and oscillations, electromagnetic waves, optics, modern physics Experimental basis of quantum physics, Planck's constant; spectra, basic phenomena of atoms, molecules and nuclei.

CHM 102 GENERAL CHEMISTRY II (2,1, 1): Physical and chemical equilibrium , solids, solutions, reaction kinetics and kinetic theory. Alkanes and cycloalkanes, reaction of carbon-carbon multiple bonds; elimination and substitution, reactions of alcohols and alkyl, halides, aromatic compounds, carbonyl compounds, organic acids' and derivates, and organic bases.

BIO 104: BIOLOGY FOR BIOLOGICAL & AGRICULTURAL SCIENCES II (1, 0,1): Form and function in animals. A general classification of animals with emphasis on the characteristic morphology and anatomy of the economically important groups, such as Mamalia, Aves, Pisces, Arthropoda, Mollusca and Nematoda. Discussion of the following processes in animals nutrition, excretion, reproduction, movement and nervous regulation.

ENG. 102 WORKSHOP PRACTICE II (0, 0, 1) Machine-shop work: Lathe-work: Instruction on working process, shaping milling, grinding, reaming and metal spinning etc. Design of simple jigs and fixtures. Finished products sample techniques. Automobile work: simple automobile diagnosis and repairs. Electrical workshop practice: Convention and application of color codes and signs etc. Use of electrical tools, machines cables and conductors.

GST 102: USE OF ENGLISH II (1, 1, 0): Comprehension and interpretation- reading efficiency of technical and non-technical material. Note taking: techniques of note taking from readings and from lectures. Precise – writing or summarizing methods, technical vocabulary, word formation, use of classical terms and affixes. Special terms, acronyms, new words formation, choice of correct words, definition, by example synonym or autonym, analytic or operational definition, basic words in fields of specialization e.g. mechanical, electrical, civil, environmental, automobile engineering, metallurgy, mathematics, agriculture, etc.

GST 108: POLITY AND ECONOMY OF NIGERIA (I, 0, 0)
The nature and scope of economics. The Nigerian political system; polity and means of production in Nigeria. The structure of the Nigeria economy, aspects of economic and technological dualism; internal migration rural to urban migration and the informal sector. The role of capital in growth and development; public investment criteria, choice of 'appropriate' or 'relevant' technology. Human resources development in Nigeria, labour utilization, education and manpower development in Nigeria labour.
Agriculture in the development process; land tenure and reform, agricultural technology and the green revolution and integrated rural development. Industrialization; role and type of industry, choice of techniques , import substitution and export expansion.
The economic role of the government expenditure and taxation; the federal structure, fiscal federalism and revenue allocation; the financial system. Problem of development planning and plan implementation in the Nigeria federal system of government. Prospects of the Nigerian economy.
Note: inclusion of Igbo and French

GST 110: PHYLOSOPHY OF SCIENCE, TECHNOLOGY AND SOCIETY (1, 0, 0):
Section A: Introduction: Science and society: the need for science: Modern scientific methods and evolution, selected key

scientific research; innovations, science and culture. Nature of Science: History of Science; classifications; science in the civilization of man: scientific evolution of man: social implications. Science and man's environment- harnessing science for, production, processing, conservation, distribution and utilization of agricultural products, climate and vegetation; terrestrial and cosmic life; implications and scientific advances, e.g population control, environmental pollution. Science and Energy Resources-energy sources and forms, solar energy reserves in Nigeria; case studies of demand and supply for energy. SECTION B: Introduction: Technology and society: Technology in the development of man: role of technology in the national economy, agriculture, entertainment, transportation communications medicine and welfare, war and crime etc. Disciplines in technology; professional opportunities in technology in Nigeria. Technology Evolution: History of technological education and practice in Nigeria. Some key revolutions in technology, e.g electronics and computer technology, robotics and cybernetics and their everyday applications. Implications of technology; Ethics in technology: the implications of technological research and advances e.g Displacements of man by machines, space travel, threat of nuclear and neutron war; the genetic research and energy crisis etc. Technological products liability: effects of mechanization, consumerism: constraints in utilization of new technological products reliability, quality control and cost effectiveness, politics and environment.

IGB 102: INTRODUCTION TO IGBO HISTORY, CULTURE AND LITERATURE (2, 0 ,0): This course will expose students to various aspects of human life among the Igbo as follows: Igbo world-view, Igbo culture and history, Igbo in a world of arts and civilization. It will also provide a good exposure in the area of Igbo literature which embodies the totality of the Igbo world-view, including their social and cultural perspectives, their aspirations and amenities, as some contemporary texts will be incorporated in the study.

FRN 102: FRENCH LANGUAGE II (2, 0 ,0): Here the students will be drilled in French grammar proper, dialogue and other oral exercises. The students will also be introduced into reading, starting with France Afrique Book 1. At the end of this course, the students should be able to speak basic French and be able to tell the time in French.

200 LEVELS
HARMATTAN SEMESTER

Year Two: Harmattan Semester

Cst 201: Crop Anatomy, Taxonomy and Physiology (1,0)
Plant anatomy: Plant cell structure, components and functions. Plant tissues and their functions Anatomy of root, stem and leaf; flora structures. Introduction to plant taxonomy. Plant specimen collection, identification and classification. Classification systems. A brief introduction of the herbarium. Characteristics, distribution and local examples of: Malvaceae, dioscoreacea, musaceae, grminae/poaceae, solanacae, fabaceae/Leguminosae, compositae, etc. Cell division. Enzymes. Some processes in crops: photosynthesis, translocation, pollination, respiration, energy utilization, seed dormancy and germination, development, mineral nutrition, etc. Growth regulation.

AGR 203 INTRODUCTION TO AGRICULTURE (1, 0, 0): Technical definition of Agriculture, its scope and importance, agro-ecological zones and distribution of products. Factors/inputs for agricultural production- land, infrastructure, capital, labour, expertise, management and entrepreneurship. Aspects and strategies for "agricultural production crop & forestry, animals & wildlife (livestock, poultry, fish, shellfish, animal products-milk, hides & skin) Agircultural marketing/economics, agricultural extension/ dissemination of current agricultural methodological expertise. Harvesting and processing of products, drying, dehulling, threshing, winnowing, decoloration, extraction, hay and silage making. Pesticides and weeds, foliage/cover crops. Common farm implements and mechanization. Career opportunities for graduates of agriculture & agricultural technology

AGR 205: AGRICULTURAL CHEMISTRY (1, 0, 1): Chemistry of the S-block elements and the representative P- block elements. Brief introduction into the Chemistry of the first series transition elements Structure , reactions, and functions of hydrocarbons, alcohols, phenols, ethers, aldehydes, ketones, organic acids and

their derivative atomic structure and bonding. Periodic table, colloids, chemical kinetics and equilibrium, oxidation and reduction of elements of importance in Agriculture.

AGR 207. AGRICULTURAL BIOTECHNOLOGY (1,0,1)

Definition and importance of biotechnology, history of agriculture, ancient germplasm, fermented foods and beverages. Classical biotechnology, early microscopy, development of cell theory, nature of gene, plant and tissue culture and applications, plant genetic engineering and application, gene transfer methods in animals, transgenic animals and their application, animal health, animal propagation, regulation of transgenic animals, patenting genetically engineered animals. Aquaculture, gastropod/bivalve and crustacean production, marine animal health, algal production and their medical potentials, anticancer and antiviral compounds, antibacterial agents, marine toxins, transgenic fish.

201 PRINCIPLES OF ANIMAL PRODUCTION I (1,0,1) Introduction to the anatomy, physiology; Fundamentals of anatomy and physiology of the cells, cell types, tissues and organs; parts of the body of cattle, sheep and goats; breeds and breeds characteristics of cattle, sheep and goats; digestive system and functions, feeds and nutrient requirements of cattle, sheep and goats; animal behaviors, handling and restraining techniques; management of tropical ruminant animals.

AEX 201 INTRODUCTION TO AGRICULTURAL EXTENSION AND RURAL SOCIOLOGY. (2, 0, 0):

The need for agricultural extension: Agricultural extension in Nigeria and the world, basic philosophy behind extension work, institutional setting for agricultural extension. Agricultural development agencies, communication and extension teaching processes, adult education principles, practical on selected oral and written communication methods and audio-visual aids (AVAS)

MTH 211: STATISTICS (2,1,0): Frequency distributions, measures of location and dispersion in samples and grouped data. Laws of probability. The binomial ,position and normal

distributions, estimation and test of hypothesis . Analysis of variance and con-variance, simple regression and correlation, contingency table and x^2 applications. Pre-requisites: MTH 101 and 102.

CSC 201 COMPUTER AND APPLICATIONS I (2,1,1)

Brief history of computer and computer generation, classification of computer, structure of a purpose computer, number systems. The stored program. The technique of problem solving : Flow charting, stepwise refinement. Algorithm for searching, sorting and merging of ordered lists. Data preparation 1/0 device, Data types, Data representations, Data Capture. Problem-oriented languages. Basic and Fortran programming: arithmetic expression assignment statements. 1/0 commands Logical expression : arrays; sequencing : alternation and iteration sub-programs and parameters, Elementary Numerical Algorithms. Pre-requisites: MTH 101, MTH 102.

GST 201 NIGERIAN AND AFRICAN CULTURAL DEVELOPMENT (1,0,0):

Concept and Meaning of development, traditional Africa, its geographical and ethnographical review, its family structure, kingship system, etc. Socio-economic pre-occupations, political systems, art and music, modes of communication; Africa and processes of modernization- education, writing and press, urbanization and social change, modern trends in arts and aesthetics, nationalism and cultural revival, mass media, and national development.

RAIN SEMESTER

AST 202 PRINCIPLES OF ANIMAL PRODUCTION II (1,0,1)

Introduction to the anatomy, physiology, genetics, breeding, nutrition, health, economics and management of the major tropical non ruminant farm animals. Specific treatment will be given to various kinds of poultry as well as swine.

CST 204 FIELD CROP PRODUCTION (2 , 0 1)

Detailed treatment of the major field crops ; yam, cocoyam,

cassava ,sweet potato, maize, rice, sorghum, beans, groundnuts, winged beans, sugar cane, tobacco etc. for each crop there will be detailed discussions on time of planting, site selection, land preparation, plant material, seed rate, spacing, mulching, fertilization (type, rate, and frequency) , crop protection (weed, pest and disease control) ,harvesting, processing and storage.

FAT 202: INTRODUCTION TO FISHERIES AND AQUACULTURE (1,0,1).

Basic concept in fisheries and aquaculture: Finfish, shellfish, fisheries, aquaculture, habitat related fisheries-river, lake, inshore/offshore. Exploitable fisheries resources-sardines, mackerels, shark, Bonga , tuna etc. major fish stocks with emphasis in Nigeria. Capture techniques in natural resource exploitation-traditional peasant and modern fishing methods, fishing vessels, fishing license, regulation, EEZ etc.

Elements of stock assessment techniques-concept of overfishing , MEI, MSY, Age/ageing. Types of aquaculture, organisms for culture, feeds used, financial aspects of aquaculture, present status of aquaculture

CST 206 AGRO-CLIMATOLOGY AND BIOGEOGRAPHY (1, 0, 1)

The principles, aims and scope of climatology and biogeography. The elements and controls of climate and weather and dynamics of the earth's atmosphere radiation and heating of the atmospheric systems, atmospheric moisture, the dynamics of pressure and wind systems, condensation and precipitation processes. Seasonal radiation in temperature, day length and radiation. Rainfall and evapo-transpiration equipment, and maintenance of standard meteorological station, relation between agriculture and climate with reference to crops, livestock, irrigation, pest and diseases .

AEC 202: PRINCIPLES OF MICRO AND MACRO ECONOMICS (2, 0, 0)

The nature of economics and economic problems: scope and method, price theory and function of the market with particular reference to agriculture. The concept of opportunity cost: supply and demand and their application to agricultural problems.

Production function, cost analysis and functions. Concept of elasticities.; The type of market, perfect competition, monopoly and oligopoly etc. Price theory and some application. Macro economic model and transitional step. Some basic concepts of national income; Methods of estimating national income; factor income approach, expenditure approach, output approach, and problems of estimating national income and uses of national income estimates. The definition and functions of money; Demand for money; commercial banking; central banking; money supply and the price level (quantity theory of money). Distinction between international and domestic trade; theories of international trade comparative and factor endowment; gains from international tariff and public policies (monetary and fiscal): Scope and definition of economic development, employment planning in developing countries.

SST 202: PRINCIPLES OF TROPICAL SOILS (1, 0, 1): Fundamental discussions on the distribution and classification of tropical soil: their physical, Chemical and biological properties as well as the relationship of the crop productivity will be dealt with.

AGR 202: FARM PRACTICE I (0, 0, 1)

Students will be required to be intimately involved in the performance of various farm operations communication and farm records skill will be taught in various aspects of crop production, fisheries forestry and poultry and non-ruminant animals husbandry techniques; semen collection and evaluation techniques; sexing, as the social components of technology generation, dissemination and Economic analysis.

AGR 204: AGRICULTURAL BIOCHEMISTRY (1, 0, 1):

Cellular composition and morphology, chemistry, metabolism and synthesis of carbohydrates, lipids and proteins . Importance of pH and buffers. Structure and functions of enzymes.

FWT 202: PRINCIPLES OF FORESTRY AND WILDLIFE RESOURCES MANAGEMENT. (1,0,1)

What constitutes a forest, its scope, nature, structure, classification and importance, forest products-timber and non-

timber forest products, taxonomy, organization of forest services /wildlife as a resource, taxonomic composition in Nigeria avifauna, reptiles, mammals, etc forest and wildlife conservation sites in Nigeria, national policy ,laws and institutions of relevance in Nigeria. Commercial trees in forests. Interlink between forestry and wildlife.

LONG VACATION
SIWES 200 INDUSTRIAL ATTACHMENT
(long Vocation) (2)

300 LEVEL
HARMATTAN SEMESTER

AGR 301: FARM PRACTICE II (0, 0, 1): Practical illustration and do-it-yourself involvement of students in the agricultural practices of crops, pests and diseases control, harvest, storage and processing; fertilizers and their applications. Agricultural price data collection, handling of instruments (for castration, Debeaking, dehorning, artificial insemination, etc) animal drugs and vaccines, housing, feeds and feeding techniques; and disease control techniques in farm animals.

FAT 301: AQUATIC MICROPHYTES (ALGAE) (1,0,1)
The general characteristics of the plant kingdom, study and identification of the characteristics of algae in fresh water and coastal brackish water swamps of the tropics. Distinction between fresh water and marine algae. Classification of algae and the description of various phyla, ecology of algae utilization and economic importance. Planktonic organisms, groups of planktons and sampling methods. Algal blooms in ponds and its management.

FAT 303: PRINCIPLES OF AQUACULTURE (1, 0, 1)
Aims and types of aquaculture. History present organization and status of aquaculture in Nigeria. Principles of aquaculture-liming and pond fertilization, food supply, growth rate and food conversion, selection of culture species, introduction of exotic species and their implications. Water requirements. Stocking,

feeding and harvesting practices. Fish farm design. Economic considerations of aquaculture.

FAT 305: LIMNOLOGY (1,0,1)

Physical and chemical properties of both marine and inland water. Hydrology and water cycle. Properties of natural and man-made lakes. Thermal properties and stratification. Socio economics and biological implication of man-made lakes and impoundments, interpretation of isopleths.

FAT 307: ICHTHYOLOGY (Systematics) (1,0,1)

Definition of systematic, development of systematic, evolution of fish, mechanism

of evolution/phylogeny. Methods of fish classification: on the basis of habitat and morphology (agnatha, chondrichthyes, osteichthyes and common characteristics of each group). Principles of taxonomy, taxonomic concepts, classification tables and rules of nomenclature. The taxonomy of living groups of fishes. Morphometric and meristic characteristics of fish and analysis. Application of keys in field identification of fish. Checklist of tropical fresh water, marine and brackish water fish species.

AGE.301: FARM PLANNING AND STRUCTURES (1,0,1)

Introduction to farmstead and farmstead problems. Consideration for size and sitting of farms. Procedure for planning the layout of facilities. Types of farms private, collective, government. Integrated study of farm houses- beef/cattle, dairy cattle, hogs, sheep and goats, and poultry housing. Farm bunkery and soils with consideration for heat requirement, generation and movement.

FAT 309 FISH NUTRITION (1,0,1)

Principles of fish nutrition. Chemistry and nutritive value of various classes of fish feed. Nutrient requirement of fish, requirements for energy, protein , vitamins and minerals and non nutrient components. Nutrient sources and practical considerations in fish feeding. Feed computation and formulation methods, the fish feed industry, feed pelleting, fish feeding habits, feed evaluation.

FAT 311: AQUATIC FAUNA (1,0,1)

Survey, identification, classification and the ecology of aquatic

fauna other than fishes, including the protozoans, sponges, soelenterates, arachnids, crustaceans, insects, mollusks,and amphibians, etc .The role of aquatic fauna in fish ecology. A description of each group of animal phyla and economic importance.

AGR 303: AGRICULTURAL GENETICS (1, 0, 1)

Elaboration of the general principles applicable in agricultural production with specific discussions on Mendellian genetics including functions, nature and structure of genes: basic concepts in the genetics of populations, and quantitative traits of economic importance in plants and animals. Rudiments of selection: and an introduction to breeding objectives and priorities in agriculture. Such objectives as yield, quality, resistance, adaptation, stress tolerance and mechanizability will be highlighted. Practical and field illustrations of these conce

AEX 301: COMMUNITY AGRICULTURAL EXTENSION (1, 0, 1)

Introduction to agricultural: meaning, concept, philosophy and principles of agricultural extension, role of governmental and non-governmental organizations (NGOS), Agricultural Extension Service and Agricultural innovations. Students will visit rural communities, conduct investigation into their agricultural practices and characteristics of the farm and observe development activities of formal agencies in rural areas. pts will be emphasized.

ENS 301 INTORDUCTION TO ENTREPRENEURSHIP AND INNOVATION (1, 0, 1)

Course Description

This introductory course will expose the students to the principles, theories and practices of entrpreneurship and the content will inclue the concept of organization and theories of entrepreneurship culture and barriers to its practice, Biographical studies of successful entrepreneurs, the business environment, Business and environmental opportunity-set. Threats and opportunity exploitating strategies. The Nigerian business

environment. Monitoring and identification of opportunities, approaches to addressing environmenat barriers. Intellectual properties, Nigerian copyright laws, strategies for the protection of original ideas, concepts and products from piracy. Also the course will expose the interface between Technology development and entrepreneurship as well a entrepreneurial opportunities in a technology-driven environment and business. Management of technology, the concept and types of innovation, theories of innovation, change management and financing innovation.

Also included here is the concept of family business, is cultural context, roles and relationships and strategies for effective functioning, success and succession. The concept of women entrepreneurship, roles, orientation and women entrepreneurial aspirations, their contributions and relevance as well as barriers o woman entrepreneurial practice. The student will also explore the various sources of business opportunities, the difference between ideas and opportunities, business opportunity scanning and in core business functional areas for competitive relevance. The concept of social entrepreneurship and value creation. The role of NGO's in social entrepreneurship. Social entrepreneurship and funding opportunities as well as enhancement factors. Relationship between scientific research innovation and products as well as products as well as product invention development timeliness and processes.

RAIN SEMESTER

AGR 302: FARM PRACTICE III (0,0,1) Practical illustration and a do-it-yourself involvement of students in the agricultural practices of ;plant spacing and orchard lay-out; manure and compost making; weeds, soil conservation techniques: antemortem inspection and slaughter management of animals; agricultural economics questionnaire design and conduct of interview.

AGR 304: AGRICULTURAL STATISTICS & BIOMETRY (1, 1, 0):

Pre-requisite: MTH 211: Statistics . Introduction to simple linear models in agricultural research, and their utilization of the design

and analysis of farm experiments. Particular emphasis will be placed on the formulation of appropriate experimental design and analysis in variance and covariance for completely randomized design: randomized block designs; latin square design and factorial experiments. Estimation of variance components regression and correlation coefficients and simple test-statistics will be discussed. Recent advances in Bio-statistics will be highlighted as well as introduction to the development of computer-assisted capability for analysis of farm data.

FAT 302: OCEANOGRAPHY (1, 0, 1)

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. Estuarine conditions and fauna. Interelationship of physiological adaption of marine organisims. Weather forecasting, sea and swell, storms and coastal fisheries. Effect of current on long lines, nets and trawlers, sea ice, winters, and fishery resources.

FAT 304: HATCHERY MANAGEMENT AND FISH FARMING TECHNIQUES (1 , 0, 1)

Spawning methods, artificial fertilization, incubation, rearing, harvesting and transportation of fry and fingerlings, selection and care of breeders, larvae and fingerlings culture of natural food. Control of weeds, parasites and diseases in the hatchery, control of physicochemical properties of water. Different types of fish culture techniques, monoculture, polyculture, intensive and extensive culture in inland and brackish water, in rice fields, in floating cages and rafts.

FAT 306: FISH BIOLOGY (1, 0, 1)

Definition of fish, biology, ecology and ecosystem. Fish morphology, basic forms and variations in shape of fish. Adaptations of fish to ecological habitats. Gross external anatomy and physiology of fish (openings, body coverings and

appendages), structures of these anatomical features, function and adaptations

Gross internal anatomy and physiology of fish, structures and functions of various organs and systems of organs in fish including: the reproductive system and modes of reproduction in the different groups of fish (cyclostomes, elasmobranches and Teleostei), the digestive system foods and feeding habits of fish, the excretory system and osmoregulation in fish, respiratory and accessory breathing organs. Brief reference to other organs and systems of organs.

FAT 308 FISH POND CONTSRUCTION AND MANAGEMENT (1, 0, 1)

Practical survey, design and construction of ponds. Construction of other fish culture enclosures. Construction and maintenance of ponds, channels and drainage facilities. Preparation of ponds for stocking and breeding, management of flora and water quality, harvesting from ponds.

AGR 306 PROCESSING AND STORAGE OF AGRICULTURAL FOOD PRODUCTS (1, 0, 1)

Different types of food, supply, composition and nutritive value, spoilage, preservation and processing of food types, indigenous, food processing methods, food additives. Quality changes during processing, preservation and storage, post harvest losses. Methods of assessing food quality. Problems militating against quality control programmes in Nigeria. Food packaging; types of packages, vacuum and modified atmospheric. Food industries in Nigeria and their role in ensuring reduction of post harvest losses.

AGR 308: GEOGRAPHIC INFORMATION SYSTEM IN AGRICULTURE (1,0,1)

Introduction to Geographic information systems (GIS). Terminologies and concepts in GIS GIS inputs methods; GPS, Remote sensing, Digital information system and Data bases, spatial analysis and image processing. Application of GIS in different aspects of agriculture.

AGE 302: INTRODUCTION TO FARM MACHINERY &

MECHANIZATION (1,0,2)

Short review of the development of agricultural machines. Historical development of tractor types: makes and features. Principles of operation and adjustment of tractor. Uses in various farm operation . Tractor hitch, linkage and control. Types of drives, uses in various farm operations, and modes of operations, familiarization with various tractors, tractor driving with test tractor and implement operations in the field. Trips to mechanized farms and research centers.

ENS302: BUSINESS CREATION, GROWTH AND CORPORATE GOVERNANCE (1,0 ,1)

Students are expected to be familiar with topics such as Concepts of Business and New value Creation, the Business planning process and Start-up decisions, Opportunity search and identification, legal issues relating to start-up, introduction to feasibility studies and cash flow. Introduction to theories of growth, challenges of growth, challenges of growth and growth stragies(external growth strategies, franchising, buy in and buy out) introduction to mergers and acquisitions. Source of Funds/Capital eg. Internal and external, formal, informal: Past government's efforts and initiatives towards the funding of new ventures and small and medium enterprises in Nigeria, Resource use and efficiency. Principles of marketing, concepts of marketing and Marketing Concept, the Marketing mix, product develoipment and management, ethics and social responsibility and their relevance in business. Ethical behavior, Business ethics and practices in Nigeria- Case studies, Community development projects/ welfare. New opportunities for expansion, E-business E-commerce E-trade. Managing transition from start up to growth, personal discipline, Basic financial literacy.

Business strategy. The concept of strategy and strategic issues in business (existing and start up) the Scientist/Engineer as an entrepreneur; opportunities and challenges.

Venture creation and elements of risk management.

400 LEVEL
HARMATTAN SEMESTER
AGR 401 FARM PRACTICE IV (0, 0, 1)

Practical illustration and a do-it-yourself involvement of students in the agricultural practices of dry season vegetable production, irrigation water management, beef and dairy cattle production, hay and silage making, pasture management and utilization.

AST 405 ANATOMY AND PHYSIOLOGY OF FARM ANIMALS (2,0,1)

Discussion and detailed practical demonstration on the anatomy of tissue, organ, and muscle structure in farm animals. Physiology of circulation, respiration, digestion, excretion, nervous and muscular responses, endocrine control and reproduction in farm animals.

FAT 401: **FISH GEAR TECHNOLOGY** (1, 0, 1)

Study of types of gears and fishing crafts. Properties of materials used in construction of nets and traps. Assessment of fish gear efficiency. Construction of hooks traps and nets. Design, production, use and maintenance of various fishing gears and crafts. Fishing boats and description of parts of an outboard engine. Catch volume, gear selectivity, electro fishing techniques.

FAT 403: **INTGRATED FISH FARMING** (1, 0 , 1)

INTRODUCTION OF INTEGRETED FARMING: Integrated management of fish and crop, livestock/poultry; models of integrated farming; web of integrated farm, necessity, objectives and systems of planning management, planning models, appraisal of economic returns. Animal raising on an integrated farm; chicken farming, duck production, pig/goat farming. Integrated management of fish and crop; terrestrial crops, aquatic plants. Fish stocking models; application of manure, pond dike system, ecological efficiency, economic efficiency

FAT 405: FISH DISEASES AND CONTROL (2, 0, 1)
Identification, morphology, taxonomy, life history of fish parasites. The ecological and pathological effects of parasites and diseases of fish. Epidemiology of parasite populations in water body. Common bacterial, fungal, and viral fish diseases and their control. Other enemies of fish. Ecological and environmental diseases of fish. International restrictions binding the transportation of fish across country boundaries. Fish ponds and public health.

FAT 407: AQUATIC MACROPHYTES (Higher Aquatic Plants) (1, 0, 1)
Definition of Aquatic macrophytes and distinction between aquatic microphytes and macrophytes. Survey , identification and classification of aquatic macrophytes. Classification based ecological habitats (floating immersed and submerged macrophytes). Description of representative members of each group of water plants. Utilization and economic importance of aquatic macrophytes. The manace of water hyacinth in tropical water ways. Methods of aquatic water control (preventive measures, mechanical, chemical and biological control methods)

FAT 409: PRODUCTION OF OTHER AQUATIC PRODUCTS (2,0,1)
Ecology and culture of frogs, crocodiles, edibles sea weeds and fresh water plants. Inland and marine capture fisheries production. Inland water artisanal capture fisheries (lakes, river basins and flood plains),yield, processing/preservation and socio-economic environment of fishing villages. Characteristics and problems of artisanal fisheries of Nigeria. Marine / coastal capture fisheries of Nigeria. Maritime jurisdiction of Nigeria. The characteristics and problems of Nigerian coastal/industrial fisheries, maritime fish assemblages in Nigerian coastal water, production and economic importance (food, employment, foreign exchange, raw material etc). Fishing license permits and gear regulatory measures.

FAT 411: WATER QUALITY MANAGEMENT AND POLLUTION CONTROL (1, 0, 1)
Physical compositions of water bodies, water chemistry and

nutrient cycles, sampling methods, management of selected marine, brackish and fresh waters. Chemical, mechanical and biological methods for maintaining and improving water quality. Ecological characteristics of polluted waters, effects of pollution on fish, plankton and benthic macro-invertebrates. Algal bloom and water quality

MGT 405 TECHNICAL REPORT WRITING (1,0,1)

Introduction to principles of effective communication, principles of technical writing, organization and presentation of technical report, feasibility studies, technical proposals, technical description and instructions, technical correspondence, oral presentation of technical ideas, technical aid in presentation , practical application

RAIN SEMESTER

SIW 400 STUDENTS INDUSTRIAL WORK EXPERIENCE SCHEME

Students are expected to undergo a six months industrial attachment in an agricultural related establishment. On completion ,the student will make a detailed report of his practical experiences in the field and of the structure and working of the organization where he underwent training.

500 LEVEL
HARMATTAN SEMESTER
AGR 501 FARM PRACTICE V (0, 0, 1)

Farm internship: Students will be assigned and detailed on farm jobs in their respective programmes. The execution will require the integration of all the on-the-farm skills acquired from all the previous farm practice courses.

FAT 501 FISHERIES STOCK ASSESSMENT AND CONSERVATION (2, 0, 1)

Fish stock, population dynamics, yield, recruitment, length/weight relationship and use, concept & use of condition factor, growth assessment of species stocks, growth models, von Bertlanffy and Ford Warford growth model mortality and natality. Concepts and estimate of standing stocks (biomass), optimum maximum sustainable yields and over fishing.

FAT 503 AQUACULTURE ENGINEERING AND SYSTEMS (1, 0, 1)

General surveying and site selection, visual and topographic survey, topographic map containing enlargement and reduction of maps, fresh water and brackish water source and valley and volume of dyke fill. Design and construction of dykes, sluice gates, drainage facilities, tanks, ponds, pens, cages, rafts and other types of fish rearing facilities, design and construction of fish farm pumping stations and fish hatcheries.

FAT 505: FISH SPOILAGE, PROCESSING AND PRESERVATION (2, 0,1)

Proximate composition of fish tissues, bio-chemical and micro-biological changes in fish post mortem. Post harvest spoilage principles and methods of processing and preservation packaging and storage, product evaluation and quality control traditional and modern preservation methods. Fish by products Fish marketing.

FAT 507 AQUATIC INVERTEBRATES (1, 0, 1)
Identification, classification, distribution and life histories of microscopic invertebrates (protozoa, cnidaria, sponges, rotiers, lophophores, cladocera, cyclopoids, calanoids, herpacticoids) and benthic macro-invertebrates used by fish as food or associated with their ecology. Aquatic biological pollution assessment based on these fauna

FAT 509 NIGERIAN FEEDS AND FEED STUFFS (1, 0, 1)
Classification of foods, feeding stuff and feed supplements, chemistry and nutritive value of succulent feeding stuff, concentrated feeds, cereals, legumes and oil seeds. Chemistry and nutritive value of some Nigerian grasses and legume species Consideration of methods of their biological evaluation, storage and quality control of feeding stuffs and feeds Constraints to fish feed development.

AEX 503 AGRIC EXTENSION ADMINISTRATION, ORGANIZATION AND SUPERVISION (2, 0, 0,)
Concepts, theories , principles and guidelines of administration, organization and supervision as applied to extension. Administrative functions and responsibilities in agricultural extension services, staff recruitment and selection, placement and supervision, budget development and fiscal control, importance of programme planning in agricultural extension and rural development, needs, objectives of education, learning experience, clientele participation in extension and rural cooperation and leadership in extension or organization, administration and supervision .

AEC 515 AGRICULTURAL BUSINESS MANAGEMENT (2, 0, 0)
The scope of agricultural business and management. Role of agricultural business, enterprise selection, production planning and control, financial planning and control, marketing management, work planning and staff control, economics of agricultural processing, public policies affecting business, farm growth, organization and tax strategies, principles of farm credit,

capital needs of agricultural industries, sources of loan funds and collateral for loans, credit agencies and government credit management, management concepts, working capital management, financial statements.

FAT 511: RESEARCH PROJECT 1 (0, 0, 2)

Under the guidance and supervision of an academic staff, aided by any technical staff a student initiates and conducts a research project in any of the areas of fisheries and aquaculture. The project must be achievable cost-effective and within the resources of the department or any internal or external sponsor and within the competence, experience and interest of the academic supervisor(s). It would be initiated as a Harmattan Semester Course to be assessed & granted on a pre determined outline such as " introduction" literature survey methodologies and preliminary data.

RAIN SEMESTER

FAT 502: SEMINAR (0, 0, 1): (On selected Special Topic)

Library project on a special topic in any aspect of fisheries & aquaculture science from within the core courses. Such a topic would be selected by each student under the guidance of a supervisor/academic staff who has expertise, interest & experience in the area pertaining to the topic. Research for this would be based on journals, monographs, field visits, etc. At the beginning of the Semester, the student would deliver it to staff and fellow students and submit bound copies.

FAT 504-ELEMENTS OF SEAMANSHIP & NAVIGATION (1,0,1): Basic critical principles of seafaring, description of seafaring boats, navigation compasses, sea weather conditions and forecasting, trawler boats, crew members and roles, echo sounding of boats safety life saving & fire fighting techniques & equipment, swimming, diving and seafaring hazards & mitigations.

FAT 506 FISHERIES POLICY LAWS & LEGISLATION (2,0,0)

Fisheries Institutions: Techniques in the sustainable

management of wild fisheries stock in rivers, lakes, reservoirs, estuarine, inshore & offshore coastal water, the use of fish landing sites, fish licensing & control, indices of over fishing/gear control, role of government regulators. Reviews of local edicts, national & international statutes and conventions- Fisheries Act of 1971, Sea Licensing Act 1971, laws of the Sea, EEZ Act 1978, etc

FAT 508- ORNAMENTAL FISHERIES & AQUARIUM DESIGN AND CONSTRUCTION (1, 0, 1)

The constitution of ornamental fishes from the various taxa of living ichthyofauna, exotic and endemic fish types. Distribution and field collection sources from the wild. Aquarium keeping & design: Biology, breeding, feeding and nutrition. Aquarium water management. The nature of local and international export trade in ornamental and exotic fishes and animals

FAT 510 FISH BREEDING AND GENETICS (1, 0, 1)

Scope of fish genetics, sexuality and reproduction. Mendelian inheritance, quantitative genetics, chromosomes of fish, sex determination, hybridization, atypical modes of sexuality, control of sex ratio, chromosome engineering and gene manipulation.

FAT 512 FISH TAXONOMY, SYSTEMATIC & ICHTHYOGEOGRAPHY AND MUSEUM OPERATIONS (1, 0, 1)

Catalogue of local fish taxa of freshwater and estuarine/coastal water of Nigeria, discussion on genera & species level, identification keys, techniques and guidelines for construction of keys, systematic and nomenclature for fishes via international naming standards. Ichthyogeographic zones of the world (West Pacific, East Atlantic, West Atlantic, Neotropical South America, Paleatic/North Europe & Asia) Africa, oriental and Australian. The roles of vicariance dispersal, isolation mechanisms , continental drift and glaciations in fish geographic distribution patterns, collection preserving and exhibiting fish specimens for education and recreational purpose.

FAT 514: FISHERY ECONOMICS (1, 0, 1)

Major economic constraints in fishery development, free access fishery, sustainable yield curve and total revenue curve. Bionomic equilibrium, factor rents, welfare economic theory and its relevance for fisheries, externalities in fisheries, capital and

consumption patterns: fisheries resources and right of ownership.

FAT 516: SHELLFISH CULTURE (1, 0, 1):
Farming of shrimps, oysters and other shellfishes, types of aquaculture systems in fresh, estuarine marine ecosystems, pond and cage cultures, water requirement, quality & management, liming, pond fertilization, natural and artificial, foods & feeds, feeding regimes, food conversion & production calculations, carrying capacities, harvesting techniques and economics of aquacultural enterprises

FAT 518 RESEARCH PROJECT II (0, 0, 4): A good semester continuation/conclusion of FAT 511. The student continues his research project with concrete definitive results, comprehensive write up of data, production of the bound project report and examined orally before external & internal examiners.

12. Book List/reference materials for some core fisheries/Aquaculture courses

Ajana.A. M, Adekoya, B.B, Olunuga, O.A. &Ayansanwo. T.O.(2006). Practical Fish Farming, A.C.T. Publs, Lagos. Nigeria. 88pp.

Amlacher. E. (1970) English translation by Conroy, D.A & Herman. R.O.- Textbook of Fish Diseases. TFH Publs; Hong Kong. China.

Anthony, A. D. (1982). Taxonomy of Tropical Cichlidfishes 1 st ed. University of Jos Press, Jos Plateau State, Nigeria, 28pp.

Aquatic Micro invertebrates. Protozoa (J. Dragesco,), Cnidaria (Goy. J .....), Sponge (Boury Esnault.N.) and rotifers CR. Pourriot): In : Flore et faune aquatiquedel Afrique sahelo saudanienne, Vol. 1. by Durand, 1. R.& Le' ve' que, C. (1981). eds. ORSTOM, Paris, France.

Bagenal, T.B (1978). Methods for the Assessment 0.[Fish Production in Fresh waters. IBP Handbook._No.3,3rd edition, Blackwell Scientific Publication Oxford & London (U .K), Edinburrgh (Scotland) & Melbourne (Australia), 365pp.

Cook, C. D. K., Gut, B. 1., Rix, E. M., Schneller, & Seitz M.(1974): Water Plants of the World A manual for the identification of the general of aquatic freshwater macrophytes. Dr W. Junk publishers, The Hague, Netherlands, 960pp.

Dagetetal (1984-1986). Checklist of the Freshwater Fishes of Africa (CLOFFA), vols. 1, 2, 3&4. MRAC (Tervurern, Belgium) and ORSTOM, Paris, France.

Duijn, C. (1990).Diseases of Fish. Lox and Wyman Ltd, London,U.K.

Edmunds, 1. (1978). Seashells and other molluscs found on West Africa coast and estuaries. Ghana University Press, Accra, Ghana, 139pp.

Fagade, S.O., Jeje, C. Y& Lowe, J.(1992) Aquatic Fauna and Flora. In: Cowx, J (ed): Aquatic Development, Commonwealth Secretariat, London, U. K. pp. 113-132.

FAO (1981) Estuarine & Marine Ecosystem, FAO Bulletin No. FAO/1989/1.Rome, Italy.

Fauchauld, K. (1977). Polychaete worms Natural History Museum of Los Angeles County Science series No. 28:1 90.

Francis-Lloyde, R. (1996): Introduction of Fish Health Management. Cooperative Extension Service, Institute of

Food and Agricultural Science University of Florida, Gainesville, 32611. U.S.A

Hakanson, L. (1981) A. Manual of Lake Morphometry, Springer Verlag, Berlin Heildelberg (Germany) and New York (USA). 78pp.

Hellawell, J. M. (1978). Biological Surveilliance of Rivers Biological Research Centre, Stevenage & Medmenham (England).332pp.

Hogendoorn, H. & Vismans M. M. (1980).Controlled propagation of the Africa catfish Clarias gariepinus. (C. & V) Aquaculture 21:39 53.

HutChinson, G.E. (1957 1975). Atreatise of limnology Vols 1,2,3&4. John Wiley & Sons. Inc; New York (USA)

Idodo Umeh, G. (2003), Freshwater Fishes of Nigeria (Taxonomy, Ecological notes, Diets and Utilization. Idodo-Umeh Publishers Ltd, Benin,Nigeria 232pp + xiv.

Ita, E. O., Sado, E.K., Balogun J.K., Pandogari, and Ibitoye, B, (1985). Inventory survey of Nigerians inland waters and their fisheries potentials. Vol.I A preliminary checklist. Kainji Lake Research Institute, New Bussa, Nigeria.

Lagler. K.F., Bardach, 1E. & Miler, R.R. (1962): Ichthyology, the Study of Fishes. John Wiley & Sons, Inc. N.Y. (USA) & (U.K). 545pp

Mackereth, F.1A (1979 ed). Water Analysis for Limnologists. FBA Scientific Publication No. 21, Freshwater Biological Association (FBA), Windermere, England.

Mitchell D. S., Pieterse.A. H. & Murphy, KJ. (1990): Aquatic plants, problemsand management in Africa. In Pieterse,AH. and Murphy K. 1 (eds). Aquatic Weeds:

Ecology and Management of Nuisance Aquatic Vegetation. Oxford University Press, Oxford United Kingdom. 342 354.

Nedelec, C. 1982. Definition and classification of fishing gear categories. FAO Fish Tech. Paper No.22,57pp.

Nwadiaro C.S (2009). A checklist of the freshwater finfishes of Nigeria with keys to the identification of the families genera and species-----.

Nwadiaro, C.S (2007). Aquatic Crustacea of Sahelo-Sudanian Africa. A French to English translation of,

Nwadiaro, C.S (2009) Fishes of the inland freshwaters of Saheic

Sudannian Africa: A French to English translation of "Poisons" by Daget, & Duraand, J. R. (1981). In J-R Darand & Leveque, C. (1981): Flore et Faune Aquatique de l'Afrique Sahelo Soudaniennne. Vol. IIORSTOM, Paris France.

Nwadiaro, C.S. & Okafor, P.T.N. 2007 Algae by A. Iltis a French to English translation In: Durand, J. R. & Leveque, C. (1981). *^lore et Faune aquatique de l'Afrique Sahelo Soudanienne*. ORSTOM, Paris, France pp.

Nwadiaro, C.S. 2007. Microscopic and Planktonic of Nigeria's inland waters Study methodologies & guidelines, atlas, review and checklists. Univ. of port Harcourt Press, PH, Nigeria.

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Obot, C.A. &Ayen;, J. S. O. (1987). A handbook of the

common aquatic plants of the Kainji Lake basin of Nigeria; National Institute of Freshwater Fisheries Research (NIFFR) Publications. New Bussa, Nigeria. 86pp.

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- The management of integrated fresh water Agro-

pisicultural ecosystems in tropical areas edited by J.J. Symoens and Micha CTA.

- Bacterial fish diseases of fish edited by V. Inghis, R.J. Roberts and N.R Bromage Blackwell Scientific Publications London
- Fish nutrition in aquaculture by S. De Silva and T.A. Anderson. Chapman and Hall London
- Fish hatchery management by R.G. Piper, I.B. Me Elwain, L.E Orme, J.P. Me Craren, L.G. Fowler and J.R. Leonard. US. Dept of Interior, Washington D.C
- Aquaculture and the environment by T.V.R Pillay. Fishing News Books, Oxford England.
- Fishery management by S.C Agarwal. Ashisl Publishing House, New Delhi.
- Water quality management for pond fish culture by C. E. Boyd. Elsevier Scientific Publishing Company Oxford.
- Post-harvest fisheries development: a guide to handling, preservation, processing and quality. Natural Resources Institute. Overseas Development Administration.
- Fundamental principles of fisheries science by G. C Onuoha. New Edition Digital Press, Umuahia, Nigeria.
- Aquaculture Engineering by F. N. Wheaton John Wiley & Sons, New York.

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