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DEPARTMENT OF BIOLOGICAL SCIENCES
FACULTY OF LIFE SCIENCES,
COLLEGE OF NATURAL AND PHARMACEUTICAL SCIENCES,
BAYERO UNIVERSITY, KANO

STUDENT HANDBOOK

Published by
The Department of Biological Sciences
Faculty of Life Sciences
Bayero University, Kano

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BAYERO UNIVERSITY CREST

The Crescent and the Star.

The Crescent: (Symbol & Unit of Time)

Jāmiatu Bayero bi Kano (Bayero University, Kano)

The Star: (Guiding Light).

Motto: **WA FAWQA KULLI DHI 'ILMIN 'ALĪM i.e**

"----- but over all Endued with Knowledge is One, the All- knowing" HQ. 12:76.

The University Colour: Blue.

N/B Transliteration/Translation is from Arabic.

As Presented by the Registrar, and printed by Kie-Dal.

Visitor and Principal Officers of the University

President Muhammadu Buhari, GCFR, President and Commander- in-Chief of the Armed Forces, Federal Republic of Nigeria	Visitor
His Royal Majesty, King Alfred Papapereye Diete-Spiff, OFR, JP, DF Sereiyai II, The Amanyanabo of Twon-Brass, D. Lit (BUK)	Chancellor
Prof. Ibrahim Agboola Gambari CFR, OCORT	Pro-Chancellor and Chairman of Council
Prof. Muhammad Yahuza Bello FNMS, B.Sc., M.Sc. (BUK), Ph.D (Arkansas)	Vice-Chancellor
Prof. Adamu Idris Tanko B.Sc., M.Sc., Ph.D (BUK), FRGS	Deputy Vice-Chancellor (Academic)
Prof. Haruna Wakili BA (BUK), MA (BUK), Ph.D (BUK), Cert. (NYU)	Deputy Vice-Chancellor (Administration)
Hajiya Fatima Binta Mohammed B.A. (Ed), MPPA (BUK), FIICAN, MNIM	Registrar

Alh. Suleiman Muhammad Bello CAN, B.Sc. (BUK), MBA (BUK)	Bursar
Dr. Musa A. Auyo CLN, DLS BA LS (BUK), MLS (ABU), Ph.D (BUK)	University Librarian
Dr. Ibrahim Lawal A. B.Sc.(***ABU***), M.Sc., Ph.D. (***BUK***)	Dean, Faculty of Life Sciences

Foreword

Welcome to the Department of Biological Sciences, Bayero University, Kano. We encourage you to avail yourself of the many resources that both the Department and the University have to offer you. The Department, the Faculty of Life Sciences, College of Natural and Pharmaceutical Sciences in conjunction with the Students' Affairs Division offer Career Guidance, Counselling and help in regulating students' social activities.

The Student Handbook is a comprehensive guide to help you understand the vision and mission, procedures, rules and regulations of the Department and the University in general. The Department offers students freedom to make choices, as enshrined in the University's Regulations. We believe that students have an obligation as members of the Department and the University community to internalize and fully understand all of our rules and policies and also the consequences of breaking these rules. **The Department holds students responsible for their actions and inactions!**

Questions relating to your academic affairs can be channelled to the H. O. D. through the level

coordinators. We therefore urge you to take advantage of all the enabling policies of the Department so as to prepare for a **Better Future Ahead.**

Please be rest assured that we are all committed to helping you in achieving your academic goals while in Bayero University, Kano and even beyond.

Prof. Zainab Tukur
Professor
Head of Department

Welcome Address by the Head of Department

Welcome to the Department of Biological Sciences. Many have attempted to be here but could not make it. Indeed its an honour to be choosen to be here

This handbook is designed with the aim of helping you find your way around the Department. When you register as a student in the University and the Department, you become entitled to use the facilities and services that the University and the Department provided and also agree to abide by its Rules and Regulations. This Handbook provides you with a guide to what the Department offers, what are our vision and mission.

We wish you every success during your studies at the Department of Biological Sciences.

Prof. Zainab Tukur
Professor
Head of Department

1. 0 Vision, Mission and Core Values of the Department

1.1 Vision

Department of Biological Sciences, Bayero University, Kano aspires to be a distinguished leading Department that provides quality education and state of the art research. We aim at preparing unique graduates that are able to meet labour market demands and provide significant contribution to the community development in a progressively complex world.

1.2 Mission

Department of Biological Sciences provides excellent teaching, research and community service. We prepare well educated and motivated graduates who are able to serve their community and contribute to the enhancement of society by:

- ✔ Establishing innovative educational programmes that meet the needs of its students and the society.

- ✔ Providing a supportive learning environment that fosters integrity, creativity and self development.
- ✔ Ensuring that our practices, policies and procedures encourage sustainable development.
- ✔ Conducting creative research in cooperation with national, regional and international organisations.

1. 3 Core Values

Department of Biological Sciences adopts the following core values as main pillars for all practices among its students, academic and non-academic staff:

- ✔ Integrity
- ✔ Honesty
- ✔ Respect
- ✔ Fairness
- ✔ Credibility
- ✔ Transparency
- ✔ Accountability

2.0 List of Staff

2. 1 List of Academic Staff

S/N	Name	Qualification(s)	Research Interests	Rank
1.	Prof. Zainab Tukur	B.Sc., M.Sc., Ph.D.	Medical Entomology and Snake Venom	Professor / HOD
2.	Prof. B. A. Abdullahi	B.Sc., M.Sc., Ph.D.		Professor
3.	Prof. (Dame) T. I. Oyeyi	B.Sc., M.Sc., Ph.D.	Parasitology	Professor
4.	Prof. Sani Ibrahim	B.Sc., M.Sc., Ph.D.	Hydrobiology, Ecology and Environmental Health	Professor
5.	Prof. Idris Ado Yola	B.Sc., M.Sc., Ph.D.	Fisheries & Aquaculture	Professor
6.	Prof. N. T. Dabo	B.Sc., M.Sc., Ph.D.	Microbiology, Parasitology and Evaluation of Plant Bioactivity	Professor
7.	Dr. Ibrahim Lawal Abdullahi	B.Sc., M.Sc., Ph.D.	Environmental Biology and Biodiversity	Senior Lecturer
8.	Dr. Safianu	B.Sc., M.Sc.,	Ecological	Associate

	Rabi'u	Ph.D.	Sciences and General Productivity	Professor
9.	Dr. Tijjani Sabi'u Imam	B.Sc., M.Sc., Ph.D.	Parasitology and Environmental Biology	Senior Lecturer
10.	Dr. Nuraddeen Abdullahi	B.Sc., M.Sc., Ph.D.	Entomology	Senior Lecturer
11.	Dr. Aisha Ahmad Dantata	B.Sc., M.Sc., Ph.D.	Parasitology	Senior Lecturer
12.	Dr. Auwalu Hassan Audi	B.Sc., M.Sc., Ph.D.	Entomology, Plant Protection	Lecturer I
13.	Dr. Halima Musa Rabi'u	B.Sc., M.Sc., Ph.D.	Rhizobiology, Microbiology & Bio-fertilisation	Lecturer I
14.	Dr. Faruk Nas	B.Sc., M.Sc., Ph.D.	Parasitology/ General Epidemiology	Lecturer II
15.	Mal. Aziza T. Zawiyya	B.Sc., M.Sc.	Parasitology	Lecturer I
16.	Asiya Aminu Mukhtar	B.Sc., M.Sc.	Environmental Biology	Lecturer II
17.	Mal. Rakiya Audu	B.Sc., M.Sc.	Fisheries & Aquaculture	Lecturer II
18.	Mal. Abba	B.Sc., M.Sc.	Marine Biology	Lecturer

	Salisu		and Aquaculture	II
19.	Mal. Aminu I. Darma	B.Sc., M.Sc.	Environmental Biology	Lecturer II
20.	Mal. Fatima M. Yusuf	B.Sc., M.Sc.	Parasitology	Lecturer II

2.2 List of Technical Staff

S/N	Name	Qualification	Rank
1.	Mal. Hassan Aliyu Garko	HND, ND/SLT, NISLT, NSM	Chief Technologist
2.	Mal. Yakubu Aliyu Otaru	HND/SLT, ND/SLT, NISLT	Principal Technologist
3.	Mal. Idris Garba	HND, ND/SLT	Senior Technologist
4.	Mal. Isah Abdullahi Isah	HND/SLT. ND/SLT	Senior Technologist
5.	Mr. David S. Okolo	HND	Technologist I
6.	Mal. Fatima Baba Abubakar	M.Sc., B.Sc.	Technologist I
7.	Mal. Umar Farouk Suleiman	B.Sc.	Technologist I
8.	Mal. Bashir Danladi Yakasai	B.Sc., M. Sc.	Technologist I
9.	Mr. Enemakwu C. Alhassan	NCE	Prin. Tech. Officer II
10.	Mal. Maryam Yahaya Ibrahim	B.Sc.	Senior Technician
11	Mal. Mubarak S. Yakubu	ND/SLT	Higher Technician
12.	Mal. Shehu Abdu	Post Literacy Certificate	Senior Lab. Attendant

1.3 List of Administrative Staff

S/N	Name	Qualification(s)	Rank
1.	Mal. Salisu Aminu Sheka	ND	Chief Typist
2.	Mal. Ibrahim Bala Umar	**SSCE**	Senior clerical Officer
3.	Mal. Shehu Nababa	SSCE	Chief Driver/ Mech.
4.	Mal. Isyaku Uba	SSCE	Messenger/ Cleaner
5.	Mal. Abdulrahman Umar Makinta	NECO, Diploma in LIMS	Messenger/ Cleaner
6.	Mal. Mustapha Ishaq	NECO	Head Gardener
7.	Mal. Ibrahim Sarki	NECO	Cleaner
8.	Mal. Balaraba Ibrahim	NECO	Cleaner

2.0 Tips for Students and Extra-curricular Activities

2. 1 Tips for Students

- ✔ Upon completion of your University and Departmental Registration, go to the student's Affairs Division; to collect your identity card. This helps you to avail yourself of the University and Department's privileges.

- ✔ Find out the name and office of your level coordinator.

- ✔ Keep a close watch on your personal belongings.

- ✔ Beware of semester calendar.

- ✔ Join clubs, and sports team. All information related to student extra-curricular activities is available through the Departmental Students Association, the Biological Sciences Students' Association (BIOSSA) and the University Students Union Government (SUG).

- ✔ Attend all departmental orientation workshops. These are held at the beginning of each academic session.

- ✔ Beware of what is happening in the Department and the University through various notice boards around the campus, academic and events calendar through the Departmental and University website.

- ✔ Every student must understand all information in this booklet and take into account the Rules and Regulations that must be abided by in all cases within the Department and the University community.

- ✔ Every student, even if he/she is not aware of these rules will not be exempted from liability in the event of any violation. However, level coordinators, members of the Department, and staff of Students' Affairs Division can guide students when exposed to any problem.

2.2 Students Extra-curricular Activities

These are largely enshrined under the activities of the **Students' Departmental Association,** the aim and objectives which include:

I. To provide a forum for the students to unite for their common good and interact between members.
II. To sensitize the University Community on ecological protection.
III. To conduct educational activities and excursion that will enhance eco-balance.
IV. To enable students embrace researches of biological relevance.
V. To periodically hold annual Biological Students' Association annual Week Celebration.

Activities:
The association organises series of activities which will include:

- ✔ Fund raising as may be decided by the executives of the association such as annual launching of association's almanac.
- ✔ Organise seminars and lectures at suitable time and place within the campus as decided by the executives.

- ✔ Organise meeting of the executive members regularly as may be deemed necessary.
- ✔ Publication of the association's newsletter ***The BIOSSA Newsletter.***
- ✔ Organise orientation programme for newly admitted students of the Department.
- ✔ Organise ***Annual Environmental Day*** every 5th of June every year.
- ✔ Organise an ***Annual Get Together*** and ***Award Night.***

4. 0 Academic Regulations

4.1 Registration

With the beginning of each session, the student registers in the courses chosen by him/her in consultation with his level coordinator on the registration forms.

The Faculty and the Department determines the minimum number of credits to be registered by each student.

4.2 Add and Drop

Registered students may make minor changes in the courses registered (by adding and / dropping some courses) at the beginning of the Second Semester. Students are advised to consult their Level Coordinators prior to the

process for guidance. Details of the procedures of the add/drop are as contained in Part 19 of the General Examinations and Academic Regulations (GEAR) for first Degree Programmes of the University.

4.3 Probation

A student whose CGPA is less than 1.50 at the end of any session shall be placed on academic probation for one session to enable him/her to upgrade his/her CGPA to at least 1.50.

4.4 Withdrawal

Part 15 of the GEAR stipulates as follows:

A student may be withdrawn from the programme if (s)he:

a. Fails to register when and as due.
b. Not able to obtain a CGPA of 1.50 after a probation period
c. Failure rate so great that at the point of consideration, the student will not be able to graduate within the remaining time available to (s)he even if (s)he is to register for, and pass, the maximum number of credits allowed by the regulations in each of the sessions available to him/her.
d. Failure to attend classes for a period which exceeds 30 consecutive days except upon

approved medical or other grounds (as contained in Part 10.3 of the GEAR)

e. Failure to complete the stated requirements for the award of a degree within the maximum number of semesters laid down for the programme (see regulation 11.16 of the GEAR).
f. Failure to sit for the entire semester examinations without any admissible reason.

4.5 Attendance Requirements

- ✔ Lectures, seminars, tutorials and laboratory attendance are integral part of the university study process; students are therefore encouraged to be regular and punctual in attending all lectures for their courses. Furthermore, attendance is checked during lectures, tutorials and laboratory sessions.
- ✔ Students must obtain at least 75% attendance of their lectures to be able to sit for the final examination for a given course.

5.0 Level Coordination

Academic coordination is a task focused on offering constructive guidance and counselling to students in order to assist them

in meeting their academic goals. The level coordinator offers assistance in evaluating academic performance and also helps the students to combine their abilities in the pursuit of educational goals that will produce the desired outcome.

5.1 Duties of a Level Coordinator

- ✔ The Level coordinator is an academic staff assigned to take charge of students coordination at respective levels from Level 100 through the final year.
- ✔ He/she is a member of the departmental Board of Examiners.
- ✔ Keeps students' academic records.
- ✔ Clarifies policies and procedures to the students (s)he coordinates.
- ✔ Helps students in addressing academic problem.
- ✔ Provides students with accurate information as regards their academic programmes.
- ✔ Listens to students problems and
- ✔ Make referrals for other services, among other responsibilities.

5.2 Student's Roles

- ✔ Share information

- ✔ Seek help before a situation escalates into a crisis
- ✔ Know how academic action affects your status
- ✔ Interact with your level coordinator
- ✔ Know and complete programme requirements
- ✔ Ask questions and always follow up accordingly

6.0 Violations of Academic Integrity

6.1 Cheating

Cheating includes but is not limited to unauthorized copying from the work of another student, using notes or other materials not authorized during an examination, giving or receiving information or assistance on work when a student is to do it him/herself or engaging in any other similar act that violates the concept of academic integrity.

6.2 Plagiarism

Plagiarism is presenting as one's own (on whole or in part) the argument, language, creation, conclusion(s) or scientific data of another without explicit acknowledgement.

6.3 Disruption of classroom/Laboratory activity

This occurs when any action or behaviour is reasonably judged by the Lecturer or Laboratory staff to be detrimental to the class.

6.4 Other violations

These may also include:

- ✔ Intentionally destroying university property.
- ✔ Distributing bulletin, papers, posters and collecting student signatures without prior consent from the university official channels.
- ✔ Participating in students strikes inside the University premises or volunteering in illegal marches.

7.0 Admission Requirements

7.1 Requirements for Admission into Level 100

For admission into Level 100, candidates must have obtained minimum of five (5) SSCE/NECO/GCE O/Level credits in Biology, Chemistry, Physics, English and Mathematics in not more than two (2) sittings in addition to passing the University Tertiary Matriculation Examination (UTME).

7.2 Requirements for Admission into Level 200

For Direct Entry into Level 200:

a) Minimum of 8 IJMB points with five (5) O/Level passes in relevant subjects, three of which must be at Credit level.
b) Passes with credits in two (2) major subjects in NCE and five (5) Ordinary Level subjects at Credit Level including English Language and Mathematics.
c) OND at Upper Credit, five (5) Ordinary Level subjects at Credit Level including English Language and Mathematics.

8.0 Course Assessment

The courses are assessed as follows:

8.1 Courses with Practical Components:

These are normally assessed as follows:
Course work (20%); Practical (20%) and Examination (60%).

8.2 Courses without Practical components:

Continuous Assessment work (Test, Quiz, Assignment) (30%) and Examination (70%).

9.0 Examination Misconduct and Leakage

These are as contained in section 19. 17 of the revised general examination regulations approved by the Senate as shown in the Directorate of Examinations, Admissions and Records (DEAR) document of the University.

The following are the categories of examination malpractice and leakage offences, as well as the appropriate punishment for the offences.

9.1 Category of offences punishable by expulsion from the University.

i. Impersonating another student, or being impersonated by another person at an examination
ii. Exchanging names and/or numbers on answer scripts/sheets
iii. Introduction and use of relevant unauthorized material(s) into the examination hall.
iv. Exchange of materials (such as question papers, examination cards) containing jottings that are relevant to the ongoing examination in the examination hall.
v. Theft and/or illegal removal of examination scripts.

vi. Any kind of mischief likely to hinder the smooth conduct of the examination. For example, causing fire, flooding or engaging in physical violence.

vii. Collaborating with, or copying from, another candidate.

viii. Cheating outside the examination hall, such as in toilets, hall of residence etc.

ix. An offence that fails under category B committed by a student who was previously rusticated.

x. Using mobile phones and other ICT devices to access voice or text messages, documents, materials from the internet, etc. during examinations.

xi. Any offence under this category committed by a student of this University in another institution.

xii. Destruction of, tempering with, evidence by candidates – including preventing access to electronic devices.

xiii. Any other misconduct deemed by the Senate Committee on Examination Misconduct and Senate to warrant expulsion.

9.2 Category of Offences Punishable by Rustication

i. Facilitating/Abetting/Aiding cheating by another candidate.
ii. Introduction, but not use, of relevant unauthorized materials to the examination hall.
iii. Using mobile phones and other ICT devices in the examination hall for things unrelated to the ongoing examination.
iv. Acts of misconduct (such as speaking/conversation) during the examination that is likely to disrupt the conduct of the examination.
v. An offence in category C committed by a previously warned or rusticated student.
vi. Any offence under this University in another institution.
vii. Any other misconduct deemed by the Senate Committee on Examination Misconduct and Senate to warrant rustication.

9.3 Category of Offences Punishable by Written Warning

i. Introduction of unauthorized irrelevant materials into the examination hall.
ii. Writing on the question paper

iii. Failure to switch off mobile phones and other ICT devices, and/or failure to keep them out of sight.
iv. Any offence under this category committed by a student of this University in another institution.
v. Any other misconduct deemed by the Senate Committee on Examination Misconduct and Senate to warrant warning.

10. List of Courses for the B. Sc. Zoology Programme

10.1 Level 100 Courses

First Semester

Course	Title	Credit
BIO 1201	General Biology I	2
BIO 1203	General Biology III	2
CHM 1231	Inorganic Chemistry	2
CHM 1241	Organic Chemistry	2
GSP 1201	Use of English	2
MTH 1301	Elementary Mathematics I	3
PHY 1170	Practical Physics I	1
PHY 1210	Mechanics	2
PHY 1220	Electricity & Magnetism	2
	Total	18

Elective

Course	Title	Credit
STA 1311	Probability	3

Second Semester

Course	Title	Credit
BIO 1202	General Biology II	2
BIO 1204	General Biology IV	2
CHM 1251	Physical Chemistry	2
CHM 1261	Practical Chemistry	2
GSP 1202	Use of Library, Study Skill and ICTs	2
MTH 1303	Elementary Mathematics III	3
PHY 1180	Practical Physics	1
PHY 1230	Behaviour of Matter	2
	Total	16

Electives

Course	Title	Credit
MTH 1302	Elementary Mathematics II	3

Total - 34 Credits

10.2 Level 200 Courses

First Semester

Course	Title	Credit
BCH2301	General Biochemistry I	3
BIO 2201	Genetics I	2
BIO 2202	Introductory Ecology	2
BIO 2203	General Physiology	2
CHM 2241	Organic Chemistry I	2
CSC 2201	Introduction to Computer	2
GSP 2206	Peace & Conflict Resolution	2
GSP 2201*	Use of English	2
MCB 2201	General Microbiology I	2
	Total	19

* For Direct Entry Students only

Electives

Course	Title	Credit
BCH 2202	**General Biochemistry II**	**2**

MCB 2202	**General Microbiology II**	**2**
BIO 2208	**Molecular Biology**	**2**

Second Semester

Course	Title	Credit
BIO 2204	Biological Techniques	2
BIO 2205	Cell Biology	2
BIO 2206	Biostatistics	2
BIO 2307	Genetics II	3
BOT 2202	Seedless Plants	2
GSP 2202*	Use of Library and ICTs	2
GSP 2204	Foundation of Nigerian Culture, Government & Economy	2
GSP 2205	Logic and Philosophy	2
ZOO 2301	Invertebrata	3
ZOO 2202	Chordata	2
	Total	22

* For Direct Entry Students only

Total – 37 Credits

Total – 41 Credits (For DE Students)

10.3 Level 300 Courses

First Semester

Course	Title	Credit
BIO 3102	Field Course I	1
BIO 3207	Biosystematics	2
BIO 3309	Introductory Nematology	3
MCB 3302	Pathogenic Bacteriology	3
ZOO 3301	Protozoology	3
ZOO 3302	Vertebrate Comparative Anatomy	3
ZOO 3303	Animal Physiology	3
ZOO 3305	Basic Entomology	3
ZOO 3306	Animal Ecology	3
	Total	24

Second Semester

Course	Title	Credit
ZOO 3699	SIWES	6

Total - 30 Credits

10.4 Level 400 Courses

First Semester

Course	Title	Credit
BIO 4213	Field Course II	2
BIO 4305	Embryology	3
BIO 4307	Hydrobiology	3
EEP 3201	Entrepreneurship and Innovation	2
ZOO 4201	Review Essay	2
ZOO 4202	Applied Entomology	2
ZOO 4305	Nigerian Animals	2
ZOO 4313	Parasitology	3
ZOO 4315	Wildlife Ecology and Conservation	3
	Total	22

Elective

Course	Title	Credit
BIO 4205	Animal Behaviour	2

Second Semester

Course	Title	Credit
BIO 4308	Fisheries and Aquaculture	3
BIO 4313	Soil Ecology	3
EEP 4201	Venture Creation and Growth	2
ZOO 4699	Project	6
	Total	14

Total - 36 Credits

11.0 Detailed Course Contents

11.1 Level 100 Courses

BIO 1201* General Biology I

Zoology as a discipline, characteristics of animals as living things; cell as the basic unit of living things (animals); cell structure, organization, cellular organelles, tissues, organs and systems. Classification of animals, general reproduction and concepts of inter-relationships in animals. Heredity and evolution. Animal ecology (definition) and habitats.

BIO 1202 General Biology II**

General survey of the animal kingdom; similarities and differences in external morphology in Protozoa, Platyhelminthes, Annelids, Arthropods, Fishes, Amphibians, Reptiles, Birds and Mammals. Division of animal taxa in the animal kingdom.

BIO 1203* General Biology III

Same as BIO 1201 but with emphasis on plants.

BIO 1204 General Biology IV**

Same as BIO 1202 but with emphasis on the Plant Kingdom, Bacteria, Viruses, Algae, Fungi, Bryophyte, Pteridophytes, Gymnosperms and Angiosperms.

11.2 Level 200 Courses

BIO 2201* Genetics I

Hereditable and non-heritable characteristics of living organism, the chromosome theory of inheritance, the chromosome structure of the eukaryotes and prokaryote (Bacterial and Viruses). Linkage, cross-over, sex-linkage, sex chromosomes

and sex determination. The mechanisms of genetic recombination. Introduction to population genetics.

BIO 2202* Introductory Ecology

Introduction to ecological concepts and theories, broad divisions of ecology, ecosystem and its components, e.g. species and populations ecological niches and competition, energy flow, productivity, nutrient an water cycles. Components of the abiotic environment, lithosphere, hydrosphere, atmosphere. Components of the biotic environment; types of biomes, Tundra, Taiga, Deciduous forests, Grassland, Desert, Tropical Rainforest, Biogeographical regions; Australian, Neotropical, Neoartic, Paleoartic, Oriental, Ethiopian, Ecosystem and its types

BIO 2203* General Physiology

Physio-chemical progresses in animals and plants; diffusion, osmotic pressure and osmolality, water potential, turgor, diffusion, pressure, plasmolysis, Gibbs-Donan relationship, Gas exchange, partial pressures (Tension), Hydrogen-Ion concentration (P^H). Henderson Hasselbach equation, buffers in physiology, respiration and photosynthesis; RQ' and QIO'S in relation to metabolism, photosynthesis, oxygen and carbon dioxide exchange.

BIO 2204 Biological Techniques**

The microscope, types of microscopes and their uses. Preparation of microscopic slides, photometry, calorimetry, chromatography, conductometry, experimental designs.

BIO 2205 Introductory Cell Biology**

Light, phase-contrast, Dark-field and Electron Microscopy, Autoradiography, Florescence, Cell cycles, Introductory cytogenetics, History and present trends in cell biology, Reproduction and cell division, cell differentiation and growth of cell, molecular basis of cell structure and developmental cell biology, protein and nucleic acids.

BIO 2206 Biostatistics**

Use of statistical methods in Biology and agriculture. Frequency distribution, Law of probability, the binomial, Poisson and normal frequency distributions, Estimations and Tests of Hypothesis. Design of simple Agricultural and Biological experiments. Analysis of variance and co-variance, simple regression and co-relation, contingency tables, some non-parametric tests.

BIO 2208 Molecular Biology**

Light, Phase-contrast dark field and Electron Microscopy, Autoradiography, Florescence, Cell cycles. Introductory cytogenetics, Biogenesis of microtubules, microfilaments, golgi bodies and mitochondria, membrane interactions. Introduction to bioenergetics and thermo-dynamics.

BIO 2307 Genetics II**

Pre-requisite: BIO 2201

Selected topics from population genetics, cytogenetics, microbial genetics, animal and plant genetics; biochemical and biomedical genetics, human genetics; further consideration of various deviations from basic principles, pedigree analysis, gene interractions.

ZOO 2202 Chordata**

Functional biology of all vertebrate phyla, including the structure and functions of their organ system. Binomics, evolution and adaptive radiation, Zoogeography.

ZOO 2301 Invertebrata**
A survey of all the invertebrate phyla.

11.3 Level 300 Courses

BIO 3102* Field Course I
Sampling techniques in local habitats; Qualitative and quantitative study of plants and animals in terrestrial and aquatic habitats.

BIO 3207* Biosystematics
Principles and methods in biosystematics concept of Taxonomic characters. Morphological, anatomical, palynological, embryological, cytological and phytochemical characters. Principles used in the delimitation of taxa and attribution of rank. Numeral taxonomy. Concepts of specific and intraspecific categories. Morphological study of selected plant families to illustrate evolutionary tendencies and phylogenetic relationships.

BIO 3309* Introductory Nematology
Principal characteristics of nematodes, morphology, position and outlines of classification of nematodes. Morphology and biology of important plant parasitic nematodes and their economic importance.

Nematological techniques. General principles and methods of controlling nematodes.

ZOO 3301* Protozoology

Pre-requisite: ZOO 2301

Classification and evolutionary relationships of the protozoa. Macro and micro structure of protozoa. The role of protozoa in ecosystems. The ecology of protozoa, their physiology and biochemistry. Life histories of protozoa of medical and veterinary importance, with emphasis on tropical species; the pathology; epidemiology and control of protozoan infections.

ZOO 3302* Vertebrate Comparative Anatomy

Functional comparative anatomy of the organ systems in vertebrates.

ZOO 3303* Animal Physiology

Pre-requisite: BIO 2203

The principles of physiological adaptation and homeostasis. Metabolism measurement and rates; thermal relations of animals. Vertebrate digestive systems: Ruminant digestion. Respiratory systems of fish, amphibian, reptilian, birds and mammals. Comparison of respiration in water and in air. Air

and water breathing vertebrates, respiratory pigments, right and left shift of Oxygen Dissociation Curve. Respiratory and circulatory changes in high altitude vertebrates and diving mammals. Osmo-regulation and excretion; evolution of vertebrate kidney. The vertebrate nervous system; membrane potential; action potentials. Muscle structure and physiology. Vertebrate endocrinology. Outline and comparison and nervous system.

ZOO 3305* Basic Entomology

Insect evolution, classification and distribution. Organization of external structure. Ingestion, digestion, excretion, blood circulation and nervous system. Behaviour and ecology of social insects.

ZOO 3306* Animal Ecology

The ecology of local terrestrial and aquatic animals; growth rate and age structure of animal populations, natality and mortality, survivorship curves. Life tables and K-factor analysis. Competition. The natural regulation of animals numbers. Population cycles. The dynamics of predator prey systems. The ecology of African mammals. Behavioural ecology.

ZOO 3699 Students' Industrial Work Experience Scheme (SIWES)**

Industrial/Field experience in any of the following:

a) Fisheries
b) Wildlife Management
c) Biology of Aquatic Environment
d) Pest Control
e) Animal and Public Health

11.4 Level 400 Courses

BIO 4213* Field Course II
Field experience in any area of Zoology.

BIO 4205* Animal Behaviour
History of ethology. Reflex and complex behaviour. Orientation and taxes. Fixed action patterns, releasers, motivation and driver. Displays, displacement activities and conflict behaviour. The social behaviour of primates. Hierarchical organization. The physiology of behaviour. Habitat selection, homing and navigation. Courtship and parenthood. Biological clocks.

BIO 4305* Embryology
Molecular genetic aspects of development. A detailed study of the cellular and multicellular basis of development

BIO 4307* Hydrobiology

Physical and chemical aspects of freshwater environments, spatial and temporal patterning of light, temperature and oxygen. Freshwater flora and fauna with particular reference to West Africa. Plankton, benthic invertebrates, fish and plant communities, production and energy flow. Characteristics of African freshwater. Case studies of various African freshwater habitats; a tropical swamp (Lake Chilwa), a warm spring (Wikki Spring), an ancient lake (Lake Tanganyika), a new man-made lakes (Lake Kainji and Tiga Lake). Problems associated with tropical freshwater, eutrophication, pollution and water-linked diseases.

BIO 4308 Fisheries and Aquaculture**

Review of the fish fauna of West Africa with special reference to Nigeria. Methods used in fisheries: sampling, examination and tagging. Age and growth, determining growth from otoliths, opercula and other bones; determining growth from length-height relationships, back calculation, production and productivity; estimation of population numbers, biomass and mortality; food analysis; assessment and management of fisheries, fish farming: principles and practice; farm design and construction, fish farm management; elements of fish nutrition; diseases

and breeding, overview of aquaculture in global food security.

BIO 4313 Soil Ecology**

Classification and characterization of soils. Chemical components and analysis of soils and plant tissue. Plant, soil and water relationships. Physical and chemical properties of soil. Detritus organisms. Cycling of mineral and nutrient pool.

ZOO 4201* Review Essay

Collection of literature on contemporary issues in Zoology from various sources and organisation of same in form of a scientific report.

ZOO 4202* Applied Entomology

Pre-requisite: ZOO 3305

Classification of economically important insects. Biology and ecology of insects of agricultural and medical importance. Control of insecticide usage and application in Nigeria. Alternatives to insecticides. Introduction to pest management. Short course on the application of entomological study to the solution of a major pest problem in Nigeria.

ZOO 4305* Nigerian Animals

General survey of local molluscs, arthropods and vertebrates.

ZOO 4313* Parasitology

Principles of parasitology and Zoo-economic effects. Introduction to parasitism: history and evolution of parasitism; types of parasitism, host-parasite relationships. Parasitic protozoa, trematodes, cestodes, nematodes, acanthocephalans, leeches and arthropods.

ZOO 4315* Wildlife Ecology and Conservation

Dynamics of wildlife population. Techniques of wildlife investigations. Principles of wildlife management. The wildlife resources of Nigeria: conservation policies, problems and prospects. World wildlife resources, differences in values, management philosophies and traditions.

ZOO 4699 Project**

A short supervised research project in any special area of Zoology conducted in the second semester of the final year. The findings are to be presented at a seminar in the Department and a comprehensive

written project report is to be submitted for assessment.

Key:

*** First Semester Course**

****Second Semester Course**