THE AFRICA CENTER OF EXCELLENCE IN PHYTOMEDICINE RESEARCH AND DEVELOPMENT (ACEPRD) UNIVERSITY OF JOS, NIGERIA

STUDENTS' HANDBOOK

August 2017

Introduction

The Africa Centre of Excellence in Phytomedicine Research and Development (ACEPRD) was established in 2014 through a World Bank alliance between the regional governments of West Africa, to harness the untapped potentials of collaboration among African researchers with the focus of creating a sustainable agenda for health innovation in Nigeria and Africa.

Phytomedicine is the key to providing significantly to the discovery of new medicines. This the centre will contribute through testing of medicinal herbs, microorganisms and fungi in our ecosystem for lead molecules, and creating a comprehensive regional and national repository that will serve as a research tool for the academia and industry in drug development.

The repository will provide equal access to scientific excellence and building capacity to support public health development in Africa by connecting, computing and biomedical software for phytomedicine data storage and information to pharmaceutical industries on lead compounds from microorganisms, fungi and plants. The centre will initiate the application of phytomedicine to boost the treatment of neglected tropical diseases using state-of-the-art technologies in less time and less cost.

Vision statement

Our vision is to provide specialization that addresses regional and national health challenges and strengthening capacity and application of phytomedicine research and development as well as knowledge dissemination.

Mission statement

To provide a level ground that will stimulate promising research and training, facilitating dissemination, storage and sharing of academic, socioeconomic and cultural development in Africa.

Academic Programs of ACEPRD

The ACEPRD supports the f following postgraduate programs within the university of Jos: Postgraduate Diploma (PGD); Masters (M. Sc.) and Masters /Doctor of Philosophy (MPhil/PhD) in Clinical Pharmacy and Pharmacy Practice. M.Sc. in Biotechnology; MPhil/PhD In Biotechnology; M.Sc. Bioinformatics and Genomics. These programs are domiciled in the various departments of the Faculty of Pharmacy, University of Jos.

Duration of Program

The postgraduate diploma programs run for a minimum of 12 months and a maximum of 18 months. The minimum duration of study for the M.Sc. program is usually12 months and a maximum of 24 months. For MPhil/ PhD, a minimum of 36 months, and maximum of 72 months are required for completion.

Admissions

Candidates that meet the minimum requirements as advertised by the university shall be shortlisted by the respective Departments and Faculties

The final selection of shortlisted candidates shall be carried out by the Admissions Committee comprising the following: Deputy Vice chancellor, Academic, Centre Leader, Dean of Faculty of Pharmaceutical Sciences Deputy Dean, HODs of Center Supported Programs, Dean of PG School or representative, Program Manager (Secretary).

Foreign students who may need to undergo language proficiency training can come 3 – 4 months earlier, attend and pay for it before they can continue the regular studies.

Available Facilities for Research: Central Laboratory

The Centre has a Central Lab which is equipped with state of the art machineries and facilities for bench work with competent staff who manage the laboratories.

Students can access laboratory facilities at the Centre which is situated at the University of Jos Senior Staff Quarters on Road 4, and also at the Faculty of Pharmaceutical Sciences.

Laboratory consumables are usually available at the various work stations and chemicals and reagents that are not available can be obtained on request. Such requests are normally made to the respective heads of departments who forward same to the Center for necessary actions.

The students that are sponsored by the Centre will not pay bench fees and they will be supported for their dissertation/thesis publications. This is only applicable for our regional and international students.

M.Sc./PhD Projects/Thesis Supervision

There should be more than one supervisor for both MSc/PhD Projects.

The departments will usually work together with the students to get appropriate supervisors. Project Title Approval is determined by a committee. Major corrections on a dissertation or thesis should be appropriately handled by the internal examiner and the department in conjunction with the supervisors to ensure that necessary corrections are effected.

Internships

All students enrolled in the Centre's programs will undertake a one-month internship program at an industry related environment; they will be expected to identify a challenge for which a solution can be proffered. This should take place at the end of the first semester, for Masters Students and after the first 6 Months, for PhD students. A supervisor is assigned to ensure that the goal for the internship arrangement is achieved.

The Centre shall provide transportation allowances and partial living expenses for students who have a place for internship in any specific location within Nigeria.

Publications

The Centre will support all students with publication fees in reputable journals but the students must acknowledge the Centre's support for the publication.

Studentship support

In order to ensure that students' welfare is adequately catered for, the Centre will provide a studentship support to qualified students with admission for the specified courses under the Centre's purview.

For Masters Students

For Regional Masters students, a return ticket is provided and support for tuition, transportation, living expense, accommodation and Laboratory consumables.

Payment is for the 1 year.

Students will have expected to submit their approved project proposals and justified budget approved by the primary supervisor.

At least 1 journal article published in an Elsevier/ Indexed journal

The same studentship Support applies for the national students but without the return ticket.

For Regional PhD

Regional PhD students, a return ticket is provided and support for tuition, transportation, living expense, accommodation and Laboratory consumables.

Payment is for the 3 years. Students will be expected to submit their approved project proposals and justified project budget approved by the primary supervisor. At least 2 journal publications in Elsevier/ Indexed journals are expected from each PhD student by the end of the program.

The same support is provided for National PhD students without the return ticket.

University Students Accommodation

Concerning the students' room rates, information can be obtained from the Students Affairs Unit. Currently, a fee of N90, 000.00 is charged per bed space in a room for 2 in the new Student hostel, Similarly, N45, 000.00 per bed space is charged for the Naraguta hostel and N13, 000.00 per bed space for the Abuja and Village hostels for 4 students per room.

Foreign students are usually accommodated in the New General hostel which is located adjacent to the Abuja Hostel in Naraguta. The rooms are self-contained apartments; with kitchen for student's self-catering In addition, Students are free to feed by themselves since there are restaurants available all over the hostels.

Student Affairs Post-Graduate Desk Officer

The Desk Officer's responsibility includes: - Providing Information Guide to students, arranging transportation from the Airport to the hostel and Accommodation especially for regional students and ensure availability of facilities such as rooms rates, electricity, water, kitchen etc.

TUITION FEES

Currently University of Jos charges N140, 000.00 for Masters Programme made up of N25, 000.00 acceptance fee and N115, 000.00 tuition

Ph.D. fees per session ranges between N235,000-250,000.00 for a specific program

LIFE ON CAMPUS

Library: Students must register with the Central Library on Main campus for access to journals and Research materials.

Sports

The students' recreational activities /Facilities on campus are located on the Naraguta Campus such as sports within or outside the different campuses.

Campus Map

To make life easy for students on campus, the following were noted to be further discussed upon: -There should be a Map Guide (students Hostels, market, banks, campuses etc).

Transportation (shuttle private cars/buses)
The Centres Administrative offices and special Laboratories are located at Road 4 Bauchi Road Staff quarters. Students will have Centres buses shuttle between the Faculty and the Centre at specific times for ease of movement.

Students Insurance
All registered students in the University pay an insurance fee and are registered under the students' insurance scheme.

Students Health
All students must register with the University Health Centre at the Naraguta Campus in order to access the health facilities on campus.

Students Visa/Resident Permit
Prospective foreign students are to be responsible for obtaining their resident permit/visas to Nigeria. Prospective students can check online requirements for stay in Nigeria at the website: *http://www.immigration.gov.ng/*. *For* **VISA renewal,** Students write to the Registrar of the University of Jos through the Centre Leader for renewal of visa, subsequently, the students Records/admissions officer will process the letter for the students.

Contact Information of Relevant Centre Staff and Faculty

Centre Leader: Prof John Aguyi

Program Manager: Mr Mark Kparmak

Deputy Centre Leader: Prof. Alemika

Dean Faculty of Pharmacy: Prof J. A. Kolawale

Deputy Dean, Pharmacy: Dr. N. C. Ngwuluka

Internship Coordinator: Dr Mrs Titi Johnson

Students' Welfare officer: Prof Patricia Lar

Foreign Students' Desk Officer: Students' Affairs

Animal House Manager:

Director Health Centre: Dr Mairiga

DETAILS OF THE CURRICULUM OF THE ACADEMIC PROGRAMS

POSTGRADUATE DIPLOMA (PGD) IN CLINICAL PHARMACY

Introduction

Pharmacy is a health profession which deals with the preparation, distribution, identification, storage, preservation, standardization, intended use and administration of drugs. The postgraduate diploma in Clinical Pharmacy provides advanced education in Clinical Pharmacy for registered pharmacists practising in various professional environments such as the community pharmacy, hospital pharmacy, public health pharmacy and the pharmaceutical industry.

Philosophy

The postgraduate diploma in Clinical Pharmacy will provide an opportunity for pharmacy graduates with a CGPA below the second class lower grade to enrol into the Masters' programme in clinical pharmacy and pharmacy practice.

AIM AND OBJECTIVES

a. To acquire the knowledge and skills needed to practice clinical pharmacy competently.
b. To equip students with the competence needed to design, implement, monitor and evaluate treatment plans for individual patients.
c. To enable students acquire knowledge of drug utilization in large populations.

MODE OF STUDY

The PGD programme will be studied on both full time and part-time basis. It will run for one academic session made up of two (2) semesters for full time students. Part time students will be expected to take the programme during two contact periods of not less than eight weeks each.

ADMISSION REQUIREMENTS

The requirements for admission as stated in the Postgraduate prospectus shall apply. Candidates must possess a Bachelor of Pharmacy degree or any other degree such as Pharm.D. from a recognized University, not below CGPA of 2.0.

COURSE REQUIREMENTS

To qualify for PGD in Clinical Pharmacy, the student must earn a minimum of 20 credit units as stated in the University of Jos Postgraduate School prospectus. This load will include a research project and all the compulsory courses.

LIST OF COURSES

Core Courses

Course Code	Course Title	CreditUnit
CLP 601	Pharmaceutical Care Planning	2 credits
CLP 602	Therapeutics	2 credits
CLP 603	Clinical Pharmacokinetics	2 credits
CLP 604	Pharmacy Management	2 credits
CLP 605	Clerkship	4 credits
CLP 606	Research Methods	2 credits
CLP 607	Project	4 credits
Total		**18 credits**

Electives

CLP 608	Community Pharmacy Practice	2 credits
CLP 609	Hospital Pharmacy Practice	2 credits
CLP 610	Pharmaceutical Public Health	2 credits
CLP 611	Pharmacy Administration	2 credits

COURSE DESCRIPTION

CLP 601 Pharmaceutical Care Planning (2 credits)

Overview of Pharmaceutical Care; Drug Information; Information Evaluation; Pharmaceutical care process in disease management; Communication skills; Pharmaceutical care competency; Patient information management.

CLP 602 Therapeutics (2 credits)

Disease characteristics (Definition, epidemiology, aetiology, pathophysiology and complications, physical examination, clinical manifestations, laboratory data, diagnosis and management) of selected diseases: Cardiovascular including High Blood Pressure (HBP), Congestive Heart Failure (HF), Ischemic Heart Disease (IHD), Cardiac arrhythmias, angina pectoris; Respiratory (Asthma, COPD and Pneumonia); Endocrine (DM); Infectious Diseases (Principles of chemotherapy, HIV, TB, Malaria).

Electives: Therapeutics of the CNS, GIT, Renal system, Hepatic system, Dermatology, Musculoskeletal system, Oncology and Haematology.

CLP 603 Clinical Pharmacokinetics (2 credits)

Overview of basic pharmacokinetics; clinical significance of pharmacokinetic parameters in drug products; dosing and monitoring of drug therapy for drugs with narrow therapeutic index; bioavailability and bioequivalence of drug products; biological and physico-chemical factors in bioavailability.

CLP 604 Pharmacy Management (2 credits)

Principles of management (Management tasks, roles, skills and tools, Modern management methods, Managerial functions, Time management, Financial Management, Managing change, Minds of a manager); Human Resource Management (Leadership styles, conflict resolution delegation of authorities, conducting meetings, Staff motivation factors).

CLP 605 Clerkship (4 credits)

History taking and physical examination techniques; medical terminologies; biochemical and pathological test methods and interpretation with relevance to therapeutics; Patient medication records, compilation and uses; Basic principles of communication, patient education/counselling and patient interviews.

Hands on training in the core therapeutic areas studied in CLP 602 (therapeutics), including oral case presentations.

PGD/CLP 606 Research Methods (2 credits)

Literature search; Critical evaluation; Review of literature; Experimental research designs; Proposal writing; Data collection and analysis; Report writing and presentation; Health services research. Review of types of data and variables; application data or variable types in the selection of appropriate statistical analysis; parametric and non-parametric analysis; Descriptive and inferential analysis.

CLP 607 Project (4 credits)

Each student must carry out research in the area of Clinical Pharmacy or Pharmacy Practice derived from empirical research obtained during clerkship. The research proposal will first be presented and defended at a seminar in the department. Topics that require adjustments will have to be amended after the seminar before the project commences. Submission of a thesis in relevant research areas will be after consultations with the assigned supervisor.

<u>Electives</u>

CLP 608 Community Pharmacy Practice (2 credits)

Chronic Disease Management, Patient assessment skills, Health Psychology; Evidence based therapeutics using OTCs; Rational selection and use of OTCs; Drug interactions, Health financing; Health economics; Business planning and development; Supply Chain Management; Monitoring and Evaluation; Health promotion: Risk analysis and management.

CLP 609 Hospital Pharmacy Practice (2 credits)

Medication review in co-morbidities and complicated patients; Critical/Logical thinking and decision making skills; comparative analysis; evidence synthesis; case presentations, Critical review and interpretation of laboratory data; Dose adjustments and calculations.

CLP 610 Pharmaceutical Public Health (2 credits)

Concept and evolution of Public Health; Primary Health Care; Health Promotion, Analysis and Implementation of health policies in specific settings; Principles of epidemiology; Introduction to Pharmacoepidemiology; study designs; comparative effectiveness; Pharmacovigilance, Fundamentals of project management; Supply chain management.

CLP 611 Pharmacy Administration (2 credits)

Comparative analysis of national and international health policies; Health policy formulation and the dynamics of prevailing socio-cultural and political system (Health policy and politics); Overview of pharmacy laws; Regulatory issues in pharmacy practice; morals, ethics and legislation in pharmacy practice; formulation and analysis of pharmacy laws; Business plan development, Business policy development, Health forecasting and budgeting; Industry analysis.

MASTER OF SCIENCE (M.Sc.) IN CLINICAL PHARMACY AND PHARMACY PRACTICE

INTRODUCTION

The Masters of Science in clinical pharmacy training programme focuses on the principle of drug therapy (including non-drug measures) as it relates to the safety, efficacy and rational use of drugs, for the management of different diseases. The students are expected to acquire skills needed to make wise judgement to improve patient therapeutic outcomes as they get involved in the patient care process. This, they would develop through the practice of pharmaceutical care as they go through extensive clinical ward rounds in accredited health institutions and community pharmacies. This will enhance their ability for drug therapy problem prevention, identification and resolution as well as enhance inter-professional collaboration in patient management with other members of the health care team.

PHILOSOPHY

The Masters programme will enable the candidates advance in their theoretical knowledge of the subject matter, research and practice which will enhance their understanding and application of how to critically evaluate disease conditions that will form the basis for appropriate drug therapy.

AIM AND OBJECTIVES

a. To enable student acquire advanced knowledge and skills in clinical pharmacy and practice
b. To enable students systematically design, implement, monitor and evaluate treatment plans for individual patients through the development of professional competence in the therapeutics of selected diseases, as well as good communication skills.
c. To develop competence in the utilization of medicines in large populations.
d. To acquaint candidates with requisite skills and knowledge to undertake original research in different aspects of pharmacy.

ADMISSION REQUIREMENTS

For the Master's degree in Clinical Pharmacy, a Bachelor of Pharmacy degree from a recognised University not below CGPA of 2.5 is required for admission. Candidates with PGD in Clinical Pharmacy and Pharmacy Practice from the University of Jos and other recognized Universities are eligible to apply.

COURSE REQUIREMENTS

The M.Sc. programme will be run for one academic session of two semesters. To qualify for M.Sc. in Clinical Pharmacy, the student must earn a minimum of 24 credit units.

MODE OF STUDY

The mode of study for M.Sc. Clinical Pharmacy is full time over a minimum of 12 months and a maximum of 24 months.

ASSESSMENT AND EVALUATION

Students will be assessed based on the regulations governing examinations and assessments of the school of the Postgraduate studies. Every enrolled student shall have attended a minimum of 75% of total lectures and 100% of Practical sessions to be eligible for examination.

Course evaluation shall consist of:

- Continuous assessment
- Seminars
- Written Examination
- A project report in an approved research area examined by an external examiner

LIST OF COURSES

Core Courses

CLP 701	Pharmaceutical Care Planning	2 credits
CLP 702	Therapeutics	6 credits
CLP 703	Clinical pharmacokinetics	2 credits
CLP 704	Pharmacy Management	2 credits
CLP 705	Clerkship	4 credits
CLP 706	Research Methods	2 credits
CLP 707	Seminar	2 credits
CLP 708	Dissertation	4 credits
TOTAL		**24 credits**

ELECTIVES

Community Pharmacy Practice

CLP 709	Chronic Disease Management	2 credits
CLP 710	Community Pharmacy Management	2 credits

Hospital Pharmacy Practice

CLP 711	Advanced Therapeutics and Care Planning	2 credits
CLP 712	Advanced Clinical Pharmacokinetics	2 credits

Pharmaceutical Public Health

CLP 713	Pharmacoepidemiology	2 credits
CLP 714	Project and supply Chain Management	2 credits

Pharmacy Administration

CLP 715	Health Policies, Pharmacy law and ethics	2 credits
CLP 716	Advanced Management	2 credits

COURSE DESCRIPTION

CLP 701 Pharmaceutical Care Planning (2 credits)

Overview of planning including levels of planning; Overview of Pharmaceutical Care; Drug Information; Information Evaluation; Application of the Pharmaceutical care process in disease management; medication review in comorbidity to identify, categorize, plan and document specific patient needs and action plans; Communication skills, Pharmaceutical care competency, Patient information management including patient education and counselling.

CLP 702 Therapeutics (6 credits)

Disease characteristics (Definition, epidemiology, aetiology, pathophysiology and complications, physical examination, clinical manifestations, laboratory data, diagnosis and management) of selected diseases: Cardiovascular including High Blood Pressure (HBP), Congestive Heart Failure (HF), Ischemic Heart Disease (IHD), Cardiac arrhythmias, angina pectoris; Respiratory (Asthma, COPD and Pneumonia); Endocrine; Infectious Diseases (Principles of chemotherapy, HIV, TB, Pneumonia, Malaria).

Therapeutics of the GIT, Renal system, Hepatic system, Dermatology, Musculoskeletal system, Oncology and Haematology and CNS.

Herbal Medicine therapeutics: Drug-herb/supplement Interactions and toxicity; myths, facts and theory; Alternative treatment of common diseases/disorders; herbs and supplements for environmental diseases; adaptogens; Botanical nutritional protocols for diseases; Alternative medicine practices; Differential diagnostics for the herbalist; Traditional medicine.

CLP 703 Clinical Pharmacokinetics (2 credits)

Overview of basic pharmacokinetics, clinical significance of pharmacokinetic parameters in drug products; dosing and monitoring of drug therapy for drugs with narrow therapeutic index; biological and physico-chemical factors in bioavailability.

CLP 704 Pharmacy Management (2 credits)

Principles of management (Management tasks, roles, skills and tools, Modern management methods, Managerial functions, Time management, Financial Management, Managing change, Minds of a manager); Human Resource Management (Leadership styles, conflict resolution delegation of authorities, conducting meetings, Staff motivation factors.); Drug management cycle: Selection, procurement, Quality assurance, Distribution, RDU, M &E, Policy and Legal framework. Health Policies: History of the evolution of health practice in Nigeria; National Health Policy; National Drug Policy, Essential Drug Program; Role of the pharmacist in health policy implementation.

CLP 705 Clerkship (4 credits)

History taking and physical examination techniques; medical terminologies; biochemical and pathological test methods and interpretation with relevance to therapeutics; Patient medication records, compilation and uses; Basic principles of communication, patient education/counselling and patient interviews.

Hands on training in the core therapeutic areas studied in CLP 602 (therapeutics), including oral case presentations.

CLP 706 Research Methods in Clinical Pharmacy (2 credits)

Literature search, critical evaluation review of literature; experimental research designs proposal writing; data collection and analysis; Report writing and presentation and health services research. Review of different types of data and variables, application of data or variable types in the selection of appropriate statistical analysis; parametric and non-parametric analysis; descriptive and inferential analysis; computer application in biostatistics.

PCP 707 Seminar (2 credits)

Research project proposal; selected topics on current trends in pharmacy practice; and any other relevant subject chosen by the student.

CLP 708 Project (4 credits)

Each student must carry out research in the area of Clinical Pharmacy or Pharmacy Practice derived from empirical research. The research proposal will first be presented and defended at a seminar in the department. Topics that require adjustments will have

to be amended after the seminar before the project commences. Submission of a thesis in relevant research areas will be after consultations with the assigned supervisor.

ELECTIVES

COMMUNITY PHARMACY PRACTICE

CLP 709 Chronic Disease Management (2 credits)
Patient assessment skills, health psychology; Medicines review and management; monitoring and evaluation of patient health outcomes, practice research; Evidence based therapeutics of OTCs, rational selection and use of OTCs and drug interactions.

CLP 710 Community Pharmacy Management (2 credits)
Entrepreneurship, health financing; health economics; Business planning and development; supply chain management; monitoring and evaluation; health promotion; risk analysis and management.

HOSPITAL PHARMACY PRACTICE

CLP 711 Advanced therapeutics and care planning (2 credits)
Complex medication needs; Medication review in co-morbidities and complicated patients; Critical/Logical thinking and decision making skills; comparative analysis; evidence synthesis; case presentations; health psychology; communication skills; resource management; health policies.

CLP 712 Advanced Clinical Pharmacokinetics (2 credits)
Critical review and interpretation of laboratory data; Dose adjustments and calculations; TDM; Drugs and diseases with special pharmacokinetic considerations; Drug management in special groups: paediatrics, geriatrics, obstetrics and gynaecology.

PHARMACEUTICAL PUBLIC HEALTH

CLP 713 Pharmacoepidemiology (2 credits)
Principles of epidemiology, pharmacoepidemiology; study designs; pharmacovigilance; concept and evolution of public health pharmacy; Primary Health Care; health promotion.

CLP 714 Project and Supply Chain Management (2 credits)

Fundamentals of project management; supply chain management; Planning and decision making; leadership, strategic management; monitoring and evaluation; risk analysis and management; analysis and Implementation of health policies in specific settings.

PHARMACY ADMINISTRATION

CLP 715 Health Policies, Pharmacy Law and Ethics (2 credits)

Overview of pharmacy laws; Regulatory issues in pharmacy practice; Morals, ethics and legislation in pharmacy practice; Formulation and analysis of pharmacy laws.
i) Comparative analysis of national and international health policies, ii) Health policy formulation and the dynamics of prevailing socio-cultural and political system (Health policy and politics), iii) Application of i and ii above in specific programmes.

CLP 716 Advanced Management (2 credits)

Business plan development; Health forecasting and budgeting; Project management; Strategic management in pharmacy practice; Corporate governance; Decision making (strategic and ethical); Strategic audit; Industry analysis.

DOCTOR OF PHILOSOPHY (M.PHIL./Ph.D.) IN CLINICAL PHARMACY

INTRODUCTION

The M.Phil./Ph.D. Clinical Pharmacy programme will provide students the opportunity to acquire advanced knowledge and skills needed to practice pharmacy competently. The students at the end of the programme should be specialists in various areas of Clinical Pharmacy and should be proficient in research, entrepreneurship and the practice of Pharmacy.

In addition to being proficient in research, candidates are required to acquire knowledge and skills in pedagogy, ICT and entrepreneurship.

PHILOSOPHY

The M.Phil./Ph.D. in Clinical Pharmacy involves theoretical, analytical and/or experimental investigations with the view to furthering knowledge and becoming specialists in various areas of clinical pharmacy which will contribute to knowledge in research, entrepreneurship and the practice of pharmacy.

AIM AND OBJECTIVES

a. To provide the requisite knowledge and skills needed for advanced clinical practice through the acquisition of right attitude and development of higher cognitive skills that enhance professional competence.
b. To develop self-directed study of relevant subject material to enable critical and analytical skills that will enable the student design and undertake original research in pharmacy practice i.e. to systematically plan and implement a research project.
c. To enable students to be intentional and reflective in the transfer of knowledge and practice of clinical pharmacy.

ADMISSION REQUIREMENTS

The general regulations governing Postgraduate admissions as stated in the Postgraduate studies prospectus shall apply.

The entry requirements for the M.Phil./Ph.D. degree programme either on full or part-time is a Master's degree in Clinical Pharmacy with a cumulative score average of at least 60% in the courses taken.

Candidates should submit a written proposal to the department for review and assignment of supervisor(s).

MODE OF STUDY

The study is offered on both full time and part-time basis. The duration of study for Ph.D. Clinical Pharmacy is a minimum of 36 and maximum of 60 calendar months for full time and a minimum of 48 and a maximum of 72 calendar months for part-time.

COURSE REQUIREMENTS

The School of Post-graduate Studies requires that some coursework be incorporated in the higher degree programme. The Department‘s regulations have been formulated to ensure that candidates for the degree have received a formal education in Clinical Pharmacy. This does not imply that all courses must be taken after admission to the department nor does it imply that these are the only courses to be taken by the students. They are meant as minimum guidelines and the assessment of previous education and graduate course load is in the first instance the responsibility of the supervisor and supervisory committee. Waiver of the minimum requirements can only be permitted after consideration by the department. The minimum credit load required to qualify a candidate for the M.Phil./Ph.D. degree is 24.

ASSESSMENT AND EVALUATION

Students will be assessed based on the regulations governing examinations and assessments of the school of the Postgraduate studies. Candidates who are deficient in some areas may be required to audit such courses with masters and or undergraduate students.

The degree will be awarded upon completion and submission of a thesis embodying the result of their original research in any chosen area of clinical pharmacy practice; this will be a record of critical review of existing knowledge that leads to novel findings in Clinical Pharmacy or Pharmacy Practice research and contributes significantly to knowledge.

LIST OF COURSES

Course Code	Course Title	Credit Unit
CLP 801	Research Methods	4 Credits
CLP 802	Seminar	8 Credits
CLP 803	Thesis	12 Credits
Total Departmental credits		**24 Credits**
SCI 802	Information Communication Technology (ICT)	2 Credits
EDU 913	Pedagogy	2 Credits
CES 903	Entrepreneurship	2 Credits
Total Credits		**30**

GENERAL REGULATIONS

OFFER AND ACCEPTANCE OF ADMISSION

Candidates offered admission shall be notified in writing by the Registrar,

The offer of admission made in accordance with Regulations of the university shall be provisional and individual candidates shall be required to:

a. Accept the offer of admission in writing on the prescribed forms and pay the prescribed acceptance fees, within the specified deadline, and
b. Comply with any other conditions that may be contained in the admission letter.

Any provisional offer of admission not accepted, as prescribed above shall be deemed to have lapsed at the expiration of the deadline.

LAPSED REGISTRATION

A postgraduate student's registration is deemed to have lapsed if he/she fails to:

1. Renew his/her registration in any session as prescribed under deferment above.
2. Submit himself/herself for examination at the expiration of the maximum period approved for the programme
3. Complete the requirements for the award of degree within the approved period for the programme.

WITHDRAWAL FROM PROGRAMME

1. Candidates that fail up to 50% of courses registered at the end of the first semester shall withdraw from the programme.
2. Candidates that failed some courses but passed up to 50% of all registered courses shall be allowed to re-sit the failed course(s).
3. Master's candidates that fail in the resit examination may apply to be assessed for the award of a PGD in Clinical Pharmacy practice.
4. PGD candidates who fail the resit examination shall be withdrawn from the programme.

FALSE DECLARATION

Any candidate found to have made a false declaration with regards to these regulations shall be asked to withdraw from the university.

a) The grading system and policy on students' probation, withdrawal and expulsion:

REQUIREMENTS FOR GRADUATION

Every enrolled student shall have attended a minimum of 75% of total lectures and 100% of Practical sessions to be eligible for examination. Course evaluation shall consist of the following:

a. Continuous assessment
b. Seminars
c. Written Examination
d. Dissertation

To successfully graduate, a candidate must pass the following:

1. All course work/seminar
2. Clinical rotation/Clerkship
3. A project report in an approved area

PASS MARK

4. Minimum pass mark in any course will be 50%.
5. Each course shall be examined to a maximum of 100 marks and all courses will be computed and assigned the appropriate Weighted Score Average (WSA)

LIST OF ACADEMIC STAFF

S/N	NAMES	RANK	QUALIFICATION	SPECIALIZATION
1.	Dayom, D. Wetkos	Lecturer I/Head of Dept.	B.Pharm. (1992); M.Sc. Pharmacology (Jos) (2001) Ph.D Clin Pharm (Benin) (2016)	Phytomedicines, pharmacotherapeutics, Malaria prevention and control
2.	Maxwel P. Dapar	Senior Lecturer	B.Pharm.(1995); M.Sc. Pharmacology (Jos) (2001); PGD. Research Methods (Aberdeen) (2009); Ph.D. (Aberdeen) (2012)	Drug Use Evaluation; Pharmacoepidemiology and Pharmacoeconomics.
3.	Steven S. Gyang	Professor	B.Sc. Pharmacy (ABU) (1975); M.Sc. Pharmacotheraeutics (North London) (1982), Ph.D. Pharmacology (Jos) (2009).	Pharmacotherapeutics of Chronic Illness.
4.	Noel N. Wannang	Professor	B.Pharm.; M.Sc. Pharmacology (Sokoto); Ph.D. Pharmacology (Zaria); M.Sc. Biochemistry (Kano); FPC Pharm.	Toxicology, Research methods in Pharmacy
5.	John C. Aguiyi	Professor	Pharm. D. (Siena) (1986) Ph.D Pharmacology (Jos) (1998)	Pharmacology and Biotechnology
6.	Nelson. A. Ochekpe	Professor	B. Pharm 1980; PhD. (Pharm Analysis)	Quality assurance; regulatory control
7.	Michael A. Adeniyi	Lecturer I	B.Pharm.(1986); PGDM (Jos) (1992); MBA (Jos) (1997); FPC Pharm. (1999)	Pharmacy management and Administration, Pharmacoeconomics
8.	Samuel B. Banwat	Lecturer I	B.Sc. Pharm (1979); M.Pharm (Bradford) (1989); PGDM (Jos) (1985); FPC Pharm.(2013)	Supply Chain Management; Drug Utilization Studies; Pharmacotherapeutics.

9.	Henry C. Ndukwe	Lecturer I	B.Pharm.(2003); M.Sc. Pharmacology (2009); M.Sc. Clinical Pharmacy (2011); FPC Pharm (2012). PhD (Otago) (2016)	Pharmacotherapeutics, Drug Use Evaluation.
10.	Omale, Simeon	Lecturer I	B. Pharm (1998): M Sc Pharmacology (2009): FCPharm (2013). PhD (2017)	Toxicology
11.	Dauda A. Dangiwa	Lecturer I	B.Pharm. (1987);Pharm. D. (Benin) (2005); M.Pharm. (Benin)(2015); FPC Pharm.(2012) PGD Psychology (2016)	Pharmaceutical care, Psychotherapeutics Pharmacoeconomics
12.	Benjamin N. Joseph	Lecturer I	B.Pharm.(2001); M.Sc. Clinical Pharmacy (2009); FPC Pharm (2013)	Pharmacotherapeutics, Adherence and Medication studies.
13.	Comfort N. Sariem	Lecturer I	B. Pharm (2003).; PGDE (Jos) (2010); M.Sc. Clinical Pharmacy (Lagos) (2011), FPC Pharm.(2013)	Behavioral Medicine, Clinical Pharmacokinetics, Public Health Pharmacy, Pharmacy Education
14.	Nanloh S. Jimam	Lecturer I	B.Pharm. (1999); M.Sc. Pharmacology (Jos).(2009)	Pharmaceutical Care of Infectious Tropical Diseases.
15.	David Shalkur	Lecturer II	B. Pharm. (1997); M. Pharm. (Nsukka). (2013)	Pharmacotherapeutics of Chronic Diseases, Pharmacy Practice

CURRICULUM FOR M.Sc. IN BIOTECHNOLOGY

1. INTRODUCTION

The M.Sc. Biotechnology programme sited in the Department of Pharmaceutics and Pharmaceutical Technology, Faculty of Pharmaceutics Sciences, is a multidisciplinary programme designed to prepare students for Leadership and careers in the biotechnology industries and pharmaceuticals and with knowledge and training in the scientific and practical aspects of Biotechnology. This advanced 'interdisciplinary' life science branch has a tremendous networking potential with modern cutting edge technology. This has given it a separate status in fundamental research as well as in modern industrial enterprise.

The programme draws its staff and courses from the Computer Sciences, plant sciences, pharmaceutical sciences, Agriculture, Medical Sciences, Arts and Education.

2. PHILOSOPHY

Biotechnology education plays a key role in the sustainable development and conservation of our planet. Our lives have been revolutionized by the creation of artificial life, stem cell research, gene mapping, biotechnology and bioinformatics, emanating from discoveries and advancements in the field of biotechnology. Consequently, we are witnessing the development of array of products in the area of healthcare, agriculture and environment. This programme is therefore designed to inculcate in the students the key knowledge requisite for the development and advancement of biotechnology in Nigeria.

3. AIM AND OBJECTIVES

The main objective of the programme is to train and produce specialized personnel to catalyze the momentum for the development and advancement of the science and practice of genetic engineering and biotechnology in Nigeria. These scientists will not only meet the need for personnel in research but also in the industry. The specific objectives of the programme include but are not limited to:

1. Familiarize students with the molecular and genetic tools used to analyze genomes, modify genetic material and techniques for modifying organisms to produce desired products.
2. Plan for and manage formulation and execution of protocols and innovative technologies and/or products.
3. Educate the students on basic philosophical and ethical considerations regarding genetic data, genetic manipulation and Biosafety issues, while exploring emerging technologies, innovations, and new products in the field of genomics and proteomics.

4. DEGREE TO BE AWARDED

The curriculum tracks; molecular Biotechnology, biomedical technologies and biopharmaceutical biotechnology give students flexibility to tailor their degree to their background, interest and career goals. These tracks, in combination with core courses, ensure that students get a uniquely broad exposure to the entire field of Biotechnology leading to degrees of M. Sc. Biotechnology. The M. Sc. Biotechnology programme consists of formal lectures, seminars and an original investigation in the laboratory which will form the subject of a dissertation.

5. ADMISSION REQUIREMENTS

The general regulations governing Postgraduate admissions detailed in the Postgraduate studies prospectus shall apply. To be eligible for the M.Sc. programme, a candidate shall possess at least a second class (Lower Division) degree in Botany or Biological Science (Plant Science) from an approved university with a minimum CGPA of 3.0/5.0. Candidates from Medical, Pharmaceutical, Veterinary, Agricultural and other relevant applied sciences are qualified to apply. Also a postgraduate diploma (PGD) in biotechnology may be considered for admission.

6. COURSE REQUIREMENTS

Candidates are admitted on full-time basis. Candidates are required to register a minimum of 40 credit units. Candidates who are not pharmacy graduates will be required to undertake pre-requisite courses from the undergraduate programme during the training programme. All students of this programme must give at least 2 seminars during the course of study and submit a research project in the relevant area of study chosen after consultation with the supervisor(s).

7. DURATION OF PROGRAMME

The programme shall run for a minimum of 12-18 months and a maximum of 24 months.

8. COURSE SCHEDULE

The following taught courses are available in the Department.

COURSE CODE	COURSE TITLE	COURSE CREDIT	SEMESTER		COURSE STATUS
			1st	2nd	
GEB 801	Introduction to Biotechnology and Bioinformatics	2	1st	-	Core
GEB 802	Concepts of Genetic Engineering	2	2nd	-	Core
GEB 803	Molecular Biology and cytogenetics	2	1st	-	Core
GEB 804	Environmental Biotechnology	2	-	2nd	Core
GEB 805	Research Method, Biostatistics and Biomathematics	2	1st		Core
GEB 806	Industrial and Agricultural Biotechnology	2	-	2nd	Core
GEB 807	Medical and Pharmaceutical Biotechnology	2	1st		Core
GEB 808	Laboratory Techniques in Biotechnology	2		2nd	Elective
GEB 809	Analytical Techniques for Biotechnology Products	2	1st		Elective
GEB 810	Enzyme Technology	2		2nd	Elective
GEB 811	Formulation/Processing of Biotechnology Products	2	1st		Elective
GEB 812	Graduate Seminar	2	1st	2nd	Core
GEB 813	Research Project	6	-	2nd	Core
CES 802	Advanced Entrepreneurship Studies	2	1st	2nd	Core
SCI 802	ICT and Research Methodology	2	1st	2nd	Core
EDU 913	Pedagogy	2	1st	2nd	Core

<u>Course Details:</u>

GEB 801: Introduction to Biotechnology and Bioinformatics (3 units)

- Definition of Biotechnology; Biotechnology in plant life; Biotechnology in world economy, future of biotechnology; Application of biotechnology to crop production, environmental management, industrial production, pollution and waste management, production of monoclonal antibodies and nucleic and probes, vaccines, new plant products, microbial biosynthesis and fermentation technology, bio-safety consideration.
- Advances in Plant Biotechnology - Cell land organism transformation, rapid micro propagation of plant materials, germplasm conservation and exchange, in vitro production of plant secondary metabolites, modern techniques in plant

biotechnology RFIP, PCR, RAPD, ELISA, MAB etc. bio-hazards and bio-safety, intellectual property rights (IOPR) and patents.

Approaches for modelling, strong, and analyzing biological systems:

- Biological and computational technologies and tools for collecting and strong genomic sequence data
- Genome sequence and protein families to include – DNA sequence databases, analysis and annotation, DNA Algorithms, protein sequence and structure databases, human genome project, sequence and structure alignment, string matching, suffix trees, sequence alignments using dynamic programming, optimization of multiple sequence alignments, evolutionary trees, map assembly, combinational approaches to sequencing and parallel processing for compute-intensive algorithms
- Applications in genomics and proteomics: discovery of evolutionary relationships, gene hunting, and microarray data analysis for disease diagnoses
- Clustering and classification, visualization techniques, unsupervised learning algorithm such as K-mean, will also be covered
- Real-world complexity of contemporary genomics and proteomics datasets, analytical and computational methods

  Ethical issues in contemporary genetics and patent law - The course covers principles of computational biology together with the range and impact of bioinformatics tools used in biological sciences. The syllabus includes: biological databases, pair-wise sequence alignment, sequence databases and multiple alignment profiles, gene finding, genomics and proteomics, and functional genomics. Lectures are supplemented by on-line exercises and tutorials and in-course.

GEB 802: Concepts of Genetic Engineering (2 units)

- Concepts of genetic engineering; Recombinant DNA technology, nucleic acid (DNA and RNA) extraction, restriction, mapping of plasmid DNA; Cloning of restriction fragment, gene cloning; Recombinant phage libraries, isolation of phage DNA from liquid culture, DNA sequencing; Transformation of cells and tissue; In vivo techniques of genetic manipulation. Gene splicing, genomic and cDNA libraries, screening methods for gene libraries. Southern and Northern blotting; chromosome walking; site specific mutagenesis; potentials of recombinant DNA technology; PCR; production of proteins; tissue culture techniques; transgenic organisms and gene therapies; restriction fragment length polymorphisms and disease detection (e.g. cystic fibrosis); human genome project; stem cells and therapeutic cloning; social considerations.

GEB 803: Molecular Biology and cytogenetics (2 units)

- Cell biology: Introduction to cell theory and cell structure; chemical composition of cell; types of cell organelles, structure and their functions; separation of cell organelles; transport properties of cell membrane; cell cycle; mitosis; molecular organization and functional role; meiosis, division and genetic consequences; comparison with mitosis; chromosomal aberrations, variation in chromosome number and structure; basis of heredity; chromosomes of bacteria; viruses and their functions. A study of the molecular organization and function of eukaryotic cell components, including membranes and membranous organelles, metabolic energy, cellular dynamics.
- Mandelian inheritance and DNA as a carrier of genetic information; double-helical structure of DNA; prokaryotic and eukaryotic chromosomal DNA; DNA replication in prokaryotes and eukaryotes. RNAs and their role in protein synthesis; RNA polymerase and transcription; regulation of transcription in prokaryotes; post transcriptional processing. The genetic code; structure of transfer RNA; ribosome structure; translational process, protein synthesis inhibitors; control of eukaryotic translation; post translational modification; regulation of gene expression. An outline of recombinant DNA methodology; nucleic acid fractionation and sequencing; potentials of recombinant DNA technology; DNA sequencing and genomics.
- Structure, conformation and other properties of proteins, with special reference to X-ray crystallography and other physical techniques. Polysaccharides, glycoprotein cell-wall structures, etc. and related biological macromolecules.
- Plant Molecular Genetics: Plant genomics, episomes, plasmids and transposomes. Agrobacterium tumifacients, symbiotic nitrogen fixation, tissue-specific expression of plant genes, restriction enzymes and ligases, DNA cloning, polymerase chain reaction, bioinformatics, plant growth regulators and tissue culture.
- Cell/chromosomes and nuclear division; Mutation, causes and types; Quantitative inheritance, structure; Morphology and behavior of chromosomes; Chromosomal aberrations; Polyploidy; Chemistry of gene, developmental genetics and variable gene activity; Linkage and crossing over; Sex determination; Sex inheritance.

GEB 804: Environmental Biotechnology (2 units)

- Concept of environmental biotechnology; Bioremediation and phyto-remediation; Pollution: types, cause and control; Sewage-dispersal, treatment (activation sludge and design), microflora of water and sewage; Wastes sauces and characteristics of waste water-biochemical oxygen demand and chemical oxygen demand; Biogas technology: needs and principles; Water sanitation,

indicators and analysis; The oxidation pond, oxidation lagoon maturation or stabilization pond; Biodegradation - biodegradation of xenobiotic chemicals.

GEB 805: Research Method, Biostatistics and Biomathematics (2 units)

- Sampling, Data Collection and Frequency Distribution - Sample and sampling, Sampling design and Sample selection, Sample size and calculation, qualitative and quantitative data collection methods, Frequency distribution, polygons and curves, histograms; measures of central tendency, arithmetic mean; measures of dispersion, range, mean deviation, standard deviation and error, coefficient of variation; probability distributions, normal, binomial and Poisson distributions; hypothesis testing, statistical decision, one and two-sample hypothesis, Z-and other tests; simple linear regression and correlation; analysis of variance; nonparametric and distribution free tests..
- Data Analysis and Computer Application - Quantitative data analysis (descriptive analysis, inferential analysis – chi square, t-test, ANOVA, correlation, 95% confidence interval, Standard error, Odds ratio, p-value, Regression analysis), Data entry and Data analysis using computer software (SPSS, STATA, SAS, Epi info etc)
- Biomathematics, algebraic expressions, polynomials, factoring of polynomials, fractional expressions; the binomial theorem and its use; use of differentiation and integration highs and lows, a special kind of point, optimization, functions in reality, the exponential growth curve, the definite integral, properties and applications of definite integration. Principles of calculus, trigonometry and algebra of importance for biotechnology.

GEB 806: Industrial and Agricultural Biotechnology (2 units)

- Definition
- Application in plant breeding: the genetic basis for plant improvement, variation, gene and gene action, mutagenic inheritance, epistasis, quantitative inheritance, linkages and its consequences, hybrid vigour
- Methods in plant breeding - Mutation breeding, plat tissue culture and transformation techniques; Principles of plant breeding; Aim of plant breeding, reproductive biology of higher plants, methods of vegetative propagation, physiochemical factors of the environment and their effects on successful plant breeding, population types and plant breeding; Apoximes; inbreeding.
- Principles and practice of tissue culture and functions of meristems, organ differentiation and chimeras in tissue culture. Tissue culture in agro-based industries. Totipotency and somatoplasmic hybridization technique and plant improvement.

- Cell technology; Biotechnology enterprise/fundamentals; Enzymes engineering (bio-catalytic design of industrial biotechnology); Metabolic engineering: (Analysis and design-metabolic network in micro-organisms); Bioscience fundamentals; Processing engineering fundamentals; Bioprocess engineering; Fermentation technology - ethanol and related fermentations; fermentation for the production of pharmaceutical products including antibiotics, hormones vaccines, etc.; production of other chemicals of industrial importance; microbial metal leaching; industrial production processes. Protein engineering and molecular modelling.
- Study concept of ethical/legal consideration in biotechnology; International codes and declarations; Intellectual property and patent legal in biotechnology; Ethics in post-genomic era: Genetic testing, genetic screening, biotechnology regulatory bodies.

GEB 807: Medical and Pharmaceutical Biotechnology (2 units)

Introduction to bimolecular; Biophysical chemistry to understand interactions; Host-parasite relationship (between commensals and human bodies); Colonization by microbes; Study of microbial diseases (STDs interaction diseases, zooses), food-borne diseases, water-borne diseases etc.; Life-cycle and molecular biology; Chemotherapy and antibiotics; Application of biotechnology in medical fields; Biology of immune system; Toxins; Introduction to bio-warfare's.

GEB 808: Laboratory Techniques in Biotechnology (2 units)

Introduction to bio-safety measures for research and development environment in biotechnology; Current good practices in manufacturing, laboratories packaging and distribution of biotechnology products; Chemical safety consideration in biologics

GEB 809: Analytical Techniques for Biotechnology Products (2 units)

UV and Visible absorption spectroscopy; IR and Raman spectroscopy; Centrifugation; Determination of structure of proteins; Electrophoresis; Mass spectrometry

GEB 810: Enzyme Technology (2 units)

Introduction to enzyme technology: screening, processing, improvement etc; Carbohydrate structure and enzymology; Living structure and enzymology; other substrates and enzymes - Protein structure and stability, Sources of industrial enzymes (natural and recombinants), Large scale industrial enzyme production, Methods in enzyme engineering, Metabolic engineering, Enzymes in fiber based industry, fuel, food, microbial.

GEB 811: Formulation/Processing of Biotechnology Products (2 units)

Unit processing of solid and liquid products in biotechnology; Particle size reduction from solids: dissolution/dispersion in liquid/semi solid media; Matter engineering: centrifugation, granulation, compression, filtration, etc of products

GEB 812: Graduate Seminar (2 units)

A seminar on an approved topic in biotechnology

GEB 813: Research Project (6 units)

Each student is expected to carry out independent on original research. The topic must be approved by the university senate, dean of the faculty, head of department or the supervisor. The research work must be carried out under the supervision of a qualified staff member. Such study is to be based on the application of biotechnology in a chosen area.

SCI 802: ICT and Research Methodology (2 units)

This course should cover essentials of spreadsheets, internet technology, statistical packages, precision and accuracy of estimates, principles of scientific research, concepts of hypotheses, formulation and testing, organization of research and report writing.

CES 802: Advanced Entrepreneurship Studies (2 units)

The course will cover business environment, general management, financial management, entrepreneurship development, feasibility studies, marketing and managerial problem solving.

EDU 913: Pedagogy (2 units)

9. EXAMINATION

The existing postgraduate regulations shall apply. Candidates are required to appear for an examination at the end of the course. Candidates who failed to obtain 50% pass mark may be required to repeat the examination within 3 months from the date of the first examination. If a candidate fails again, he/she may be asked to withdraw from the programme, if the course failed is a core course. Candidates taking pre-requisite undergraduate courses are required to appear for examination to obtain at least 50% pass mark.

At least a written paper in each course taken with a minimum of 50% pass and a satisfactory grade in both **GEB 812** (Graduate Seminar), as well as in **GEB 813** (project report) which is subsequently followed by an oral examination.

10. REQUIREMENT FOR GRADUATION

Candidates must register and pass a minimum of 24 credits including all core courses and at least two electives, to be eligible for graduation with the M.Sc. Genetic Engineering and Biotechnology. The WSA of the students will be based on all core courses and one elective totaling 24 credits. Students must register and pass **CES 802, SCI 802** and **EDU 913** but this will not count in the calculation of their WSA. Additionally, it is expected that the students must undertake a critical analysis and review of 10 peer reviewed articles from learned journals in the field of interest as determined by the supervisor.

11. STAFF LIST

Name	Qualification	Rank	Area of Specialization
Prof. T. Ishaya	B.Sc., M.Sc., Ph.D	Professor	ICT
Prof. J. C. Aguiyi	B.Sc., M.Sc., Ph.D	Professor	Biotech and Genetic Engineering
Prof. C. Esimore	B.Sc., M.Sc., Ph.D	Professor	Mol. Microbiology
Dr. P. Wuyep	B.Sc., M.Sc., Ph.D	Reader	Biotech and Genetic Engineering
Dr. R. Kutshik	B. Sc., M.Sc., Ph.D	Lecturer II	Molecular Biology/Biochemistry
Prof. C. I. C. Ogbonna	B.Sc., M.Sc., Ph.D	Professor	Fermentation Technology
Prof. B. Ajala	B.Sc., M.Sc., Ph.D	Professor	Cytogenetics
Prof. B. M. Matur	B.Sc., M.Sc., Ph.D	Professor	Parasitology
Prof. P. M. Lar	B.Sc., M.Sc., Ph.D	Professor	Medical Microbiology
Prof. F. A. C. Onwuliri	B.Sc., M.Sc., Ph.D	Professor	Microbiology & Biochemistry
Prof. M. A. Ibrahim	B.Sc., M.Sc., Ph.D	Professor	Pharm. Technology
Prof. I. S. Okafor	B.Sc., M.Sc., Ph.D	Professor	Pharm Tech/Biostatistics
Prof. I. J. Ogaji	B.Sc., M.Sc., Ph.D	Professor	Pharm Tech/Res Method
P. O. Olorunfemi	B.Pharm., M.Sc	Reader	Pharm. Microbiology
Dr. N. C. Ngwuluka	B.Pharm., M.Sc., Ph.D	Reader	Pharm. Technology
Dr. E. I. Nep	B.Pharm., M.Sc., Ph.D	Senior Lecturer	“
Dr. E. A. Onwuliri	B.Pharm., M.Sc., Ph.D	Senior Lecturer	Pharm. Microbiology
Dr. J. D. Audu-Peter	B.Pharm., M.Sc., Ph.D	Reader	Pharm. Technology

CURRICULUM FOR M.Phil./Ph.D. IN BIOTECHNOLOGY

1. INTRODUCTION

The M.Phil./Ph.D. Biotechnology programme sited in the Department of Pharmaceutics and Pharmaceutical Technology, Faculty of Pharmaceutics Sciences, is a multidisciplinary programme designed to equip students with knowledge and training in the scientific and practical aspects of Biotechnology and also to prepare them for Leadership and careers in the biotechnology and pharmaceutical industries.

2. PHILOSOPHY

Economic growth and development in Nigeria continues to be propelled by growth in agriculture and allied sectors. However, over time, changed circumstances, declining total factor productivity, rising unemployment, fast degrading natural resources etc., have led to declining agricultural growth. Since a large proportion of our population is dependent on agriculture, it is pertinent to ensure their economic security under changing competitive globalized environment. This can only be done through technological advancements and competent human resource to serve the needs of highly receptive farming communities. Thus to put the country's agricultural growth on fast track, development of cutting edge technologies and competent human resource is the need of the hour.

Biotechnology is a relatively new cutting edge science which incorporates principles of biological, physical and chemical sciences. It is based on techniques involving genes, genomes, nucleic acids and other related macro and micro bio-molecules. Advances so far made in this discipline have already found valuable applications in quantity and quality of production and productivity, processing and value addition of produce of agriculture and allied sectors.

The tremendous impetus received for biotechnological research and education has been due to its direct impact on human and animal health, agricultural productivity and environment issues. Due to increasing acceptance of genetically modified foods and agricultural produce, big Pharmaceutical and Agro-business companies are investing huge funds in the biotechnology R&D sector. To sustain these efforts, biotechnology R&D as well as education sector needs high quality human resources for inventing and creating value added products through intervention of biotechnology.

3. AIM AND OBJECTIVES

The Aim of the program is to offer students a coherent profession-oriented education within the field of Biotechnology. On completion of the program, students will be able to perform research at all levels and analyse and solve questions and problems within the broad field of Biotechnology.

The objectives of the programme are to give students:

a. A theoretical and method-oriented knowledge of biotechnology within the fields of domestic animals and livestock, plants, human, microorganisms or biochemistry.
b. The knowledge to analyse complex biotechnology problems of importance for the biotechnological industry, governmental agencies or educational programmes.
c. The ability to communicate knowledge at all levels, and a broad knowledge of the interactions between biotechnology and industry, society and the environment.
d. The knowledge, skills and competences to pursue careers in the biotechnology and pharmaceutical industries.

4. DEGREES TO BE AWARDED

The curriculum tracks; molecular Biotechnology, biomedical technologies and biopharmaceutical biotechnology give students flexibility to tailor their degree to their background, interest and career goals. These tracks, in combination with core courses, ensure that students get a uniquely broad exposure to the entire field of Biotechnology leading to degrees of M.Phil./Ph.D. Biotechnology. The M.Phil./Ph.D. Biotechnology programme is a step by step quest in providing answers to a research question in which the candidate is expected to make an original contribution to knowledge and enhance research skills.

5. ADMISSION REQUIREMENTS

This is opened to candidates with M. Sc. or M.Phil. degree in Biotechnology from an approved institution with at least a WSA of 60% or its equivalent. In addition, the general regulations governing Postgraduate admissions detailed in the Postgraduate studies prospectus shall apply.

6. COURSE DURATION

The programme shall run for a minimum of 36 months and a maximum of 50 months.

7. COURSE REQUIREMENTS

Candidates may be admitted on part-time or full-time basis. The M.Phil./Ph.D. degree will be awarded mainly on the basis of a satisfactory thesis. Candidates with M.Sc. in Plant Science & Technology, Botany or Chemistry will be required to take necessary courses along with M.Sc. students.

Candidates registered for the M.Phil./Ph.D. degree will attend and participate in workshops on research techniques and methodology in his/her field of specialization offered in the Department and approved by his/her supervisor.

8. COURSE SCHEDULE

The existing postgraduate regulations shall apply, which in addition to requirement in section 5, includes that candidates are to register and Pass the following taught courses in the first year.

GEB 802: Advanced Concepts of Genetic Engineering (2 units)
GEB 805: Research Method, Biostatistics and Biomathematics (2 units)
SCI 802: ICT and Research Methodology (2 credits)
CES 902: Issues in Entrepreneurship and Innovation (2 credits)
EDU 913: Pedagogy (2 credits)

COURSE DETAILS:

GEB 802: Advanced Concepts of Genetic Engineering (2 units)

Concepts of genetic engineering; Recombinant DNA technology, nucleic acid (DNA and RNA) extraction, restriction, mapping of plasmid DNA; Cloning of restriction fragment, gene cloning; Recombinant phage libraries, isolation of phage DNA from liquid culture, DNA sequencing; Transformation of cells and tissue; In vivo techniques of genetic manipulation. Gene splicing, genomic and cDNA libraries, screening methods for gene libraries. Southern and Northern blotting; chromosome walking; site specific mutagenesis; potentials of recombinant DNA technology; PCR; production of proteins; tissue culture techniques; transgenic organisms and gene therapies; restriction fragment length polymorphisms and disease detection (e.g. cystic fibrosis); human genome project; stem cells and therapeutic cloning; social considerations.

GEB 805: Research Method, Biostatistics and Biomathematics (2 units)

- Sampling, Data Collection and Frequency Distribution - Sample and sampling, Sampling design and Sample selection, Sample size and calculation, qualitative and quantitative data collection methods, Frequency distribution, polygons and curves, histograms; measures of central tendency, arithmetic mean; measures of dispersion, range, mean deviation, standard deviation and error, coefficient of variation; probability distributions, normal, binomial and Poisson distributions; hypothesis testing, statistical decision, one and two-sample hypothesis, Z-and other tests; simple linear regression and correlation; analysis of variance; nonparametric and distribution free tests..
- Data Analysis and Computer Application - Quantitative data analysis (descriptive analysis, inferential analysis – chi square, t-test, ANOVA, correlation, 95% confidence interval, Standard error, Odds ratio, p-value, Regression analysis), Data entry and Data analysis using computer software (SPSS, STATA, SAS, Epi info etc)
- Biomathematics, algebraic expressions, polynomials, factoring of polynomials, fractional expressions; the binomial theorem and its use; use of differentiation

and integration highs and lows, a special kind of point, optimization, functions in reality, the exponential growth curve, the definite integral, properties and applications of definite integration. Principles of calculus, trigonometry and algebra of importance for biotechnology.

SCI 802: ICT and Research Methodology (2 units)

This course should cover essentials of spreadsheets, internet technology, statistical packages, precision and accuracy of estimates, principles of scientific research, concepts of hypotheses, formulation and testing, organization of research and report writing.

CES 902: Issues in Entrepreneurship (2 units)

The course will cover business environment, general management, financial management, entrepreneurship development, feasibility studies, marketing and managerial problem solving.

EDU 913: Pedagogy (2 units)

9. EXAMINATIONS

The existing postgraduate regulations shall apply. In addition, candidates who have deficiencies shall be required to sit for examinations in the deficient courses drawn from the M.Sc. Biotechnology course schedule. In addition, candidates must register and pass **GEB 802** and **GEB 805**. The pass mark shall be 50% but the scores shall not count towards the final grading for the award of the Ph.D. degree. Candidates are expected to meet all other requirements for the award of the Ph.D. degree of the University of Jos. These include, students must register and pass **CES 802**, **SCI 802** and **EDU 913.**

A thesis will be defended before a senate approved panel of examiners which must include at least one external examiner as under the M. Sc. degree above. A candidate may be referred in all or parts of the examination by the panel of examiners. One re-examination will be allowed. Format of thesis presentation, number of copies and other details are as contained in the University of Jos regulations on postgraduate studies.

STAFF LIST

Name	Qualifications	Rank	Area of Specialization
Prof. T. Ishaya	B.Sc., M.Sc., Ph.D.	Professor	ICT
Prof. J. C. Aguiyi	B. Pharm., M.Sc., Ph.D.	Professor	Biotech. and Genetic Engineering
Prof. C. Esimore	B.Sc., M.Sc., Ph.D.	Professor	Molecular Microbiology
Dr. P. Wuyep	B.Sc., M.Sc., Ph.D.	Reader	Biotech and Genetic Engineering
Prof. C. I. C. Ogbonna	B.Sc., M.Sc., Ph.D.	Professor	Fermentation Technology
Prof. B. Ajala	B.Sc., M.Sc., Ph.D.	Professor	Cytogenetics
Prof. B. M. Matur	B.Sc., M.Sc., Ph.D.	Professor	Parasitology
Prof. P. M. Lar	B.Sc., M.Sc., Ph.D.	Professor	Medical Microbiology
Prof. F. A. C. Onwuliri	B.Sc., M.Sc., Ph.D.	Professor	Microbiology & Biochemistry
Prof. M. A. Ibrahim	B.Sc., M.Sc., Ph.D.	Professor	Pharm. Technology
Prof. I. S. Okafor	B. Pharm., M.Pharm., Ph.D.	Professor	“
Prof. I. J. Ogaji	B. Pharm., M.Sc., Ph.D.	Professor	“
Dr. N. C. Ngwuluka	B. Pharm., M.Sc., Ph.D.	Reader	Pharm. Technology
Dr. E. I. Nep	B. Pharm., M.Sc., Ph.D.	Senior Lecturer	“
Dr. E. A. Onwuliri	B. Pharm., M.Sc., Ph.D.	Senior Lecturer	Pharm. Microbiology
Dr. J. D. Audu-Peter	B. Pharm., M.Sc., Ph.D.	Reader	Pharm. Technology

CURRICULUM ON M.Sc. BIOINFORMATICS AND GENOMICS

Introduction

Bioinformatics and Genomics, an intersection of biology and computer science provides the researcher with a better understanding of the molecular processes affecting human health and diseases. The application of high thorough-put technologies in medical genomics yields complex, multi-dimensional data sets that describe in detail individual cells and how these differ between patients.

Philosophy

This programme provides theoretical and practical expertise in the field for integrative analysis for genomics data to answer specific biological questions. It also creates advanced algorithms computational and statistical techniques and theory to solve formal and practical problems rising form the management and analysis of biological data.

In summary, it is a multi-disciplinary programme with the aim of connecting computing, biology and medicine for diagnostic testing, and management to provide better patient care, education, research and administration.

Objectives

At the end of the training, students will acquire skills in the use and development of modern informatics technologies in the health sciences and the ability to integrate such knowledge into solving their peculiar problems.

Degree to be Awarded

M.Sc. Bioinformatics & Genomics

The M.Sc. programme will strictly be full-time. To qualify for award of M.Sc., the candidate must earn a minimum of 24 credit units including all core courses.

Admission requirements

All candidates for admission into one-year full time programme in Bioinformatics and Genomics must possess at least a second class degree (lower division) in biological sciences, informatics, medicine, Pharmacy, nursing, and computer sciences from any National Universities Commission (NUC) approved universities.

Courses

The courses are drawn from biology, mathematics, statistics and computer sciences to offer modern integrative training across genomics and bioinformatics with opportunities to specialize in experimental and computational disciplines. The courses are listed below details:

Course Code	Course Title	Credit
	CORE COURSES	
	(1st Semester)	
BIG 601	Biostatistics and Research Methods	2
BIG 602	Advanced Modelling for Biology	2
BIG 605	Principles of genetics	2
BIG 607	Programming in python and Optimisation	2
BIG 608	Databases	2
	(2nd Semester)	
BIG 609	Systems biology approaches and Genomic data analysis	2
BIG 610	Drug Molecular Modelling	2
BIG 611	Seminar and Directed Reading	2
BIG 612	Research project	6
	Total	22
	ELECTIVES	
	(1st Semester)	
BIG 603	Molecular biology	2
	(2nd Semester)	
BIG 604	Datamining	2
BIG 606	Biomolecules	2

COURSE CONTENT

BIG 601 Biostatistics and Research Methods 2 Credits

Sampling, qualitative and quantitative data collection and frequency distribution. Data analysis and Computer applications. Introduction and objectives of research. Hypothesis setting, literature review, Critical appraisal and Meta-analysis. Ethical issues in research.

BIG 602 Advanced Modelling for Biology 2 credits

First order ordinary differential equations, population models , exponential growth, the logistic equation, application to study a fish stocks applications to study of speciation, stability, systems of the order differential equations, application to study of predator prey interactions, phase plane analysis, applications to study of the ozone

layer, stability in non-liner systems, application to study of restoration ecology, matrices, application to study Australian predators, advection, diffusion, pattern formation. Includes 6 hours of tutorial for students to gain expertise in applying mathematical modelling techniques to practical problems.
Construction of mathematical models with first order and second orders differential equations. Partial differentiation and conservation principles. Models concerned with population dynamics, epidemiology and dispersive phenomena. Applications of mathematical modelling to bioinformatics and system's biology. Includes 10 hours of tutorials for students to gain expertise in applying mathematical modelling methodologies to practical problems.

BIG 603 Molecular Biology 2 credits

An overview of the cell at the molecular level, including metabolism, protein function, DNA and chromosomes, gene regulation, membrane structure and function organenelles, cell communications, cell survival and cell death, cell division, genomics, proteomics, and DNA technology. Analysis of recent papers from the scientific literature in this filed.

BIG 604 Datamining 2 credits

Applications and principles of data mining: knowledge representation; rule leaning; statistical modelling; decision tree induction; association rule mining; linear models; lazy learning; clustering; cost-sensitive learning; input transformations; boosting; using unlabeled data; applications and tools. Includes 10 hours of laboratory practical's for students to gain hands-on expertise. Summarization methods for data. Concept of probability and conditional probability. Baye's Theorem. Random variables and probability distributions. Population, variability and sampling. Statistical inference, including interval estimation and hypothesis testing. Regression. Applications of statistics to bioinformatics. Includes 10 hours' laboratory practical for students to gain hands-on training.

BIG 605 Principles of genetics 2 credits

Principles and practical significance of the elements of modern genetics, including medlian genetics and extensions, linkage and napping, quantitative and population genetics, and introduction to genomics and genome analysis. Applications to bioinformatics. Includes 18 hours of laboratory practical for students to gain hands-on expertise.

BIG 606 Biomolecules 2 credits

An introduction to the chemistry of biomolecules: sterioisomers, the role of water as biological constituent of life, the importance of pH to biological systems, hydrogen bonding, structure and function of amino acids, protein structure and function,

enzymes and enzyme kinetics, carbohydrates and polysaccharides. Applications to bioinformatics. Includes 12 hours of laboratory practical to gain hands – on expertise.

BIG 607 Programming and Optimisation 2 credits

Introduces the fundamental principles of object-oriented programming using the python language: variables, expressions and statement; functions, conditionals and recursion; fruitful functions and iteration; strings and list; tuples and dictionaries; files and exceptions; classes and objects. Includes 10 hours of laboratory practicals for students to gain expertise. Teaches how to design and implement in python of bioinformatics algorithms of moderate complexity, and to develop computational solutions to problems in bioinformatics, for example, using algorithms for sorting and searching for analysing trees and graphs; using dynamic programming; and using regular expressions.

Optimisation techniques from several fields, including linear programming, mixed integer programming, dynamic programming, constraint programming, greedy algorithms, local search and evolutionary computation.

BIG 608 Databases 2 credits

Databases and Database management systems. Data models. The relational model Database processing using SQL relational language. Programmed access to databases. Security and sharing of data. Directories. Includes 10 hours of laboratory practical for students to gain hands-on expertise.

BIG 609 Systems biology approaches and genomic data analysis 2 credits

Data gathering and analysis used in the fields of systems biology, illustrated by practical examples. Topics will include analysis of genome sequence data, annotation of genome sequences, analysis of functional genomics data such a s SNP data, metabolome modelling, analysis of regulatory networks, analysis of interactome, epigenetic and knockout/knockdown data. Includes 12 hours of laboratory practical's for students to gain hands-on expertise.

Introduction to theory and application of bioinformatics analyses of genome sequence data, including sequence analysis, identification of sequence motifs. Sequence ontology, sequence alignment, phylogenetic, enzyme and pathway analysis, protein folding, protein structure modelling. Includes 12 hours of laboratory practical for students to gain hands-on expertise.

BIG 610 Drug Molecular Modelling 2 credits

Construction of molecular models. Molecular mechanics. Molecular orbital theory. Drug-receptor theories. Hard-and software molecular graphics. Applications and products.

BIG 611 Seminar and Directed Reading 2 credits

Seminar presentations on assigned topics of research interest and presentations based on the research project.

BIG 612 Research Project 6 credits

Supervised investigation of a research problem to reinforce the principles taught in the various courses.

LIST OF POSTGRADUATE TEACHING STAFF

NAME	QUALIFICATIONS	RANK	AREA OF SPECIALIZATION
J. A. Kolawole	B. Pharm. M.Sc. Ph.D	Professor	Pharmaceutical Analysis; Pharmacokinetics, Drug design
J. C. Aguiyi	B.Pharm, M.Sc., Ph.D.	Professor	Pharmacology, Genetic engineering
T. Ishaya	B.Sc., M.Sc., Ph.D	Professor	ICT
M. A. Ibrahim	B.Pharm, M.Sc., Ph.D.	Professor	Pharmaceutical technology
I. S. Okafor	B.Pharm, M.Sc., Ph.D.	Professor	Pharmaceutical technology
P. A. Wuyep	B.Sc., M.Sc., Ph.D.	Reader	Biotech & genetic Engineering
J. O. Onah	B.Sc. M.Sc. Ph.D	Professor	Pharmaceutical Analysis and Phytochemistry
N. A. Ochekpe	B.Sc. Pharm. Ph.D	Professor	Pharmaceutical Analysis; Drug stability, Natural Products.
T. E. Alemika	B.Sc. PGDE, M.Sc. Ph.D	Professor	Phytochemistry, Natural Products, Pharmaceutical Analysis
E.O. Afolabi	B.Sc. M.Sc. PGDE, Ph.D	Reader	Organic Synthesis, Drug Design
P. O. Odumosu	B.Pharm., M.Sc., Ph.D.	Senior Lecturer	Pharmaceutical Analysis, Phytochemistry
N. C. Ngwuluka	B.Pharm., M.Sc., Ph.D.	Senior Lecturer	Pharmaceutical technology
O. C. Kolawole	B.Pharm, M.Sc.		Drug design

CURRICULUM ON M.Sc. IN PHARMACEUTICAL MICROBIOLOGY

1. Preamble

This programme is designed to give advanced training in the subject area of Pharmaceutical Microbiology. This is essential for attaining higher level of expertise in specialized areas within the broader discipline of Pharmaceutical Microbiology, and also to meet the manpower needs of academia and research institutions, drug industry and drug quality control. Knowledgeable personnel in this field are in high demand.

2. Degree to be awarded

The programme is structured to provide a range of courses and challenges in Pharmaceutical Microbiology leading to degrees of M. Sc. Pharmaceutical Microbiology. The programme consists of formal lectures, seminars and an original investigation in the laboratory which will form the subject of a dissertation. The programme will run for a minimum of 18 months and a maximum of 30 months.

3. Admission requirements

The general regulations governing Postgraduate admissions detailed in the Postgraduate studies prospectus shall apply. Postgraduate study in Pharmaceutical Microbiology shall be open to candidates with first degree in Pharmacy, Microbiology or closely related discipline. Candidates who are not Pharmacists may be required to take some undergraduate Pharmacy courses as deemed necessary. To be eligible for the M.Sc. programme, a candidate must have graduated with a CGPA of at least 2.4 or its equivalent in the Bachelors degree programme.

4. Course requirements

The M. Sc. programme is of two semesters of continuous residency. Candidates are required to register a minimum of 26 credits and a maximum of 30 credit units. All students must give at least two seminars during the course of study and submit a dissertation based on a research project which area is chosen in consultation with the supervisor(s). To qualify for an award, a candidate must earn a minimum of 24 credits in addition to passing all the core courses.

5. Course Schedule

The following taught courses are available in the Department.

CORE COURSES

PMB 801 Microbial Structure and Physiology (3 Units)
PMB 802 Bacteria Genetics (3 Units)
PMB 803 Analytical Methods in Microbiology (2 Units)

PMB 804 Ecology of microorganisms as it affects the Pharmaceutical industry and hospital environments. (2 Units)
PMB 805 Advanced concepts and recent advances on sterilization, disinfection and preservation. (2 Units)
PMB 806 Sterile Preparation, factory and hospital hygiene (2 Units)
PMB 807 Chemotherapy, chemotherapeutic agents and bacterial drug resistance (2 Units)
PMB 808 Research Method and Biostatistics (2 Units)
PMB 811 Seminar/Tutorials (2 Units)
PMB 812 Research Project (6 Units)

Electives
PMB 809 Microbial Biotechnology (2 Units)
PMB 810 Immunology and immunological products (2 Units)
CES 802 Issues in Entrepreneurship (2 credits)

COURSE DETAILS

PMB 801: Microbial Structure and Physiology (3 Units)
Bacterial Classification History, Fundamental and new approaches to bacterial taxonomy and nomenclature, Bacterial phylogeny, Characteristic of major families of bacteria (Gram positive, Gram negative, Mycobacteria, Actinomycetes, Rickettsia, Chlamydia, Mycoplama)
Molecular Structure and Composition of Bacterial Cell Structure, physiology and functions of bacterial Cell wall, Cell membrane, Capsule, Spore, Flagella, Pili, Ribosome and other cellular structures.
Bacterial Growth in individual cell, Batch and Continuous growth, Kinetics of bacterial growth, growth curve, Synchronization Procedures, Measurement of bacterial growth**.**
Bacterial Metabolism Transport mechanism of nutrients, Respiration and fermentation, Major energy yielding pathways and their significance, Electron transport chain, Oxidative and substrate level phosphorylation, Different types of fermentative pathways.
Fungi: Structure and Physiology Classification, Morphological and growth characteristics, Reproduction and life cycle of Yeast and Mold.
Viruses: Structure, Classification and Replication Structure of viruses, Classification schemes of bacteriophages and viruses, Replication, Enumeration, Culture and recovery of Viruses.

PMB 802: Bacteria Genetics (3 Units)

Overview: Molecular Structure and Function of DNA and RNA of Prokaryotic and Eukaryotic Cells.

DNA Transfer in Procaryote: Types and Functions of Plasmids, Recombination (Homologous and Non-homologous), Transformation, Transduction (Generalized and Specialized), Conjugations, Genetic mapping.

DNA Replication Molecular Mechanism of DNA Replication in prokaryotic and eukaryotic cells, Enzymes involved in DNA replication: Topoisomerases, Helicases, DNA polymerases; Proofreading, post-replicational modification of DNA.

Transcription Role of RNA in transcription, Mechanism of RNA Synthesis, Initiation and Termination of Transcription, Post transcription modification of the RNA.

Protein Biosynthesis Role of RNA in protein biosynthesis, Translation of the genetic code, Steps involved in translation (Initiation, Elongation and Termination).

Regulation of the Gene Expression Mechanism of Lac-operon and trp Operon: Gene expression in Eucaryotic cells.

Mutations Types of Mutation, Mutagenic agents: Physical, Chemical and Biological, Detection of Mutants.

Recombinant DNA Technology Principle, procedures and mechanism of gene cloning, Formation of the Recombinant DNA, cloning vectors, Expression vectors, Detection of the recombinant DNA, Cloning of the eucaryotic genes in bacteria.

Molecular Techniques Extraction and purification of plasmid and chromosomal DNA and RNA, Principle, procedures and applications of PCR based techniques and blotting techniques in microbiology: Plasmid Profiling, PCR, Real time PCR, RFLP, DNA Finger printing, Western blotting, Southern blotting and Northern Blotting, PFGE, Gene Sequencing

PMB 803 Analytical Methods in Microbiology (2 Units)

Traditional and automated rapid methods for species identification – genotyping, chemotaxonomy, electrophoretic protein typing, etc.; Microbiological assays; Microbiological standard methods of the pharmacopoeia.

PMB 804 Ecology of microorganisms as it affects the Pharmaceutical industry and hospital environments. (2 Units)

Sources of contamination: atmosphere, water, raw materials, people or personnel and clothing; manufacturing plant, packaging, buildings, hospital environment. Types of organisms involved. The significance of contamination; Microbial spoilage; Preservation of pharmaceutical products; Evaluation of microbial stability of formulations; preservation of multiphase systems.

PMB 805 Advanced concepts and recent advances on sterilization, disinfection and preservation. (2 Units)

Kinetics of thermal destruction or inactivation – time survivor curves, D-value, Z-value, inactivation factor, F-value, sterilization protocols. Autoclaves – vacuum-purged, ballasted, etc. economics of continuous autoclaves; gaseous sterilization; ionizing radiation. Recent advances in disinfection and assessment of chemical disinfectants, methods of disinfectant evaluation. Aerial disinfection and factors affecting air disinfection; design and assessment of microbiological quality of sterile (aseptic) rooms.

PMB 806 Sterile Preparation, factory and hospital hygiene (2 Units)

Composition, characters, large scale production, large volume sterile solutions, parenteral admixtures, convenience parenteral, radiopharmaceuticals, ophthalmic preparations; good manufacturing practice; general aspects the manufacture of sterile products; contamination control, design of clean areas; surfaces, pipes and ducts, etc. equipment, personnel.

PMB 807 Chemotherapy, chemotherapeutic agents, and Bacterial drug resistance (2 Units)

Selectivity of action of drugs as he basis of chemotherapy; general principles governing selectivity of action of chemotherapeutic agents; antibacterial, antifungal and antiviral drugs – their properties, classification and mechanisms of action, interferon; Types and Mechanisms of resistance; Genetic and biochemical basis of resistance. evolution of resistance determinants; evolution of plasmid and physical sizing of plasmid; Control of resistance.

PMB 808 Research Method and Biostatistics (2 Units)

Research Methods

Introduction and objectives of Research, Criteria of good research question, Research Process, Priority Areas, Objectives/ Hypothesis setting, Literature Review, Critical Appraisal and Meta-analysis, Ethical Issues in Research: Salient point of the International guidelines, General ethical principles, Informed Consent

Scientific Writing: Paper writing, Proposal writing, Thesis/report writing (Seminar presentations)**.**

Biostatistics

Sampling, Data Collection and Frequency Distribution: Sample and Sampling, Sampling design and Sample selection, Sample size and calculation, Qualitative and quantitative data collection methods, Frequency Distribution.

Data Analysis and Computer Application: Quantitative data analysis (descriptive analysis, inferential analysis- chi square, t-test, ANOVA, co-relation, 95% CI,

Standard error, Odds ratio, p-value, Regression analysis), Data entry and Data analysis using computer software (SPSS, STATA, SAS, Epi Info etc.)

PMB 809 Microbial Biotechnology (2 Units)

Overview: History, Scope, Areas, Application, Risk and Hazards of Biotechnology; Gene Transfer Techniques: Vector Gene transfer (based on Ti and Ri Plasmid, intermediate and helper plasmid, binary vector, virus as vector), Gene transfer techniques using *Agrobacterium;* Animal Cell Culture Technology, Plant cell and Tissue Culture Technology.

Fermentation Technology

Fermentation Processes and Culture improvement: Introduction to industrial fermentation and bioprocess technology, Microorganisms of industrial importance, search and selection of new culture of industrial microorganisms. Strain development and Improvement of Industrial microorganisms. Contamination control mechanisms in the Fermentation Industry. Maintenance, quality control and purity of preserved stock culture. Management of culture collection; Bioengineering and Bioreactor Design: Basic concepts in Bioengineering; dimensions and units, equilibrium and rate, coefficients for mass and heat transfer, volumetric coefficient and mass balance. Bioreactor Design Fundamentals; introduction, volumetric oxygen transfer coefficient, aeration and agitation, scale up, impeller design, effect of stirring, sparging and other parameter, different type of bioreactors, operation and control of bioreactor system. Batch, fed-batch and continuous culture, solid state and submerged fermentation. Sterilization for fermentation.

Production, Purifications and Product recovery of Physiologically active substances by fermentation: Antibiotics (Penicillin, Streptomycin, Polypeptide antibiotics), enzyme inhibitors, Beta carotene, Riboflavin and vitamin B12, amino acids (glutamic acid, leucine, isoleucine, lysine, tryptophan, nucleic acids) Organic acids (Citric acid, Acetic acid, Lactic acid, Kojic acid), Enzymes (Amylase, Protease, Chitinase, Pectinase), Alcoholic beverages (Wine, Beer, Distilled liquor), Fermented Foods (Kinema, Soya sauce, NATO, Kimchi) and Single Cell Protein.

Production and product recovery of: Human growth hormones, interferon, and insulin. Types, Applications and Production Process of Microbial bio-fertilizers. Types, Applications and Production procedures of Bacterial, Fungal and Viral Biopesticides and Bioherbicides.

PMB 810 Immunology and immunological products (2 Units)

Overview of Immunology.

Introduction to Immunology and Serology Cells and Tissues of the Immune System; Primary & Secondary Lymph Organs.

Innate Immunity: Development and function, Non-specific Defence against the Microbial Infections, Physical and Anatomical Barriers, Cells and Secretary molecules, serum components, Phagocytosis.

Complements Mechanism and significance of Classical and alternative pathways of complement system; ***Antigens*** Types and properties; Conditions of the antigenicity;

Antibodies and immunoglobulins Molecular structure, Classes, subclasses, types, subtypes, Genetic basis of the Diversity; ***Antigen-antibody Reactions*** Principle of Antigen-Antibody reactions *in vitro* Precipitation: Types, principle, procedures and applications; Agglutination: Types, principle, procedures and applications; Immunochemical methods: Antibodies Labelling Methods Immunofluorescence assay, ELISA, Radioimmunoassay

Immunoelectrophoresis, and Immuno Blotting Methods.

Cells and Tissues of Adaptive Immunity Types, development and function, MHC, antigen processing, presentation and receptors.

Cell Mediated Immunity T cell development, activation, effector mechanisms; B cell activation, Antibody production, immunological tolerance, Assays used to measure CMI

Humoral Immune Responses Effector Mechanisms; Cell Signalling: Intra- & Extra-cellular mediators and pathways, Cytokines; TLR.

Immune Disorders Hypersensitivity, Autoimmunity & Allergy; Congenital & Acquired Immunodeficiency's.

Vaccines History of vaccine and vaccination, Types of vaccines- killed organism as a vaccine, attenuated vaccine, methods of attenuation, experimental vaccines, Overview of vaccine production techniques, Quality and Efficacy, Adverse events following immunization, Recent Developments and Prospects.

PMB 811 Seminar (2 Units)

PMB 812 Research Project (6 Units)

CES 802: Issues in Entrepreneurship (2 units)

The course will cover business environment, general management, financial management, entrepreneurship development, feasibility studies, marketing and managerial problem solving.

6. Examinations

At least a written paper in each course taken with a minimum of 50% pass and a satisfactory grade in both PMB 605 (Seminar) as well as in PMB 606 (project report) which is subsequently followed by an oral examination.

STAFF LIST

NAME	QUALIFIC.	RANK	AREA OF SPECIALISATION
J. O. Ehinmidu	Ph.D.	Professor	Chemical antimicrobial agents, microbial fermentation
P. O. Olorunfemi	M.Sc.	Reader	Sterile products, Antibiotics and Drug resistance
E. A. Onwuliri	Ph.D.	Senior Lecturer	Antibacterial agents
I. J. Ogaji	Ph.D.	Professor	Research methodology
I. S. Okafor	Ph.D.	Professor	Biostatistics
N. C. Ngwuluka	Ph.D.	Senior Lecturer	Biotechnology and polymers
E. I. Nep	Ph.D.	Senior Lecturer	Biotechnology and polymers
P.M. Lar	Ph.D.	Professor	Microbiology
J. Mawak	Ph.D.	Professor	Microbiology
G. M. Ayanbimpe	Ph.D.	Professor	Mycology

CURRICULUM ON M.PHIL./PH.D. IN PHARMACEUTICAL MICROBIOLOGY

1. Preamble

This programme is designed to give advanced training in the subject area of Pharmaceutical Microbiology. This is essential for attaining higher level of expertise in specialized areas within the broader discipline of Pharmaceutical Microbiology, and also to meet the manpower needs of academia and research institutions, drug industry and drug quality control. Knowledgeable personnel in this field are in high demand.

2. Degree to be awarded

The programme is structured to provide a range of courses and challenges in Pharmaceutical Microbiology leading to degrees of Ph.D. Pharmaceutical Microbiology. The programme is a step by step quest in providing answers to a research question in which the candidate is expected to make an original contribution to knowledge and enhance research skills.

3. Admission requirements

The general regulations governing Postgraduate admissions detailed in the Postgraduate studies prospectus shall apply. Postgraduate study in Pharmaceutical Microbiology shall be open to candidates with first degree in Pharmacy, Microbiology or closely related discipline. Candidates who are not Pharmacists may be required to take some undergraduate Pharmacy courses as deemed necessary. The M.Phil./Ph.D. Degree is opened to candidates with M. Sc. or M.Phil. degree in Pharmaceutical Microbiology from an approved institution with at least a CSA of 60% or its equivalent.

4. Course requirements

The requirements for the M.Phil./Ph.D. degree is as contained in the Postgraduate School regulations and include a successful completion of a thesis adjudged to show originality and of significant contribution to knowledge.

5. Course Schedule

The existing postgraduate regulations shall apply, which in addition to requirement in section 5, includes that candidates are to register and Pass the following taught courses.

PMB 901-
PMB 902
PMB 903
PMB 904
SCI 802: ICT and Research Methodology (2 credits)
CES 902: Issues in Entrepreneurship (2 credits)
EDU 913: Pedagogy (2 credits)

Course details

SCI 802: ICT and Research Methodology (2 units)

This course should cover essentials of spreadsheets, internet technology, statistical packages, precision and accuracy of estimates, principles of scientific research, concepts of hypotheses, formulation and testing, organization of research and report writing.

CES 902: Issues in Entrepreneurship (2 units)

The course will cover business environment, general management, financial management, entrepreneurship development, feasibility studies, marketing and managerial problem solving.

EDU 913: Pedagogy (2 units)

6. Examinations

A thesis will be defended before a senate approved panel of examiners which must include at least one external examiner. A candidate may be referred in all or parts of the examination by the panel of examiners. One re-examination will be allowed. Format of thesis presentation, number of copies and other details are as contained in the University of Jos regulations on postgraduate studies.

STAFF LIST

NAME	QUALIFIC.	RANK	AREA OF SPECIALISATION
J. O. Ehinmidu	Ph.D.	Professor	Chemical antimicrobial agents, microbial fermentation
P. O. Olorunfemi	M.Sc.	Reader	Sterile products, Antibiotics and Drug resistance
E. A. Onwuliri	Ph.D.	Senior Lecturer	Antibacterial agents
I. J. Ogaji	Ph.D.	Professor	Research methodology
I. S. Okafor	Ph.D.	Professor	Biostatistics
N. C. Ngwuluka	Ph.D.	Senior Lecturer	Biotechnology and polymers
E. I. Nep	Ph.D.	Senior Lecturer	Biotechnology and polymers
P. M. Lar	Ph.D.	Professor	Microbiology
J. Mawak	Ph.D.	Professor	Microbiology
G. M. Ayanbimpe	Ph.D.	Professor	Mycology

CURRICULUM ON MASTER OF SCIENCE (M.Sc.) DEGREE PROGRAMME IN PHARMACOGNOSY

Introduction

The department of Pharmacognosy shall offer courses leading to the award of a Master of Science (M.Sc.) degree in Pharmacognosy.

Philosophy

Pharmacognosy may be defined as the study of the physical, chemical, biochemical and biological properties of drugs, drug substances or potential drugs or drug substances of natural origin as well as the search for new drugs from natural sources.
The Philosophy of Master of Science (M.Sc.) degree in Pharmacognosy borders on establishment of standards to ensure quality Pharmacognosy education and Traditional Medicine Practice.

Aims and Objectives

a) To provide in the theory and encourage creative thinking and research in Pharmacognosy
b) To provide high level and specialized manpower for Pharmaceutical Research Institutions, Institutions of Higher Learning and Quality Control Industries.
c) To provide knowledge in Traditional Medicine Practice and its application in healthcare system.

Entry Qualifications

Holders of the following qualification may be considered for admission into the M.Sc. (Pharmacognosy) programme of the University

a) First degree in Pharmacy of the University of Jos or any other recognized University with at least a CGPA of 2.40
b) First degree in Plant Science & Technology, Chemistry, Botany, Biochemistry, Microbiology and other related disciplines of the University of Jos or any other recognized University with pass at not less than Second Class Honours

Duration of the Course

The M.Sc. (Pharmacognosy) shall be run over three semesters of six months each or 18 calendar months.

Mode of Study

The M.Sc. (Pharmacognosy) degree programme shall be run on full-time basis. The programme consists of course work and dissertation. Candidates are required to register a minimum of 24 credit units. Candidates who are not pharmacy graduates

will be required to undertake pre-requisite courses from the undergraduate programme during the training programme.

Examination

The pass mark for each course work is 50%. Candidates shall be assessed by:

a) Continuous assessments which shall comprise of written and oral tests, attendance and participation in class work, paper presentation and group works which shall account for 40%
b) End of semester examinations which shall account for 60% to make up for the maximum score of 100%.
c) Project

Candidates who fail to obtain 50% pass mark in any subject shall be required to repeat the examination within 3 months from the date of the first examination. A candidate who fails a second time will be asked to withdraw from the programme. Candidates taking pre-requisite undergraduate courses are required to obtain at least 50% pass mark in those courses.

LIST OF COURSES

Core Courses

Course code	Course Title	Credit Hour
	1st Semester	
PCG 801	Biogenesis of Plant metabolites	3
PCG 802	Advanced Techniques in Microscopy	4 (3+1)
PCG 803	Taxonomy of medicinal plants	3 (2+1)
PCG 804	Herbal Medicine and Diseases	2
PCG 805	Traditional Medicine Practice	4 (3+1)
PCG 806	Research Methods in Pharmacognosy	3
Electives		
PCL 802	Instrumental and Experimental Procedures	2
PCH 803	Spectroscopic methods of Analysis	2
2nd Semester		
PCG 807	Standardization of Herbal Medicine Preparations	2
PCG 808	Pharmaceutical Necessities	2
PCG 809	Biotechnology for Medicinal plants	4 (3+1)
PCG 810	Biodiversity & Conservation of Medicinal plants	3 (2+1)
PCG 811	Separation Techniques	3 (2+1)

PCG 801	Seminar	2

3rd Semester

PCG 802	Research Project	6

COURSE DESCRIPTIONS:

Core Courses

PCG 801 Biogenesis of Plant metabolites 3 Credits

Significance of study, unit transformations, sources of energy and enzymes. Shikimic acid and pathways leading to aromatic natural products. Mevalonic acid and pathways leading to isopreniods, inter-relationship of various terperniods.

PCG 802 Advanced Techniques in Microscopy 4 Credits

Advanced Microscopy and histological techniques. Staining technique, Electron microscopy, Quantitative microscopy and photomicrography.

PCG 803 Taxonomy of Medicinal Plant 3 Credits

Classical plant taxonomy, use of flora and keys for identification, chemotaxonomy, Chemotaxonomic groups and markers. Preparation of herbarium specimens.

PCG 804 Herbal Medicines and Diseases 2 Credits

Contributions of plants and plant products in the treatment of diseases. Cardiovascular, antineoplastic, antimicrobial, antimalarial, anti HIV/AIDS, antifertility and antihypertensive drugs of plant origin.

PCG 805 Traditional Medicine Practice 4 Credits

Concept in Traditional Medicine Practice (TMP) - Definitions and historical review, Traditional Medicine (TM) Methods. Integration/co-recognition of TM and Orthodox medicine. Significance of Traditional medicine in relation to Health Care Delivery. Traditional Medicine Practice (TMP) in Nigeria, China, India, Australia, Europe and USA.

PCG 807 Standardization of Herbal Medicine Preparations 2 Credits

Prospects and problems of standardization of herbal remedies. Stability studies of herbal formulations. General methods of evaluation of vegetable, microbial and animal drugs. Basic information and standards with respect to potency, identity, safety, purity, etc. of herbal medicine preparations.

PCG 808 Pharmaceutical Necessities 2 Credits

Pharmacognostic profiles of various groups of pharmaceutical necessities obtained from plants (diluents/disintegrants, adhesives/binders, flavouring, colouring and sweetening agents etc.)

PCG 809 Biotechnology for Medicinal plants 4 Credits

Plant cell and tissue culture. Micro propagation and production of secondary metabolites. Advances in microspore culture technology. Biosynthetic potential of hairy roots for production of new natural products.

PCG 810 Biodiversity & Conservation of Medicinal plants 2 Credits

Components of biodiversity (Ecosystem, Species, and Genetic biodiversity's). Loss of biodiversity. Biodiversity monitoring, conservation and preservation.

PCG 811 Separation Techniques 3 Credits

Principles and applications of separation techniques in medicinal plant research.

PCG 806 Research Methods in Pharmacognosy 3 Credits

Literature search; Critical evaluation; review of literature; Experimental research designs; Proposal writing; Data collection and analysis; Report writing and presentation. Analytical tools of statistics that are applicable to pharmacognosy research such as parametric and non-parametric analysis, descriptive and inferential analysis; computer application in biostatistics.

PCG 801 Seminar/Tutorial 2 Credits

PCG 802 Research Project in area of choice in Pharmacognosy 6 Credits

Elective courses

PCL 802: Instrumental's and experimental procedures 2 Credits

Using both intact and insolated tissue preparations, students will perform a variety of experiments of types commonly encountered in applied pharmacology and in pharmacological research. These will include; animal handling; body fluid sampling; anaesthesia; administration of drugs; elementary surgical and dissection techniques; blood pressure recording; Pharmacokinetics or oral and intravenous

routes of drug administration, experiments with heart muscle and nervous tissue. Basic chromatographic procedures. Emphasis will be on the use of modern techniques as they are applied to Pharmacological problems. The course will include practical instruction and experiences in such techniques as spectrophotometry; spectrofluorimetry; chromatography; subcellular fractionation; gel electrophoresis; Electron microscopy; iontophoresis microelectrode techniques. Ligand binding and Radioactivity, Radioimmunoassay techniques.

PCH 803 Spectroscopic methods of Analysis 2 Credits

The theory and applications of classical instrumental techniques. Chromatography; Spectrophotometric methods; Absorption and Emission spectrophotometry; NMR; IR; MS, Joint application of spectroscopic methods in structure elucidation. Radiopharmacy; Quantitative and qualitative analysis of various classes of drugs; alkaloids, steroids, hormones, antibiotics.

ACADEMIC STAFF LIST

S/N	NAME	QUALIFICATION	RANK	RESEARCH INTEREST
1	O. O. Kunle	B.Pharm. (1985), M.Sc. Pharmacognosy (1991), Ph.D Pharmacognosy(2001)	Reader (visiting)	Traditional Medicine, Instrumentation, Medicinal and Aromatic plants
2	J. C. Aguiyi	Pharm. D. (1986), Ph.D Pharmacology (1998)	Prof.	Biotechnology & Genetic Engineering
3	J. A. Kolawole	B.Pharm(1983), M.Sc. Pharm. Chem. (1988), Ph.D Pharm.& Med. Chem. (1996)	Prof.	Drug Analysis and Design, Medicinal Chemistry
4	J. O. Onah	B.Sc. Biochemistry (1976), M.Sc. Pharm. Chem. (1982), Ph.D Pharm. Chem. (1997)	Prof.	Medicinal Chemistry
5	M.O. Uguru	B.Sc Pharmacology (1978), M.Sc. Pharmacology (1983), Ph.D Pharmacology (1996), M.Sc. Herbalism (2005)	Prof.	General Pharmacology Ethno-Pharmacology
6	P. O. Olorunfemi	B.Sc. Pharm. (1980), M.Sc. Pharm. Microbiology (1985)	Reader	Pharmaceutical microbiology
7	T. E. Alemika	B.Sc. Chemistry (1982), M.Sc. Pharm. Chem. (1987), PGDip. Ed. (1990), Ph.D Pharm. Chem. (2001)	Prof.	Medicinal Chemistry; Drug Analysis & Phytochemistry.
8	S. S. Gyang	B.Sc. Pharm (1975), M.Sc. Pharmacotherapeutics (1982), Ph.D Pharmacology (2009)	Prof.	Ethnopharmacology & Pharmacotherapeutics

9	N. A. Ochekpe	B.Sc. Pharm.(1980), Ph.D (1988)	Prof.	Aromatic Plant Chemistry and Instrumentation
10	N. N. Wannang	B.Pharm(1992), M.sc. (1998), Ph.D Pharmacology (2004), M.Sc. Biochemistry (2006)	Prof.	Toxicology,ethnopharmacology
11	A. Abubakar	B.Sc ;M.Sc (2004), Ph.D (2011)	SNR. Lecturer (Visiting)	Phytochemistry and Traditional medicine
12	D. G. Dafam	B.Pharm (2001), M.Sc Pharm (2011),	Ag.HOD/Lect.I	Natural Poducts Research and Phytomedicine
13	P. N. Olotu	B.Pharm (2006), M.Sc Pharm (2013)	Lecturer I	Natural Products and Traditional Medicine

LIST OF TECHNICAL STAFF

S/NO	NAMES	RANK
1	T.P.Yakubu	Chief Technologist
2	J.N. Damos	Principal Technologist
3	H.H.Tukur	Technologist II
6	D.Monday	Senior Assistant Technologist
4	L. Bako	Laboratory Technician
5	R. E. Masok	Laboratory Technician

LIST OF ADMINISTRATIVE STAFF

S/NO	NAMES	RANK
1	Joshua Gwomson	Chief Secretarial Assistant
2	Benkyes Domna Fantur	Assistant Chief Clerical Officer

MASTER OF PHILOSOPHY AND DOCTOR OF PHILOSOPHY (M.PHIL./PH.D.) DEGREE PROGRAMME IN PHARMACOGNOSY

Introduction

The department of Pharmacognosy shall offer courses leading to the award of a Doctor of Philosophy (Ph.D.) degree in Pharmacognosy. Candidates who wish to pursue the programme leading to the award of Ph.D. must first apply for and be admitted into the M.Phil./Ph.D. programme. After successfully completing course on methodology and presenting an acceptable proposal at the faculty level.

Philosophy

Pharmacognosy may be defined as the study of the physical, chemical, biochemical and biological properties of drugs, drug substances or potential drugs or drug substances of natural origin as well as the search for new drugs from natural sources.
The Philosophy of Doctor of Philosophy (Ph.D.) degree in Pharmacognosy borders on establishment of standards to ensure quality Pharmacognosy education and Traditional Medicine Practice.

Aim and Objectives

a) To provide opportunity for training and research in Pharmacognosy in order to support the present health system in meeting her health needs, especially in rural areas.
b) To produce experts and specialized personnel equipped with adequate knowledge to explore and exploit Nigerian plants for possible use in medicine which will in turn result in integrating Herbal Medicine into Modern Medicine.

Entry Qualification

Candidates must possess a M.Sc. degree in Pharmacognosy with at least a CGPA of 3.5 or 60% in the courses taken at the Master's Degree level, to be considered for admission onto M Phil/Ph.D. (Pharmacognosy) programme of the University.

Duration of Programme

The M.Phil./Ph.D. (Pharmacognosy) has a minimum of thirty-six (36) calendar months (full time) and a maximum of sixty (60) calendar months (part time).

Mode of Study

Candidates may be admitted on part-time or full-time basis. The Ph.D. Degree will be awarded after a satisfactory defense of Ph.D. thesis. Candidates registered for the Ph.D. degree will attend and participate in workshops on research techniques and

methodology in the field of specialization offered in the Department and approved by his/her supervisor.

Examination

The existing postgraduate regulations shall apply,

An M.Sc. candidate from Plant Science & Technology, Botany, Chemistry, Biochemistry and Microbiology will be required to sit for examinations in the deficient courses. The pass mark shall be 50% but the scores shall not count towards the final grading for the award of the Ph.D. degree. Candidates are expected to meet all other requirements for the award of the Ph.D. degree of the University of Jos.

List of Courses

Course code	Course Title	Credit Hour
SCI 802	Information Communication Technology (ICT)	2
EDU 913	Pedagogy	3
CES 902	Entrepreneurship	2
PCG 901	Traditional medicine practice	3
PCG 902	Pharmaceutical necessities	2
PCG 903	Evaluation of crude drugs of Natural origin	3
PCG 904	Research Methods in Pharmacognosy	3
PCG 905	Seminar	9
PCG 906	Project	12

ACADEMIC STAFF LIST

S/N	NAME	QUALIFICATION	RANK	RESEARCH INTEREST
1	O.O. Kunle	B.Pharm. (1985), M.Sc. Pharmacognosy (1991), Ph.D Pharmacognosy(2001)	Reader (visiting)	Traditional Medicine, Instrumentation, Medicinal and Aromatic plants
2	J.C Aguiyi	Pharm. D. (1986), Ph.D Pharmacology (1998)	Prof.	Biotechnology & Genetic Engineering
3	J.A.Kolawole	B.Pharm(1983), M.Sc. Pharm. Chem. (1988), Ph.D Pharm.& Med. Chem. (1996)	Prof.	Drug Analysis and Design, Medicinal Chemistry
4	J.O. Onah	B.Sc. Biochemistry (1976), M.Sc. Pharm. Chem. (1982), Ph.D Pharm. Chem. (1997)	Prof.	Medicinal Chemistry
5	M.O. Uguru	B.Sc Pharmacology (1978), M.Sc. Pharmacology (1983), Ph.D Pharmacology (1996), M.Sc. Herbalism (2005)	Prof.	General Pharmacology Ethno-Pharmacology
6	P.O. Olorunfemi	B.Sc. Pharm. (1980), M.Sc. Pharm. Microbiology (1985)	Reader	Pharmaceutical microbiology
7	T. E. Alemika	B.Sc. Chemistry (1982), M.Sc. Pharm. Chem. (1987), PGDip. Ed. (1990), Ph.D Pharm. Chem. (2001)	Prof.	Medicinal Chemistry; Drug Analysis & Phytochemistry.
8	S. S. Gyang	B.Sc. Pharm (1975), M.Sc. Pharmacotherapeutics (1982), Ph.D Pharmacology (2009)	Prof.	Ethnopharmacology & Pharmacotherapeutics
9	N.A. Ochekpe	B.Sc. Pharm.(1980), Ph.D (1988)	Prof.	Aromatic Plant Chemistry and Instrumentation
10	N.N Wannang	B.Pharm(1992), M.sc. (1998), Ph.D Pharmacology (2004), M.Sc. Biochemistry (2006)	Prof.	Toxicology,ethnopharmacology
11	A. Abubakar	B.Sc ;M.Sc (2004), Ph.D (2011)	SNR. Lecturer (Visiting)	Phytochemistry and Traditional medicine

LIST OF TECHNICAL STAFF

S/NO	NAMES	RANK
1	T. P. Yakubu	Chief Technologist
2	J. N. Damos	Principal Technologist
3	H. H. Tukur	Technologist II
6	D. Monday	Senior Assistant Technologist
4	L. Bako	Laboratory Technician
5	R. E. Masok	Laboratory Technician

LIST OF ADMINISTRATIVE STAFF

S/NO	NAMES	RANK
1	Joshua Gwomson	Chief Secretarial Assistant
2	Benkyes Domna Fantur	Assistant Chief Clerical Officer