FACULTY OF PHARMACY, MADONNA UNIVERSITY

BRIEF HISTORICAL BACKGROUND

The establishment of a Pharmacy program was in the original plan of the University. It came on stream in 2003 when the first batch of students where admitted. The program was for Bachelor of Pharmacy (B. Pharm) degree in the Department of Pharmacy.

The year 2005 saw changes in the Pharmacy Program. With the approval of the University Senate, the Faculty of Pharmacy was established to replace the Department of Pharmacy. The Faculty has six Departments, which are as follows:

- Department of Pharmaceutics and Industrial Pharmacy
- Department of Pharmaceutical Microbiology and Biotechnology
- Department of Pharmaceutical Chemistry
- Department of Pharmacognosy
- Department of Pharmacology and Toxicology
- Department of Clinical Pharmacy and Pharmacy Practice

The vision of the Faculty of Pharmacy is to produce graduates whose qualification would be of world class standard. We are aware that the Bachelor of Pharmacy (B. Pharm) degree is no longer accepted for the practice of Pharmacy in many countries. For example, in Britain and other European countries, the terminal degree for registration as a Pharmacist is Master of Pharmacy (M. Pharm.) degree and not B. Pharm. degree. In USA, the accepted qualification for registration as a Pharmacist is Doctor of Pharmacy (Pharm. D) degree and not B. Pharm. degree. Because the Faculty wanted to start on the right footing and to produce graduates whose training and certificates will be accepted anywhere in the word, a doctor of Pharmacy degree was presented to and approved by the University Senate. The changeover was easy as the programs of both B. Pharm and Pharm. D were the same for year 1 to year 3.

However, when National University Commission (NUC) formally approved the establishment of Pharm. D. program for Faculties of Pharmacy in Nigerian Universities, it directed that no retroactive approval would be granted. This put an end to our Pharm. D. Program as the Faculty did not get NUC approval before starting the program. The Faculty had no choice but to return to the B. Pharm Program with the approval of University Senate for students already admitted by the Faculty. However the Faculty plans to introduce the Pharm. D. program as soon as approval is granted.

The Faculty has started to develop an integrated approach to teaching in order to reduce or abolish repetition of topics by different departments. Our vision of the Faculty is to emphasize Pharmaceutical manufacturing, Pharmaceutical analysis, Clinical Pharmacy and entrepreneurship. To achieve these, the long term plan of the Faculty is to have a commercial Pharmaceutical manufacturing outfit with the state of the art quality control unit. A drug manufacturing company has been registered by the University administration as the first step. Another long term plan of the Faculty is to have a community Pharmacy in PortHarcourt/Owerri. When these become operational our will be expected to have industrial experience in the establishments. It is expected that the graduands of the Faculty will have the knowledge, capability and confidence to enter any of these areas with assured success.

As expected of a new Faculty in a new Institution, the Faculty has a fair share of usual teething challenges. These are being tackled head-on and in no distant date all will be a thing of the past. A gigantic Faculty building with all the necessary laboratories, classrooms, staff offices conveniences, is now in place. The Faculty is proud of the building and the departments available where all the department are domiciled. We are grateful to the Very Rev. Fr. Prof. E.M.P Edeh, the Founder of the University Administration for this.

We are confident that the Faculty will continue to fulfill its objectives and realize its vision.

PHILOSOPHY

The Philosophy of the Faculty is derived from and complements that of the University. It is to prepare students for life of honour, dignity and responsibility as educated citizens with the knowledge, skill, motivation and competencies for the practice of the profession in all its ramifications.

AIMS AND OBJECTIVES

The aims and objectives of the program are as follows:

1. To instill in the students a sense of appreciation of the profession of Pharmacy and to involve them in an intellectually stimulating and satisfying learning experience.
2. To provide students with a broad and balanced foundation in all the areas of Pharmaceutical knowledge.
3. To provide students with education to enter into practice of Pharmacy and function as professionals in a changing health care system and be responsible for generating and disseminating new knowledge about drugs and Pharmaceutical care.
4. To train and educate students to assume responsibility, authority and accountability for Pharmaceutical care.
5. To develop in the students, the ability to apply Pharmaceutical knowledge in health care delivery system.
6. To provide students with Pharmaceutical knowledge and professional skill to identify and solve (both human and veterinary) drug related problems.
7. To instill in the students the dynamic value of profession, this makes life-long learning a necessity.
8. To provide students with adequate knowledge and appropriate skill base from which they can proceed for further studies in specialized areas of Pharmacy and other medical sciences.
9. To make the students accept the needs of the society and individual patients as a priority.
10. To ensure adequate exposure of students through industrial training program in industry, hospital and community practice so as to prepare them for early useful entrance into any of these areas.

NOMENCLATURE OF THE DEGREE

The degree of the Faculty is Bachelor of Pharmacy (B. Pharm.) Degree.

DURATION OF THE DEGREE COURSE

The Bachelor of Pharmacy (B. Pharm) degree program lasts for a period of five years for UTME and four years for direct entry candidates.

ADMISSION REQUIREMENTS

Five Year Program

The entrants would be candidates with senior secondary school certificate or its equivalent. The candidates are expected to have successfully passed physics, Chemistry, Biology, Mathematics and English language at the credit level or higher at not more than two sittings. This is in addition to an acceptable pass in the Unified Tertiary Matriculation Examination (UTME). It may be desirable to mount appropriate screening for candidates before admission in order to ensure that students with the right attitude and aptitude for the competencies expected are selected. This must be in line with Madonna University policy on admission.

Four- Year Program

Direct entry students seeking admission to the four year program must have a pass in Chemistry, Physics, Biology or Botany or Zoology at the Higher School Certificate (Principal Level) with credit in English and Mathematics in the West African School Certificate Examination or its equivalent. The passes at the advanced level should have been obtained at not more than two sittings. First degree and Higher National Diploma (HND) holders in related subjects maybe accepted.

Transfer Candidates

Candidates wishing to transfer to Faculty of Pharmacy from other programs or from other Universities may be admitted at the appropriate level to be determined by the Faculty, provided the candidate has the minimum entry requirement prescribed for the Faculty. Such candidates will be expected to register and pass all prescribed courses of the Faculty where he/she is found deficient.

Job Opportunities

Candidates normally have career prospects in various branches of the Pharmacy Profession namely hospital (as specialist clinical pharmacist, drug information pharmacist), wholesale and retail community Pharmacy

practice, pharmaceutical industry (as formulation, production, quality control and analysis or retailing pharmacist) teaching and research, drug regulatory affairs and government service.

Academic Content

General outlook

The principal objective of the curriculum is to provide a plan for the education, development and training of qualified students for careers in Pharmacy practice. The curriculum therefore provides the students with the following three areas of education:

a. General Education

This includes a variety of non-professional courses in the humanities, social and behavioral sciences, information and communication technology and entrepreneurship skills.

b. Basic and Pre-Clinical Sciences

The basic sciences include the courses in the physical, chemical and biological sciences, as well as mathematics. These courses are usually pre-requisites for the pre-clinical and professional courses.

The pre-clinical sciences are the following:

i. Human Anatomy
ii. Biochemistry
iii. Human Physiology

c. Professional Studies and Training

The variety of courses is classified under the headings and courses grouped together as shown below:

1. Biomedical/Pharmaceutical Sciences

Examples are

i. Pathology
ii. Computer Science
iii. Research Methodology and Biostatistics
iv. Immunology
v. Public Health/Epidemiology
vi. Pharmaceutical Technology
vii. Pharmaceutical Chemistry
viii. Pharmacognosy
ix. Toxicology
x. Veterinary Pharmacy
xi. Pharmaceutical Microbiology
xii. Pharmacology
xiii. Biotechnology
xiv. Pharmaceutics
xv. Herbal and alternative medicine
xvi. Industrial training

2. Administrative Pharmacy

This includes

i. Pharmacy management
ii. Pharmacy practice
iii. Pharmacy ethics / Jurisprudence
iv. Entrepreneurship

3. Clinical sciences (including clinical pharmacy)

These include Clinical courses in Pharmacy Practice, based on the Pharmaceutical and biomedical Sciences.

Examples include:

i. Biopharmaceutics
ii. Clinical Pharmacokinetics
iii. Pharmacotherapeutics

iv. Pharmacoepidemiology
v. Clerkship
vi. Drug information/Pharmacovigilance
vii. Communication skill
viii. Pharmaceutical care
ix. Supervised training in appropriate in-patient and out-patient environments under the title of clinical clerkship.
x. Clinical Pharmacology
xi. Clinical toxicology
xii. Public health
xiii. Management of minor diseases
xiv. Supervised training in appropriate in-patient and out-patient environments under the title of clinical clerkship.

STRESS AREA

Department	Code	Subject Area
Pharmaceutics & Industrial Pharmacy	PIP	1
Pharmaceutical Microbiology & Biotechnology	PMB	2
Pharmaceutical Chemistry	PCH	3
Pharmacognosy	PCG	4
Pharmacology & Toxicology	PTO	5
Clinical Pharmacy & Pharmacy Practice	CPP	6

ACADEMIC YEAR AND SEMESTER

The University operates a two semester (first and second semester) academic year. A semester last eighteen (18) weeks of which fifteen (15) weeks are devoted to teaching (Lectures, practicals and tutorials) and (3) weeks for organization of examinations.

COURSE CREDIT SYSTEM

The courses are structured on credit unit system. One(1) credit unit is equivalent to one hour lecture per week, or three hours of practical per week. Tutorial is equivalent to a lecture period.

COURSE CODING INDEX

Each course code used in the Faculty is made up of three letters indicating the department code and a three-digit number. The three digit number indicates the following:

First digit

This represents the level of courses i.e 1 for 100 level; 2 for 200 level; 3 for 300 level; 4 for 400 level & 5 for 500 level.

Second digit

This indicate the subject area (in this case the department subject area) in which the course is taken (see above)

Third digit

This indicates the semester in which the course is taken

- 1,3,5,7 & 9 indicating first semester courses
- 2,4,6,& 8 indicating second semester courses

EXTERNAL PRACTICAL EXPOSURE AND TRAINING (SIWES)

A period of 6-10 weeks which shall be spent in community Pharmacy, hospital Pharmacy or drug manufacturing industry during the long vacation from the second professional year. At the end of each period, the students shall present a report of the experience during the attachment.

External Examinership

There shall be external examiners appointed to vet and moderate the course and examinations for the various subject areas of the professional examination. The examiner's reports shall be sent to the Vice Chancellor and made available to the department for appropriate action.

REGULATIONS GOVERNING THE AWARD OF THE DEGREE OF BACHELOR OF PHARMACY (B.PHARM.)

1. The degree of Bachelor of Pharmacy (B Pharm.) shall be the primary degree in the Faculty of pharmacy and shall be awarded after a successful completion of the senate approved curriculum and examinations.

2. The curriculum for degree of Bachelor of Pharmacy shall normally extend over a period of five (5) academic years for students admitted by UTME or four (4) years for students admitted by direct entry.

3a. To qualify to proceed to the second year of the program, the candidate must have a minimum passing grade in the subjects of Chemistry, Physics, Biology, Mathematics, English language and General studies courses.

The minimum passing grade is 50% in each of the component courses of the above listed subjects and general studies courses, is 40%.

3b. Where a candidate fails to make a passing grade, in any components of the above listed subjects as in 3a, he/she shall not be eligible to proceed to year two of pharmacy programme.

4. STUDENT ASSESSMENT

Assessment of students shall be based on one or more of the following:

i. Written/informal examination
ii. Continuous assessment
iii. Laboratory reports
iv. Practical examinations
v. Oral presentation /examination
vi. Term papers including work experience reports
vii. Conducting and reporting of project works.

5. EXAMINATION ARRANGEMENT

Continuous Assessment:

5.1.1 Continuous assessment during the semester shall form part of the final semester grading. Continuous assessment shall carry 30% of the final grade of a semester examination. All candidates are required to have a minimum of 75% class attendance of each course to qualify to sit for the examination.

5.1.2 The pass mark for students' academic work in all courses and practicals shall be 50% except in general studies where the pass mark is 40%. Without contradiction, passing the practical course of a level is a pre-requisite for registering for the next higher practical course.

5.1.3 The result of the examination shall be translated in the letter grade for purposes of determining the students Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA).

5.1.4 The examination results are graded as follows:

Percentage score	**Letter grade**	**Grade point**
70-100%	A	5
60-69%	B	4
50-59%	C	3
45-49%	D	2
40-44%	E	1
0-39%	F	0

- For Dispensing practical (PIP 215), and Ethics/Jurisprudence (CPP 466), the minimum passing grade is B (60%)
- For all examinations except general studies, the minimum passing grade is C (50%)
- For General Studies, the minimum passing grade is **E** (40%)

5.1.5 In any examination a distinction shall be awarded in any course(s), provided the candidate scores **70%** or more in the course and passes all the courses in first sitting. The award of distinction shall be subject to a credible defence in an oral examination.

5.1.6 The Bachelor of Pharmacy degree shall not be classified,

6.0 PRE-REQUISITE OF PROCEEDING TO THE NEXT LEVEL

6.1 To qualify to move to a higher level, a candidate must pass all the lower courses.

A candidate is allowed to carryover to a higher level, the number of units that will complete the maximum of twenty four (24) units per semester acceptable by the university, otherwise he/she is expected to repeat the year and register a minimum of fifteen (15) units per semester including the failed course(s).

6.2 A candidate who fails seminar or project shall be required to represent the project or seminar to the department.

6.3 A candidate who repeats a level and fails to pass all the registered courses (i.e after a second attempt) shall withdraw from the programme.

7.0 ADDENDUM TO GRADUATION REQUIREMENTS.

7.1 Seminar:

A candidate must deliver a well designed seminar and present to the Faculty before graduation and a minimum pass mark is 50%

7.2 Project:

A candidate is required to carry out a well designed and supervised research work which must be presented to external examiner. The grading of the project will be done by the department and the external examiner. The pass mark is 50%.

8. General Considerations

8.1 Before presenting themselves for an examination, candidates shall be required to have completed to the satisfaction of the departments concerned, approved periods of practical work and/or other assignments regarded as part of the program.

8.2 Without prejudice to the existing general University Academic regulations on examination malpractice, any student found guilty of any form of examination malpractice shall not be allowed to continue with Bachelor of Pharmacy program.

8.3 Any matters relating to the award of the degree of Bachelor of Pharmacy of this University, which are not covered in this regulation shall be subject for determination by the Academic Board of the Faculty of Pharmacy.

SUBJECT/COURSE AND DEPARTMENT CODE

Subject/Course	Department Code
Biology	BIO
Physics	PHY
Chemistry	CHM
Mathematics	MTH
General Studies	GST
Anatomy	ANT
Biochemistry	BCH
Physiology	PIO
Pharmaceutics & Industrial Pharmacy	PIP
Industrial Training (SIWES)	PIP
Biopharmaceutics	PIP
Pharmaceutical Microbiology & Biotechnology	PMB
Pharmaceutical Chemistry	PCH
Pharmacognosy	PCG
Phytochemistry/Phyto-analysis	PCG
Herbal & Alternative Medicine	PCG
Veterinary Pharmacy	PTO
Pharmacology and Toxicology	PTO
Communication Skill/ Pharmacy Practical	CPP
Clinical Pharmacokinetics	CPP
Introduction to Clinical Pharmacy & Pharmaceutical Care	CPP
Computer Application in Pharmacy & Drug Information	CPP
Clinical Clerkship	CPP
Pharmacy Management & Entrepreneurship	CPP
Research Method & Biostatistics	CPP
Pharmacy Ethics/Jurisprudence	CPP
Pathology	CPP
Pharmacy Public Health	CPP
Pharmacotherapeutics	CPP
Seminar	CPP
Project	CPP

COURSE OUTLINE AND DISTRIBUTIONS
FOR STUDENTS ADMITTED THROUGH UTME
(Five – Year Standard Program)
YEAR ONE (100 LEVEL)
FIRST SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Required Ancillary Courses		
BIO 101	General Biology (Theory & Practical)	3
CHM 101	General Chemistry I	3
CHM 171	Practical Chemistry I	1
MTH 101	General Mathematics I	3
PHY 101	General Physics I	3
PHY 105	General Physics Laboratory I	1
General Studies Courses		
GST 111	Communication in English I	2
GST 113	Nigerian people and culture	2
GST 121	Uses of Library, Study Skills & Information Technology	2
GST123	Communication in French	2
GST 125	Introduction to Entrepreneurship Studies I	2
TOTAL		**24**

SECOND SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Required Ancillary Courses		
BIO 102	General Biology II	3
BIO 172	General Biology Practical II	1
CHM 102	General Chemistry II	3
CHM 122	Organic Chemistry	1
CHM 172	Practical Chemistry II	1
MTH 102	General Mathematics II	3
PHY 102	General Physics II	3
PHY 106	General Physics Laboratory II	1
General Studies Courses		
GST 102	Fundamental Philosophy	1
GST 112	Logic, Philosophy & Human Existence	2
GST 122	Communication in English II	2
GST 142	Communication in German	1
GST 162	Introduction to Social Sciences	2
TOTAL		**24**

YEAR TWO (200 LEVEL)
FIRST SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Core Courses		
PIP 211	Pharmaceutical Calculations	1
PIP 213	Introduction to Pharmaceutics (Dispensing)	2
PIP 215	Practical Introduction to Pharmaceutics	1
PMB 221	Fundamental Pharmaceutical Microbiology	2
PCH 231	Pharmaceutical Chemistry IA	2
PCG 241	Introductory Pharmacognosy (Pharmacognosy IA)	2
Required Ancillary Courses		
BCH 201	General Biochemistry I	3
BCH 261	Practical Biochemistry	1
PIO 201	General Principles of Physiology, Blood & Homeostasis	2
PIO 231	Excitable Tissues	2
General Studies Courses		
GST 211	Fundamental Theology	1
GST 215	Introduction to Entrepreneurship Study II	2
TOTAL		**21**

SECOND SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Core Courses		
PIP 212	Introduction to Industrial Pharmacy	2
PMB 222	Practical Pharmaceutical Microbiology I	1
PCH 232	Pharmaceutical Chemistry IB	2
PCH 234	Practical Pharmaceutical Chemistry IB	1
PCG 242	Indigenous Medicinal Plant (Pharmacognosy IB)	2
PCG 244	Practical Pharmacognosy IB	1
CPP 262	Introduction to Pharmacy	2
Required Ancillary Courses		
ANT 202	Human Anatomy & Histology (Theory & Practical)	3
PIO 224	Cardiovascular System Physiology	2
PIO 242	Gastrointestinal tract & Bilary Physiology	2
General Studies Courses		
GST 222	Peace Conflict Resolution	2
GST 224	Fundamental Ethics	1
GST 252	Bioethics	1
TOTAL		**22**

YEAR THREE (300 LEVEL)

FIRST SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Core Courses		
PIP 311	Pharmaceutics II	2
PIP 313	Practical Pharmaceutics II	1
PMB 321	Sterilization & Chemical Disinfection	2
PMB 323	Microbial Genetics	2
PCH 331	Pharmaceutical Chemistry IIA	2
PCH 333	Practical Pharmaceutical Chemistry IIA	1
PCG 341	Natural Products (Pharmacognosy IIA)	2
PCG 343	Practical Pharmacognosy IIA	1
PTO 351	Pharmacology IA	3
PTO 353	Practical Pharmacology IA	1
CPP 361	Introduction to Pathology (Theory & Practical)	3
TOTAL		**20**

SECOND SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Core Courses		
PIP 312	Industrial Pharmacy II	2
PIP 314	Practical Industrial Pharmacy II	1
PIP 316	Industrial Training (SIWES)	2
PMB 322	Practical Pharmaceutical Microbiology II	1
PMB 324	Introduction to Biotechnology	2
PCH 332	Pharmaceutical Chemistry IIB	2
PCH 334	Practical Pharmaceutical Chemistry IIB	1
PCG 342	Phytochemistry (Pharmacognosy IIB)	2
PCG 344	Practical Pharmacognosy IIB	1
PTO 352	Pharmacology IB	3
PTO 354	Practical Pharmacology IB	1
TOTAL		**18**

YEAR FOUR (400 LEVEL)

FIRST SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Core Courses		
PIP 411	Industrial Pharmacy II	2
PIP 413	Practical Industrial Pharmacy III	1
PMB 421	Sterile Pharmaceutical Products	2
PCH 431	Pharmaceutical Chemistry IIIA	2
PCH 433	Practical Pharmaceutical Chemistry IIIA	1
PCG 441	Phytoevaluation & Phytoanalysis IA	2
PCG 443	Practical Phytoevaluation & Phytoanalysis	1
PTO 451	Pharmacology IIA	3
PTO 453	Practical Pharmacology IIA	1
CPP 461	Clinical Pharmacokinetics	2
CPP 463	Computer Application in Pharmacy & Drug Information Services	2
CPP 465	Pharmacy Management & Entrepreneurship	2
TOTAL		**21**

SECOND SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Core Courses		
PIP 412	Cosmetic Science & Drug delivery systems	2
PIP 414	Biopharmaceutics	2
PMB 422	Practical Pharmaceutical Microbiology III	1
PMB 424	Microbial Infection, Immunology & Blood Products	2
PCH 432	Pharmaceutical Chemistry IIIB	2
PCH 434	Practical Pharmaceutical Chemistry IIIB	1
PCG 422	Phytoevaluation & Phytoanalysis IB	2
PCG 444	Practical Phytoevaluation & Phytoanalysis IB	1
PTO 452	Pharmacology IIB	3
CPP 462	Research Method & Biostatistics	2
CPP 464	Introduction to Clinical Pharmacy/Pharmaceutical Care	2

CPP 466	Ethics & Jurisprudence	2
TOTAL		**22**

YEAR FIVE 500 LEVEL

FIRST SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Core Courses		
PIP 511	Industrial Pharmacy & Process Validation	2
PMB 521	Principles of Biotechnology & Fermentation	2
PCG 541	Herbal & Alternative Medicines	2
PTO 551	Pharmacology IIIA	3
PTO 553	Vet. Pharmacy	2
CPP 561	Pharmacotherapeutics I	3
CPP 563	Pharmacy Public Health	2
CPP 565	Pharmacy Practice & Communication Skills	3
TOTAL		**19**

SECOND SEMESTER

COURSE CODE	COURSE TITLE	UNIT (S)
Core Courses		
PMB 522	Antimicrobial Compounds & Microbial Resistance	3
CPP 562	Pharmacotherapeutics II	3
CPP 564	Clinical Clerkship	4
CPP 566	Seminar	1
CPP568	Project	4
TOTAL		**15**

FOR STUDENTS ADMITTED BY DIRECT ENTRY
(Four Year Standard Program)
YEAR TWO (200 LEVEL)
FIRST SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Core Courses		
PIP 211	Pharmaceutical Calculations	1
PIP 213	Introduction to Pharmaceutics (Dispensing)	2
PIP 215	Practical Introduction to Pharmaceutics	1
PMB 221	Fundamental Pharmaceutical Microbiology	2
PCH 231	Pharmaceutical Chemistry IA	2
PCG 241	Introductory Pharmacognosy (Pharmacognosy IA)	2
Required Ancillary Courses		
BCH 201	General Biochemistry I	3
BCH 261	Practical Biochemistry	1
PIO 201	General Principles of Physiology, Blood & Homeostasis	2
PIO 231	Excitable Tissues	2
General Studies Courses		
GST 211	Fundamental Theology	1
GST 215	Introduction to Entrepreneurship Study II	2
TOTAL		**21**

SECOND SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Core Courses		
PIP 212	Introduction to Industrial Pharmacy	2
PMB 222	Practical Pharmaceutical Microbiology I	1
PCH 232	Pharmaceutical Chemistry IB	2
PCH 234	Practical Pharmaceutical Chemistry IB	1
PCG 242	Indigenous Medicinal Plant (Pharmacognosy IB)	2
PCG 244	Practical Pharmacognosy IB	1
CPP 262	Introduction to Pharmacy	2
Required Ancillary Courses		
ANT 202	Human Anatomy & Histology (Theory & Practical)	3
PIO 224	Cardiovascular System Physiology	2
PIO 242	Gastrointestinal tract & Bilary Physiology	2
General Studies Courses		
GST 222	Peace Conflict Resolution	2
GST 224	Fundamental Ethics	1
GST 252	Bioethics	1
TOTAL		**22**

YEAR THREE (300 LEVEL)

FIRST SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Core Courses		
PIP 311	Pharmaceutics II	2
PIP 313	Practical Pharmaceutics II	1
PMB 321	Sterilization & Chemical Disinfection	2
PMB 323	Microbial Genetics	2
PCH 331	Pharmaceutical Chemistry IIA	2
PCH 333	Practical Pharmaceutical Chemistry IIA	1
PCG 341	Natural Products (Pharmacognosy IIA)	2
PCG 343	Practical Pharmacognosy IIA	1
PTO 351	Pharmacology IA	3
PTO 353	Practical Pharmacology IA	1
CPP 361	Introduction to Pathology (Theory & Practical)	3
TOTAL		**20**

SECOND SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Core Courses		
PIP 312	Industrial Pharmacy II	2
PIP 314	Practical Industrial Pharmacy II	1
PIP 316	Industrial Training (SIWES)	2
PMB 322	Practical Pharmaceutical Microbiology II	1
PMB 324	Introduction to Biotechnology	2
PCH 332	Pharmaceutical Chemistry IIB	2
PCH 334	Practical Pharmaceutical Chemistry IIB	1
PCG 342	Phytochemistry (Pharmacognosy IIB)	2
PCG 344	Practical Pharmacognosy IIB	1
PTO 352	Pharmacology IB	3
PTO 354	Practical Pharmacology IB	1
TOTAL		**18**

YEAR FOUR (400 LEVEL)

FIRST SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Core Courses		
PIP 411	Industrial Pharmacy II	2
PIP 413	Practical Industrial Pharmacy III	1
PMB 421	Sterile Pharmaceutical Products	2
PCH 431	Pharmaceutical Chemistry IIIA	2
PCH 433	Practical Pharmaceutical Chemistry IIIA	1
PCG 441	Phytoevaluation & Phytoanalysis IA	2
PCG 443	Practical Phytoevaluation & Phytoanalysis	1
PTO 451	Pharmacology IIA	3
PTO 453	Practical Pharmacology IIA	1
CPP 461	Clinical Pharmacokinetics	2
CPP 463	Computer Application in Pharmacy & Drug Information Services	2
CPP 465	Pharmacy Management & Entrepreneurship	2
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SECOND SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Core Courses		
PIP 412	Cosmetic Science & Drug delivery systems	2
PIP 414	Biopharmaceutics	2
PMB 422	Practical Pharmaceutical Microbiology III	1
PMB 424	Microbial Infection, Immunology & Blood Products	2
PCH 432	Pharmaceutical Chemistry IIIB	2
PCH 434	Practical Pharmaceutical Chemistry IIIB	1
PCG 422	Phytoevaluation & Phytoanalysis IB	2
PCG 444	Practical Phytoevaluation & Phytoanalysis IB	1
PTO 452	Pharmacology IIB	3
CPP 462	Research Method & Biostatistics	2
CPP 464	Introduction to Clinical Pharmacy/Pharmaceutical Care	2
CPP 466	Ethics & Jurisprudence	2
TOTAL		**22**

YEAR FIVE 500 LEVEL

FIRST SEMESTER

COURSE CODE	COURSE TITLE	UNIT(S)
Core Courses		
PIP 511	Industrial Pharmacy & Process Validation	2
PMB 521	Principles of Biotechnology & Fermentation	2
PCG 541	Herbal & Alternative Medicines	2
PTO 551	Pharmacology IIIA	3
PTO 553	Vet. Pharmacy	2
CPP 561	Pharmacotherapeutics I	3
CPP 563	Pharmacy Public Health	2
CPP 565	Pharmacy Practice & Communication Skills	3
TOTAL		**19**

SECOND SEMESTER

COURSE CODE	COURSE TITLE	UNIT (S)
Core Courses		
PMB 522	Antimicrobial Compounds & Microbial Resistance	3
CPP 562	Pharmacotherapeutics II	3
CPP 564	Clinical Clerkship	4
CPP 566	Seminar	1
CPP568	Project	4
TOTAL		**15**

DESCRIPTION OF COURSES

YEAR ONE (100 LEVEL

FIRST SEMESTER

BIO 101: General Biology I (3 Units)

Cell structures and organization; plant and animal cells, function of cellular organelles; diversity and characteristics of living things. *General reproduction; mitosis, meiosis, abnormalities associated with gene crossing, heredity and evolution. *Concept of ecology and types of habitats diversity of plants and animals. *Food chains and food webs; interrelationship of organisms. *Elementary biochemistry of carbohydrates, protein, lipid and nucleic acids.

* Ecology, ecosystem, biotic and abiotic factors, interrelationship between animals and plants.*Adaptation of plants and animals to their environments. *Type of population dynamics, static, climax communities, type and factors affecting them. *Edaphic factors, rainfall, wind, relative humidity, light intensity etc. *Modification of the natural ecosystem.

CHM 101: General Chemistry I (3 Units)

Atomic structure and periodic table. Development of configuration of Elements. Stoichiometry and mole concept. Electronic theory of atoms and valence. Chemical bonding. Formula and IUPAC nomenclature of compounds. Concept of matter, laws of chemical combination by mass. Wave theory, principles of quantum mechanics. Periodic table and periodicity of fundamental properties. Hydrogen. Nuclear chemistry and radioactivity and its application. General study of groups to emphasize periodicity. Selected transition elements.

CHM 171: General Chemistry Practical I (1Unit)

The theory and practice of simple volumetric and qualitative analysis eg, Acid-base, complexometric and redox titrations. simple organic preparations, reaction of functional groups. Laboratory safety and techniques in the laboratory.

MTH 101: General Mathematics I (3 Units)

1. Real number system: Simple definitions of integrals, rational and irrational numbers. The principles of mathematical induction. Real sequences and series: elementary notion of convergence of geometry, arithmetic and other simple series. Theory of quadratic equations.
2. Simple inequalities: Absolute values and the triangle inequality.
3. Identities, partial fraction.
4. Sets and subset: union, intersection, compliments. Properties of some binary operations of sets: distributive, closure, associative, commutative laws with examples. Relations in a set: equivalence relation. Properties of set functions and inverse set functions.
5. Permutations and combinations. Binomial theorems of any index.
6. Circular measures, trigonometric function of angles of any magnitude. Addition and factor formulae.
7. Cmplex number: Algebra of complex numbers, the Argand diagram, De Morvre's theorem, n-th root of unity. (2 Lectures, 1 tutorial/week).

PHY 101: General Physics I (3 Units)

Mechanics and Properties of Matter Space and time, frames of reference, Units and Dimension. Vector & Scalars. Kinematics; Fundamental laws of Mechanics, Statics, and Dynamics, Galilean Invariance; Universal Gravitation, Work, Power and Energy; Rotational Dyunamics and anagular momentum; Conservation laws Molecular treatment of properties of matter, Elasticity: Hooks law, Young, Shear and Bulk modulus; Hydrostatics: pressure, buoyancy, Archimedes principles, Hydrodynamics; streamlines, Bernoulli and continuity equations, turbulence, Reynold's number, viscosity, laminar flow, poiseuilli's equation. Surface tension, adhesion, cohesion, capillarity, drop and bubbles.

PHY 105: General Physics Laboratory I (1 Unit)

The laboratory course emphasize on qualitative measurements, the treatment of experimental error, and graphical analysis. A variety of experimental techniques will be employed. The experiments will include topics covered in general Physics i.e.

GST 111: Communication in English I (2 Units)

The nature and function of language, language skills, listening, comprehension, speaking skills, phonetics, the art of public speaking and communication skills, figures of speech, Nature process and development, reading comprehension**.**

GST 113: Nigerian Peoples and Culture (2 Units)

Study of Nigeria history, culture and arts in pre-colonial times, Nigerians' perception of the world, Culture areas of Nigeria and their characteristics, Evolution of Nigeria as a political unit, Indigene/settler phenomenon, Concepts of trade, Economic self-reliance, Social Justice, Individual and National development, Norm and Values, national Integration, Philosophy and national Development, negative attitudes and conducts (cultism and related vices). Re-orientation of moral and national values, Moral obligations of citizens, Environmental problem; language Communication, Religion, Arts, Archaeology/Tourism and their relevance to national development.

GST 121: The Use of Library, Study Skills & Information Technology (2Units)

Brief history of libraries, Library and education, University libraries and other types of Libraries, Study Skills (reference services), Types of library materials, using library resources including e-learning, e-materials, etc. Understanding library catalogues (card, OPAC, etc) and classification. Copyright and its implications, database resources, Bibliographic citations and referencing. study techniques and basic research methods

GST 123: Communication in French (2 Units)

- Le Francais et le reste du monde. (French and the rest of world)
- Pronuciation (pronunciation)
  - Accent (Stress)
  - Voyelles(Vowels)
  - Conconnes (Consonants)
  - Sons nasals (Nasal Sounds)
  - Liaison;
  - Accent (Accent)
  - L'Alphabet francais (French Alphabet)
- Les articles (Articles**)**
  - Articles defines (Definite Articles)
  - Articles indefinis (Indefinite articles)
  - Articles partitifs (Partitive Articles)
- Pluriel des noms (Plural of nous)
- Qu'est le que C'est? (what is this?)
- Les pronoms sujests (subject pronouns) et Le verbe avoir (the verb to have)
- Le negative (the negative)
- Le verbe etre (the verb to be)
  - Une petite chanson fracaise (A little French song)
  - Les adjectifs (Adjectives)
- Le pluriel des adjectifs (Plural of Adjectives); Les interrogatifs (interrogatives)
- Salutations (greetings);
  - Une petite chanson (A little French song)

GST 125: Introduction to Entrepreneurial Study I (2 units)

Introduction to entrepreneurship and new venture creation; entrepreneurship in theory and practice, the opportunity, forms of business, staffing, marketing and the new venture; determining capital requirements, raising capitals, financial planning and management; starting a new business feasibility studies, innovation; legal issues; insurance and environmental considerations.

SECOND SEMESTER

BIO 102: General Biology II (3 Units)

Levels of organization. Origin and history of classification. Principles of Binomial nomenclature. Hierarchical classification. Molecular classification of bacteria. The structure, morphological features and chemical nature of viruses. Kingdom monero; Habitat, structure and morphological characteristics and life cycle of Cynaonbacteria, Archaebacteria, Eubacteria. Kingdom prostita;-Habitat, structure and morphological characterics and life cycle and protozoans, algae and slime moulds. Kingdom Mycota-Habitat, structure and morphological characteristics and life cycle of ascomyctes, deuteromyctes, zygomycytes, oomycytes and deteromeycytes. Kingdom Plantae Habitial, structure and morphological characteristics of bryophytes, pteridopytes, gymnospermae and angiospermae. Kingdom animalia;-Invertebrat e and Jorigin of animal diversity. Symmetry,

BIO 172: General Biology Practical II (1 Unit)

Introduction to Laboratory apparatus/reagents and laboratory safely measures; Usage/care of microscope; preparation of microscopic slides; demonstration of diffusion and osmosis/gaseous exchange experiments. *Observation of cells and tissues of selected plants and animal species. *Investigations on physiological processes affecting photosynthesis. *Testing for the presence of food substances, Observation of mitosis in onio bulb. *Observation of cyst and ova of parasitic worms. *Study of fungi structures; observation of bacteria cells; study of selected plants and their uses; Observation of arthropods of medical importance; Dissection of frogs/rats; basics of photometry, colorimetry . Principles of chromatography/electrophoresis.

CHM 102: General Chemistry II (3 Units)

Structure of solid. Kinetic theory of gasses and gas laws. Colligative properties of dilute solutions. Raout's law, Henry's law and molecular weight determination.

Thermochemistry and Hess's law. Chemical Equilibrium. Law of mass action, reaction rate and chemical energetic. Electrochemistry. Ionic equilibria. Theory of acids, bases and indicators. Catalysis. Ionics. Phase Equilibrium, one and tow component system. Enthalpy, Entropy and Free energy.

CHM 122: Organic Chemistry (1 Units)

Historical survey of the development and importance of organic chemistry. IUPAC nomenclature and classification of organic compounds. Homologous series. Elemental analysis and molecular formula, structural isomerism. Isolation and purification methods, concept of functional group-resonance and aromaticity. Electronic theory in organic chemistry, (brief) Saturated and unsaturated hydrocarbons, alcohols, alklhalides, ethers, aldehydes and ketones, carboxylic acids, amines and aromatic compounds, comparison of phenols with alcohols.

CHM 172: Practical Basic Chemistry II (1 Unit)

Qualitative analysis of inorganic salts. Inorganic preparations. Enthalpy changes, etc.

MTH 102: General Mathematics II (3 Units)

This course is a continuation of the course MTH 111. The main areas to be covered include; Axioms of real numbers, Absolute values, Real values functions, properties, Domain of function, Limit of functions, Continuity, Differentiability, Interpretability. The abstract definitions of these concepts should be stated; prove of limit existence theorems, finding limits of functions, proving continuity of functions, differentiating and integrating functions, techniques of limit, differentiation and integration. (2 lectures, 1 tutorial/week).

PHY 102: General Physics II (3 Units)

Electromagnetism and Modern Physics:

Electrostatics; Induction, coulomb law, gauss' Law. Electric field; electrostatic potential; capacitance; dielectric, electric current; circuits analysis; ampere's law, faraday's law. Electric current: circuits analysis, Ampere's law, Faraday's law of induction; Alternating current, Maxell's equations, electromagnetic oscillation and waves; application. Modern physics; the theory of photons. Photoelectric & Compton effects. Part production and Annihilation, wave particle duality, uncertainty principle. The Bohr theory of the hydrogen atom. Nuclear properties, forces, atomic and mass number; binding energy. Reductive decay; nuclear fission and fusion, elementary particles. Waves, Optics and thermal Physics; Optics; reflection and refraction (prism and thin lenses), Deviation: Spectrometer. Wave motion: Longitudinal and transverse waves; superposition of

waves. Interference and diffraction; propagation of waves in material media and wave refraction at spherical surface, optical lenses sound wave: pitch, intensity, quality. Doppler Effect; ultra-Sonics. Light waves: Wave theory of light, polarization, spectroscopy. Temperature; the Zeroth law of thermodynamics; heat, gas law, law of thermodynamics; Kinetic theory of gases. Applications.

PHY 106; Practical General Laboratory II (1 Unit)

A variety of experimental techniques will be employed. The experiments will include topics covered in general physics II.

GST 112: Logic, Philosophy and Human Existence (2 Units)

A brief survey of the main branches of philosophy symbolic logic, special symbols in symbolic logic conjunction, negation, affirmation, disjunction, equivalent and conditional statements, law of Tort.

The method of deduction using rules of inference and biconditional qualification theory. Types of discourse. Nature of arguments, Validity and soundness; Techniques for evaluating arguments, Distinction between inductive and deductive inferences, etc. (illustrations will be taken from familiar texts, including literature materials, Novels, law reports and newspaper publications).

GST 122: Communication in English II (2 Units)

The concept and elements of grammar, direct and reported speech, the mechanics of writing, elements of writing report writing and other varieties of writing and techniques, collection and organization of materials and logical presentation of papers, special register in communication.

GST 162: Introduction to Social Sciences (2 Units)

- Cultural, Religion and its contribution to human society
- Social Mobility
- Introduction to personality
- Research methodology and documentation
- Affection, perception and sensation
- Social stratification
- Society and social change
- Political and economic system
- Population growth and consequences
- Family, household and issues.

YEAR TWO (200 LEVEL)

FIRST SEMESTER

PIP 211: Pharmaceutical Calculations (1 Unit)

Prescription and interpretation, weights and capacity, metric system, common system, conversions, preparations, dilution and concentration, isotonic solution, electrolyte solutions and concept of milliequivalent, reducing and enlarging of formulas, buffers and buffered solutions, isotonic system, posology calculations of doses. Calculations involving radioisotopes.

PIP 213: Introduction to Pharmaceutics I (Dispensing) (2 Units)

Introduction to dispensing: Definition of dispensing and its application in pharmacy. Dispensing equipment: fundamental operation in weighing and weighing techniques, weighing balances and their sensitivity requirements, minimum weighable quantities and errors in using dispensing balance. Containers such as pipettes, beakers, conical flask for measuring liquids: measuring techniques and errors in measurement. Transference losses. Measuring and weighing of small amount of materials. Dispensing and presentation of pharmaceutical products: General dispensing procedure, labeling of dispensed medicines, auxiliary labels and storage conditions. Types of pharmaceutical preparation: bulk and divided powders, solutions. (Pharmaceutical Solution and solubility physicochemical properties of solutions, unit expression of solubility, factors affecting solubility and dissolution rate of drugs, colligative properties of solution, pH and buffer solutions) mixtures, syrups, linctuses, elixir, liniment, gargles, mouth washes, lotions, eye, nasal and eardrops, inhalations, collodions and paints.

PIP 215: Practical Introduction to Pharmaceutics I (Dispensing) (1 Unit)

Laboratory experiments to demonstrate the different techniques and principles covered in PIP 212and PIP 224

PMB 221: **Fundamentals of Pharmaceutical Microbiology (3 Units)**

General description of the bacterial cell, cell structures and functions;

The Bacterial spore structure and its resistance to physical and chemical toxic agents, its significance in Pharmacy and medicine. Protoplasts, Spheroplasts, L-forms and Mycoplasma.

Nutritional requirements and growth of bacteria, culture media, their use and diagnostics significance. The evolution of pure culture techniques enumeration or counting of bacteria. Principles and methods of enumeration. Total counts, viable counts, most probably number (MPN), methods. Systematic classification of bacteria and the characteristics of the major groups of Pharmaceutical importance. Fundamental studies of fungi and moulds; their importance on Pharmacy and medicine. Rickettsia, Chlamydia, Viruses including HIV/Aids. Viral growth and replication. Introductory parasitology. Protozoal parasite of public health importance (zootic infections).

PCH 231: Pharmaceutical Chemistry (2 Units)

i. **Atomic and Molecular Structure**

In this course, a short review of electronic structure of atoms and molecules including introduction of quantum theory, application of Schrodinger equations to simple system (e.g. the hydrogen atom) to show the origin of the: n, I, m, s, nomenclature will be carried out. The relationship between the electronic structure of elements and the formation of covalent, ionic and coordinative (dative) bonds leading to complexation and chelating, physical properties of drug molecules viz: dipole moments, optical activity etc, who will be discussed. The nature and pharmaceutical application of coordination compounds, metal complexes and chelating agents will be discussed.

ii. Pharmaceutical Inorganic Chemistry

Theoretical aspects of qualitative/gravimetric analysis of inorganic mixtures. A comparative study of the physicochemical properties, preparation and uses of the elements of the periodic table and compounds of pharmaceutical importance in group i-iv, and o (including the transition, elements). The chemical basis for the pharmaceutical uses will also be emphasized.

iii. Inorganic substances as pharmaceutical agents such as, body electrolytes, pharmaceutical excipients, antidotes to heavy metal poisoning, gastrointestinal agents e..g antacids, ligands etc. volumetric analysis, (acid-base titration. Non-aqueous titration, redox titration, iodometric titration, argentiomentric titration and complexometric titration).

PCG 241: Introductory Pharmacognosy (Pharmacognosy 1A) (2 units)

Introduction to Pharmacognosy: Classification of natural/crud drugs- Taxonomical, Alphabetical, Morphological, Pharmacological, Chemical and Biogenetical basic of classification. Definition of terms.

Macromorphology: Descriptive terms for the identification of various organ drugs: storage of plant products and organs.

Herbarium: function, collection of plants, arrangement, storage and care of specimens.

Micro-morphology: the cell types, sub-cellular structure, organized cell inclusions

Microscopy: Principle, techniques, accessories, sue and care of the microscope, reagent and micrometry.

Methods of identification, macromorpholgy, micromorphology, organoleptic investigation and chemomicrisocpy.

BCH 201: General Biochemistry I (3 Units)

Importance of biochemistry to the health sciences, levels of medical care and biochemistry, organization and Molecular architecture of living cell and membrane. Techniques used in biochemistry and medicine. Protein calorie malnutrition. Metabolism-introduction of the study of intermediary metabolism. Carbohydrate chemistry, digestion, absorption and metabolism. Lipid chemistry, digestion, absorption and metabolism including phospholipids and prostaglandins; Lipidosis, Metabolism of amino acids: amino degradation and biosynthesis, Essential and non essential amino acids. Ketogenic and glucogenic aminoacids. Enzymes and co-enzymes, bioenergetics and basic neurochemistry.

BCH 261: Practical Biochemistry (1 Unit)

Laboratory experiment to demonstrate the different techniques and principles covered in BCH 201.

PIO 201: General Principles of Physiology, Blood & Homesostasis (2 Units)

Introduction and history of physiology cells and oragnelles transport across cell membranes Homeostasis and control system body fluids and its composition electrolytes body fluid compartments general haematopoiesis erythropoiesis and factors affecting Hemoglobinization anemia definition and types antigenicity immunity and reticuloendothelial system disorders associated with polymorphonucleated cells hypersensitivity reactions blood grouping and transfusion platelets and characteristics haemostasis haematological indices and their measurement (note that students are expected to have covered the practical aspect of haematological indices and measurement before the lecture)

PIO 231: Excitable Tissues (2 units)

The structure and classification of nerves, goldman equation and equilibrium potential, action potential in a nerve fiber: myelinated and non-myelinated, resting membrane potential, synapses and types. Synaptic transmission, neuromuscular junction transmission, structures and classification of muscles, mechanisms of muscle contraction, excitation-contraction coupling.

GST 215: Introduction to Entrepreneurship Skills (2 Units)

The course is a continuation of GST 125 (Entrepreneurial Studies I)

Attention is given to management of people (personal management), materials management, purchasing (financial management), machinery (technology) management, concept of marketing, market segmentation, product, price, promotion, place, salesmanship, personal selling, available trade for entrepreneurs and decision making. Students are exposed on some of the entrepreneurial skills.

SECOND SEMESTER

PIP 212: Introduction to Industrial Pharmacy (2 Units)

Evaporation, heat transfer to boiling liquids, mathematical representation of heat transfer, effect of active constituent(s) of solution, classification and type of evaporators. Clarification and filtration-factors affecting filtration media, type of filters and centrifugation. Drying-equilibrium-moisture content, loss on drying constant and falling rate periods, drying equipment, freeze dryers as examples of non-thermal dryers and reason of using it. Milling – Applications of size reduction in drug formulation, factors affecting solution as dosage forms. Extraction, classes and types of extraction, extraction methods, Large-scale extraction and classes of extracts.

PMB 222: Practical Pharmaceutical Microbiology (1 Unit)

Introduction to Pharmaceutical microbiology, techniques of inoculating liquid and semisolid culture media, identification and counting of microorganisms.

PCH 232: Pharmaceutical Chemistry IB (2 Units)

i) **Physical Chemistry:**
Chemical Kinetics and stability:
Review of principles of thermodynamics, chemical and ionic equilibria and chemical kinetics relevant to pharmacy, effect of these on the feasibility of drug synthesis, mixing, solubility, and biological redox systems.

ii) **Radiochemistry/Radio Pharmacy:**
Introduction to radiochemistry: Type of radioactivity and radioactive decay particle and their measurements pharmaceutical application of radio isotopes.

iii) **Organic Pharmaceutical Chemistry:** A brief review fundamental concepts in organic chemistry such as bonding and reactivity of organic compounds, hybridization, resonance theory, inductive, mesmeric hypercojugative and electrometric effects.

PCH 234: Practical Pharmaceutical Chemistry 1B (1 Unit)

Laboratory experiments to demonstrate the different techniques and principles covered in PCH 232.

PCG 242: Indigenous Medicinal Plants Pharmcognosy (Pharmacognosy 1B) (2 units)

Biological and geographical sources of plant crude drugs with reference to Nigeria plants use antimalarias, antisicklings antihypertensive, antidiabetics, antimicrobials, hallucinogens, allergens and marine drugs. Macroscpic and microscopic characteristics of the above plant morphyological groups.

Plant morphology and histology as an aid to identification and detection of possible adulteration in plant drug. The cell wall, cell structure and cell content.

Differentiation of woods, barks, leaves, flowers, seeds, fruits, herbs, roots and rhizomes.

PCG 244: Practical Pharmacognosy 1B (1 Unit)

Microscopic examination of the various organ drugs: leaves, stems, barks, root and rhizomes. Clearing agents, methods of clearing and micrometry.

Collection of herbarium sample from ecological surveys. And preparation and preservation of herbarium specimens. Use of microscope and microscopic examination, organoleptic investigation.

CPP 262: Introduction to Pharmacy Practice; (2 Units)

Various disciplines of Pharmacy, opportunities in Pharmacy and health care delivery, drugs and society; History of Pharmacy and development of Pharmaceutical education in Nigeria. Transition in Pharmacy practice (Apothecary, compounding, distribution, clinical Pharmacy, Pharmaceutical care and total Pharmacy care models); comparison between traditional Pharmacy practice and Pharmaceutical care; role of Pharmacist in healthcare delivery

Introduction to first aid / hygiene and basic concepts of first aid / hygiene

Concepts of dosage forms and prescription (Symbols and terminologies); Pharmaceutical calculations

ANT 202: Human Anatomy and Histology (Theory and Practical) (3 Units)

- Basic organization of the human body: a study of human biological structure at various levels of complexity: from sub cellular to gross and microscopic structure of individual organ systems. Structure-function correlation are emphasized: integumentary system, circulatory system, lymphoid system, alimentary system, genital system, endocrine system, organ of special sense.
- Neuroanatomy: Basic structure organization of the nervous system: the neuron (soma and neuritis); centralization and telecephalisation; neural circuitry (receptors, effectors and the synapse); spinal cord and brain vesicle; neural crest; spinal cord: general topography; grey matter; ascending and descending pathways.
- Brian: general topography; brain tem; cerebellum; diencephalons, cerebrum; meanings and ventricular system; pia; arachnoids and drua mater, secretion and circulation of cerebrospinal fluid; blood-brain barrier.
- Peripheral nervous system: basic plan; afferent and afferent cerebrospinal peripheral nerve endings; ganglia.
- Autonomic nervous system: basic plan; sympathetic system, parasympathetic autonomic effectors endings.

PIO 224: Cardiovascular System (2 units)

Properties of cardiac muscle cardiac automaticity, pacemaker and non-pacemaker potentials, cardiac cycle, cardiac output, measurement and control, heart rate control, baroreceptors and Bainbridge mechanisms electrophysoplogy and arrhymias, hemodynamics of venous return central venous pressure arterial blood pressure and assessment using ascultartory method korotkoff sounds and physiological importance, blood flow and autoregulation, edema, regional circulation, pathophysiology of some cardiovascular system.

PIO 242: Gastrointestinal Tract and Bilary Physiology (2 units)

Physiology anatomy of the gut, excitation of the gut: intrinsic and extrinsic innervation, swallowing and vomiting, gastrointestinal motility and disorders, gastrointestinal secretion, digestion and absorption of carbohydrates, proteins and lipids, functions of the colon, diarrhea, endocrine functions of the gastrointestinal tract, basic experimental techniques in gastrointestinal physiology.

GST 222: Peace & Conflict Resolution (2 units)

This course focuses on basic concepts in peace studies and conflict resolution. Peace as vehicle of unity and development; conflict issues, Types of conflicts, e.g. Ethnic/religious/political/economic conflict; Roots cause of conflicts and violence in Africa, Indigene, Settler phenomenon, peace-building, management of conflict and security. Element of peace studies and conflict resolution.

YEAR THREE (300 LEVEL)
FIRST SEMESTER

PIP 311: Pharmaceutics II (2 Units)

Emulsions cream ointments, gels, paste and suppositories formulation. Rheology and viscosity: Newtonian fluids; flow characteristics of Newtonian fluids and effect of temperature, viscosity imparting- agent in pharmacy, determination of viscosity, capillary tube; redwood and falling sphere, rotational viscometers. Flow properties of dispersed systems and viscosity coefficient of colloidal dispersions. Non Newtonian fluids, plastic, oseudoplastic and dilations flows: thixotropic system. Rheological properties of suspensions, emulsions, creams, gels and ointments. Mechanism of fluid flow; significance of Reynolds number; distribution of velocity across a tube and boundary layer. Phase equilibra: The phase rule, systems of one and two components and applications in pharmacy eg eutectic mixture and sublimation (freeze- drying). Adsorption: The mechanism of adsorptions: the Lang Muir and B.E.T. isotherms, chemisorptions, and factors affecting the amount of adsorption, application in pharmacy. Surface and interfacial phenomenon: Surface tension, contact angle and the wetting of solids, spreading of one liquid over another, mechanism of capillary rise and effect of temperature, method of determining surface tension. Surface active agents and their classification: Pharmaceutical applications and medicinal importance of surface active agents. Bulk properties of surfactant solution: micelle formation and method for the determination of the critical micelles, stability of micelles. solubilization: factors affecting solubilization and pharmaceutical application of solubilization. Colloidal systems: Classification of colloids, properties of colloidal solutions, preparation, lyophobic solutions, stability of lyophobi colloids.

PIP 313: Practical Pharmaceutics II (1 Unit)

Experiments designed to illustrate various theoretical aspects discussed in PIP 311

PMB 321: **Sterilization and Chemical Disinfection (2 Units)**

The course content includes principles of physical sterilization which involves use of hear, gases or radiation method; mechanical removal using filters factors affecting the efficiency of sterilization protocols. The official methods (Monographs) on sterilization. Principle of sterility testing of filter-sterilized materials.

Chemical disinfection: Definition of relevant terms used in disinfection. Properties required of the ideal chemical disinfection agent. Factors affecting the activity of disinfectants the major groups of chemical disinfectants their properties, handling and use. Evaluation methods available for disinfectant potencies: extinction-Time and phenol coefficient methods (Rideal walker, Chick-Martin Kelsey-Sykes) methods etc. determination of bacteriostatic and fungistatic activities of antiseptics and preservative agents; modes of action of non-antibiotic antibacterial agents used as disinfectants and preservatives. The design of aseptic room and provision of clean air aerial sterilization. Hospital or regional or national policy on disinfectants and disinfection practice.

PMB 323: **Microbial Genetics (2 Units)**

A basic bacterial genetics course involving a detailed knowledge of the structures, properties and replication of DNA, and RNA function of the different type of RNA, genetic code, damaged DNA repair and detailed processes of protein synthesis. Mutagenesis and transfer of genetic information such as conjugation, transformation and transduction and recombination processes. Principles of genetic transformations applicable for the general understanding of recombinant DNA and basic genetic engineering as applicable to pharmaceutical and medical products and bacterial resistance to antibacterial agents.

PCH 331: Pharmaceutical Chemistry 11A (2 Units)

1) Aliphatic and aromatic compounds characteristics; types of reactions (including mechanism, syntheses and application). Nomenclature of all functional groups: amides, alcohols, phenols, alkenes, alkenes, alkynes, alkyl, halides, aldehydes, ketones, carboxylic acid etc. qualitative analysis of organic compounds and preparation of their derivatives. Chemical tests for the identification of crude drugs.

2) Chemistry of named reactions: aldol condensation, Clasissen condensation, Cannizzaro reaction, Diets-Alder reaction etc.
3) Stereochemistry, Optical isomerism, chirality, recemic mixtures, designations for configuration, optical rotator dispersion, geometric isomerism. Elucidation of configuration. Drug receptor interactions. Other physical properties of Pharmaceutically important compounds with emphasis on their uses, stability, etc.
4) Chemistry of heterocyclic compounds-nomenclature, structure, properties, preparations of furan, thiophene; pyrrole, quinolones, isoquinolones etc.
5) Organo-metalic compounds- preparation and Pharmaceutical uses.

PCH 333: Practical Pharmaceutical Chemistry 11A (1 Unit)

Experiment to demonstrate the technique covered in PCH 331

PCG 341: Natural Products (Pharmacognosy 11A) (2 units)

Organised (cellular) drugs: Biological and geographical source, collection, and preparation, cultivation, constituents, dose (where applicable sample chemical text and uses.

Unorganized drugs (acellular) to be treated as for organized drugs and their macroscopy and microscopy. Herbicides, pesticides and molluscides. Simple carbohydrates, gums and mucilages, pharmacopeia requirements for crude drugs. The need for evaluation and standardization (moisture content, ash values and other numerical values). Compilation of compendia and commercialization. Methods of Adulteration and substitution of crude drugs. Surgical dressing and simple fibres; absorbency, fabrics, medical dressing material: wool, silk, cotton, juter fibre.

PCG 343: Practical Pharmacognosy 11A (1 unit)

Macroscpical and microscopical examination of various crude drugs listed in PCG 341 (unorganized drugs especially). Determination of moisture content, ash values, extractive values, crude fibres, saponification, rancidity, solubility etc.

PTO 351: Pharmacology IA (**3 Units)**

Drug administration, distribution, biotransformation and excretion. Pharmacodynamics, drug receptors, autonomic pharmacology, autacoids histamine, 5-hydroxytraptamine,

Polypeptides, etc and their antagonists. Allergy and analphylaxis, skeletal muscle relaxants, coagulants and anticoagulants, haematinics and plasma substitutes, drugs acting on GIT, smooth muscle relaxants, drugs acting on respiratory systems, drug development and the evaluation of new drugs, drug nomenclature, drug-drug and drug-food interactions. Drugs interactions with laboratory test values. Introduction of the concept of Ethnopharmacology.

PTO 353: Practice pharmacology 1A (1 Unit)

Experiment to illustrate pharmacological action of drugs covered in PTO 351 using smooth and skeletal muscle preparations.

CPP 361: Introduction to Pathology (3 Units)

Cellular adaptations and cell injury: etiology , pathogenesis , morphology of cell injury morphology of irreversible cell injury ; cellular adaptations cellular aging .

Inflammation and healing: Introduction, types and morphology; healing (regeneration, repairs, wound healing and healing in special tissues)

Flulid and hemodynamic dysfunction: Shock; hemorrhage; oedema, infarction, thrombosis, embolism and introduction to concept of organ failure.

Pathology of systemic diseases: Endocrine, GIT, CNS, iron storage disorders, gout and urate deposit in the kidney; protein calorie malnutrition; vitamins and mineral deficiency; blood vessels and the heart; lymph nodes and spleen; Infectious diseases

Immune dysfunction: cells of immune system cytokine, complement system, human leucocyte antigen system, innate versus acquired immunity , mechanism of immune injury, transplantation immunology, immunodeficiency diseases, autoimmunity, connective tissue (collagen) diseases.

SECOND SEMESTER

PIP 312: Industrial Pharmacy II (2 Units)

Polymorphism, formulation studies on suspension flocculates, production of floccules, stability and quality control tests on suspension an equipment for production of suspensions. Packaging materials science, glass, plastics and metallic containers. Unit dose packaging strip and blister packaging. Materials for pharmaceutical plant construction their resistance to corrosion, strength and economy of materials. Powder and Granules Technology.

PIP 314: Practical Industrial Pharmacy II (1 Unit)

Exercises on flow characteristics of non-solid dosage forms. Use of viscometers. Formulation, production and batch variation tests on suspensions. Experiment in particle site analysis and derived properties of powder-flow rates and angles of repose. Hauser's quotient and carr's compressibility.

PIP 316: Industrial Training (SIWES) (2 Units)

This is a short period of 6-10 weeks to be spent either in community pharmacy, hospital pharmacy or drug manufacturing industry during the long vacation time of the second professional year. This is to make the student appreciate the theoretical teaching they have received in the past and to make them have pre-graduation experience of various of pharmacy practices.

PMB 322: **Practical Pharmaceutical Microbiology II (1 Unit)**

This course is designed to enhance understanding of the principles of the PMB 321 theory course.

Practical exercises will include physical and chemical agent actions on microorganisms. Factors that affect their activities; phenol-coefficient determination (R-W, C-M) and others.

PMB 324: **Introduction to Biotechnology (2 Units)**

Definition of biotechnology; glossing of terms in biotechnology:

Basic techniques and tools involved in biotechnology; features of biotechnology products; applications of biotechnology (General and specific applications in pharmacy) genetically modified food products and Genetically produced pharmaceutical and medical products. Advantages and disadvantages of biotechnology products.

Principles of conjugation, transformation and cloning of genes.

PCH 332: Pharmaceutical Chemistry IIB (2 Units)

(Instrumentation/Instrumentation Analysis)

Instrumental methods of analysis (including identification, structure elucidation, purity determination) of bioactive products viz: spectroscopy, differential spectrophotometer (IR, UV, NMR, and MS) fluorometry atomic absorption spectroscopy, Quality contril-simple estimation of structure, quantity and quality etc, of compounds involving colorimeter, spectrophometer, PH-meter, conductivity bridge, potentiometry, Karl-Fisher apparatus etc. Basis principles of instrumentation, fluorimetry, flame photometry, electrogravimetry and colorimetry. Pharmaceutical analysis-Electrochemistry, conductometry and potentiometry.

PCH 334: Practical Pharmaceutical Chemistry IIB (1 Unit)

Experiments to demonstrate areas covered in PCH 332.

PCG 342: Phytochemistry (Pharmacognosy IIB) 2 Units

Phytochemistry: General principles, classification and detection, source, chemistry, actions and uses of medicinal importance Alkaloids, volatile oil, glycosides;- saponins, cardiac, anthracene, cyanogenetics, isothioeynate. Enzymes, tannins, proteins, lipids (fats and fixed oils), waxes and carbohydrate derived drugs.

Biosynthesis: Methods of biosynthetic studies, biosynthetic pathways;-mevalonic acid pathway and shikimic acid pathway.

PCG 344: Practical Pharmacognosy IIB (1 unit)

Experiment to demonstrate the different techniques covered in PCG 342: Phytochemical test;- Alkaloids, Tannins, glycosides, carbohydrates, phenolics ete.

PTO 352: Pharmacology1B (3 Units)

Cardiovascular drugs: cardiac glycosides,Anti-arrhythmic drugs, anti-hypertensive drugs, drugs used in hyperlipidaemia, antiangina drugs and diuretics, endocrine drugs. Thyroid and anti-thyroid drugs, parathyroid and calcium metabolism. Anti-diabetics, adrenocorticotropic hormone and antagonists. Sex hormones, fertility and anti-fertility drugs affecting uterine motility oxytocin etc.Natural sources of drugs .Local plants with established activities.

PTO 354: Practical Pharmacology 1B (1 Unit)

Experiment to demonstrate the actions of drugs covered in PTO 352.

YEAR FOUR (400 LEVEL)
FIRST SEMESTER

PIP 411: Industrial Pharmacy III (2 Units)

Pre-formulation studies in drug formulation. Definition of the concept. A consideration of physic-chemical characteristics of new medicinal agents and problems inherent in the drug formulations of their dosage forms. Selection of additives in drug formulation. Micromeritics/particle size in pharmaceutical systems: distribution and analysis. Experiment methods; fisher sub-sieve analysis, microscopy, sedimentation rate, coulter counter, dissolution and absorption, in vitro and in vivo correlation derived properties of powder porosity, density, Hauser quotient and granulation, measurement of cohesion and adhesion, the shear stress methods of improving flow rates formulations of tablets an capsules. Coating of tablets sugar and film coating processes. Enteric coating formulation and equipment. quality control and stability testing of coated products. Compression coated and layer tablets. Formulation of tablets and capsules. Stability studies. Decomposition of drug product, physicochemical and microbiological a factors. Prevention of deterioration. Effervescent and chewable tablets. Medicated Lozenges. Aerosol technology packing, propellants, system and quality control. Regulatory aspect of industrial pharmacy-patients, copyrights, trademarks, recall.

PIP 413: Practical Industrial Pharmacy III (1 Unit)

Experiments on formulation of dosage form, basic raw materials. Exercises on tablets and tablet coating and other aspects covered in PIP 411 including capsules.

PMB 421: **Sterile Pharmaceutical Products (2 Units)**

Properties and desirability of vehicles (aqueous and non-aqueous) used for the preparation of parenteral products. Quality of water used for the preparation of sterile products. Pyrogens, nature and detection of pyrogens in parenteral solutions. Preparation of apyrogenic water.

Parenteral routes of drug administration, advantages and limitation associated with each route in relation to the administration of sterile preparation. Containers-glass and plastics, their qualities, effect of stability of different groups of preparations, advantages and disadvantages etc.

Eye drops and contact lens solutions.

Formulation of injections, infusions and drops. Their calculations and units used & express isotonicity, milliequivalent, millimoles respectively. Bactericides used in muttidose injections, their quality equivalents an expressed in BP, BPC and USP.

Principles of preservation of signle and multiphase systems such as ophthalmic solutions including contact lens solution, creams and emulsions and even dispersed system in process microbiological contact procedures.

Microbial spoilage and preservation of pharmaceutical product, principles and significance of quality assurance (QA) system in pharmaceutical processing. Code of Current Good Pharmaceutical Manufacturing Practice (CCGMP).

PCH 431: Pharmaceutical Chemistry IIIA (2 Units)

i. Terpene chemistry.

ii. Organic oxidation and reduction reaction in drug synthesis.

iii. Drug design: Physico-chemical approaches to drug design. Historical, free-Wilson and Hansch approaches. The concept of isosterism, Bioisosterism as a tool in drug design, SAR in drug design, anti-metabolite and pro-drug approach to design of new drugs.

iv. Medicinal chemistry of some selected compounds. Study of the following classes of drugs with respect to their nomenclature, physical and chemical properties, structure—activity relationship, synthesis (where necessary), assay, metabolism, application and uses. General and local anesthetics, sedative hypnotics, benzodiazepine. Antipsychotic drugs, phenothazines; Antipsychotic Phenytoin; Carbamazepines. Antidepressants Imipramine. Antihistamines, Analgesics etc.

PCH 433: Practical Pharmaceutical Chemistry IIIA (1 Unit)

Experiments to demonstrate the techniques covered in PCH 431.

PCG 441: Phytoevaluation & Phytoanalysis IA (2 Units)

Extraction methods including maceration, percolation, soxhhet and counter-current. Separation and isolation methods: conventional column, high performance liquid chromatography (HPLC) gas chromatography (GC), Droplet counter-current chromatography, (DCCC), gel filtration, ion0exchange chromatography, moderate pressure-liquid chromatography and affinity chromatography. Electrophoresis, Adsorbents in chromatography and their applications. Quantitative microscopy. Plant tissue culture for the production of secondary metabolites.

PCG 443: Practical Phytoevaluation & Phytoanalysis IA (1 Unit)

Laboratory experiment to demonstrate the different techniques and theories covered in PCG 441 Marceration, percolation, soxchet, conventional column, partition chromatography, **HPLC** etc. Lycopodium spore method, stomata number palisade ratio etc.

PTO 451: Pharmacology 11A (3 Units)

A review of the functional organization of the C.N.S. local anesthetics; theories of general anesthetics; pre-anesthetic medication, CNS neurotransmitters. Hypnotics and Sedatives; CNS stimulants; Drugs used in other neurodegenration diseases; Anti-psychotics; Antidepressants and mood stabilizing agents; Opioid analgesic and antagonists; Non-steroidal anti inflammatory drugs, anti-epileptic agents.

PTO 453: Practical pharmacology 11A (1 Unit)

Experiments to demonstrate the pharmacological actions of drugs covered in PTO 451.

CPP 461: Clinical Pharmacokinetics (2 Units)

Definitions, terminologies and symbols; Pharmacokinetics of drugs absorption distribution and elimination after various routes of administration

Compartment models: Single and multiple compartments as related to drug distribution; Pharmacokinetics of multiple dosage regimens based on Pharmacokinetic princlples; non-linear Pharmacokinetics, relationship between Pharmacokinetic parameters and Pharmacological response

Pharmacokinetics of drugs in disease states that modify body functions (Eg GIT, renal and liver diseases) Pharmacokinetics of drugs in special patient populations (pediatrics, elderly, pregnancy and lactating mothers).

Therapeutic drug monitoring (TDM): Introduction and rational; Pharmacokinetic application in TDM; TDM drugs and common characteristics; frequently used equations in TDM.

Drug interactions: Pharmacokinetics of drug interactions, Pharmacodynamic interaction; food and herbal interactions.

Adverse drug reaction (classification and drug induced diseases and control measures.

CPP 463: Computer Application in Pharmacy and Drug Information Services (2 Units)

COMPUTER APPLICATION:

TOOLS: Computer components, functions, standards vocabularies, tables, databases

Introduction to health / Pharmacy informatics: definition, objectives of informatics

Deriving useful information: Query criteria, Boolean operator, networks

Computer application in Pharmacy: Administration financial management, inventory management, accounting packages, POS system, and Data analysis using statistical packages.

Informatics: Organization of information including design and creation of Pharmacy database, techniques for validating data accuracy and detecting error.

Pharmacy automation: Electronic order entry, patient record system, automated dispensing systems – Pyxis®, Script pro®, Tug®, E-prescribing, clinical decision support, Pharmacy information systems, inventory control system, Barcode medication scanning.

Benefits and Constraints of using ICT in healthcare

DRUG INFORMATION (DI)

Definition of DI, sources of drug information and retrieval, interactive evaluation, resources required for the establishment of a drug information center, process of providing drug information services.

The course will provide the students with skills and expertise on how to retrieve drug information, evaluate, interact and communicate information response. It will be designed to provide the students with experience using computerized data retrieval system. Students will be thought how to apply systematic approach to answering drug information requests and how to use the various types of databases an on-line journal indexing, abstract services / internet based information to respond to information request.

CPP 465: Pharmacy Management/Entrepreneurship (2 Units)

Definition of entrepreneurship, development and objectives, characteristics of successful entrepreneurs; Requirements for starting one's own Pharmacy;

Forms of business: sources of funds for business, business plan, case illustrations of feasibility study for a Pharmaceutical enterprise

Concepts in accounting and financial management, accounting records ; accounting equations, financial statements – liquidity / solvency ratios profitability ratio, gross profit, net profit, return on investment (ROI), inventory management , procurement methods for drugs and health care, commodities in public health facilities ; health care financing , drug logistics and supply chain management.

Concepts of management and tools of management , time management effectiveness and efficiency in management, business goals, relevance of management, administrative school and behavioral school, roles and skills decision roles ; technical, human and conceptual skills). Functions of managers: Planning, Organizing, Power and authority in an organization ; Pharmacy control system ; Leadership motivational Maslow's theory; theory x and y, Hersberg's two factor theory, organizational communication channels and barriers to effective communication, functions of human resource management) , marketing management (marketing mix-product, price, place and promotion; marketing communication mix-salesmanship, problems of drug distribution in Nigeria.

SECOND SEMESTER

PIP 412: Cosmetic Science and Drug Delivery Systems (2 Units)

Raw materials for cosmetic formulation, local sources/processing of cosmetic raw materials, small scale production and quality control of cosmetic formulation. Herbal cosmetic formulation. Drug release mechanism: ocular, trans-dermal and trans-nasal delivery systems. Other novel drug delivery systems. Site-specific/ targeted delivery. Production of therapeutic proteins/ biochemicals. Polymeric substance; design of therapeutic and diagnostic agents.

PIP 414: Biopharmaceutics (2 Unit)

The fate of a after administration, physical significance of drug concentration in the blood, physiochemical properties and pharmaceutical formulation. Factors affecting the processes of absorption, distribution, metabolism and excretion of drugs, bioavailability and bioequivalence. The problems associated with preformulation of drugs and the design of dosage form an industrial perspective will be discussed.

PMB 422: **Practical Pharmaceutical Microbiology III (1 Unit)**

The exercises in this practical course will address aseptic techniques in the preparation of some sterile dosage forms such as eye drops, (single and multidose) as well as preparation of large volume infusion solutions.

PMB 424: **Microbial Infections, Immunological and blood products. (2 Units)**

Microbial infections; the host-parasite relationship of infection. Transmission of infection: mechanisms of transmission. Pathogenesis or the disease process in infection. Types of immunity: inate and acquired immunity; theories of immunity. Cells and organs of immunity. Effectors and regulators of immune responses. Antigens and Antibodies. Processes of antigen recognition and consequences. Hypersensitivity/Allergic reactions. Autoimmune diseases. Serology (Antigen/Antibody reactions); outcome and application in diagnosis in clinical microbiology. Immunological products, production QC measures, storage, transportation (cold chain) and use (Emphasis on the NPI) product.

PCH 432: Pharmaceutical Chemistry IIB (2 Units)

Study of the chemistry of medicinal compounds: The chemistry, nomenclature, physic-chemical properties, stereochemistry, synthesis (where necessary) structure activity relationship of the following groups of drugs:

i. Antihypertensives, diuretics, steroids including steroidal hormones. Chemotherapeutic agents such as penicillins cephalosporins etc. cholinergic and anticholinergic agents, and Adrenergic drugs

ii. Anthelmintics, trypanocides, schistosomicides, amoebicides, anticancer and antiviral agents (including HIV).

iii. Vitamins, prostaglandins and Amino Acid (protein) Chemistry

PCH 434: Practical Pharmaceutical Chemistry IIIB (1 Unit)

Experiment to demonstrate theories and techniques covered in PCH 432

PCG 422: Phytoevaluation and Phytoanalysis IB (2 units)

Comperative phytochemistry and chemotaxonomy. Phytocosmetics and all nutraceutics. Scientific evaluation of herbal practices. Quality, safety and efficacy. Methods of evaluation of crude drugs (including assay of crude drugs). Exogenous and endogenous factors affecting quality of drugs. Environmental medicine: Detailed study of selected useful medicinal poisons and ordeal plant of Nigeria. Theory and bioassays of important groups of secondary metabolites which act as- anti – malarial, cathartics, carminatives, anti –spasmodic, demulcent, CNS drugs, cardiotonic, hypertensive, antparasitic and flavoring agents.

PCG 444: Practical Phytoevalution and Phytoanalysis B (1 unit)

Experiments to demonstrate the different techniques and theories covered in PCG 441

Field trip to herbal homes and medicinal plant research content.

PTO 452: Pharmacology (Chemotherapy) 11B (3 Units)

Principles of Chemotherapy-Sulphonamides, Beta –lactam antibiotics (penicillins cephalosporins, carbepenems and monobactams), Tetracycline, Chloramphenicol, Aminoglycosides, Miscellaneous antibiotics, macrolides, polymixins, lincocin. Fluoroqunolones. Metronidazole. Bacitracin, Chemotherapy of Tuberculosis and leprosy; Anti-fungal agents. Chemotherapy of protozoan parasitic infections; Anti-malarials, Amoebicides, drugs used in Trichomoniasis, Gardiasis, Trypanosomiasis, schistosomiasis Anthelmintics; Antiviral agents, HIV/AIDS treatment. Anti-cancer drugs, immunosuppressives and Radioisotopes. General protocols adapted in the screening of activity of plant extracts using whole animal model.

CPP 462: Research Methodology and Biostatistics (2 Units)

Review of basics statistics, concept of data, types of data, accuracy and precision, levels of data measurements; descriptive statistics; statistical measures (measures of central tendency, measures of spread, measures of shape) Data presentation inferential statistics, hypothesis testing, parametric and non parametric tests, students t-tests (paired and independent); z-score test, ANOVA, chi square test and their non-parametric equipment, correlation and regression

Scientific methods of planning research; types of research (Basic, pure and operational research) methods of data generation questionnaire, focus group and laboratory experiments); data analysis, data presentation writing of research papers (Abstracts, introduction / literature review; method (method and materials); results; discussion, conclusion and referencing.

CPP 464: Introduction to Clinical Pharmacy and Pharmaceutical Care (2 Units)

Terminologies and abbreviations used in clinical Pharmacy; patient history taking / interview and physical assessment techniques; Application of physical assessment in identifying and resolving drug therapy problems;

Biochemical and hematological test values necessary in order to assess progress and monitor drug therapy, Biochemical and pathological test results and interpretation relevant to therapeutics. Relevant case studies should be used to guide the students.

Clinical Pharmacy and Pharmaceutical Care; concepts and need for Pharmaceutical Care, Pharmaceutical Care outcomes and quality assessment; steps in providing Pharmaceutical care ; scope of drug therapy problems; Barrier to PC; marketing Pharmaceutical Care; PC in special population and disease states (HTN, DM, HIV/AIDS, MP etc).

CPP 466: Pharmacy Ethics & Jurisprudence (2 Units)

Pharmacy; Pharmacy laws and drug laws; Poisons and Pharmacy Act Cap 154; Ethics of Pharmacy profession in Nigeria; National drug formulary and essential drugs list, Dangerous drug acts, drug laws: National Agency for Food and Drug Administration and Control Act (NAFDAC), National Law Enforcement Agency (NDLEA), Standard Organization of Nigeria (SON); Pharmacists Council of Nigeria (PCN), counterfeit and fake drugs act (miscellaneous provisions); WHO / FAO Codex Allimentarium commission; United Narcotic Commission; Federal Environmental Protection Agency (FEPA); Dangerous drugs and Pharmacy acts; Consumer Protection Law; Laws related to the practice Pharmacy including those of Pharmacists disciplinary committee and assessors rules; Pharmacist registration etc. Patent and proprietary medicines etc; Legislation on animal health products; National drug policies and other health policies: Laws of Contract and Agreement for Pharmacists.

YEAR FIVE (500 LEVEL)
FIRST SEMESTER

PIP 511: Industrial Pharmacy and Process Validation (2Units)

Pharmaceutical Process Validation. The regulatory basis of process validation, validation sequence, validation master plan, protocols, tests reports and review. Validation of sterile products and aseptic manufacture process. Validation of non-sterile products and process validation of raw materials and biopharmaceuticals. Validation of analysis procedures, computer validation. Pharmaceutical Industry and production, the pharmaceutical industry: primary, secondary, problems and prospects in Nigeria. Planning of pharmaceutical industry-plant design / layout, location, infrastructure facilities and operational cost, pilot plant scale up technique. Good manufacturing practices, production management and statistical quality control. General consideration of various dosage forms production such as solid, liquid and semi solids. Tablet technology: Consideration of tablets excipient. Effect of type and concentration of excipient on in vivo characteristics of tablets. Types of tablet production, mobilization of local raw materials for the pharmaceutical industry.

PMB 521: **Principles of Biotechnology and fermentation (2 Units)**

Concept of Biotechnology, genetic engineering, enabling techniques; cutting and joining of DNA molecules, cloning vectors and introduction of vectors into the host.

Construction and screening of prokaryotic and eukaryotic genomes. Optimizing expression of recombinant genes, amplifying DNA; the polymerase chain reaction (PCR) and its clinical significance. Application of biotechnology in pharmaceutical sciences, production of therapeutic proteins vaccines and antibiotics etc. Pharmaceuticals products produced by microorganisms and use of microorganisms in biotechnology for the production of pharmaceutical products. Use of microorganisms and their products in assays such as vitamins and amino acid assays, carcinogen and mutagen testing. Selection of mutants, media development and principles of basic fermentation processes for the production of Antibiotics.

PCG 541: Herbal & Alternative Medicines (2 Units)

Introduction to complementary medicine/medicinal practices (various categories). Comparism between complementary and conventional medicines. Homeopathy and herbal medicines. Basic principles of the African Traditional medicine with particular emphasis on those of Nigeria. Traditional Bone-setters, traditional Birth Attendants (TBA), Acupunctures, Moxibustion, African Traditional Psychiatry versus the orthodox methods of treatment. Traditional mind-body intervention, manual manipulation, Asian and Chinese healing method, hypnosis, sound therapy, negative on therapy. Exploration of the reason for the rising trend towards complementary/alternative medicine including socioeconomic factor. Immigration and perception of conventional medicine. Natural products in current use. Health food s, Hallucinogens, Allergent, marine drugs, Teratogens, carcinogens, pest and pest control. Use and misuse of herbal medicines. Formulation of Phytomedicines, quality, safety and efficacy. NAFDAC, WHO and PCN regulation on standardization and registration of herbal medicines.

PTO 551: Pharmacology 111A (3 Units)

Definition of toxicology and toxicant, management of acute drug poisoning; plants; bacteria and animal poisoning; solvent poisoning; pesticides herbicides, CO & SO_2 Natural environment toxin, snake venom, scorpion sting, bee sting, mycotoxins & food poisoning; radiation toxicology, Air-borne poisoning; heavy metals and chelating agents; food additives; drugs overdose: effect and treatment. Safety of herbal drugs.

Chemotherapy of bacterial infections, parasite infections, antifungal and antiviral agents and chemotherapy of neoplastic diseases (with emphasis ondosing, bioavailability and adverse effects. Biochemical pharamacolgy calculations of $LD_{50,}$ $ED_{50,}$ student t-test,.

PTO 553: Veterinary Pharmacy (2 Units)

Introduction to Veterinary Pharmacy. Formulation and storage of veterinary drugs. Administration of veterinary drugs.

Common diseases in animals in (ruminants, pigs horse, dogs, cats, poultry and fish).

Veterinary dosage forms and routes of administration in veterinary practice. Common veterinary drugs; insecticides and ascaricides; Disinfectants (antiseptics topical and unitary) vaccines and other biological; products. Antiprotozoan and anthelminitics; vitamins; haematinics; dietary supplements; Digestants and other feed additives.

At the end of the course, the students would have acquired the knowledge of the scope of drug use in disease of animals and identify any difference from human use.

CPP 561: Pharmacotherapeutics (3 Units)

Objectives: The course will employ the application of the knowledge of Pathophysiology, epidemiology, clinical presentations, diagnosis, biopharmaceutics and Pharmaceutical care to develop skills in planning the rational therapeutics and non-drug therapy of selected diseases. Case studies and WHO / other standard indicators / prescribing guidelines are employer as approaches to developing the ideas of rational drug interactions.

Topics to be covered will include: CVS (HTN, CHF, dislipidemia); Nephrology (AKD, CKD); Neurology (epilepsy and parkinsonism); infectious diseases (STD/UTI, HIV/AIDS, Fungi); Psychiatry (Schizophrenia, affective disorder); Oncology (Breast Cancer, Leukemia); Hematology (Anemia). Common eye and ear disorders; Special patient groups (Pediatrics, geriatrics, drug therapy in pregnancy) and clinical toxicology.

CPP 563: Public Health Pharmacy (2 Units)

Overview of epidemiological studies, concepts of health, models of health ; triangular models of health; Scope and role of public health; determinants of health; culture and health; water and health, housing and health should be specifically discussed; population health indicators ; public health Pharmacy (meaning, challenges and roles of Pharmacists in public health); Stratification of Public Health Pharmacy; health promotion model comprising of health protection, disease prevention and health education; specific health education themes; Smoking cessation; substance abuse, alcohol moderation and management of alcoholics.

Concept of Pharmacy Health Care (PHC); Drug use and management in PHC; drug use in infertility and family planning management; control of communicable diseases; immunization (vaccine preventable diseases, adult and childhood vaccination schedules vaccine administration, storage and adverse effect.

CPP 565: Pharmacy Practices and Communication Skills (3 Units)

Good dispensing practice , Unit dose dispensing system; organization of hospital Pharmacy procurement tendering procedures, stores' management, proper drug storage and distribution, ward Pharmacy, drug production in Hospital Pharmacy, drug and therapeutic committee, formulary preparation.

Pharmacoeconomics: Pharmacoeconomic techniques (CMA, CEA, CUA, CBA, BIA AND COT) and analysis; health care financing, National health insurance scheme (definition, scope, organization and working principles, Health Maintenance Organization (HMOs)

Principle of interpersonal communication; verbal and nonverbal communication; Questioning skills, listening skills, application of communication skills in Pharmacy practice; patient interview; Patient education and counseling; Negotiation and conflict management; presentation skills , public speaking, speech delivery, Pharmacists communication with other healthcare professional.

Pharmacy over the Counter (OTC) managed diseases (cold and catarrh and cough) Acne, diarrhea, eczema, hemorrhoid etc.

SECOND SEMESTER

PMB 522: **Microbial Chemotherapy and Bacterial Resistance (3 Units)**

Rational antimicrobial therapy:- The role of (a) the antimicrobial agent (b) the infecting organism or pathogen (c) the host defense mechanism or immune system (d) the host's environment. The pharmacokinetic profile of the drug (e) other factors such as compliance, availability and affordability.

Classification of antibiotics on the basis of source of origin; spectrum of activity and molecular mechanism of action in relation to chemical structure as in the penicillins. Group properties of different classes of antibiotics. Use of antibiotic combinations in antimicrobial therapy: Additively, synergy and indifference:

Antimicrobial activities molecular mechanisms of action.

Genetic basis of bacterial resistance and chemical applications.

Antiviral drugs

Antifungal agents

Microbial Resistance: Development of resistance by microorganisms to antimicrobial agents. Mode and molecular mechanisms of bacterial resistance to antibacterial agents. Problems of antibiotic resistance: the Social and clinical implications of bacterial resistance to antibiotics/antibacterial agents.

CPP 562: Pharmacotherapeutics II (3 Units)

Topics to be covered include: Endocrine diseases (DM, TD); Respiratory diseases (asthma, COPD); Pains (Rheumatoid arthritis, Gout); GIT diseases (PUD, Liver disease); Parasitic disease (malaria, amoebiasis, and helminthiasis); medical emergencies and critical care therapeutics including treatment of poisoning and adverse drug reactions (ADR).

This course will also emphasize the application of the knowledge of Pathophysiology, clinical presentations, epidemiology, diagnosis, PC and Biopharmaceutics to develop skills in planning rational drug therapy and non-drug therapy of the selected diseases; case studies and WHD/ other standard indicators / prescribing guidelines are to be employed as approached to developing the ideas of rational drug therapy, monitoring DTP and drug interactions.

CPP 564: Clinical Clerkship (4 Units)

This is an experiential course designed to provide the opportunity for the students to have direct patient contact and associated Pharmacy experiences. The course is designed to enable the students assimilate and apply their previously acquired disease and Pharmaceutical knowledge in patient care environment.

Areas of rotation will include internal medicine; ambulatory care units and intensive care units; pediatrics; obstetrics and gynecology; psychiatry units.

Activities will include history taking, medication record review, drug therapy monitoring, health disease prevention and health maintenance

Students will be graded on group case presentation, onsite assessment, individual case presentations and oral examination at the end of the rotation.