PHARMACOGNOSY
GRADUATE PROSPECTUS

DEPARTMENT: PHARMACOGNOSY

Introduction and Brief history of the programme:
Pharmacognosy postgraduate training programme encompasses research in areas of pharmaceutical sciences of natural products. It consists of studies that range from identification of natural products (medicinal plants, animal and mineral sources) that are of beneficial to the management of human and veterinary diseases; discovery and development and formulation of new medicines from natural products; analytical and quality control of both raw and finished natural products; understanding of the use and impact of traditional and alternative healthcare system on general public health care systems.

The Pharmacognosy departmental postgraduate programmes are multidisciplinary and designed to prepare graduates from Pharmacy and allied courses for academic, industrial, or government agencies, in drug discovery and development and biomedical research.

POSTGRADUATE PROGRAMMES AVAILABLE

- M.Sc. Pharmacognosy (Full Time only)
- M.Phil Pharmacognosy (Full Time and Part Time)
- Ph.D. Pharmacognosy (Full Time and Part Time)

Vision
To be listed among the world class programmes, improved career building pathway for our postgraduates, problem solving oriented programmes in medicine/natural drug discovery and development, building up man power to improve primary healthcare delivery and increase in research outputs and visibility globally.

To increase in postgraduate student data base, thus directly increase competent man power in traditional medicine practice and healthcare system.

Mission
To produce competent manpower postgraduates in traditional medicine practice and healthcare system by engaging best practices in programme lecture/training delivery techniques, and cutting-edge techniques in research and services.

Objectives
The major objectives of the departmental graduate programme include:

- To develop strong research and work force individuals with inquisitive minds
- To create research questions towards resolving identified problem(s)
- To guide the students in seeking answers to research questions

- To understand the terrain and techniques of literature search for information towards solving or understanding identified problem
- To design and write experimental protocols with intention to obtain a missing information or to solve a problem
- To plan, conduct and complete a research projects
- To document, and communicate research findings in writing and in oral presentations
- To foster through instruction, a deeper understanding of responsible research, research ethics research collaborations and team work
- To prepare students for future career in in academia, industry, self and government employment.

STAFF
Postgraduate Teachers

Rank	*Number of Full-Time Staff including Contract Staff*	*Number of Part-Time Staff or Adjunct Staff*
Professor	5	-
Associate Professor	1	-
Senior Lecturer	3	-
Lecturer I (with Ph.D.)	1	-
Lecturer I (without Ph.D.)	-	-
Lecturer II (with at least 2 Years Post Ph.D. Qualification	-	-
Total	10	-

List of Postgraduate Teachers for the Programme

SN	*Full Name (Surname First)*	*Highest Qualification*	*Status*	*Dept*	*Area(s) of Specialization*
1	Prof. Adesegun, Sunday Adeleke	B. Pharm, M.Sc, Ph.D	Professor/ HOD	Pharmacognosy	Natural products drug discovery and Phytochemistry
2	Prof. Odukoya, Olukemi Abiodun	B.Pharm, M.Sc, Ph.D.	Professor	Pharmacognosy	Evaluation of biologically active natural products, Standardization and Phytochemistry
3	Prof. Ajayi, Glory Oluremilekun	B.Pharm, M.Sc, Ph.D.	Professor	Pharmacognosy	Phytochemistry, Biological evaluation of natural products and Quality control of herbal drugs
4	Prof. Sowemimo, Abimbola Adepeju	B.Sc. MSc, Ph.D.	Professor	Pharmacognosy	Natural Product Research

SN	*Full Name (Surname First)*	*Highest Qualification*	*Status*	*Dept*	*Area(s) of Specialization*
1	Prof. Adesegun, Sunday Adeleke	B. Pharm, M.Sc, Ph.D	Professor/ HOD	Pharmacognosy	Natural products drug discovery and Phytochemistry
5	Prof. Sofidiya, Margaret Oluwatoyin	B.Sc. MSc, Ph.D	Professor	Pharmacognosy	Ethnobotany and Ethnopharmacology
6	Dr. Orabueze, Ifeoma Celestina	B.Pharm, M.Sc, Ph.D.	Associate Professor	Pharmacognosy	Ethnomedicine, Natural Product Chemistry, Formulation and Quality control and analysis of herbal products
7	Dr. Odimegwu, Joy Ifunaya	B.Sc. MSc, Ph.D	Senior Lecturer	Pharmacognosy	Medicinal Plant Development using Biotechnology and Phytochemistry
8	Dr. Mutiat Bolanle Ibrahim	B.Pharm, M.Sc, Ph.D.	Senior Lecturer	Pharmacognosy	Ethnopharmacology/Phytochemistry
9	Dr. Nkemehule, Florence Ezinwa	B.Sc. MSc, Ph.D	Lecturer 1	Pharmacognosy	Ethnobotany and Ethnopharmacology
Lecturers from other Departments					
9.	Dr. Akinsola, Oluwatosin Jonadab	MBBS MSc, PhD	Senior Lecturer	Public Health	Medical Statistics and Medical data analysis

Technical Staff: Names and qualifications/Designation

SN	*Full Name (Surname First)*	*Highest Qualification*	*Designation*	*Qualification & Dates Obtained*
1	Mr. Adeleke, Tijani Isaac	M.Sc.	Chief Technologist III	M.Sc. OOU (2018); PGD OOU (2013); Advance Diploma in Herbal Medicine (2005); Final Dip. Unilag. (1993); Intermediate Dip. NISLT (1991)
2	Mr. Yusuf, Habeeb Olalekan	B.Sc.	Technologist I	B.Sc. Science Laboratory Technology (Pharmacology and Physiology) (2012); Associate Nig. Institute of Science Laboratory Technology (2014)
3	Mr. Eyiwumi, Gbadebo Ayotunde	HND	Technologist II	Higher National Diploma (2008), National Diploma in Science Laboratory (2004), Associate Nig. Institute of Science Laboratory Technology (2011)
4	Mrs. Juwon-Mathew, Mojisola Roseline	HND	Senior Laboratory Supervisor	HND Science Laboratory Technology (2014), National Dip. Science Laboratory Tech. (2010), Pharmacy Technician

SN	*Full Name (Surname First)*	*Highest Qualification*	*Designation*	*Qualification & Dates Obtained*
				Certificate (1990), Associate Nig. Institute of Science Laboratory Technology (2015), National Association of Pharmaceutical Technologist & Pharmacy Technician of Nigeria 2000. Diploma in Herbal Medicine (2005)
5	Mr. Julius, Solomon Omogbai	B.Sc.	Principal Technical Officer II	B.Sc. Chemistry (2020); OND Science Laboratory Technology (2012)
6	Mrs. George, Susan A.	SSCE	Higher Technical Officer	Senior Secondary Certificate Examination SSCE (2002)

Administrative Staff: Names and qualifications/Designation

SN	*Full Name (Surname First)*	*Highest Qualification*	*Designation*	*Qualification & Dates Obtained*
1	Mrs. Okosie, Anthonia	GCE	Principal Personal Assistant I	Diploma (Computer and Management) 2008, Advanced Diploma (Computer and Management) (2008), GCE (2002), Pitman Advanced Certificate London (1981)
2	Mr. Olatunde, Gabriel	B.Sc. (Business Administration)	Principal Executive Officer I	B.Sc. Bus. Admin. (2008); Adv. Dip. In Desktop Publishing & Graphic Designs (2006); Dip. Computer & Mgt. (1999)
3	Mr. Oluwale Olaniyi Gbenga	MSc.	Administrative Officer II	B.Sc. (Business Admin.) 2014, MSc. (Organizational Behaviour) 2019
4	Mr. Gbolagunte Kazeem	HND	Administrative Assistant I	HND, OND in Computer Engineering (2018); SSCE (2014).

Facilities and equipment in the department

S/N	**Equipment**	**Unit**	**Status**
1	Rotary evaporators	2	Functional
2	Soxhlet apparatus	1	Functional
3	Ultra violet spectrophotometer	2	Functional
4	Water distiller	1	Functional
5	Freeze dryer	1	Functional
6	Sonicator with water bath	1	Functional
7	Melting point apparatus	1	Functional
8	Grinding mill	2	Functional
9	UV tanks and lamps (254 and	1	Functional

	366 nm)		
10	Microscopes	20	Functional
11	Oven	4	Functional
12	Water bath	2	Functional

S/N	Facilities	Unit	Status
1	Teaching classroom	1	Functional
2	PG laboratory	1	Functional
3	Herbarium	1	Functional

CHAPTER TWO

ADMISSION AND REGISTRATION PROCEDURES

Admission

i. Admission general procedures is as guided by the requirements and directives of the School of Postgraduate School, University of Lagos, Nigeria.
ii. The specific requirements for admission into any of the Department of Pharmacognosy postgraduate programmes are specified according to each programme or programme of interest.
iii. Complete the application form for the programme of interest on the University portal.
iv. Fill accurately all required information on the online form and upload all relevant documents, including certificates of degrees, National Youth Service Corps (NYSC) discharge or exemption, etc as will be requested by SPGS.

Screening and Selection Criteria

i. Applicants for admission into the postgraduate programme of the Department of Pharmacognosy will be subjected to screening test as decided or recommended by the SPGS. The screening test could include any of the following, a combination or all of the test options, The test options include, written, oral tests or previously obtained degree points. The testing option for any new academic sessional application is dependent on the decision of the SPGS. Whatever the screen option maybe, the applicants will be informed.

ii. The result of the screening will be sent to the department for recommendation of applicants for admission based on total percentage of their grades obtained during the screening process.

iii. The departmental recommended applicants will be invited by the SPGS for original certificate/document screening.

iv. And thereafter, the SPGS will offer letter of admission to successful candidates.

Registration

i. All newly admitted candidates (offered admission) will be required to registered online in accordance with the SPGS directives. The online filled registration forms will be printed for endorsement by appropriated personnels.

ii. And thereafter, the candidate will be required to register with the department, where a folder for the student will be created for documentation. The SPGS registration form print-out copies will be duplicated and submitted to the department. Such documents and are kept in the folder of the student and any other relevant document or information the department may deem it right to ask for.

iii. Some departmental fees may apply, especially the bench fees.

iv. All active students are required to register at the beginning of each academic session and the beginning of each semester will register of courses he or she will be offering with the SPGS through their student portal.

LECTURES AND ASSESSMENTS

i. Registered students are expected to attend all lectures and participate in all the assignments and fieldworks and practical classes.
ii. A 75% lecture attendance is needed to be eligible to take any semester or sessional examination.
iii. Assignments are learning tools used by PG teachers to create a learning interest/ability, research and reporting skills for the students. Such assignments are evaluated/assessed and feedback are given to the students.
iv. The MSC. Programme is 80% theory course work and 20% research.
v. The M.Phil. and PhD are 100% research programme. Refer to the relevant programme for more information on this.

RESEARCH SUPERVISORS

i. A student for MSc. Will be assigned to one project supervisor who will act also in the capacity of a mentor throughout the stay of the student for the programme. Such research supervisor cum mentors are assigned at the beginning of the programme.

ii. As a research supervisor, the academic staff will guide the student through research project topic selection (the possible area of research project), to proposal write-up, to seminar presentation, to bench work to dissertation write-up to project/dissertation oral defence before an invited external examiner.

iii. The M.Phil. students will be assigned to one supervisor

iv. The PhD. Students are assigned to 2 supervisors (a main supervisor and a co-supervisor). The main supervisor should be an academic staff of the department. An additional third supervisor can be assigned but with permission from the SPGS. The supervisors will mentor the student through the act of topic selection, identification of problems, raising of research questions based on the identified problem, proposal writing (including literature search, methodology), bench work, data analysis and manuscript writing etc.

DISSERTATION/THESIS

i. The end of MSc. programme final research report/write-up shall be by dissertation.

ii. The end of Ph.D. programme final research report/write-up shall be by a thesis.

iii. Both MSc. and Ph.D. students shall be mentored and guided all through the stages of the data analysis, interpretation and write-up by their assigned supervisor through the writing of this end of programme manuscripts (dissertation for MSc. and thesis for Ph.D.)

iv. The MSc. dissertation shall be examined and graded by an external examiner. The grading will involve oral presentation of defence of the dissertation by the student, question and answers, and the written work itself. The department has an existing list of points to be evaluated and graded (over one hundred percent).

v. The Ph.D. thesis shall be subjected to a viva/ oral defence as guided by the policy of the SPGS. The viva will be conducted by a panel of examiners which must include the Head of Department (Chief examiner), external examiner, Departmental representatives, SPS representative and the student's supervisors. The external examiner must be an expert in the candidate's Ph.D. research interest.

SEMINARS

MSc. seminar:

The students in all the programmes are required to make scientific oral presentation(s) at specified time during their post graduate training. The purpose of the seminars is to allow the students develop oral presentation skills and topic development skills.

i. The student with the aid of the project supervisor selects a topic and presents it orally, using PowerPoint.
ii. All departmental PG lecturers are expected to be in attendance to critique the oral presentation and grade the student within the already established grading scale (over hundred percent). The score earned here counts in the CGPA.
iii. Any other lecturer from the University of Lagos from the rank of Senior Lecturer so desired can be in attendance and can given the grading form to grade the students.
iv. Suggested corrections, inputs on the presented seminar are expected to be effected by the student to the satisfaction of the PG coordinator, and the supervisors.

M.Phil. Seminar:

A research-based seminar will be presented by the M.Phil. student and it counts for his/her GPA

Ph.D Seminars:

The student, under the guidance of his/her supervisors, shall present the following s five (5) seminars in the department before the degree can be awarded:

i. Three term paper seminars which should consist of industrial Pharmacognosy, Natural product Chemistry and clinical Pharmacognosy seminars. A soft bound term paper will be submitted with each of the seminar presentation. The term paper will be graded by the 2 assigned supervisors and deposited in the department shelf.

ii. Research Proposal seminar.

iii. Research result seminar
iv. APC research seminar, this is seminar is not graded but done in preparation of the student to attend APC. This seminar presents both the proposal to the final results and contribution to knowledge and must be in conformity to the University SPGS format.

CONVERSION FOR M.PIL. TO PH.D. PROGRAMME

i. Students who entered the M.Phil. programme can on completion of the programme can apply to convert to PHD. However, eligibility for this conversion is subjected to meeting up with the stipulated requirement.
ii. The SPGS handles the consideration and recommendation for the conversion after the student has filled and submitted the conversion form

DISSERTATION/THESIS

Guidelines for writing of thesis and dissertation

The departmental guidelines for writing of dissertation and thesis are in line with that of SPGS. There is a unified style/format which every student is strongly advised to conform with as failure to do so may lead to rejection of the dissertation or thesis. Students are advised to obtain such information from the SPGS website or office.

The content of the dissertation/thesis shall be arranged in the following order but highly advised to seek for more information from SPGS:

Cover Page:

Cover Page should contain the following information and arranged accordingly:

a. The title of the thesis/dissertation
b. The full name of the candidate
c. The degree/programme to be awarded
d. The candidate's matriculation number
e. The declaration that the research was in partial fulfilment for the award of a specified degree.
f. The month and year of submission of the thesis/dissertation.

Certification page:

The page shall contain a statement declaring the certification of the title and work. The page is endorsed with the signature of the Head of the Department, Supervisor(s) and that of the student

Acknowledgment:

The students acknowledge various helps received and any other privately received favours

Dedication:

The candidate can dedicate the thesis/dissertation to person(s), or events

Table of contents:

List and pages of all topics and subtopics

List of Tables/Plates/Figures:

This captures all the cited tables, plates and figures for ease of location.

Abbreviations/Glossary/Definitions:

Abstract:

Each thesis/dissertation shall have an abstract.

The Main Body of the Thesis/Dissertation:

The main body of a Ph.D. thesis shall contain the following

a) Chapter One - Introduction

b) Chapter Two - Literature Review

c) Chapter Three - Methodology (or Materials and Methods)

d) Chapter Four - Results (or Data Presentation and Analysis)

e) Chapter Five - Discussion

f) Chapter Six - Conclusions and Recommendations
The emphasis of this chapter shall be on:

i. Summary of findings in relation to the research objectives
ii. List of contributions to the existing body of knowledge on the subject area.

List of References:
The list of references. All cited journals (in-text) must include all papers cited in the body of the thesis/dissertation.

Plagiarism

i. There should be responsible use of other author/scholars' work and ideas. Cited information must be referenced. Extensive copying of others' work in the form of direct copying or paraphrasing is regarded as plagiarism. Repetitive quotation and copying of information from the same source, author, material, set of works etc is regarded as plagiarism.
ii. Plagiarism affects the integrity and originality of personal work, research and intention.
iii. Submitted dissertations/theses are subjected to plagiarism test by the SPGS and any more than 19/29/39 percent is rejected and returned back to the student.

PROGRESS REPORT:

i. Each student in all the different programmes must submit a yearly progress report to the SPGS.
ii. The form can be obtained from the SPGS.
iii. The progress form will be filled by both the student and the supervisor lead supervisor.
iv. The filled form will be submitted to the Head of the Department and the PG coordinator for their recommendations

v. Students who are not making satisfactory progress can be recommended to the SPGS for counselling or advised to withdraw.

OUR GRADUATE STUDENT OUTPUTS AND PLACEMENT OPPORTUNITIES

In the last ten years, many of our graduates have won the Fulbright and funded PhD programmes in international schools.
We laid strong and excellent foundation in proposal, grant application writing which enables our graduate to achieve international grants and school placements easily. Topic development using PowerPoint and seminar presentations are core part of our skill training process in the course of their postgraduate programme. Each of the programmes has the minimum number of such seminars to be presented towards the award of the degree.

Private and government-oriented research and academia are the highest absorber of our graduates. They have been noted to excel in such places, evidence based also on the number of awards they receive and remarkable achievements made in their places of duties.

The industry sectors have also benefited greatly in the quality of our graduates. Some of our graduates are formulators, quality analyst, quality assurance/control in herbal medicine manufacturing

CHAPTER THREE

THE PROGRAMMES IN DETAILS

A MASTERS (M.Sc.) PHARMACOGNOSY (FULL TIME)

i. Introduction and Area of Specialization

The M.Sc. Pharmacognosy is a lecture-based programme with hands-on practical classes and a research project. It is intended to produce a pool of highly trained personnel who will be involved in research and development including policy aspects of phytomedicines. At the end of training, graduates are expected to have gained basic understanding of the physical and chemical properties of the compounds that occur in nature, in order to be able to isolate, identify, characterize, and utilize them for specific purposes. Graduates of this course will be in demand in research institutions, pharmaceutical firms dealing with natural drugs, teaching at tertiary institutions or as practitioners in traditional medicine. Areas of specialization include:

- Drug discovery and development
- Development and use of analytical methods for standardization and quality control of natural products
- Use of traditional remedies
- Conservation of medicinal or economically important natural products
- Use of natural products for agricultural and veterinary purposes
- Safety and functional uses of food components and consumer products
- Cosmetic application of natural compounds or extracts
- Use of genetic biosynthetic pathways for the purpose of enhancing the production of natural compounds

ii. Duration of Programme:

The duration of the programme is a minimum of three (3) semesters and a maximum of six (6) semesters.

The minimum duration is two (2) semesters or one academic session for full-time and four (4) semesters or two (2) academic sessions for the part-time PGD programme.

The minimum duration is four (4) semesters or two (2) academic years for full-time and six (6) semesters or three (3) academic years for the part-time Master's programme (M. A, MSc., M.Eng, MBA and MPA)

iii. Programme Entry/Admission Requirement

(a) An applicant for admission to this programme shall be a graduate of the University of Lagos or any other approved University, holding a degree with minimum of second-class lower division in any of the following courses:

- Pharmacy (B. Pharm or Pharm. D.), Chemistry, Biochemistry, Botany and Plant science

(b) Registration with Pharmacists Council of Nigeria will be an advantage and will attract an extra score.

iv. Programme Graduation Requirement

To satisfy the requirements for the award of M.Sc. Pharmacognosy: Candidates must take and pass a minimum of **30 units** and maximum of 40 units made up of the following:

- Compulsory courses 22 units
- Seminar 2 units
- Research project 4 units
- Electives 2 units

Candidates without a Pharmacy background will be required to take some undergraduate courses i.e. **PCG 311, 312, 321, 401, 402 and 403.** Candidates are expected to pass the in-course in the audited courses.

v. List of Courses

Code	*Course Title*	*Status*	*Units*
First Semester			
PCG 811	Taxonomy and Chemotaxonomy	E	2
PCG 812	Agro-pharmaceuticals	C	2
PCG 813	Pharmaceutical analysis of natural drug products I	C	2
PCG 814	Advanced natural product chemistry I	C	2
PCG 815	Advanced Techniques in Pharmacognosy I	C	2
PCG 816	Registration and regulation of herbal products	E	2
PCG 817	Veterinary Pharmacognosy	C	2
PUH 811	Medical Statistics	C	2
Second Semester			
PCG 821	Herbal cosmetology	E	2
PCG 822	Pharmaceutical analysis of natural drug products II	C	2
PCG 823	Advanced natural product chemistry II	C	2
PCG 824	Advanced Techniques in Pharmacognosy II	C	2
PCG 825	Biological variations in Natural Products	E	2
PCG 826	Pharmacognostic analysis of drugs and surgical dressings	E	2
PCG 841	Principle and practice of herbal medicine	C	2
PCG 842	Research Seminar	C	2
Third Semester			
PCG 831	Clinical Pharmacognosy and Training	C	2
PCG 833	Phytotherapy and Nutritional Medicine	E	3
PCG 834	Marine derived Natural Products	E	3
PCG 899	Research Project	C	4

GENERAL COURSE GRADING FORMAT

i. Lecture attendance is compulsory at all levels of the postgraduate studies.

ii. A student must have a minimum of 75% attendance in a course to be

eligible to sit for the examination.
iii. Courses shall be examined at the end of each semester. A score of 50% is considered the pass mark for all Postgraduate courses.
iv. A Ph.D student must obtain a minimum CGPA of 4.0 in the course work to be eligible to proceed to the proposal defence stage of the Ph.D programme.
v. An M.Phil. Student must obtain a minimum CGPA of 4.0 in the course work to be eligible for conversion to the Ph.D programme and the proposal defence stage.

(B) MASTER OF PHILOSOPHY (M.Phil.) PHARMACOGNOSY (FULL TIME/PART TIME)

i. Introduction and Area of Specialization

The M. Phil. (Pharmacognosy) will expose the students to both theory and practical classes. It is intended to produce a pool of highly trained personnel who will be involved in natural products research and development including policy aspects of phytomedicines. They will be versed in herbal medicine drug discovery for diverse disease systems e.g. cancers, cardiovascular diseases and so on. Graduates of this course will be in demand in research institutions, pharmaceutical firms dealing with natural drugs, teaching at tertiary institutions or as practitioners in traditional medicine. They will also be empowered to start up; Agro-Pharmaceuticals as it has to do with Traditional and Herbal Medicines.

Areas of specialization include:

- Drug discovery and development
- Conservation of medicinal or economically important natural products
- Use of natural products for agricultural and veterinary purposes
- Use of genetic biosynthetic pathways for the purpose of enhancing the production of natural compounds

ii. Duration

a. **Full Time**: Minimum of four (4) semesters and maximum of eight (8) semesters.

b. Part Time: Minimum of six (6) semesters and maximum of twelve (12) semesters.

The minimum duration is seven (7) semesters or three and a half (3½) academic Years for full-time and ten (10) semesters or five (5) academic years for the part-time M.Phil./Ph.D. programme.

iii. Admission Requirement

Admission into the degree programme of Master of Philosophy in Pharmacognosy is open to:

a. Candidates who possess a Master of Science degree (M.Sc.) in Pharmacognosy from the University of Lagos or any other approved University with a minimum CGPA of 3.00/5.00.
b. Candidates with Bachelor of Pharmacy Degree (B. Pharm.) from the University of Lagos or any other approved University with a minimum CGPA of 3.00/5.00.

iv. Graduation Requirement

A. Candidates admitted with M.Sc. Pharmacognosy must offer and pass the following:
   i. 9 units coursework at 900 level (M.Phil. courses),

B. Candidates admitted with B. Pharm must offer and pass 43 units including:
   i. 22 units from the 800 level courses (M.Sc)
   ii. 9 units from 900 level courses (M.Phil)

C. A candidate in categories **a** and **b** above with course work results with CGPA of less than 3.50/5.00 would be required to pass:
   i. 6 units seminar,
   ii. 6 units Dissertation

After which he/she will be advised to terminate the programme.

D. A candidate in categories **a** and **b** above with course work results CGPA of 3.50/5.00 and above would be advised to proceed to Ph.D. programme.

v. List of Courses

Code	*Course Title*	*Status*	*Units*
PCG 911	Natural Product of medicinal importance	C	3
PCG 922	Industrial Pharmacognosy	C	3
PCG 933	Herbal Therapeutics	C	3
PCG 934	Quality control and regulation of herbal products	E	2
PCG 935	Nutrition and aromatherapy	E	2
PCG 936	Formulation and standardization of herbal medicine	E	2
PCG 941	Seminar I	C	2
PCG 942	Seminar II	C	2
PCG 943	Seminar III	C	2
PCG 949	Dissertation	C	6

GENERAL COURSE GRADING FORMAT

i. Lecture attendance is compulsory at all levels of the postgraduate studies.
ii. A student must have a minimum of 75% attendance in a course to be eligible to sit for the examination.
iii. Courses shall be examined at the end of each semester. A score of 50% is considered the pass mark for all Postgraduate courses.
iv. A Ph.D student must obtain a minimum CGPA of 4.0 in the course work to be eligible to proceed to the proposal defence stage of the Ph.D programme.
v. An M.Phil. Student must obtain a minimum CGPA of 4.0 in the course work to be eligible for conversion to the Ph.D programme and the proposal

defence stage.

(E) DOCTOR OF PHILOSOPHY (Ph.D.) PHARMACOGNOSY (FULL TIME/PART TIME)

i. Introduction and Area of Specialization

The PhD Pharmacognosy in the Department of Pharmacognosy is a world class programme. It offers the opportunity to be engaged in a wide range of cutting-edge research topics. The research area selected is dependent on the project interest of the PhD student and the supervisor (member of academic staff). The focus and rate of the student research development and progress is constantly evaluated. Attendance at departmental seminars, reading of the literature, lab meetings and skills training is compulsory.

The programmed aimed at producing highly qualified personnel who will be involved in natural products drugs research and development including contributing to policy decisions on phytomedicines. They will be versed in herbal medicine drug discovery research for diverse disease systems e.g. cancers, cardiovascular diseases. Thus, graduates can be employed in direct research institutions, pharmaceutical firms dealing with natural drugs, teaching at tertiary institutions or as practitioners in traditional medicine. They will also be empowered to start-up; Agro-Pharmaceuticals as it has to do with Traditional and Herbal Medicines. Areas of specialization include:

- Drug discovery and development
- Natural product chemistry
- Herbal formulation and standardization
- Use of natural products for agricultural and veterinary purposes
- Phytomedicine

ii. Duration of Programme:

a. **Full Time**: Minimum of six (6) semesters and maximum of twelve (12) semesters.
b. **Part Time**: Minimum of eight (8) semesters and maximum of sixteen (16) semesters.

The minimum duration is six (6) semesters or three (3) academic years for full-time and eight (8) semesters or four (4) academic years for the part-time Ph.D. programme.

iii. Programme Entry/Admission Requirement

Admission into the Doctor of Philosophy degree Programme in Pharmacognosy will be to candidates who possess a:

a. Master of Philosophy (M.Phil.) in Pharmacognosy with a minimum cumulative GPA of at least 3.50/5.00 from the University of Lagos or any approved University.

b. Master of Science Degree (M.Sc.) in Pharmacognosy from the University of Lagos or any other approved University with a cumulative Grade Point Average (CGPA) of 3.50/5.00

c. B. Pharm from the University of Lagos or any other approved University with a Distinction or cumulative Grade Point Average (CGPA) of 4.50/5.00

iv. Programme Graduation Requirement

a. To qualify for the award of Ph.D. in Pharmacognosy, a candidate who holds an M. Phil. Degree in Pharmacognosy must offer and pass:

i. 6 units of course work of Ph.D. courses
ii. 6 units of seminars
iii. 12 units of thesis

b. To qualify for the award of Ph.D. in Pharmacognosy, a candidate who holds a Master's Degree in Pharmacognosy must offer and pass:

i. Coursework 12 Units
ii. Seminar 6 Units
iii. Thesis 12 Units

c. To qualify for the award of Ph.D. in Pharmacognosy, a candidate who holds a B. Pharm in Pharmacy must offer and pass:

i. Compulsory courses 22 Units (MSc. level)
ii. 900 level courses 9 units from (M.Phil)
iii. Coursework 6 Units (for PhD.)
iv. Seminar 6 Units
v. Thesis 12 Units

v. List of Courses

Course	*Course Title*	*Status*	*Units*
PCG 951	Advanced Topics in Natural Product of Medicinal Importance	C	3
PCG 952	Advanced Topics in Industrial Pharmacognosy	C	3
PCG 953	Advanced Topics in Herbal Therapeutics	C	3
PCG 954	Advanced Techniques in Chemistry of Natural Products	E	3
PCG 955	Wellness and physical therapy	E	2
PCG 956	Advanced Agro-pharmaceuticals	E	2
PCG 991	Seminar IV	C	3
PCG 992	Seminar V	C	3
PCG 999	Thesis	C	12

STAGES	**ACTIVITIES**
1	**Proposal defence**

	Presentation and defence of submitted proposal Offer of admission Assignment of supervisors
2	**Seminar presentation** Research proposal seminar PCG 954 3 term paper seminars PCG 953
3	**Field/Bench work** Research result seminar (PCG 954
4	**Registration of title** Faculty APC preparatory seminar APC presentation
5	**Oral defence of the research thesis** Appointment of assessors Appointment of panel of examiners Plagiarism evaluation of submitted thesis Assessors; report
6	**Approval of thesis** Final correction and submission of thesis
7	**Award of the degree**

GENERAL COURSE GRADING FORMAT

i. Lecture attendance is compulsory at all levels of the postgraduate studies.
ii. A student must have a minimum of 75% attendance in a course to be eligible to sit for the examination.
iii. Courses shall be examined at the end of each semester. A score of 50% is considered the pass mark for all Postgraduate courses.
iv. A Ph.D student must obtain a minimum CGPA of 4.0 in the course work to be eligible to proceed to the proposal defence stage of the Ph.D programme.
v. An M.Phil. Student must obtain a minimum CGPA of 4.0 in the course work to be eligible for conversion to the Ph.D programme and the proposal defence stage.

COURSE DESCRIPTIONS

PCG 811 Taxonomy and Chemotaxonomy 2 Units

Classical plant taxonomy of higher and lower plants: Taxonomy refers to a process of classification of living organisms into various categories of taxa. Identification and study of different characteristics, identification, classification and nomenclature of living organisms. Information about various external and internal structure, cell structure, biochemistry, physiological characteristics, developmental processes and also ecological features of the organisms to detect the similarities and differences.

Classical plant chemotaxonomy of higher and lower plants: classification of plants based on their chemical composition, constituents of nature like different living components of the environment that have useful, harmful and inactive chemical composition. Distribution of certain chemotaxonomic groups of constituents in the plant kingdom. Significance of biosynthetic pathways, variations, selection of chemotaxonomic markers and application of chemotaxonomy to plant breeding.

PCG 812 Agro-pharmaceuticals 2 Units

Historical developments of cultivated plants. Drug plant propagation techniques, examples from common crude drugs of African origin e.g. Digitalis, Opium, Bitter leaf, *Garcinia kola*, Ginger, Cannabis, Nutmeg, Cinnamon. Development of cultivation, Propagation and Conservation Methodse.g. Plant tissue culture, Bioreactors for established medicinal plants (e.g. those in the African Pharmacopoeia). Agricultural types; Aeroponics, Hydroponics, Medicinal Plant gardens, Arboretum management, Soil types, Degradation, Rehabilitation; Natural and Biological methods.

Analytical techniques of assessing pollutants, Study of the different factors affecting crude drugs collection and storage; GMP throughout the value chain. Physiology of flowering, fruiting, ageing, and senescence of medicinal plants whose bioactive compounds are mostly in these parts; *Hibiscus sabdarifa, Terminalia cattapa.* Economic plant diseases; Viral, Bacterial; Mechanisms of resistance to infection and plant disease control especially molecular techniques. Opportunities and challenges

PCG 813 Pharmaceutical Analysis of Natural Drug Products I 2 Units

Extraction efficiency and purification methods: Principles of extraction and selection of suitable extraction method, Different methods of extraction including maceration, percolation, hot continuous extraction, pilot scale extraction and supercritical fluid extraction with their merits and demerits. Purification and Recovery of Solvents. Chromatographic techniques (Adsorption CC, TLC, VLC), Partition (PC, GC, e.t.c), HPLC, Gel Filtration, electrophoresis, ion-exchange separation, Droplet counter current (DCCC) e.tc. Titrimetric and gravimetric methods. . Assessment of purity, quantification and derivatization of natural products.

PCG 814 Advanced Natural Product Chemistry I 2 Units

Advanced phytochemistry of the following groups (i.e. Natural sources, biosynthesis, study of isolation, chemical properties and bioactivities) of acetate pathways: fatty acids and polyketides; shikimate pathways: aromatic compounds, anthraquinones, coumarins, flavonoids and other groups like amino acids and phenylpropanoids; and carbohydrates: monosaccharides, oligosaccharides, aminosugars, aminoglycosides. Specific examples will be selected within each class and discussed from the perpective of their structures, stereochemical relations, spectrum of pharmacological activity and chemistry including their synthesis and synthesis of related compounds.

PCG 815 Advanced Techniques In Pharmacognosy I 2 Units

Laboratory Course in PCG 812, 813, 814 and 825. Field trip. Preparation of herbarium specimens, use of flora keys for plant identification, advanced histological techniques, Morphological Analysis, Pharmacognostic drawings, and microscopy as applied to drug evaluation. Evaluation and standardization of herbal drugs, micro measurement and Magnification; Morphological and microscopical examination of crude drug and cell inclusions. Chromatographic techniques and isolation techniques: Thin Layer Chromatography (TLC), Open column chromatography and modified column chromatography, Hyphenated chromatography: HPLC, GC-MS, LC-MS. Isolation of pure compounds from crude extracts and active fractions

PCG 816 Registration and regulation of herbal products 2 Units

The course will cover the Registration and regulation policy of herbal products.

Regulatory provisions in relation to manufacturing GMP, license, drug registration guidelines, offences and penalties involved in the production and sales of herbal/natural products.
Regulatory issues, national requirements for setting up herbal/natural drug industry for production or sale outlets, patenting of herbals/natural drugs, herbal drug registration processes and trade of raw materials and finished herbal products

PCG 817 Veterinary Pharmacognosy 2 Units

Natural products and animal health-The traditional concepts of animal diseases and treatment with crude drugs. Plants that improve yield (milk, eggs, healthier young ones) Antibiotic principles in plants used in poultry; Wild amaranth species. Substances of natural origin that promote good health in animals (e.g. *Acacia nilotica*, Gambir from *Uncaria gambir*, *Lagenaria brevifolia* fruit) and proven toxic to animals and their effects e.g. *Eupatorium rugosum*, *Euphorbia* spp., *Strophanthus* spp., *Calotropis procera* etc. The significance of Pesticides and Herbicides of natural origin e.g. seeds of *Azadiractha indica.*Phytoestrogens in grasses and effects on herbivores e.g. Clover. Opportunities and challenges**PUH 811**

Medical Statistics 2 Units

This course is to equip the students with statistical analysis of experimental data. Design, conduct and interpretation of clinical and epidemiological studies, standard statistical concepts of data descriptions, hypothesis testing including test statistics, correlation, p-values, significance levels, confidence levels and linear regression.

PCG 821 Herbal Cosmetology 2 Units

Introduction to Cosmetic Science: Basics of skin and Hair science.
Herbal ingredients in herbal cosmetics: classes of natural ingredients used in cosmetics making, herbal extracts, oil, essential oil.
Introduced to the principles of surface and colloidal chemistry and their specific applications to the development and manufacture of cosmetic products
Basics of formulation and development of body, skin and hair care products from locally available natural raw materials. Such include, emulsions-shampoo, conditioners, oils, gels.
Perfumery and deodorants: Science and use of natural sourced fragrance.
Analysis: techniques for evaluating both raw and finished herbal cosmetics: physical and sensory properties of products, efficacy, safety, microbial load, stability studies
Packaging and packaging materials.
Hands on training: Making of cosmetic formulation: emulsion, shampoo, hair and skin care products and Lip balm

PCG 822 Pharmaceutical Analysis of Natural Drug Products II 2 Units

Spectroscopic data in organic structure analysis, Introduction to Nuclear Magnetic resonance, interpretation and use of proton and carbon chemical shifts, multiple-pulse and multidimensional NMR techniques: one and two-dimensional NMR techniques, core techniques of mass spectroscopy: interpretation and use of data, different ionization techniques, molecular formular from molecular ion peak tandem mass spectroscopy, fragmentation processes, Infrared spectroscopy, optical and chiroptical techniques: UV spectroscopy, including behaviour of chiral chromophores, ORD-CD. Strategy of determining structure and stereochemistry: spectroscopic data translated into structures.

PCG 823 Advanced Natural Product Chemistry II 2 Units

Advanced phytochemistry of the following groups (i.e. Natural sources, biosynthesis, study of isolation, chemical properties and bioactivities) of mevalonate and deoxyxylulose pathways: terpenoids (mono, sesqui, di, sester, tri and tetraterpenoids), steroids, carotenolides, cardiac glycosides,. Alkaloids from ornithine, lysine, nicotinic acid, tyrosine, tryptophan, histidine, and purine alkaloids. Peptides, proteins and other amino acid derivatives. Specific examples will be selected within each class and discussed from the perpective of their structures, stereochemical relations, spectrum of pharmacological activity and chemistry including their synthesis and synthesis of related compounds.

PCG 824 **Advanced Techniques In Pharmacognosy II** **2 Units**

Classical and Chemical analysis of crude drugs and surgical dressings, different extraction procedures: extraction of Piperine from Piper nigrum, extraction of Caffeine from Tea leaves. Chromatographic studies: TLC Analysis of Curcumin and its Derivatives of Turmeric, flavonoids, coumarin derivatives and anthraquinones; VLC in separation of natural products; Column chromatography techniques and application of spectroscopic methods (i.e. a mini project to be submitted at the end of session.

PCG 825 Biological variations in Natural Products **2 Units**

Bio-variation of secondary metabolites, genetic factors (chromosomes, mutation, polyploidy, hybridization, chemical races) regulatory mechanisms in biochemical systems. Effect of the enzyme on chemical constituents and drug activity e.g. oxidoreductases of flavonoids, opium tea fermentation and hydrolases of cardiac and cyanogenetic glycosides. Factors affecting plant growth e.g. environmental factors, growth hormones and inhibitors etc. Phenotypic effects on variation during cultivation, tissue culture of medicinal plants, possibilities and prospects of drug plant production in Nigeria- economic factors, genetic consideration and selection in plant breeding.

PCG 826 Pharmacognostic analysis of drugs and surgical dressings **2 Units**

The importance of Pharmacognostic analysis, quality control and assessment of herbal medicines. Preparation of herbarium specimens, Use of flora keys for identification. Microtomy and advanced histological techniques and standardization. Evaluation and standardization of crude drugs and surgical dressings i.e. Classical and Chemical analysis, Proximate analysis. Biological methods of assay: Pharmacological, Microbiological, Radioimmunoassays

PCG 831 Clinical Pharmacognosy and Training **2 Units**

Nigerian medicinal plants in Traditional medicines. Integration or co-recognition of Traditional medicine. Methods and techniques of Traditional Medicine. Scientific evidence supporting some remedies or practices in Traditional medicine. For the training, students will visit an established herbal home/health services home to be able to acquire competence in (a) Providing a detailed evaluation of the patient's state of health. (b) Producing a full management plan, incorporating estimated length of treatment and appropriate therapeutic management including herbal medicine, diets, dietary supplements, exercise and massage etc. (c) Training in the use of common diagnostic tools (d) Monitoring and auditing of treatment.

PCG 833 Phytotherapy and Nutritional Medicine **3 Units**

Knowledge of disease process: Antimicrobial, anticancer, antihypertensive, antidiabetes, anti-diarrhoea etc. agents of plant origin to include- occurrence, plant part used, dosage, possible dosage forms. Nutritional medicines as adjunctive treatment in traditional medicine. The role

of nutrition in the prevention and treatment of chronic diseases. The use of naturally occurring nutrients, their absorption and functioning within the body in the management of some common disorders. The average Nigerian diet and the influence of social, economic, environmental and political forces on the choice of diet. Normal and abnormal bowel ecology. The effects of detoxification and fasting. Consideration of the principles behind and application of some dietary approaches e.g. vegetarianism. The effect of diseases on the nutrient requirements of the body, scientific evidence relating to diet and health, nutrition health education and nutrition health promotion. Assessing the impact of nutrition and food policies at local and national level. Nutritional aspects of pregnancy and baby nutrition. The role of diet, micronutrients and dietary supplement in disease states/ Food allergy

PCG 834 Marine derived Natural Products 3 Units

Marine biodiversity, including invertebrates, algae and bacteria etc. The physical and chemical properties of marine environments. Compounds produced by marine organisms, including peptides and related compounds. Marine Pharmaceuticals Discovery and Development: Marine natural products as anticancer, antimicrobial, anti-tubercular, anti-HIV drugs etc. Other uses for marine-derived compounds include: cosmetics, nutritional supplements, artificial bone, and industrial applications. Define the key drivers in marine drug development, Understand the potential of marine-derived compounds as value-added products, Explain the advantage of marine natural products as potential drugs, Describe the possible ways of , Marine antibacterial drugs obtaining bioactive compounds for biotechnological and industrial applications, Organisms collection and cultivation, Marine anticancer drugs, Approved marine drugs, Marine nutraceuticals and functional food, *marine natural products* drug discovery

PCG 841 Principle and Practice of Herbal medicine 2 Units

Nomenclature and Terminology: Traditional Medicine and Herbal Medicine. Advantages and Disadvantages of Traditional and Modern Medicine. Historical Review, Methods and Techniques and Standardization of Herbal Potions, Scientific evidence of ascertaining some researches, Relationships between plants used in Traditional Medicine and Modern Drugs. Integration or Co-recognition of Traditional and Modern Medicine. Methods of obtaining information on Medicinal Plants. Screening plants for bioactive agents. Guidelines for Research on medicinal plants for local drug production. Research Trend on medicinal plants. Conservation and biodiversity of medicinal plants. Some common medicinal and poisonous plants. Field Trip/Visit to Traditional Medical Clinics

PCG 842 Research Seminar 2 Units

This will be current topics in Pharmacognosy and Traditional Medicine Practice. The objective is to train graduate students how to search for, understand, write-up and orally present scientific information.

PCG 899 Research Project 4 Units

Application of research techniques and development of research methodologies to solve problems in the areas of natural drug products.

PCG 911 Natural Products of medicinal importance 3 Units

Review of standard research publications in chemistry of natural products. Chemistry of separate classes of compounds such as steroids, terpenes, alkaloids, sugars, carotenoids, fatty acid.
General characteristics and properties, detection, identification assays, extraction and isolation, structure elucidation. Standardization and quality control of natural products and end products. The chemistry of the following can also be reviewed (but not limited to the list): toxic constituents from marine sources; natural sweeteners; generation of wines; biological markers; pesticides; and secondary natural chemicals formed by microorganisms.
Candidates will be required to submit a term paper.

PCG 922 Industrial Pharmacognosy 3 Units

Review of standard research publications in Industrial Pharmacognosy. Optimization of formulation, pilot-plant and production scale-up. Formulation and processing of herbals and other raw materials for Industrial use. Processing of plant materials into different dosage forms. Preparation and storage- Physiochemical properties including Pka, ionization, oxidation. Rate of decomposition and rate of reaction studies of various temp, pH and relative humidity. Determination of shelf life of various formulated products. Quality control of herbal drugs.
Important concepts and principals in modern pharmaceutical industry, such as QbD (Quality-by-Design) and PAT (Process Analytical Technology)
Development and production of new drug substances and products, Relevant modern technology, principals and models for rational industrial r&d, Medicinal chemistry, pre-clinical efficacy and safety, pharmaceutical technology. Fingerprint analysis of extracts and standardization of the finished product.
Natural product based materials used in pharmaceutical industry. Candidates may be required to submit a term paper.

PCG 933 Herbal Therapeutics 3 Units

Review of standard research publications in Herbal therapeutics. The following area may be of interest. The nature of therapeutics and the role of herbal therapeutics, common (global) elements in the therapeutics of herbal traditions around the world. A review of the main underlying concepts of medical herbalism. Treating, prescribing and choice of herbs for different age and gender groups including infants, children, pregnancy, birth, lactation and the elderly. Choosing the appropriate therapeutic route of administration of herbal remedies, e.g. infusions, lotions, ointments etc. Review of Pharmacy procedures. Self-audit strategies for monitoring the course of treatment and quality of delivery of herbal practice. Legal requirements and issues affecting herbal practice. Candidates may be required to submit a term paper.

PCG 934 Quality control and regulation of herbal products 2 Units

The course will cover the regulatory and quality policy guiding the production and trade of herbal products and other drugs of natural origin. Regulatory provisions in relation to manufacturing GMP, license, drug registration guidelines, offences and penalties involved in the production and sales of herbal/natural products. The following areas will be of interest for a complete holistic view of the course to be appreciated, guidelines for quality control of herbal/natural medicines and regulatory issues, national requirements for setting up herbal/natural drug industry for production or sale outlets, patenting of herbals/natural drugs, herbal drug registration processes and trade of raw materials and finished herbal products

PCG 935 Nutrition and aromatherapy 2 Units

Nutrition will be addressed as a therapeutic instrument in the course of management, prevention, control of disease states. The course will cover the use of nutrition as a target to good health, wellness, healing and relaxation. The courses is designed to include also, effects of food additives (Supplementation and food fortification) and food processing, maternal nutritional needs and childhood malnutrition

Extraction, extraction techniques and storage for essential and fixed oils; Curative power of essential and fixed oils: focus will be on the use of locally available oils for therapeutic purposes such as general body healing, immune support, stress relief, emotional balance, skin care, respiratory health, green cleaning, and even muscle tension, pain, relaxation and sleep.

Aromatherapy techniques: Different methods of applying extracts from plants and healing oils to achieve topical and internal healing. Application techniques include: sprays, salt baths, massage oils, inhalation and techniques.

PCG 936 Formulation and standardization of herbal medicine 2 Units

The source and identification of commonly available and used raw materials of natural origin, basic methods or procedures for various herbal preparations, formulation development of various dosage form of herbal medicine and quality control of drugs of natural origin, current good manufacturing practices of herbal products as stated by regulatory authorities, guidelines for quality control of herbal products, current challenges in modernization and packaging of herbal formulations, hygiene, documentation (record keeping).

PCG 941 Seminar I 2 Units

Presentation of seminar on current research on natural product drug discovery.

PCG 942 Seminar II 2 Units

Presentation of seminars on current advances in herbal therapeutics.

PCG 943 Seminar III 2 Units

Presentation of seminar on any other related topics given by a supervisor.

PCG 949 Research Project 6 Units

Research project and thesis writing

PCG 951 Advanced Topics in Natural Product of Medicinal Importance 3 Units Review of standard research publications in chemistry of natural products. General characteristics and properties, detection, identification assays, extraction and isolation, structure elucidation. Role of natural products in drug discovery. Candidates will be required to submit a term paper.

PCG 952 Advanced Topics in Industrial Pharmacognosy 3 Units

Review of standard research publications in Industrial Pharmacognosy. Formulation and processing of herbals and other raw materials for Industrial use. Processing of plant materials into different dosage forms. Preparation and storage- Physiochemical properties including Pka, ionization, oxidation. Rate of decomposition and rate of reaction studies of various temp, pH and relative humidity. Determination of shelf life of various formulated products. Quality control of herbal drugs. Global trade, quality control and regulatory concerns, traditional

medicine systems, production and utilization of drugs, and utilization of medicinal and aromatic plants. Phytopharmaceuticals uses of natural products in the pharmaceutical industry. Candidates may be required to submit a term paper.

PCG 953 Advanced Topics in Herbal Therapeutics 3 Units

Review of standard research publications in Herbal therapeutics. The following area may be of interest. The nature of therapeutics and the role of herbal therapeutics, common (global) elements in the therapeutics of herbal traditions around the world. A review of the main underlying concepts of medical herbalism. Treating, prescribing and choice of herbs for different age and gender groups including infants, children, pregnancy, birth, lactation and the elderly. Choosing the appropriate therapeutic route of administration of herbal remedies, e.g. infusions, lotions, ointments etc. Review of Pharmacy procedures. Self-audit strategies for monitoring the course of treatment and quality of delivery of herbal practice. Legal requirements and issues affecting herbal practice. Candidates may be required to submit a term paper.

PCG 954 Advanced Techniques in Chemistry of Natural Products 3 Units

Related topics are given by a supervisor. Chemistry of secondary metabolites, isolation and structure determination of natural products, biosynthesis. Trending and current information o separation and analytical techniques and instrumentation: *thin-layer chromatography (TLC), high-performance thin-layer chromatography (HPTLC), high-performance liquid chromatography (HPLC), gas chromatography (GC) and, mass spectrometry (MS) and nuclear magnetic resonance (NMR),* X-ray diffraction, HSCCC = high-speed counter current chromatography; supercritical fluid chromatography (SFC); liquid chromatography–mass spectrometry (LC–M); liquid chromatography–nuclear magnetic resonance (LC-NMR); liquid chromatography–capillary electrophoresis (LC-CE); liquid chromatography–infrared (LC-IR)
Candidates may be required to submit a term paper.

PCG 955 Wellness and physical therapy 2 Units

This course address issues related to wellness and overall health and fitness promotion from holistic approach to healthcare.
Identification of basic body landmarks tendons, muscles, joint boundaries, and ligaments of the trunk, head, and extremities
Basic medical applications of scientific-medical imaging systems include conventional X-ray, computed tomography (CT), magnetic resonance imaging (MRI), nuclear medicine (PET and SPECT), and ultrasound.
Pain science, musculoskeleta pain, relationship between sleep and pain, neuromuscular Rehabilitation
Topics of interest will include nutrition, balance, weight loss, basic dietary and lifestyle for all ages promoting lifelong wellness, meditation, yoga,
Physical therapy will include, yoga, therapeutic exercise, stretching exercise, exercise physiology, sports medicine, massage techniques and healing process and maintenance of effective therapeutic relationships.
The relationship between safe exercise and cardiovascular, pulmonary, neuromuscular, musculoskeletal, endocrine, thermoregulatory, and renal systems/

PCG 956 Advanced Agro-pharmaceuticals 2 Units

Drug plant propagation techniques for greatest phytochemical yields; (augmented extractive values) Common crude drugs of African and Nigerian origin cultivated; for commerce; Specific monocropping for Pharmaceutical industry use e.g sesame seeds, *Carica papaya*. Specialised drying techniques for thermo-labile crude drugs e.g flash drying of fruits.
Advanced Conservation Methods e.g. Plant tissue culture, Bio-reactors for established medicinal plants, emphasis on indigenous plants. Agricultural types; Aeroponics, Hydroponics, Medicinal Plant gardens, Soil types, Degradation, Rehabilitation; Natural and Biological methods of rehabilitation e.g. Use of Moringa trees.
Analytical techniques of assessing pollutants, Study of the different factors affecting crude drugs collection and storage; GMP as indicated by FAO and WHO throughout the value chain; soil preparation, seed/stem selection, monitoring growth, ground water for contaminants like heavy metals as plants take these up through the roots. Appropriate time of harvest, Quality assurance methods. Laws protecting the environment; Federal Environment Protection Act of 1988 etc. Economic plant diseases; Viral, Bacterial; Mechanisms of resistance to infection and plant disease control especially molecular techniques. Case studies of Agro-Pharmaceuticals; Pax herbals and BDCP:Bioresources Development and Conservation Programme. Opportunities and challenges of agro pharmaceutical

PCG 991 Seminar IV **3 Units**

Presentation of Proposal Seminar on the current research topic. The intended research outline, such as literature review, aim, objective, methods and timeline will be presented.

PCG 992 Seminar V **3 Units**

Presentation of Seminar on results obtained from the research/project reports, and research findings.

PCG 999 Research Project -Thesis **12 Units**

Research project and thesis writing by the candidate following the university stated outline and format.

SUMMARY

S/N	*Programme*	*Units of Compulsory Courses*	*Minimum Units of Electives*	*Units of Seminar*	*Units of Project/ Thesis*	*Minimum Units a Student Can Offer*	*Minimum Units for Graduation*
1	M.Sc. Pharmacognosy (FT)	22	2	2	4	30	30
2	M.Phil. Pharmacognosy (FT/PT)- B.Pharm Entry level	31	-	6	6	43	43
3	M.Phil. Pharmacognosy (FT/PT)-M.Sc Entry level	9	-	6	6	21	21

4	Ph.D. Pharmacognosy B.Pharm Entry level	37	-	6	12	55	55
5	Ph.D. Pharmacognosy, MSc. Entry level	12		6	12	30	30
6	Ph.D. Pharmacognosy, M.Phil. Entry level	6	-	6	12	24	24