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NATIONAL UNIVERSITIES COMMISSION

BENCHMARK MINIMUM ACADEMIC STANDARDS

For

UNDERGRADUATE PROGRAMMES

In

NIGERIAN UNIVERSITIES

BASIC MEDICAL SCIENCES

NOVEMBER 2014

PLEASE NOTE: Conclusive statement
shall be made on the minimum CGPA of 1.5
for graduation after the forthcoming workshop on
Grading System

PREFACE

Section 10 (1) of the Education (National Minimum Standards and Establishment of Institutions) Act, Cap E3, Laws of the Federation of Nigeria 2004, empowers the National Universities Commission to lay down minimum standards for all programmes taught in Nigerian universities. In 1989, the Commission, in collaboration with the universities and their staff, developed minimum academic standards for all the programmes taught in Nigerian universities and the Federal Government subsequently approved the documents.

After more than a decade of using the Minimum Academic Standard (MAS) documents as a major instrument of quality assurance, the Commission in 2001 initiated a process to revise the documents. The curriculum review was necessitated by the fact that the frontiers of knowledge in all academic disciplines had been advancing with new information generated as a result of research. The impact of Information and Communication Technologies on teaching and learning and the dynamics of the skills set required to face the challenge of competition engendered by globalization were also compelling reasons for the curriculum review.

Other compelling reasons included the need to update the standard and relevance of university education in the country as well as to integrate entrepreneurial studies and peace and conflict studies as essential new platforms that will guarantee all graduates from Nigerian universities the knowledge and appropriate skills, competencies and dispositions that will make them globally competitive and capable of contributing meaningfully to Nigeria's socio-economic development.
Recognising that the content-based MAS documents were rather prescriptive, a decision was taken to develop outcome-based benchmark statements for all the programmes in line with contemporary global best practice. To actualize this, the Commission organized a stakeholders' workshop to benchmark each programme in all the disciplines taught in Nigerian universities. Following comments and feedback from critical stakeholders in the universities indicating that the Benchmark-style Statements were too sketchy to meaningfully guide the development of curricula and were also inadequate for the purpose of accreditation, the Commission put in place the mechanism for the merger of the Benchmark-style Statements and the revised Minimum Academic Standards into new documents referred to as the Benchmark Minimum Academic Standards (BMAS).

The resultant documents, an amalgam of the outcome-based Benchmark statements and the content-based MAS clearly enunciates the learning outcomes and competencies expected of graduates of each academic programme without being overly prescriptive while at the same time providing the requisite flexibility and innovativeness consistent with institutional autonomy.
The first step in the process of amalgamation of the Benchmark statements and the content-based MAS was the conduct of a needs assessment survey and the publication of the findings in the report titled *Needs Assessment Surveys of Labour Market for Nigerian Graduates.* This was carried out for all the disciplines taught in Nigerian universities. The exercise involved major stakeholders particularly employers of Nigerian graduates. The objectives of the Needs Assessment Survey included identification of expected knowledge, attitudes and skills for graduates and their ability to fit into the requirements of the new national and global economy. The second stage was the organisation of a workshop at which academic experts across Nigerian universities, including

Vice-Chancellors, participated with the objective of ensuring that the designed BMAS for the various disciplines took into cognizance the identified knowledge and skill gaps. At the end of the workshop, draft BMAS documents were produced for the various programmes in the thirteen broad academic disciplines into which the Nigerian University System has been structured. Of significance was the introduction of science- and social science/humanities-based courses under the General Studies programme which are compulsory for all first- year students in Nigerian universities, irrespective of their course of study.

The documents were later sent to the Universities offering relevant disciplines for comments and input. Following the collation of the input and comments from the Universities, another workshop was held at which invited academic experts studied and incorporated the relevant comments and input received into the draft documents.

After content and language editing, by relevant experts, a one-day workshop was held at which the edited documents were harmonized to produce the final BMAS documents.

Consequent upon the afore-mentioned processes, BMAS documents were produced for the under-listed academic disciplines:

i. Administration; Management and Management Technology;
ii. Agriculture, Forestry, Fisheries and Home Economics;
iii. Arts;
iv. Basic Medical and Health Science;
v. Education;
vi. Engineering and Technology;
vii. Environmental Sciences;
viii. Law;
ix. Pharmaceutical Sciences;
x. Medicine and Dentistry;
xi. Science;
xii. Social Sciences; and
xiii. Veterinary Medicine.

For each programme, the document contains suggestions of the status of each course in terms of *compulsory*, *required* and *elective*. Universities are encouraged to take due cognizance of the BMAS while bringing necessary innovation into the content and delivery of their programmes towards achieving their overall objectives and goals. Programmes are to be structured in such a way that a typical student does not carry less than 30 credit units or more than 48 credit units per session.

It is the Commission's expectation that this BMAS document will serve as a guide to the universities in the design of curricula for their programmes in terms of the minimum acceptable standards of input, process as well as measurable benchmark of knowledge, skills and competences expected to be acquired by an average graduate of each of the academic programmes.

Professor Julius A. Okojie, ***OON***
Executive Secretary

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GLOSSARY OF COURSE CODES

S/N	Course Code	Programme
1	ANA	Anatomy
2	ARC	Archaeology
3	BCH	Biochemistry
4	BIO	Biology
5	CHM	Chemistry
6	CPS	Computer Science
7	GEO	Geography
8	GST	General Studies
9	KHE	Physical and Health Education
10	MCB	Microbiology
11	MLS	Medical Laboratory Science
12	MTH	Mathematics
13	NSC	Nursing Science
14	NUT	Human Nutrition
15	OPT	Optometry
16	P10	Physiology
17	PAT	Pathology
		Pharmacognosy
		Pharmaceutical Chemistry
20	PHA	Pharmacology
21	PHY	Physics
22	PST	Physiotherapy
23	PSY	Psychiatry
24	RAD	Radiography and Radiation Science
25	STA	Statistics
26	ZOO	Zoology

SECTION ONE:

FUNDAMENTAL ELEMENTS OF THE BENCHMARK MINIMUM ACADEMIC STANDARDS IN BASIC MEDICAL AND HEALTH SCIENCES

1.1 Preamble

In this document, the Benchmarks and Minimum Standards for the education and training of students studying for first degrees in the programmes of the Basic Medical and Health Sciences discipline in the Nigerian University System are prescribed. It is expected that the components of the minimum standards described here will enable the graduates of the programmes to acquire sufficient theoretical and practical knowledge to contribute to national advancement and be competitive in the globalised environment. Institutions are expected to use these standards as the minimum guidelines in the innovative design of their own specific programmes.

1.2 Programmes and Degrees

The list of programmes and degrees covered in this current BMAS document is shown in Table 1.1. The list is not exhaustive. However, the document should serve the needs of the institutions in reviewing their existing programmes and developing new ones to enable them meet the challenges of the rapidly changing health sciences field.

List of Programme(s) and Degree(s) in View

S/N	Programme	Degree(S) in View
1	Dental Technology	B.Sc.
2	Environmental Health Science	B.Sc
3	Human Anatomy	B.Sc.
4	Human Nutrition and Dietetics	B.Sc.
5	Medical Laboratory Sciences	B.MLS
6	Nursing Sciences	B.NSc.
7	Optometry	O.D.
8	Pharmacology	B.Sc.
9	Physiology	B.Sc.
10	Physiotherapy	B.Physiotherapy/BMR
11	Prosthetics and Orthotics	B.Sc
12	Public Health	B.Sc.
13	Radiography and Radiation Sciences	B.Sc.

1.3 Philosophy and Objectives of the Discipline

1.3.1 Philosophy

The training towards the degrees in Basic Medical and Health Sciences are geared to respond to the recognition of life as a bio-psycho-socio-cultural entity in which continuous and rapid changes are the norm. They are designed to provide the graduates with a fundamental body of knowledge to make them sufficiently versatile to understand these changes and contribute meaningfully to the health sciences knowledge industry.

1.3.2 Objectives of the Discipline

The discipline is designed to contribute to the health and socioeconomic well-being of the nation through the following objectives:

a) prepare students with sufficient theoretical scientific knowledge base and practical skills that enable them assume professional positions.
b) develop students in the relevant practical and technological competence in practice at primary, secondary and tertiary levels of health care.
c) assist students in the development of interpersonal skills necessary to function as members of the health team.

1.4 Basic Admission Requirements

There are three different pathways by which candidates can be admitted into the programmes in the discipline: the Unified Tertiary Matriculation (UTME), the Direct Entry, and Inter-University Transfer.

Unified Tertiary Matriculation Examination (UTME)

The minimum academic requirement is credit level passes in five subjects at O'Level in nationally recognised examination including English Language, Mathematics, Physics, Chemistry and Biology at not more than two (2) sittings and an acceptable pass mark at the UTME conducted by the Joint Admission and Matriculation Board (JAMB).

Direct Entry

Candidate seeking admission through this mode should in addition to the UME requirements possess either:

a) passes in Physics, Chemistry and Biology or Zoology at the Higher School Certificates or Advanced Level of General Certificate Examination or its equivalent; OR
b) An acceptable First Degree in relevant Biological or Physical Sciences Discipline.

Inter-University Transfer Mode

Students can transfer into 200-Level courses provided they have the relevant qualifications and the requisite CGPA.

1.5 **Duration of the Programmes**

For candidates admitted through the UTME mode, the minimum duration of programmes under the discipline ranges from 4 – 6 academic sessions based on the specification of each programme. For candidates admitted through Direct entry the minimum duration of the programme will range from 3-5 academic sessions based on the specification of the programme and as may be determined by the receiving university in case of Inter-University Transfer.

1.6 **Graduation Requirements**

1.6.1 **Course System**

Credits are weights attached to a course. One credit is equivalent to one hour per week per semester of 15 weeks of lectures or three hours of laboratory/studio/workshop work per week per semester of 15 weeks

Definition of Course System

This should be understood to mean a quantitative system of organization of the curriculum in which subject areas are broken down into unit courses which are examinable and for which students earn credit(s) if passed. The courses are arranged in progressive order of complexility or in levels of academic progress, e.g. Level or year I courses are 100, 101 etc and Level II or year II courses are 200, 202 etc.

The second aspect of the system is that courses are assigned weights allied to Units.

Units

Consist of specified number of student-teacher contact hours per week per semester. Units are used in two complementary ways: one, as a measure of course weighting, and the other, as an indicator of student work load.

(i) As a measure of course weighting for each Unit course (e.g) HIS 105, ZOO 203, ARCH 504), the credit unit to be earned for satisfactorily completing the course is specified; e.g. a 2-credit unit course may mean two 1-hour lecture per week per semester or one 1-hour lecture plus 3-hour practical per week per semester.

(ii) As a measure of work load, "One Credit Unit" means one hour of lecture or one hour of tutorial per week per semester. For other forms of teaching requiring student teacher contact, the following equivalents may apply:

two hours of seminar: three hours of laboratory or field work, Clinical practice/practicum, studio practice or stadium sporting activity, six hours of teaching practice; four weeks of industrial attachment where applicable.

Normally, in Course Credit System, courses are mounted all year round, thus enabling students to participate in examinations in which they are unsuccessful or unable to participate on account of ill health or for other genuine reasons. In such a system, no special provisions are made for re-sit examinations.

The minimum number of credit units for the award of a degree is 120 units, subject to the usual Department and Faculty requirements and duration of study. A student shall therefore qualify for the award of a degree when he has met the conditions.

The minimum credit load per semester is 15 credit units.

For the purpose of calculating a student's cumulative GPA(CGPA) in order to determine the class of Degree to be awarded, grades obtained in **ALL** the courses whether compulsory or optional and whether passed or failed must be included in the computation.
Even when a student repeats the same course once or more before passing it or substitutes another course for a failed optional course, grades scored at each and all attempts shall be included in the computation of the GPA. Pre - requisite courses must be taken and passed before a particular course at a higher level.

1.6.2 Standard Terminologies

The following standard terminologies are used for different categories of courses.

i. **Core/Compulsory Course:**
A course which every student must compulsorily take and pass in any particular programme at a particular level of study.

ii. **Elective Course**
A course that students take within or outside the faculty. Students may graduate without passing the course provided the minimum credit unit for the course had been attained.

iii. **Optional Course**
A course which students can take based on interest and may count towards the minimum credit unit required for graduation.

iv. **Pre-requisite Course**
A course which student must take and pass before taking a particular course at a higher level.

v. **Required Course**
A course that you take at a level of study and must be passed before graduation.

1.6.3 Grading of Courses

Grading of courses shall be done by a combination of percentage marks and letter grades translated into a graduated system of Grade Point as shown in Table 1.2.

Grade Point System

Mark %	Letter Grade	Grade Point
70 – 100	A	5
60 – 69	B	4
50 – 59	C	3
45 – 49	D	2
0 – 44	F	0

1.6.4 Grade Point Average and Cumulative Grade Point Average

For the purpose of determining a student's standing at the end of every semester, the Grade Point Average (GPA) system shall be used. The GPA is computed by dividing the total number of Units x Grade Point (TUGP) by the total number of units (TNU) for all the courses taken in the semester as illustrated in Table 1.3.

The Cumulative Grade Point Average (CGPA) over a period of semesters is calculated in the same manner as the GPA by using the grade points of all the courses taken during the period.

Calculation of GPA or CGPA

Course	Units	Grade Point	Units x Grade Point (UGP)
C_1	U_1	GP_1	U_1 x GP_1
C_2	U_2	GP_2	U_2 x GP_2
-	-	-	-
-	-	-	-
C_i	U_i	GP_i	U_i x GP_i
-	-	-	-
-	-	-	-
C_N	U_N	GP_N	U_N x GP_N
TOTAL	**TNU**		**TUGP**

$$TNU = \sum_{i=1}^{N} U_i \quad TUGP = \sum_{i=1}^{N} U_i * GP_i \quad CGPA = \frac{TUGP}{TNU}$$

1.6.5 Degree Classifications

Classes of degree are to be awarded depending on the cumulative GPA obtained. The classes of degrees that may be awarded are First Class Honours, Second Class Honours (Upper Division), Second Class Honours (Lower Division) and Third Class Honours.

Degree Classification

CGPA	CLASS OF DEGREE
4.50 – 5.00	First Class Honours
3.50 – 4.49	Second Class Honours (Upper Division)
2.40 – 3.49	Second Class Honours (Lower Division)
1.50 – 2.39	Third Class Honours

Unclassified Degree Categories

Cumulative Grade Point Average (CGPA)	Category Of Degree
2.4 – 5.00	Pass

1.6.6 **Probation**

Probation is a status granted to a student whose academic performance falls below an acceptable standard. A student whose Cumulative Grade Point Average is below 1.50 at the end of a particular year of study, earns a period of probation for one academic session. For unclassified degree, a student with CGPA less than 2.4 in a semester earns a probation.

1.6.7 **Withdrawal**

A candidate whose Cumulative Grade Point Average is below 1.50 at the end of a particular period of probation should be required to withdraw from the University. For unclassified degree, a student with CGPA below 2.4 for four consecutive semesters of probation should be required to withdraw from the programme. Where possible, consideration may be given to a student withdrawn from a programme of study for transfer to any other programme within the same university.

Subject to the conditions for withdrawal and probation, a student may be allowed to repeat the failed course Unit(s) at the next available opportunity, provided that the total number of credit units carried during that semester does not exceed 24, and the Grade Points earned at all attempts shall count towards the CGPA.

1.7 **Evaluation**

1.7.1 **Modes of Student Assessment**

All courses taken must be evaluated and a final grade given at the end of the semester. To arrive at the final grade, the evaluation must be a continuous process consisting of some or all of the following where applicable:

(i) Continuous Assessment
(ii) Examinations

a) **Continuous Assessment**
Continuous assessment shall be done through essays and tests. Scores from continuous assessment shall normally constitute 30-40 per cent of the full marks for courses which are primarily theoretical.

b) **Examinations**
In addition to continuous assessment, final examinations should normally be given for every course at the end of each semester. All courses shall be graded out of a maximum of 100 marks comprising:
Final Examination:60% - 70%

Continuous assessment (Quizzes, Homework, Tests and Practical): 30% - 40%

1.7.2 **External Examiner's System**

The involvement of external examiners from other universities is a crucial quality assurance requirement for all couses in Nigerian University System. In this regard, external examiner should go beyond mere moderation of examination questions to examining of examination papers to scope and depth of examination questions vis a vis the curricular expectation.

1.7.3 **SIWES Rating and Assessment (where applicable)**

There should be a mandatory 6 months uninterrupted SIWES training at the 300- or 400-level during which students can gain work experience in laboratories, hospitals or tertiary institutions in fields relevant to the course and or job market. For professional courses, the specific requirements of the appropriate regulatory body should be met.

1.7.4 **Students' Evaluation of Courses**

There should be an established mechanism to enable students to evaluate courses delivered to them at the end of each semester. This should be an integral component of the course credit system to serve as an opportunity for feedback on the effectiveness of course delivery.

Such an evaluation, which should be undertaken by students at the end of each course, should capture, among others:

(i) Improvement in the effectiveness of course delivery.
(ii) Continual update of lecture materials to incorporate emerging new concepts.
(iii) Effective usage of teaching aids and tools to maximize impact of knowledge on students and
(iv) Improvement in students' performance through effective delivery of tutorials, timely in presentation of continuous assessment and high quality examination.

It is very important that students' evaluation of courses be administered fairly and transparently through the use of well-designed questionnaires. The completed questionnaires

should be professionally analysed and results discussed with the course lecturer(s) towards improvement in course delivery in all its ramifications.

1.8 Resource Requirements

1.8.1 Personnel

Staff of the Faculty can be categorized into two; academic and non-teaching staff. The non-teaching staff can be further categorized into four: Senior Technical, Senior Administrative, Technical and Non-technical Junior Staff.

1) **Academic Staff**

Academic staff requirements are in terms of three criteria: number, structure, and qualifications (appointments and promotions).

i) **Staff-Student Ratio**

Determination of the number of academic staff required for an academic programme is contigent on the approved staff-student ratio for each discipline. The approved Staff-Student ratio for Basic Medical and Health Sciences Discipline is 1:15.

ii) **Staff – Mix by Rank**

Academic staff in the Universities are broadly classified into three categories; Professorial (Professor/Reader) Senior lectureship and Lecturers Grade I and below. The Professorial cadre should constitute a maximum of 20 percent of the staff strength while the remaining two should constitute 35 and 45 percent respectively.

iii) **Qualification for Appointment/Promotion of Academic Staff**

The qualifications and other criteria necessary for appointment and/ or promotion of academic staff at the various levels of the career structure are set out in the table below.

Table 1.5: Qualifications for Appointments/Promotion of Academic Staff

	LEVEL	QUALIFICATIONS
i.	Graduate Assistant	A good Bachelor's Degree (with a minimum Second Class Upper Division) This is a training position, and staff in this category are expected to complete their Master's degree within two years of their appointment.
ii.	Assistant Lecturer	A Master's Degree in addition to a good Bachelor's Degree.
iii.	Lecturer II	• A PhD Degree for direct appointment; • By promotion from Assistant Lecturer rank after a minimum of three years in addition to fulfilling other promotion requirements

iv.	Lecturer I	In addition to the qualifications specified for Lecturer II, Lecturer I should have had at least three years post-doctoral teaching experience and demonstrated ability for research work and evidence of scholarship.
v.	Senior Lecturer	A PhD Degree in addition to meeting the requirements for publications, teaching and other conditions stipulated in the guideline.
vi.	Reader (Associate Professor)	Basic qualifications set out for Senior Lecturer plus at least three years of experience. Must have considerable publications resulting from research as well as demonstrated academic leadership ability. A Reader should have evidence of participation in University administration and community activities. External assessment is required for promotion to the level of a Reader.
vii	Professor	Basic qualifications as for Reader/Associate Professor. Must have had at least three years of experience as Reader/Associate Professor in addition to meeting the necessary publications. A Professor should demonstrate clear evidence of scholarship as well as academic and administrative/professional leadership.

2) **Academic Support Personnel**

Teaching Assistants/Demonstrators to help lecturers in the conduct of tutorials, practicals and field work.

3) **Senior Administrative Staff**

The Faculty shall have the following senior administrative staff who shall be responsible to the Dean:

i) Faculty Officer – not below Assistant Registrar
ii) Two Executive Officers
iii) A Secretary

The services of the administrative support staff are indispensable in the proper administration of Departments and Faculty offices. It is important to recruit very competent, computer literate senior staff. Each Department should have a Secretary to each Head of Department

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4) **Technical Support Personnel**

The services of technical support staff, which are indispensable in the proper running of laboratories and workshops, are required. It is important to recruit very competent senior technical staff to maintain teaching and research equipment. They are also to undergo regular training to keep them abreast of developments in equipment operation and maintenance.

5) **Junior Staff**

The Faculty shall have non-teaching support staff who shall be responsible to the Dean such Secretary, Clerical Officer, Driver, etc. Each Department shall have a Secretary, Clerical Officer and other support staff as may be required

1.8.2 **Physical Facilities**

a) **Spaces**

Classroom Accommodation

The NUC standard requirement of 0.65m^2 per full-time student is maintained. Thus the minimum total space requirement of a Faculty or Department shall be the product of its total Full Time Equivalent student enrolment (FTE) and the minimum space requirement per full-time equivalent i.e. (FTE) 0.65m^2.

Office Accommodation

In this respect, each academic staff should have an office space of at least 25 square metres taking into cognisance the status/cadre of the staff

In addition, there should be for the Faculty, a Dean's office and for each Department a Head of Department's office with attached offices for their supporting staff as specified below in m^2:

Professor's Office-18.50
Head of Department's Office-18.50
Tutorial Teaching Staff's Office -13.50
Other Teaching Staff Space- 7.00
Technical Staff Space- 7.00
Secretarial Space- 7.00
Staff Research Laboratory-16.50
Seminar Space/per student- 1.85
Laboratory Space- 7.50

b) **Laboratories and Equipment**

To achieve the benchmark statements for any programme, there should be:

(i) A minimum number of identifiable laboratories for each programme which should be in accordance with the recommended space requirements and, in addition, be adequately equipped.

(ii) At least one large and reasonably equipped central laboratory for teaching and research.

1.8.3 **Library and Information Resources**

Universities should leverage on available technology to put in place rich databases and other electronic/digital library and information resources. In addition well stock and current hardcopies of reference and other textual materials should be provided centrally at the level of the Faculty. A well network digital library should serve the entire university community. Availability of wireless facilities (Wifi) with adequate bandwidth should enhance access to these electronic resources.

In any case, there should be internet ready workstations available in the library for least 25% of the total student enrolled in each academic programme.

The funding of the Library should be in line with NUC guidelines.

1.9 **General Studies**

Goal

To produce a well-rounded, morally and intellectually capable graduates with vision and entrepreneurial skills in an environment of peace and social cohesiveness.

Objectives

The objectives of the General Studies programme consist of the following:

a) Acquisition development and inculcation of the proper value-orientation for the survival of the individual and society.
b) The development of intellectual capacities of individuals to understand, appreciate and promote peaceful co-existence.
c) Production of graduates with broad knowledge of the Nigerian Nation and people with a view to inculcating in them mutual understanding and patriotism.
d) Exposing graduates of Nigerian Universities to the rudiments of ICT for computer literacy and ability to live usefully in this ICT age.
e) Preparing students for a post university life with opportunities for job creation and entrepreneurial skills.
f) Production of graduates capable of communicating effectively (both oral and written).

***SECTION TWO*:**

COMMON COURSES IN BASIC MEDICAL AND HEALTH SCIENCES PROGRAMMES: STRUCTURE AND SYNOPSES

2.1 Preamble

In the first two academic sessions of the programmes in this discipline, the students in these programmes take several common courses and thus undergo substantial educational interaction. These courses are in three basic areas viz: general studies programme, courses in core basic sciences and some common courses in some departments in the discipline. These courses constitute the common courses in the Basic Medical and Health Sciences. They are summarized in the tables and synopses below.

2.2 Common Courses

The common courses are basically in the following four categories:

- General Studies (GST)
- Courses in core basic sciences of Biology, Chemistry, Mathematics and Physics
- Entrepreneurship
- Student Industrial Work Experience (SIWES)

2.2.1 General Studies (GST)

The goal and objectives of the General Studies (GST) Programme have been fully outlined in Section 1.7. In a nut-shell the aim of the General Studies Programme is to expose students to a course of liberal education through which they can develop and expand their awareness of their social, cultural and natural environments. The goal is to produce well-rounded graduates that are intellectually sound and competent in the use of English Language.

The objectives of the programme include:

- Acquisition of a body of situational relevant knowledge outside of the respective field of specialization of the students for productive, healthy living and promotion of peaceful coexistence.
- Development of competence in the use of English Language as a tool for their studies and effective means of communication in the society and in their future employment/enterprise.

The General Studies courses available are as follows:

GST 111	Communication in English I	2
GST 112	Logic, Philosophy & Human Existence	2
GST 113	Nigerian Peoples and Culture	2
GST 121	Use of Library, Study Skills and ICT	2
GST 122	Communication in English II	2
GST 123	Communication in French	2
GST 124	Communication in Arabic	2

GST 125	Contemporary Health Issues	2
GST 211	Environment & Sustainable Development	2
GST 222	Peace and Conflict Resolution	2
GST 223	Introduction to Entrepreneurship	2
GST 224	Leadership Skills	2
GST 311	Entrepreneurship	2

Students are expected to pass a minimum of 10 units of GST courses including GST 111, GST 121 and GST 122 before graduating.

2.2.2 Common Basic Science Courses.

The basic science courses which students of most Degree programmes in Basic Medical and Health Sciences discipline have to register for at the 100 Level are:

BIO 101: General Biology I(3 Units)
BIO 102: General Biology II(3 Units)
BIO 107: General Biology Practical I(1 Unit)
BIO 108: General Biology Practical II(1 Unit)
CHM 101: General Chemistry I(3 Units)
CHM 102: General Chemistry II(3 Units)
CHM 107: General Chemistry Practical I(1 Unit)
CHM 108: General Chemistry Practical II(1 Unit)
CSC 101: Introduction to Computer Science(3 Units)
MTH 101: Elementary Mathematics I(3 Units)
PHY 101: General Physics I(3 Units)
PHY 102: General Physics II(3 Units)
PHY 107: General Physics Practical I(1 Unit)
PHY 108: General Physics Practical II(1 Unit)

2.2.3 Entrepreneurship

Towards Nigeria's quest for accelerated economic growth, it is important that active and virile youth population is assisted to develop and convert their innovative ideas into business ventures. These skills can be acquired particularly by those so innately inclined. This underscores the need to actively promote and train students to be entrepreneurial within our educational system. The entrepreneurship programme aims at re-orientating students towards a job- creation mind-set rather than the fixed attitude of job-seeking. It will equip them with the skills required in establishing businesses or making them add value to existing systems, if employed in organizations. The main objective is to introduce students to concepts and opportunities available in entrepreneurship and innovation. It assumes no previous knowledge and takes students through the rudiments of entrepreneurship to selecting a desired business and starting it with a Feasibility Report.

Entrepreneurship is incorporated into the General Studies Programme as two courses, GST 223 and GST 311.

The specific objectives of the GST 223 (Introduction to Entrepreneurship) and GST 311 (Entrepreneurship), are to enable students to:

- Understand the relationship of enterprise, entrepreneur, business, entrepreneurship, innovation and creativity.
- Analyse the historical perspective of entrepreneurship in Nigeria, and relate it to the recent trend of unemployment, under-employment and job dissatisfaction, personal, national and global economic recession.
- Identify the roles of entrepreneurial development agencies and regulatory bodies.
- Cultivate the spirit of entrepreneurship.
- Correct wrong attitudes and mind-sets and develop high entrepreneurial potential in student.
- Select possible business ideas.
- Build the capacity to develop business plan to start a business.

2.2.4 Students Industrial Work Experience Scheme (SIWES)

An important aspect of the education and training of science students in the universities is organised exposure to some elements of industrial art as articulated below under the Students Industrial Work Experience Scheme (SIWES). This is being emphasised herein in view of the rather poor handling of SIWES, in some existing universities in the country.

Universities are expected to establish a SIWES Unit to coordinate SIWES in all programmes that have SIWES component to shoulder the following responsibilities:

- Soliciting co-operative placements (jobs) in business, industry, government or service agencies depending upon the needs and qualifications of the student, and placing students on such training assignments after analysing the technical contents.
- Coordinating and supervising the co-operative employment of students in such a way that students have the opportunity of learning useful scientific skills on real jobs and under actual working conditions.
- Conducting follow-up activities regarding all placements by checking regularly each student's job performance through company visits and individual student's interview.
- Assembling individual inventory records of students and employers for the purposes of placements and supervision in addition to maintaining functional departmental and personal records and reports.
- Providing necessary advice to students as to the relevance of their chosen field to the industrial requirements of the country.
- Organizing and conducting students' seminars on Work Reports.
- Liaison with NUC, ITF, other agencies and industries on student industrial training programme of the University.

Students are expected to undertake this activity for 24 weeks (6 months) continuous which attracts 6 credit units earning upon successful completion.

It should be noted that Industrial Training as a course involves the following:

- Working successfully in the industry for the specified period.
- Submitting of a Work Report to the Industrial Training Coordinating Centre at the end of the training period.
- Presentation of seminar on the industrial training experience.

Appropriate Course code should be used, e.g. ANA 399 represents industrial attachment for Anatomy Students at 300 level.

2.3 Course Structure and Synopses of General Studies and Discipline Common Courses

A: Course Structure

100 Level General Studies and Science courses.

Course Code	Course Title	Units	Status	LH	PH
BIO 101	General Biology I	3	**	45	-
BIO 102	General Biology II	3	**	45	-
BIO 107	General Biology Practical I	1	**	-	45
BIO 108	General Biology Practical II	1	**	-	45
CHM 101	General Chemistry I	3	**	45	-
CHM 102	General Chemistry II	3	**	45	-
CHM 107	General Chemistry Practical I	1	**	-	45
CHM 108	General Chemistry Practical II	1	**	-	45
CSC 101	Introduction to Computer Science	3	C	30	45
GST 111	Communication in English	2	C	30	-
GST 112	Logic, Philosophy and Human Existence	2	E	30	-
GST 113	Nigerian Peoples and Human Existence	2	R	30	-
GST 121	Use Library, Study Skills & ICT	2	C	30	-
GST 122	Communication in English II	2	C	30	-
GST 123	Communication in French	2	E	30	-
GST 124	Communication in Arabic	2	E	30	-
GST 125	Contemporary Health Issues	2	R	30	-
MTH 101	Elementary Mathematics I	3	**	45	-
PHY 101	General Physics I	3	**	45	-
PHY 102	General Physics II	3	**	45	-
PHY 107	General Physics Practical I	1	**	-	45
PHY 108	General Physics Practical II	1	**	-	45
*XYZ 299	Industrial Attachment I (12 Weeks)	3	C		
*XYZ 399	Industrial Attachment II (12 Weeks)	3	C		

LH = Lecture Contact Hours; PH = Practical Contact Hours; C = Compulsory; R = Required; E = Elective. *XYZ represents the three letter code for each programme. ** The status of each of these courses depends on the programme under consideration.

Common GST Courses at 200 - 300 Levels in Basic Medical and Health Sciences

Course Code	Course Title	Units	Status	LH	PH
GST 211	Environment & Sustainable Development	2	R	30	-
GST 222	Peace Studies and Conflict Resolution	2	R	30	-
GST 223	Introduction to Entrepreneurship	2	R	30	-
GST 224	Leadership Skills	2	R	30	-
GST 311	Entrepreneurship	2	R	30	-

Table 2.3 Common 200-300 Level Courses for the Discipline

Course Code	Course Title	Unit
ANA 201	Introductory Anatomy & Gross Anatomy of Upper and	4
ANA 202	Histology of Basic Tissues	2
ANA 203	General Embryology	2
ANA 204	Gross Anatomy of Thorax, Abdomen, Pelvis and Perineum	4
ANA 205	Systemic Histology	2
ANA 206	Systemic Embryology	2
ANA 211	Systemic and Functional Anatomy	2
ANA 212	Regional Anatomy	2
BCH 201	General Biochemistry I	3
BCH 202	General Biochemistry II	3
BCH 203	General Biochemistry Practical	1
BCH 304	Chemistry and Metabolism of Amino Acids and Proteins	2
BCH 305	Chemistry and Metabolism of Nucleic Acids	2
PIO 201	Introduction to Physiology	2
PIO 202	Principles of Cell Physiology	2
PIO 203	General Physiology	2
PIO 204	Introduction to Laboratory Physiology	3

B: Course Synopses

General Studies 100 Level

GST 111: Communication in English **(2 Units: LH 30)**
Effective communication and writing in English; Language skills; writing of essay answers; Comprehension; Sentence construction; Outlines and paragraphs; Collection and organization of materials and logical presentation; Punctuation.

GST 112: Logic Philosophy and Human Existence **(2 Units: LH 30)**
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 bi-conditionals qualification theory. Types of discourse; Nature or 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 113: Nigerian Peoples and Culture **(2 Units: LH 30)**
Study of Nigerian history, culture and arts in pre-colonial times, Nigerian's perception of his 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; Norms and values; Negative attitudes and conducts (cultism and related vices); Re-orientation of moral Environmental problems.

GST 121: Use of Library, Study Skills & ICT **(2 Units: LH 30)**
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. Development of modern ICT, Hardware technology Software technology, Input devices, Storage devices, Output devices, Communication and internet services, Word processing skills (typing, etc).

GST 122: Communication in English II **(2 Units: LH 30)**
Logical presentation of papers, Phonetics, Instruction on lexis, Art of public speaking and oral communication, Figures of speech, Précis, Report writing.

GST 123: Communication in French **(2 Units: LH 30)**
Introduction to French, Alphabets and numeric for effective communication (written and oral), Conjugation and simple sentence construction based on communication approach, Sentence construction, Comprehension and reading of simple texts.

OR

GST 123: Communication in Arabic **(2 Units: LH 30)**
Introduction to Arabic alphabets and writing systems, Elementary conversational drills, Basic reading skills, Sentence construction in Arabic.

General Studies 200 Level

GST 211: Environment and Sustainable Development **(2 Units: LH 30)**
Man – his origin and nature, Man and his cosmic environment, Scientific methodology, Science and technology in the society and service of man, Renewable and non-renewable resources – man and his energy resources, Environmental effects of chemical plastics, Textiles, Wastes and other material, Chemical and radiochemical hazards. Introduction to the various areas of science and technology. Elements of environmental studies.

GST 222: Peace Studies and Conflict Resolution **(2 Units: LH 30)**
Basic Concepts in peace studies and conflict resolution, Peace as vehicle of unity and development, Conflict issues, Types of conflict, e. g. Ethnic/religious/political/economic conflicts, Root causes of conflicts and violence in Africa, Indigene/settler phenomenon, Peace – building, Management of conflict and security. Elements of peace studies and conflict resolution, Developing a culture of peace, Peace mediation and peace-keeping, Alternative Dispute Resolution (ADR).

Dialogue/arbitration in conflict resolution, Role of international organizations in conflict resolution, e.g. ECOWAS, African Union, United Nations, etc.

GST 223: Introduction to Entrepreneurship **(2 Units: LH 30)**
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 capital; Financial planning and management; Starting a new business, Feasibility studies; Innovation; Legal Issues; Insurance and environmental considerations. Possible business opportunities in Nigeria.

GST 224: **Leadership Skills** **(2 Units: LH 30)**
Transformation is a fundamental shift in the deep orientation of a person, organization or society such that the world is seen in new ways and new actions and results become possible that were impossible prior to the transformation. Transformation happens at the individual level but must be embedded in collective practices and norms for the transformation to be sustained. Leadership Development Programme (LDP) proposes novel approaches to teaching and learning, which emphasizes the practical involvement of participants. It is interactive and involves exercises and actual implementation of breakthrough projects by teams that make difference in the lives of the target population. In this course, leadership concepts comprising of listening, conversation, emotional intelligence, breakthrough initiatives, gender and leadership, coaching and leadership, enrolment conversation and forming and leading teams will be taught

General Studies 300 Level

GST 311: **Entrepreneurship** **(2 Units: LH 30)**
Some of the ventures to be focused upon include the following: Soap/Detergent, Tooth brushes and Tooth paste making. Photography; brick, nails, screws making; dyeing/Textile blocks paste making; rope making, plumbing, vulcanizing, brewing, glassware, production/Ceramic, production Paper production; Water treatment/Conditioning/ Packaging; Food processing/packaging/preservation; Metal working/Fabrication – Steel and aluminium door and windows; Training industry; Vegetable oil/and Salt extractions; Fisheries/Aquaculture; Refrigeration/Air conditioning; Plastic making; Farming (crop); Domestic Electrical wiring; Radio/TV repairs; Carving; Weaving; Brick laying/making; Bakery ; Tailoring; Iron welding; Building drawing; Carpentry; Leather tanning; Interior decoration ;Printing; Animal husbandry (Poultry, Piggery, Goat etc); Craft – Blacksmith, Tinsmith etc ;Sanitary wares; Vehicle maintenance; Bookkeeping;

Common Science courses-100 Level

BIO 101: General Biology I **(3 Units: LH 45)**
Characteristics of living and non-living things. Scientific methods to biology concepts. Taxonomy of living organism – Microbes. Plants including field and herbarium methods. Morphology and life cycles of phyla and plant kingdoms. Cell concepts, structure, organization, functions, and chemical and physical characteristics. Plant and tissues and organism systems. Elements of biological chemistry – aspects of organic, inorganic and physical chemistry relevant to biology.

BIO 102: General Biology II **(3 Units: LH 45)**
Genetics and its scope. Mendel and his laws of inheritance. Physical and chemical basis of inheritance. Man as an object of genetics. Modifications of classical Mendelian ratios. Heredity and environment. Probability and the chi square test Quantitative and multiple allelic inheritance. Sex development, sex linkage and sex abnormalities. Mutations, Heredity, Eugenics and the future of mankind.

BIO 107: General Biology Practical I **(1 Unit; PH 45)**
Laboratory experiments designed to illustrate the topics covered in BIO 101

BIO 108: General Biology Practical II **(1 Unit; PH 45)**
Experiments designed to emphasise the practical aspects of topics of course BIO 102

CHM 101: General Chemistry I **(3 Units: LH 45)**
Atoms, molecules and chemical reactions. Modern electronic theory of atoms. Electronic configuration, periodicity and building up of the periodic table. Hybridization and shapes of simple molecules. Valence Forces; Structure of solids. Chemical equations and stoichiometry; Chemical bonding and intermolecular forces, kinetic theory of matter. Elementary thermochemistry; rates of reaction, equilibrium and thermodynamics. Acids,

bases and salts. Properties of gases. Redox reactions and introduction to electrochemistry. Radioactivity.

CHM 102: General Chemistry II **(3 Units: LH 45)**

Historical survey of the development and importance of Organic Chemistry; Electronic theory in organic chemistry. Isolation and purification of organic compounds. Determination of structures of organic compounds including qualitative and quantitative analysis in organic chemistry. Nomenclature and functional group classes of organic compounds. Introductory reaction mechanism and kinetics. Stereochemistry. The chemistry of alkanes, alkenes, alkynes, alcohols, ethers, amines, alkyl halides, nitriles, aldehydes, ketones, carboxylic acids and derivatives. The Chemistry of selected metals and non-metals. Comparative chemistry of group IA, IIA and IVA elements. Introduction to transition metal chemistry.

CHM 107: General Chemistry Practical I **(1 Unit: PH 45)**

Laboratory experiments designed to reflect topics presented in courses CHM 101 and CHM 102. These include acid-base titrations, qualitative analysis, redox reactions, gravimetric analysis, data analysis and presentation.

CHM 108: General Chemistry Practical II **(1 Unit: PH 45)**

Continuation of CHM 107. Additional laboratory experiments to include functional group analysis, quantitative analysis using volumetric methods.

CSC 101: Introduction to Computer Science **(3 Units: LH 30, PH: 45)**

Survey of computers and information processing and their roles in society. This course introduces a historical perspective of computing, hardware, software, information systems, and human resources and explores their integration and application in business and other segments of society. Students will be required to complete lab assignments using the PC's operating system, and several commonly used applications, such as word processors, spreadsheets and graphics presentations applications. Internet and on-line resources, browsers and search engines.

MTH 101: Elementary Mathematics. **(3 Units: LH 45)**

Elementary set theory, subsets, union, intersection, complements, venn diagrams. Real numbers; integers, rational and irrational numbers, mathematical induction, real sequences and series, theory of quadratic equations, binomial theorem. Complex numbers; algebra of complex numbers; the Argand diagram. De-Moivre's theorem, nth roots of unity. Circular measure, trigonometric functions of angles of any magnitude, addition and factor formulae.

PHY 101: General Physics I **(3 Units: LH 45)**

(Mechanics, Thermal Physics and Waves)

Space and time, units and dimension, kinematics; Fundamental laws of mechanics, statics and dynamics; work and energy; Conservation laws. Moments and energy of rotation; simple harmonic motion; motion of simple systems; Elasticity; Hooke's law, Young's shear and bulk moduli, hydrostatics; Pressure, buoyancy, Archimedes' principles; Surface tension; adhesion, cohesion, capillarity, drops and bubbles; Temperature; heat, gas laws; laws of

thermodynamics; kinetic theory of gases; Sound. Types and properties of waves as applied to sound and light energies. Superposition of waves. Propagation of sound in gases, solids and liquids and their properties. The unified spectra analysis of waves. Applications.

PHY 102: General Physics II **(3 Units: LH 45)**

(Electricity, Magnetism and Modern Physics)

Electrostatics; conductors and currents; dielectrics; magnetic fields and electro- magnetic induction; Maxwell's equations; electromagnetic oscillations and waves; Coulomb's law; methods of charging; Ohm's law and analysis of DC circuits; AC voltages applied to Inductors, capacitors and resistance.

PHY 107: General Practical Physics I **(1Unit: PH 45)**

This introductory course emphasizes quantitative measurements, the treatment of measurement errors, and graphical analysis. A variety of experimental techniques should be employed. The experiments include studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity, etc., covered in PHY 101 and PHY 102. However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis and deduction.

PHY 108: General Practical Physics II **(1 Unit: PH 45)**

This is a continuation of PHY 107

200 Level

BCH 201: General Biochemistry I **(3 Units: LH 45)**

Introductory chemistry of amino acids; their properties, reactions and biological functions. Classification of amino acids: neutral, basic and acidic; polar and non-polar; essential and non-essential amino acids. Introductory chemistry of proteins; methods of their isolation, purification and identification. Primary, secondary, tertiary and quaternary structures of proteins. Basic principles of tests for proteins and amino acids. Biological functions of proteins. Introductory chemistry of carbohydrates, lipids and nucleic acids. Nomenclature of nucleosides, and nucleotides; effects of acid and alkali on hydrolysis of nucleic acids.

BCH 202: General Biochemistry II **(3 Units: LH 45)**

The cell theory. Structures and functions of major cell components. Cell types, constancy and diversity. Cell organelles of prokaryotes and eukaryotes. Chemical composition of cells. Centrifugation; Methods of cell fractionation. Structure, function and fractionation of extra-cellular organelles. Enzymes. Water and bio-molecules: protein, carbohydrates, lipids etc.

BCH 203: General Biochemistry Practical I **(1 Unit: PH 45)**

Laboratory experiments designed to reflect the topics covered in BCH 201 and BCH 202. Introduction to laboratory methods and procedures employed in studying biochemical processes.

300 Level

BCH 301: Enzymology (3 Units: LH 45)

Discovery, classification and nomenclature of enzymes. Vitamins and co-enzymes; minerals in enzyme biochemistry. Fat and water soluble vitamins. Structures and functions of vitamins and co-enzymes. Genetics of enzymes. Enzyme inhibition. Mechanisms of enzyme-catalysed reactions. Effects of temperature, pH, ions and inhibitors on enzyme catalysed reactions. Derivation and significance of Michaelis-Menten equation. Allosteric/Regulatory enzymes. Active sites of enzymes. Estimation of kinetic parameters of enzyme activities. Zymogen activation, digestive enzymes etc. Production, isolation, purification and characterization of enzymes. Recent advances in enzymology.

BCH 304: Chemistry and Metabolism of Amino Acids & Proteins (2 Units: LH 30)

Amino acids as building blocks of proteins; the peptide bond as covalent backbone of proteins. Forces involved in the stabilization of protein structure. Protein isolation, fractionation, purification and characterization. Amino acid analysis of peptides and proteins. Methods for the determination of the sequence of amino acids in proteins. Molecular weight determination of proteins. Techniques in protein biochemistry. Oxidative degradation of amino acids and metabolism of one carbon units. Ammonia toxicity and urea formation. Biosynthesis of amino acids and some derivatives; the urea cycle; metabolism of inorganic nitrogen. Disorders of amino acid metabolism.

BCH 305: Chemistry and Metabolism of Nucleic Acids (2 Units: LH 30)

Structure and function of nucleic acids. DNA replication and protein synthesis. DNA repairs. The genetic code and protein synthesis. Metabolism of purines and pyrimidines, nucleosides and nucleotides. Degradation of purine and pyrimidine nucleotides. Abnormalities in nucleic acid metabolism-xeroderma pigmentation and skin cancer.

***SECTION THREE*:**

COURSE STRUCTRURE AND SYNOPSES OF BASIC MEDICAL AND HEALTH SCIENCES DEGREE PROGRAMMES

3.1 DENTAL TECHNOLOGY (BSc)

3.1.1 Philosophy, Aims and Objectives of the Programme

3.1.2 Philosophy

The philosophy is to produce Dental Technology Professionals with sound knowledge of principles and techniques in addition to scientific and clinical knowledge used in the practice of Dental Technology, with due recognition of the leading role of the Dental Surgeons (Dentists) in the practice of the profession.

3.1.3 Aims and Objectives:

The aim of the programme is to produce Dental Technologists who can effectively fabricate various dental appliances and prostheses used in the treatment of dental patients.

The general objectives include:

i. To realize the important role of dental technologists as major partners in the dental profession

ii. To work along with the dentists in creating dental awareness in our developing economy

iii. To inculcate sufficient professional knowledge to enable them be involved in research activities that can lead to better service provision

iv. To have the capability to undertake independent practice within the limits of the professional training and help in employment generation

3.1.4 Basic Admission Requirements

There are three different pathways by which candidates can be admitted into the programmes in the discipline: the Unified Tertiary Matriculation (UTME), the Direct Entry, and Inter-University Transfer.

Unified Tertiary Matriculation Examination (UTME)

Candidates seeking enrolment into the B.Sc. Dental Technology Programme must obtain O level passes at credit level (at not more than two sittings) in five subjects including Mathematics, Physics, Chemistry, Biology and English Language.

Direct Entry

- HSC/GCE A/LEVEL passes in two relevant subjects with SC/GCE O/Level credit passes in Chemistry and three other subjects from among these: Biology, Physics, English Language and Mathematics at not more than two sittings.

- Holders of OND (ND) certificate with minimum of upper credit pass are eligible for admission into 200 level provided that their programme covers certain basic courses offered in the school up to the second year.

- Holders of HND with minimum of lower credit pass are eligible for admission into 300 level depending on the appropriateness of their requisite academic preparation.

In addition to fulfilling the requirements in (ii) above, a holder of OND (ND) and / or HND must also have five GCE O/Level credit passes including English, Biology, Chemistry, Physics and Mathematics.

Inter-University Transfer Mode

Students can transfer into 200-Level courses provided they have the relevant qualifications and the requisite CGPA.

3.1.5 Learning Outcome

Regime of Subject Knowledge

Each institution providing B.Sc. (Dental Technology) degree must adhere to the course content considered minimum and adopt appropriate codes in this document. It is expected that the students hoping to graduate from this programme must have strong practical knowledge in dental laboratory technology. Therefore, serious attention must be given to practical aspects of the course involving orthodontic appliances, dental and maxillofacial prosthodontics, crowns and bridges, etc. Students must have scored log books that would be signed for their day-to-day laboratory / posting experiences.

Students are expected to be posted to specific hospital-based laboratories for professional experience under the supervision of senior dental technologists / lecturers as part of the Students Industrial Work Experience Scheme (SIWES).

The graduates of the programme are expected to be able to:

- Demonstrate a systematic use of the breadth and depth of knowledge and techniques in areas of Dental Technology
- Demonstrate the ability to work independently and be able to construct range of dental prostheses, to a standard suitable for clinical presentation and patients use.

- Communicate information, ideas, problems and solution in a variety of media
- Apply their knowledge in contributing to the dental team in caring for the patients.
- Critically review their work, justifying the materials selection and assess its suitability for clinical presentation and patients use as well as being able to undertake further training and studies to acquire new skills.

Competences and Skills

- The Dental Technologist should possess the cognitive ability to manage all common dental deformities requiring his skills.
- The Dental Technologist should be able to train, supervise other subordinates under him/her and exhibit adequate management and communication skills.
- Ability to use the computer, information and communication technology and entrepreneurship skills.
- Interpersonal skills relating to the ability to interact with patients, other health and Dental team members and to engage in collaborative and team working.
- Study skills required for continuing Professional Development

Behavioural Attributes

On graduation, students would have been well equipped with sound professional ethics for the profession of Dental Technology including good reputation and fulfilment of professional role with integrity; refraining from its misuse to the detriment of patients particularly in respect to health and safety as well as information confidentiality and general responsibility. A graduate of this programme must recognise that he/she must design or fabricate dental appliances /prostheses following the prescription by a dentist as expected in the practice of the dental profession.

3.1.6 **Attainment Level**

It is essential that the procedure used for students' assessment should correspond to the knowledge, abilities and skills that are to be developed through their degree programme. These should be based on the following: formal examinations, laboratory works or performance, problem-solving exercises, oral presentations and planning, conduct and reporting of project work and researches. Other assessments may include Essay assignments, literature surveys and evaluations (presented as class seminars/ tutorials), reports of external / laboratory postings.

3.1

PLEASE NOTE: Conclusive statement
shall be made on the minimum CGPA of 1.5
for graduation after the forthcoming workshop on
Grading System

3.1.7 **Course Structure**

YEAR I
100 LEVEL COURSES
CORE COURSES

Course Code	Course Title	Units	Status	LH	PH
PHY 101	General Physics I	3	**C**	**45**	**-**
MTH 101	Elementary Mathematics I	2	**C**	**30**	**-**
CHM 101	General Chemistry I	3	**C**	**45**	**-**
GST 111	Use of English I	2	**C**	**30**	**-**
GST 122	Use of English II	2	**C**	**30**	**-**
GST 103	Culture and Civilization	2	**R**	**30**	**-**
GST 121	Use of Library, Study Skills & ICT	2	**C**	**30**	**-**
PHY 102	General Physics II	3	**C**	**45**	**-**
MTH 102	Elementary Mathematics II	2	**C**	**30**	**-**
CHM 102	General Chemistry II	3	**C**	**45**	**-**
BIO 101	General Biology I	3	**C**	**45**	**-**
BIO 102	General Biology II	3	**C**	**45**	**-**
PHY 107	General Physics Practical I	1	**C**	**-**	**45**
PHY 108	General Physics Practical II	1	**C**	**-**	**45**
BIO 107	General Biology Practical I	1	**C**	**-**	**45**
BIO 108	General Biology Practical II	1	**C**	**-**	**45**
CHM 107	General Chemistry Practical I	1	**C**	**-**	**45**
CHM 108	General Chemistry Practical I	1	**C**	**-**	**45**
CSC 101	Introduction to Computer Science	3	**C**	**30**	**45**
	TOTAL	**39 Units**			

YEAR II
200 LEVEL COURSES
CORE COURSES

Course Code	Course Title	Units	Status	LH	PH
HST 203	Human Anatomy	2	**C**	**30**	**-**
BCH 201	General Biochemistry	2	**C**	**30**	**-**
IMB 201	General Microbiology	2	**R**	**30**	**-**
STA 211	Introduction to Statistics	2	**C**	**30**	**-**
HST 201	General Physiology I	2	**C**	**30**	**-**
ENG 219	Bioengineering Materials I	2	**C**	**30**	**-**
ENG 221	Electrical Engineering	2	**R**	**30**	**-**
CSC 201	Computer Applications	2	**C**	**30**	**-**
CSC 202	Computer Applications	2	**C**	**30**	**-**
HST 202	Human Physiology II	2	**C**	**30**	**-**

BCH 202	Medical Biochemistry	2	**C**	**30**	**-**
ENG 226	Electrical Electronics II	2	**R**	**30**	**-**
ENG 228	Bioengineering Materials	2	**C**	**30**	**-**
DNT 202	Introduction to Dental Technology	2	**C**	**30**	**-**
IMB 202	Medical Microbiology	2	**R**	**30**	**-**
DNT 204	Oral Anatomy	2	**C**	**30**	**-**
PTE 202	Introduction to Polymer	2	**C**	**30**	**-**
DNT 207	Dental Laboratory Techniques I	3	**C**	**-**	**45**
	TOTAL	**37 Units**			**-**

YEAR III
300 LEVEL COURSES
CORE COURSES

Course Code	Course Title	Units	Status	LH	PH
DNT 301	Dental Prosthesis & Techniques	3	**C**	**45**	**-**
DNT 303	Oral Physiology	2	**C**	**30**	**-**
ENG 319	Thermo fluids for Health Professionals	2	**C**	**30**	**-**
HST 301	Introduction to General Pathology	2	**C**	**30**	**-**
HST 303	Introduction to Pharmacology	2	**C**	**30**	**-**
PTE 301	Polymer Chemistry	2	**C**	**30**	**-**
DNT 305	Introduction Dental Materials	2	**C**	**30**	**-**
PHT 309	Organization and delivery of Health Services	2	**C**	**30**	**-**
DNT 304	Dental Materials Science I	3	**C**	**45**	**-**
DNT 306	Oral Pathology I	2	**C**	**30**	**-**
DNT 308	Materials Processing For Dental Technology	2	**C**	**30**	**-**
HST 304	Statistics For Health Professionals	2	**C**	**30**	**-**
PTE 302	Chemistry Of Elastomers	2	**C**	**30**	**-**
DNT 310	Dental Lab. Techniques II	3	**C**	**-**	**45**
GST 302	Introduction to Entrepreneurship and Innovation	2	**C**	**30**	**-**
	Total	**33 Units**			

YEAR IV
400 LEVEL COURSES
CORE COURSES

Course Code	Course Title	Units	Status	LH	PH
DNT 401	Denture Prosthesis II	2	**C**	**30**	**-**

DNT 403	Dental Material Science II	2	**C**	**30**	**-**
DNT 411	Dental Laboratory Technique	3	**C**	**-**	**45**
DNT 405	Conservation Dental Prosthesis	3	**C**	**45**	**-**
DNT 407	Metallic Prosthodontics I	2	**C**	**30**	**-**
DNT 409	Oral Pathology II	2	**C**	**30**	**-**
HST 401	Health Information Management System	2	**C**	**30**	**-**
HST 403	Research Methodology	2	**C**	**30**	**-**
ENG 407	Mechanisms of Biomedical Devices	2	**R**	**30**	**-**
ENG 409	Biomechanics	2	**R**	**30**	**-**
SIW 400	Student Industrial Works Experience Scheme (SIWES)	4	**C**	**-**	**60**
	Total	**26 Units**			

YEAR V
500 LEVEL COURSES
CORE COURSES

Course Code	**Course Title**	**Units**	**Status**	**LH**	**PH**
DNT 501	Seminar in Dental Technology	2	**C**	**30**	**-**
DNT 503	Denture Prosthondontics III	3	**C**	**45**	**-**
DNT 505	Dental Laboratory Technique II	3	**C**	**45**	**-**
DNT 507	Orthodontic Technology I	3	**C**	**45**	**-**
DNT 509	Maxillo-Facial Techology	3	**C**	**45**	**-**
DNT 501	Biomedical Devices Design	2	**C**	**30**	**-**
ENG 503	Biomedical Devices Manufacturing Process	2	**R**	**30**	**-**
DNT 502	Research Project	4	**C**	**60**	**-**
DNT 504	Professional Ethics and Jurisprudence	2	**C**	**30**	**-**
DNT 506	Orthodontic Technology II	3	**C**	**45**	**-**
DNT 508	Maxillo-facial Technology II	3	**C**	**45**	**-**
DNT 504	Entrepreneurship II	3	**C**	**45**	**-**
DNT 512	Implantology in Dental Technology	2	**C**	**30**	**-**
PHT 508	Health Policy and Administration	2	**C**	**30**	**-**
PHT 516	Rehabilitative Health Technology	2	**C**	**30**	**-**
	Total	**39 Units**			

3.1.8 **Course Synopses**

General Studies 100 Level

GST 111: Communication in English **(2 Units: LH 30)**

Effective communication and writing in English; Language skills; writing of essay answers; Comprehension; Sentence construction; Outlines and paragraphs; Collection and organization of materials and logical presentation; Punctuation.

GST 112: Logic Philosophy and Human Existence **(2 Units: LH 30)**

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 bi- conditionals qualification theory. Types of discourse; Nature or 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 113: Nigerian Peoples and Culture **(2 Units: LH 30)**

Study of Nigerian history, culture and arts in pre-colonial times, Nigerian's perception of his 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; Norms and values; Negative attitudes and conducts (cultism and related vices); Re-orientation of moral Environmental problems.

GST 121: Use of Library, Study Skills & ICT **(2 Units: LH 30)**

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. Development of modern ICT, Hardware technology Software technology, Input devices, Storage devices, Output devices, Communication and internet services, Word processing skills (typing, etc).

GST 122: Communication in English II **(2 Units: LH 30)**

Logical presentation of papers, Phonetics, Instruction on lexis, Art of public speaking and oral communication, Figures of speech, Précis, Report writing.

GST 123: Communication in French **(2 Units: LH 30)**

Introduction to French, Alphabets and numeric for effective communication (written and oral), Conjugation and simple sentence construction based on communication approach, Sentence construction, Comprehension and reading of simple texts. OR 18

GST 123: Communication in Arabic (2 Units: LH 30)

Introduction to Arabic alphabets and writing systems, Elementary conversational drills, Basic reading skills, Sentence construction in Arabic

General Studies 200 Level

GST 211: Environment and Sustainable Development (2 Units: LH 30)

Man – his origin and nature, Man and his cosmic environment, Scientific methodology, Science and technology in the society and service of man, Renewable and non-renewable resources – man and his energy resources, Environmental effects of chemical plastics, Textiles, Wastes and other material, Chemical and radiochemical hazards; Introduction to the various areas of science and technology; Elements of environmental studies

GST 222: Peace Studies and Conflict Resolution (2 Units: LH 30)

Basic Concepts in peace studies and conflict resolution, Peace as vehicle of unity and development, Conflict issues, Types of conflict, e. g. Ethnic/religious/political/economic conflicts, Root causes of conflicts and violence in Africa, Indigene/settler phenomenon, Peace – building, Management of conflict and security, Elements of peace studies and conflict resolution, developing a culture of peace, Peace mediation and peace-keeping, Alternative Dispute Resolution (ADR).

Dialogue/arbitration in conflict resolution, Role of international organizations in conflict resolution, e.g. ECOWAS, African Union, United Nations, etc

GST 223: Introduction to Entrepreneurship (2 Units: LH 30)

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 capital; Financial planning and management; Starting a new business, Feasibility studies; Innovation; Legal Issues; Insurance and environmental considerations. Possible business opportunities in Nigeria

GST 224: Leadership Skills (2 Units: LH 30)

Transformation is a fundamental shift in the deep orientation of a person, organization or society such that the world is seen in new ways and new actions and results become

possible that were impossible prior to the transformation. Transformation happens at the individual level but must be embedded in collective practices and norms for the transformation to be sustained. Leadership Development Programme (LDP) proposes novel approaches to teaching and learning, which emphasizes the practical involvement of participants. It is interactive and involves exercises and actual implementation of breakthrough projects by teams that make difference in the lives of the target population. In this course, leadership concepts comprising of listening, conversation, emotional intelligence, breakthrough initiatives, gender and leadership, coaching and leadership, enrolment conversation and forming and leading teams will be taught

General Studies 300 Level

GST 311: Entrepreneurship (2 Units: LH 30)

Some of the ventures to be focused upon include the following: Soap/Detergent, Tooth brushes and Tooth paste making. Photography; brick, nails, screws making; dyeing/Textile blocks paste making; rope making, plumbing, vulcanizing, brewing, glassware, production/Ceramic, production Paper production; Water treatment/Conditioning/ Packaging; Food processing/packaging/preservation; Metal working/Fabrication – Steel and aluminium door and windows; Training industry; Vegetable oil/and Salt extractions; Fisheries/Aquaculture; Refrigeration/Air conditioning; Plastic making; Farming (crop); Domestic Electrical wiring; Radio/TV repairs; Carving; Weaving; Brick laying/making; Bakery ; Tailoring; Iron welding; Building drawing; Carpentry; Leather tanning; Interior decoration ;Printing; Animal husbandry (Poultry, Piggery, Goat etc); Craft – Blacksmith, Tinsmith etc ;Sanitary wares; Vehicle maintenance; Bookkeeping;

Common Basic Medical Science Courses-100 Level

BIO 101: General Biology I (3 Units: LH 45)

Characteristics of living and non-living things, Scientific methods to biology concepts, Taxonomy of living organism – Microbes. Plants including field and herbarium methods, Morphology and life cycles of phyla and plant kingdoms, Cell concepts, structure, organization, functions, chemical and physical characteristics, Plant and tissues and organism systems, Elements of biological chemistry – aspects of organic, inorganic and physical chemistry relevant to biology.

BIO 102: General Biology II (3 Units: LH 45)

Genetics and its scope; Mendel and his laws of inheritance; Physical and chemical basis of inheritance; Man as an object of genetics; Modifications of classical Mendelian

ratios, Heredity and environment; Probability and the chi square test Quantitative and multiple allelic inheritance; Sex development, sex linkage and sex abnormalities, Mutations, Heredity, Eugenics and the future of mankind

BIO 107: General Biology Practical I (1 Unit; PH 45)

Laboratory experiments designed to illustrate the topics covered

BIO 101: BIO 108: General Biology Practical II (1 Unit; PH 45)

Experiments designed to emphasize the practical aspects of topics of course

CHM 101: General Chemistry I (3 Units: LH 45)

Atoms, molecules and chemical reactions; Modern electronic theory of atoms, Electronic configuration, periodicity and building up of the periodic table; Hybridization and shapes of simple molecules, Valence Forces; Structure of solids, Chemical equations and stoichiometry; Chemical bonding and intermolecular forces, kinetic theory of matter, Elementary thermochemistry; rates of reaction, equilibrium and thermodynamics; Acids, bases and salts; Properties of gases; Redox reactions and introduction to electrochemistry; Radioactivity.

CHM 102: General Chemistry II (3 Units: LH 45)

Historical survey of the development and importance of Organic Chemistry; Electronic theory in organic chemistry; Isolation and purification of organic compounds; Determination of structures of organic compounds including qualitative and quantitative analysis in organic chemistry; Nomenclature and functional group classes of organic compounds; Introductory reaction mechanism and kinetics. Stereochemistry; The chemistry of alkanes, alkenes, alkynes, alcohols, ethers, amines, alkyl halides, nitriles, aldehydes, ketones, carboxylic acids and derivatives; The Chemistry of selected metals and non-metals; Comparative chemistry of group IA, IIA and IVA elements. Introduction to transition metal chemistry

CHM 107: General Chemistry Practical I (1 Unit: PH 45)

Laboratory experiments designed to reflect topics presented in courses CHM 101 and CHM 102. These include acid-base titrations, qualitative analysis, redox reactions, gravimetric analysis, data analysis and presentation.

CHM 108: General Chemistry Practical II (1 Unit: PH 45)

Continuation of CHM 107; Additional laboratory experiments to include functional group analysis, quantitative analysis using volumetric methods

CSC 101: Introduction to Computer Science (3 Units: LH 30, PH: 45)

Survey of computers and information processing and their roles in society; This course introduces a historical perspective of computing, hardware, software, information systems, and human resources and explores their integration and application in business and other segments of society. Students will be required to complete lab assignments using the PC's operating system, and several commonly used applications, such as word processors, spreadsheets and graphics presentations applications. Internet and on-line resources, browsers and search engines.

MTH 101: Elementary Mathematics. (3 Units: LH 45)

Elementary set theory, subsets, union, intersection, complements, venn diagrams. Real ; integers, rational and irrational numbers, mathematical induction, real sequences and series, theory of quadratic equations, binomial theorem; Complex numbers; algebra of complex numbers; the Argand diagram; De-Moivre's theorem, nth roots of unity. Circular measure, trigonometric functions of angles of any magnitude; addition and factor formulae

PHY 101: General Physics I (3 Units: LH 45)

Mechanics, Thermal Physics and Waves) Space and time, units and dimension, kinematics; Fundamental laws of mechanics, statics and dynamics; work and energy; Conservation laws. Moments and energy of rotation; simple harmonic motion; motion of simple systems; Elasticity; Hooke's law, Young's shear and bulk moduli, hydrostatics; Pressure, buoyancy, Archimedes' principles; Surface tension; adhesion, cohesion, capillarity, drops and bubbles; Temperature; heat, gas laws; laws of thermodynamics; kinetic theory of gases; Sound. Types and properties of waves as applied to sound and light energies. Superposition of waves; Propagation of sound in gases, solids and liquids and their properties; The unified spectra analysis of waves. Applications

PHY 102: General Physics II (3 Units: LH 45)

(Electricity, Magnetism and Modern Physics) Electrostatics; conductors and currents; dielectrics; magnetic fields and electro- magnetic induction; Maxwell's equations; electromagnetic oscillations and waves; Coulomb's law; methods of charging; Ohm's law and analysis of DC circuits; AC voltages applied to Inductors, capacitors and resistance.

PHY 107: General Practical Physics I (1Unit: PH 45)

This introductory course emphasizes quantitative measurements, the treatment of measurement errors, and graphical analysis. A variety of experimental techniques

should be employed. The experiments include studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity, etc., covered in PHY 101 and PHY 102. However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis and deduction.

PHY 108: General Practical Physics II (1 Unit: PH 45)

This is a continuation of PHY 107

STA 211: Introduction to Statistics (2,0,0) (2 Units: LH 30)

Frequency and distribution measures of location and dispersion in simple and grouped data, Laws of probability, The Binomial, Poisson and normal distributions, Estimation and Tests of hypothesis, Analysis of variance and Covariance, simple regression and correlation, Contingency tables and X^2 applications.

HST 201: Human Physiology I (2 Units: LH 30)

General introduction to human physiology involving gross overview of human physiology

CSC 201: Computer and Application (2,0,1,) (3 Units: LH 45)

Introduction to digital computers; their use and modern programming techniques; brief history of computers, generation of computers, structure of a general purpose computer; General problem solving, systematic development of algorithms, flow diagrams, meaning of logical processes analysis of computational problems coding of programmes, verification and validation of programmes, Practical experience operating computers and peripheral equipment, Extensive practice with one or more high level language, Emphasis on Technical applications, Elementary numerical algorithms.

HST 203: Human Anatomy (1,0,1,) (2 Units: LH 30)

Overview of cell biology, histology and the anatomical features of human skeletal, muscular, nervous, cardiovascular, respiratory, digestive, excretory, endocrine and reproductive systems.

HST 202: Human Physiology (1,0,1) (2 Units: LH 30)

Overview of physiology and its applications: Cellular physiology Homeostasis and Homeostatic mechanisms, physiology of the skin, nutrition and gastro-enterology; circulatory and cardiac physiology; renal physiology; respiratory physiology;

reproductive, fetal and neonatal physiology, endocrinology and neurophysiology, Physiological measurements and factors affecting them, Neuromuscular system.

BCH 201: General Biochemistry (1,0,1) (2 Units: LH 30)

Review of general chemistry: Chemical elements and the periodic table; Electronic configuration, electronic orbital, valency of atoms, and types of chemical bonds; Metals and non-metal; Acids and Bases, highlighting Lewis Conception; Carbon, sp^3 hybridization, the tetrahedron and covalent bond; functional groups; water and its special properties, Introduction of the cell and hierarchy of organization of living things: macromolecules, organelles, cells, tissues, organs and organism, Amino acids proteins; the peptide bond and polypeptides; proteins as biological catalysts, immune agents and structural molecules. Carbohydrates: the glycosidic bond; relationship of photosynthesis and tissue respiration; carbohydrate as storage molecule of easily accessible metabolic energy; Fatty acids and lipids: the ester bond of lipids and triglycerides; Fat as efficient energy storage molecule. Nucleic acids and nucleotides: DNA and RNA as polymers of nucleotides; the phosphodiester bond; Gene and genetic information transcription and translation.

BCH 202: Medical Biochemistry (1,0,1) (2 Units: LH 30)

Carbohydrate metabolism; Glycolysis and Intermediary metabolism, Electron transport and oxidative phosphorylation, Disorders of Carbohydrate Metabolism (e.g. diabetes, etc), Blood lipids and lipid metabolism; Disorders of lipid metabolism Amino acid and protein metabolism; disorders of protein metabolism; Gene expression and molecular diseases (e.g. sickle cell etc), Liver function and tests, Renal function and tests, Blood Chemistry (including haemopoesis), Hormones and metabolism; endocrinal diseases (e.g. goiter, etc).

IMB 201: General Microbiology (1, 0, 1,) (2 Units: LH 30)

History and scope of microbiology; the general characteristics of microorganisms, Prokaryotic and eukaryotic microorganisms, Bacterial morphology and cell structure, Growth and reproduction of microorganisms, Biochemical reactions of microorganisms, antimicrobial agents, Systematic classification of bacteria, fungi, viruses, algae and protozoa.

IMB 202: Medical Microbiology (1,0,1,) (2 Units: LH 30)

Introduction to Medical Microbiology: Basic concepts and terminology: Infection and Disease, pathogenicity and virulence, immunity, Hypersensitivity, latency and communicability. Pathogenic properties of bacteria:- Invasiveness, Toxigenicity and

Exotoxins, virulence properties. Host defence mechanisms:-Skin and mucous membrane barriers, phagocytic defence and inflammation; Bacterial Infection:The pathogenicity, morphology and cultural characteristics of certain groups of bacteria, Gram-positive bacteria – Bacillus, Clostridium, Staphylococcus and Streptococcus; Gram-Negative bacteria – the family Enterobacteriacae, Neisseria, Pseudomonas and Vibrio; Mycotic Infections: Types of mycoses. The morphology, laboratory diagnosis and treatment of diseases caused by certain groups of fungi to include Aspergillus, Blastomyces, Candida, Cryptococcus, Histoplasma, Sporotrichum and yeasts; Viral Infections: Classification of viruses, Distinctive properties of viruses, Methods for the diagnosis of viral infections.

DNT 202: Introduction to Dental Technology (1,0,1) (2 Units: LH 30)

General Introduction: General definition of Dental Technology and the various branches; Prosthodontics, Orthodontics, Maxillo-Facial and Conservative Dental Technology; Manual dexterity in the practice of dental Technology, Characteristic arrangement of teeth; Dental formular-deciduous and permanent dentition; Outline the importance of Dental Technology to dental health care delivery and the relationship with other members of the Health Care Delivery Team. Basic tools and equipment used in Dental Technology Practice.

Tooth Morphology; principles involved in the construction of basic dental appliances – impression taking, handling and casting, model separation, trimming of models, special tray construction, duplication of models, Bite registration block making and registration.

DNT 204: Oral Anatomy (1,0,1) (2 Units: LH 30)

Fundamentals of oral embryology and histology; The skull and associated bones including mandible, maxilla and temporomandibular joint (TMJ), The movement of the TMJ, The muscles of facial expression and mastication including their origins and insertions, functions as well as their nerve and blood supplies; Anatomy of the open mouth including the palate the tongue, the vestibules and denture bearing areas, The teeth, different types, their special features including deciduous and permanent dentitions, their nerve and blood supplies, the distributions of the facial and trigeminal nerves as well as the maxillary and mandibular branches of the external carotid artery; The structure of the periodontium including its function, the principal fibres, the papilla and gingival sulcus; the salivary glands, their locations, ducts and nerve supply. The tongue, intrinsic and extrinsic muscles movements, innervations and functions

PTE 202: Introduction to Polymer (2, 0,1) (2 Units: LH 30)

Survey of the structure and statistics of polymer and Textile Industries; small and large companies, horizontal and vertical integration, general plant layout plastics and rubber, fibre and textile manufacture; processing and fabrication; Technical services for plant and sales various allied industries plastic, Plant, resins, rubber, textile, foam, adhesive, paper; Classification of polymers: Survey of type of fibres and textiles, Structure of polymers, techniques of polymer formation (bulk, suspension, solution); molecular weight concept, Raw materials: coal, petroleum, natural gas, proteins, cotton, natural rubbers.

ENG 228: Bio-Engineering Materials I (1,0,1) (2 Units: LH 30)

Investigation into bio-compatible materials as appropriate for biomedical engineering designs and manufacture: with respect to strength, weight, economy, availability, workability, etc. This includes metals, refractory materials, ceramics, polymer materials, alloys, iron and its alloys; amalgam, non-ferrous metals and woods, as well as any other appropriate materials, Environmental stability of bio-engineering materials. Mechanical, electrical, thermal, optical, magnetic and other properties of materials will be studied. Course also covers elementary concepts in theory of elasticity, axial forces and bending moments; simple bending theories and deflection of beams; buckling of columns.

DNT 207: Dental Laboratory Techniques I (3 Units: LH 45)

Identification of equipment and basic tools and their uses in dental laboratory, principles of impression taking, handling and casting, model separation and trimming, carving of various teeth in the mouth, special tray construction in different materials, duplication of models in different materials, bite block making and registration.

DNT 310: Dental Laboratory Techniques II (3 Units: LH 45)

Surveying, mounting of models on various types of articulators, construction of immediate dentures, complete dentures procedures to finishing and polishing, classes of 1, 2 and 3 jaw relationships, designs and construction of different classes of partial dentures, and incorporation of different component parts and fitting such appliances.

DNT 411: Dental Laboratory Techniques III (3 Units: LH 45)

Repairs, rebasing , relining soft lining and addition, design and construction of crowns and bridges including post-retained in different materials, designs and construction of different types and classes of metallic appliances including electroplating and fitting of same, design and construction of different types of orthodontic appliances including myofunctional appliances.

ENG 221: Electrical & Electronics Engineering 1(1,0,1) (2 Units: LH 30)

Review of electrostatics and electromagnetism, Transient and steady state analysis of circuits, Network theorems and techniques. Passive and active circuits and building blocks, sinusoidal analysis and phases, introduction to electronic circuits and devices, PN junction and bipolar transistors intro to integrated circuit design.

ENG 219: Bio-Engineering Materials II (1,0,1) (2 Units: LH 30)

This covers the two-dimensional theory of elasticity; Hook's law; Equilibrium equation; strain displacement; stress-strain relationship. It also covers mechanical properties of bio-materials, axial load, sheer, torsion, bending and combined loading. Other areas are thermal stress and strains on axial loading, sheer and bending moments diagrams; elementary beam theory; stress-strain transformation Mohre's circle, and bending of beams.

ENG 226: Electrical & Electronic Engineering 11 (1,0,1) (2 Units: LH 30)

Transformers and their principles of operations; Electrical motors, generators, single and poly-phase system;, Introduction to instrument and bionics.

HST 301: Introduction to General Pathology (2,0,0,) (2 Units: LH 30)

Definition of pathology; disease and relevant terms used in pathology, the causes and classification of diseases, Cell damage and its sequels; Inflammation, its functions and types, Cardinal signs and mechanisms of inflammation, Infection and the body's defense against it, Body's response to infection including immunity to infection. Cross infection and its control, Some important bacterial, fungal and viral infections including Tuberculosis, Candidiasis and HIV/AIDS, Disorders of growth including hyperplasia, hypertrophy, dysplasia and dystrophy, Tumors, their aetiology, types, classification and characteristics. Cysts, their formation and classification, Developmental anomalies or disturbances, Effects of ionizing radiation on human tissues, Trauma- wounds, fractures, dislocations and bleeding.

Systems Pathology: Disorders of blood – disorders of red blood cells, WBC's and thombocytes, Disorders of circulation, disorders of the Heart, Diseases of the respiratory system, diseases of the gastro-intestinal track, disorders of bones and joints.

HST 303: Introduction to Pharmacology (2,0,0) (2 Units: LH 30)

Historical Development of Pharmacology; Divisions of Pharmacology and their applications; Definitions of terms and abbreviations; concept and nature of drugs; pharmacodynamics; pharmacokinetics; classification of drugs and their importance;

drug abuse and controlled drugs; drug noncompliance or misuse, introduction to toxicology and its importance, general principles of poisoning management.

ENG 319: Thermo Fluids for Health Professionals (2,0,1) (3 Units: LH 45)

This integrates the study of theories and principles of fluid mechanics, thermodynamics and mass transfer in engineering into a course that specifically explores their applications to the design and production of materials for health and medicine. Course covers First and Second laws of Thermodynamics; Pressure-Volume-Temperature relationships; C_p-C_v relationships; principles of fluid mechanics; manometry; forces on plain and curved surfaces; types of flow including continuity equation, energy equation, momentum equation; fluid resistance; laminal and turbulent flow. This course also covers modes of heat transfer, systems with heat source; mass diffusion; combined modes of transfer; condensation; radiation heat between black and grey bodies, thermal conduction principles.

HST 304: Statistics for Health Professions (1,1,0) (2 Units: LH 30)

Applications of descriptive, inferential, parametric and non-parametric statistics to health, Theory of probability, sampling techniques, hypothesis testing, dealing with errors, construction and interpretation of graphs and data tables, Biostatics non sampling structural measurements statistical application to health and medicine, drug evasion, health survey.

DNT 301: Dental Prosthetics and Technology (2,0,1) (3 Units: LH 45)

Principles of surveying, mounting of models on articulators, immediate dentures – advantages and disadvantages; types of immediate dentures and their construction techniques; Delivery and care for immediate dentures; Theory and practice of complete denture (class 1 normal occlusion); Identification and differentiation between the various classes of jaw or occlusion relationship – classes I, II, and III; Factors responsible or affecting retention and stability of complete dentures.

DNT 302: Denture Prosthodontics 1 (2,0,1) (3 Units: LH 45)

Theory and practice of removable partial dentures, Classification of partial dentures; indication and contra-indication of types of partial dentures – tissue borne, tooth borne, combination, Principles of partial dentures design. Describe the component parts of partial dentures, Principles of retention and stability of partial dentures, Construction and fitting of dentures.

DNT 303: Oral Physiology (1, 0, 1) (2 Units: LH 30)

Organic and inorganic composition of enamel, dentine, cementum, bone and their comparison; factors which affect calcium and phosphorus metabolism; Tooth formation amelogenesis and odontogenesis, including the enamel organ and tooth germ, eruption and shedding of teeth, Age changes in the tooth including the pulp, Saliva composition, characteristics and functions, Tooth deposits including materia alba, dental plaque and dental calculus, The formation, classification and comparison of plaque and calculus, Dental stains – intrinsic and extrinsic exogenous and endogenous stains, The tongue and taste sensation including distribution of the four basic taste, Mastication and deglutition and the roles played by the teeth, the lips, the cheeks and the palate in chewing and swallowing, Voluntary and involuntary phases, Halitosis (oral malodour), causes and prevention.

DNT 305: Introduction to Dental Materials (1, 0, 1) (3 Units: LH 45)

Scope and Need for the Course, Structure of matter, Adhesion: Physical and Chemical properties of dental materials, Measurements and testing equipment; Biological consideration, Standardization/Specification. International Standard Organization, National Standard Organizations, Classification of various Dental Materials commonly used in the Dental Laboratory, Their fitness for purpose in relation to their molecular structures.

DNT 304: Dental Material Science 1 (2,0,1) (3 Units: LH 45)

The Science of Gypsum and Gypsum Products, Production; Chemistry of Setting: Properties of Die and Cast Materials, Manipulation, Technical consideration: - Porosity, Warpage, Shrinkage, Hygroscopic Expansion etc.Synthetic Resins: Classification of Dental Resins: Polymerization, Types Copolymerization, Cross Linkages, Uses in density, Other applications: soft liners, tissue conditioners and denture cleaners, Technical Consideration: - Shrinkages, porosity crazing and processing stresses; Impression materials: Classification of impressions, requirements of impressions materials, Impression trays: Types and uses; Classification of impression materials: elastic and non elastic impression materials, Compositions, Properties, Requirements and Technical considerations, Waxes: Classification, Compositions; Abrasive and Polishing materials.

DNT 306: Oral Pathology 1 (1,1,0) (2 Units: LH 30)

Introduction to oral pathology such as nature and principles of pathology, Causes and types of oral pathology and their classification, Developmental disturbances of the oral cavity ranging from minor variations, anomalies through malformations to monstrosities, Disturbances of the teeth in numbers, shape, eruption, structure and colour, Disturbances of enamel, dentine and pulp, Disturbances of the face and jaws

including clefts of the palate and lips, Also included are micro and macrognathia, Disturbances of the temporomandibular Joint including trismus, trauma and dislocation, Disturbances of oral soft tissues including the gingiva, tongue, lips and mucous membranes, Cysts of the oral region, odontogenic and non-odontogenic cysts, Oral neoplasms, benign and malignant including their behaviours, characteristics and classifications, Simple tumours of the salivary gland, tongue, mandible and maxilla.

DNT 308: Materials Processing For Dental Technology (2,0,1) (2 Units: LH 30)

Review of the common materials for dental appliances e.g. glass – ceramics (porcelains), polymeric materials, dental amalgams (alloys), stainless steel etc., Brief introduction to the structure and properties of these materials, Chemistry and Physics of polymers, polymerization mechanical and physical properties of dental materials, Fundamentals of heat flow and mass transportation applied to processing of dental materials, Principles of fabrication, introductory foundry technology, casting, molding and extrusion techniques, Densification and properties of compacts – bulk density, porosity and shrinkage, Thermal treatments, solidification, powder processing, hot isotatic precisions, Concepts of bio-compatibility, material degradation, testing and elementary fracture toughness analysis of dental materials.

ENS 302: Introduction to Entrepreneurship and Innovation I (1,0,1) (2 Units: LH 30)

Technology Development and Entrepreneurship: Evolution of industrial, domestic and commercial ventures and products; Identification of society's needs, market surveys, invention, innovation and diffusion, patents, trademarks and copyrights, Maintenance culture; concepts of maintenance and repair of equipment and units, Maintenance scheduling, Business planning, financing accounting and marketing; consultancies, small business startup and management, Internal connectivity methods and analysis, Product Research and Development Methods using internal Browsing. **Practice:** Innovative solutions to invention needs chosen by students, Development of new product or processes, Development of business plans and proposals.

PTE 301: Polymer Chemistry (2, 0, 0,) (2 Units: LH 30)

Initiation mechanisms (free radical, cationic, anionic stereo-specific) in the polymerization reactions through functional groups and multiple bounds, (vinyl and diene); ring opening, polymer modification, living polymers; distribution between chain and step growth kinetics, kinetics of vinyl polymerization and poly-condensation, Methods of determination deviation of equipment, parameters of

polymerization, Auto acceleration, chain transfer, inhibitors, retarders, Raw materials, polymerization techniques and properties of polyethylene, polypropylene, polystyrene, polyvinyl chloride, polyvinyl acetate, polyvinyl alcohol, polymethyl methacrlate, polyamides, polyethers, polyurethane's and inorganic polymers, Polymer characterization: essential characteristics of fibre forming polymers.

PTE 302: Chemistry of Elastomers (1,0,1) (2 Units: LH 30)

Raw materials sources, manufacture, cross-linking and properties of the following elastomers: polyisoprene (natural and synthetic); Butaidene: SBR: Thermoplastic elastomer; Ethylene propylene rubber; polyisobutylene: Butyl rubber; Neoprene: Acrylic elastomers; nitrile rubbers; Fluorinated rubbers; chlorosulphonated polyethylene rubber; polyether rubber.

PHT 309: Organization and Delivery of Health Services (2, 0, 0) (2 Units: LH 30)

A survey course dealing with the various patterns of organization and delivery of health care services, Topics include personal versus public health services, levels of personal health services (Primary, Secondary, Tertiary), community health services, proprietary health care services, ambulatory care service, group practice, complimentary health care services- including traditional medicine and phytomedicine, regionalization of health care services, various specialties in health and medical care etc; in each case, the implication of various patterns of organization and delivery of health care services for health technology are discussed.

HST 401: Health Information Management Systems (1, 0, 1)(2 Units: LH 30)

Study of contemporary medical and health information systems especially as used in morbidity surveys, disease surveillance systems, disease registers, etc. Also includes introduction to computer simulation techniques and life-table techniques, Medical and health data based management, intranet, internet and extranet applications, E- library; information globalization and teleconferencing.

HST 403: Research Methodology (1, 1, 0,) (2 Units: LH 30)

Rudiments of research methodology and its application to the public health field, Course covers a basic learning of the following aspects: research problem definition, research questions, research and null hypothesis theoretical-conceptual formulation of research problems, review of related literature, basic research designs, methods of research observations, measurement of variables, data analytic techniques, interpretation of research findings, Includes study of randomization techniques, epidemiologic research designs and controlled clinical trials.

ENG 407: Mechanisms of Biomedical Devices (1, 0, 1) (2 Units: LH 30)

Concepts of mechanisms; links, kinematic pairs, kinematic chains and inversion, Types of mechanisms, muscle as slicing mechanical systems; analysis coupler curves, velocity and acceleration; static and dynamic forces, Theory of involute gearing; simple, compound and epicylic gear trains, Dynamics of roboting and reciprocating biomedical engineering devices, statics and dynamics balancing of biomedical engineering devices, Information and communication technology in the understanding and application of mechanisms, Friction, wear, lubrication; applications in kinematics and selection of power screws, belt and rope drives, brakes, chains and clutches. Hydrodynamic drives, torques, converters, hydraulic systems.

ENG 409: Bio-Mechanics (1, 0, 1) (2 Units: LH 30)

Basic concepts in statics; statics of particles and rigid bodies on a plane; analysis of forces; distributed forces; vectors, flexible cables; friction; static and dynamic equilibrium of a particle and equilibrium of rigid bodies, areas of centroids, masses and center of gravity; analysis of structures; internal forces, Newton's third law; sheering forces; moments; trusses and frames, Forces system resultants; structural analysis; kinematics and kinetics of particles and rigid body in motion; methods of impulse and momentum; linear and angular momentum; work and energy.

DNT 401: Denture Prosthodontics II (1, 0, 1) (2 Units: LH 30)

Theory and practice of construction of dentures in classes II and III jaw relationships, Principles of balanced occlusion and articulation in these classes, Principles and practice of repairs, rebasing, relining, soft lining and addition, Identification of materials, constituents and properties of materials for undertaking above procedures.

DNT 403: Dental Material Science II (1, 0, 1) (2 Units: LH 30)

Properties and composition of various refractory investment materials viz gypsum bonded, silica bonded and phosphate bonded. Metals – various states, space lattice structures, mechanical properties and types of stress: Grain structure, deformation of metals viz slip and dislocation; cold work and strain hardening, stress relief, recystallization annealing; Dental alloys – binary, ternary, quaternary, eutectic alloys etc. Reasons for alloying, Components and Properties of various alloying metals. Choice of alloys and treatment - hardening heat treatment, homogenizing anneal, weld decay, softening heat treatment etc., Stainless steel in dental technology – constituents, manipulation and treatment – tempering, work hardening etc., Solders, fluxes and anti-fluxes used in Dental Technology, their compositions and application and uses of picking solution, Electrolysis and electrolytes, Die materials.

DNT 405: Conservative Dental Prosthetics (2, 0, 1) (3 Units: LH 45)

Definition of terms associated with ceramics, bridgework, crowns (metallic and non-metallic), post retained, onlays, inlays, posts and core, plating, burnishing, Types of crown, components and type of bridges; cavity classification, inlays and classes, dies, Factors determining the selection of alloys, and or acrylic resin in relation to aesthetics, and function, porcelain, porcelain fused to metal restorations, Occlusion in relation to conservative prosthetic practice, Indications and contra-indications for conservative prostheses.

DNT 407: Metallic Prosthodontics I (1, 0, 1) (2 Units: LH 30)

Materials for construction of metallic prosthodontic appliances - gold alloys, chromium cobalt, swaged stainless steel etc and suitability of each material for prosthodontic appliance. Properties of each material – corrosion resistance, thermal conductivity, tarnishing, dimensional changes, malleability, ductility, impact strength, fatigue strength, work hardening, stress anneal, heat treatment, hardening heat treatment etc., Duplication of model using refractory model materials, Design of metallic prosthodontic appliance with emphasis on rests, rest seats, clasp position and approach, metallic main frame, Combination of metallic and non-metallic denture base materials, Principles of supporting units for partial dentures – onlays, rests, hook, continuous clasps, plates, bars. General pattern of investment procedures, wax elimination and heat soaking, casting in various types of casting machines, trimming, polishing and finishing, soft lining or resilient lining practice, fitting of such appliances on the patient.

DNT 409: Oral Pathology II (1, 1, 0) (2 Units: LH 30)

Inflammatory conditions of the oral region including dental caries, gingivitis, periodontitis, stomatitis and glossitis, Micro-organisms and types associated with the mouth, their consequences to oral and dental health, Significance of oral micro-organisms in the aetiology of dental plaque, dental caries and periodontal diseases, Pathology of the oral mucosa including denture hyperplasia, denture/dental ulcers and stomatitis, Common causes of pain in the oro-facial region including tooth and jaw fractures, pulpitis, denture induced pain, oral ulcerations, neuralgias and oral infections.

DNT 502: Research Project (0, 0, 2) (4 Units:)

Guided individualized tutorials in research implementation or in product design and development, Student works one-on-one with assigned supervisor to initiate and execute of a research project on an approved topic in the area of dental technology or in the design and development of prototype dental technology devices. Such project

must have the potentials to come up with findings (facts, procedures and/or devices) that could mitigate a predefined problem.

DNT 503: Denture Prosthodontics III (2, 0, 1) (3 Units: LH 45)

Principles of rigid connectors and stress breakers, factors influencing the choice of each, advantages and disadvantages; Direct and indirect retainers, clasps designs, general principles of setting partial denture – objective of design, stages in design of partial denture, forces on dentures during function viz vertical, lateral, antero-posterior forces, construction of partial dentures-components of partial dentures, saddle, occlusal rests etc.

DNT 504: Professional Ethics and Jurisprudence (1, 0, 0) (2 Units: LH 30)

Role of Dental Technologists Registration Board of Nigeria (DTRBN) in the practice and training in Dental Technology Profession; DTRBN Decree 43 of 1987, Right of the Board in regulating professional qualification required before entering the practice, various committees of the Board and their functions, Activities of Association of Dental Technologists of Nigeria (ADTN), The difference between the Board and ADTN, Responsibilities of ADTN to members of the profession, responsibilities of members to ADTN; Relationship of Dental Technologist to the welfare of Patients, code of conduct for practitioners and consequences of contravening the code. Inter-professional and intra-professional relationship in dental health care delivery; procedures for setting up general dental laboratory practice – what the law states about setting up a business venture, Definition of skill, mal practice in the profession, business ethics and corruption in practice, infamous or disgraceful conduct in dental technology practice, Various offences of a Dental Technologist as relates to disgraceful conduct, legal aspect of health care law as relates to pitfalls in practice of dental technology.

DNT 505: Dental Laboratory Technique II (2, 0.1) (2 Units: LH 30)

Principles of 'lost wax' process in metal casting, preparation for partial dentures – sprueing, investment, burn-out, casting, sand – blasting, timing polishing and finishing in relation to metal works, Principles of metal melting in Dental Technology practice, welding and soldering techniques, Description of spot welding and soldering equipment and hand tools, Carryout practical process of above, Casting technology – direct and indirect methods of investment, preparation of master model; sprueing principles, investing, methods of melting metal, casting force, pickling, polishing and finishing; Defects in casting – oxidation, back pressure, sprue falling, incomplete casting, porosity, surface pitting, cooling shrinkage, occluded gases etc.

DNT 506: Orthodontic Technology II (2, 0, 1) (3 Units: LH 45)

Principles of screws expansion appliances, springs, oral screen and myofunctional appliances and procedures for construction of same, Principles of selection of removable orthodontic appliances and types of anchorage used, Demonstration and construction of appliances with such anchorages. Determine and construct appliance for Orthodontic treatment.

DNT 507: Orthodontic Technology I (2, 0, 1) (3 Units: LH 45)

History and development of Orthodontics – define Orthodontics, orthodontic treatment in contemporary dental practice, goals of orthodontic treatment, terminology in orthodontics, classification of orthodontic cases viz class I, class II and class III; orthodontic model making and trimming, Muscles of mastication and expression (facial), describe the principles and procedures for the construction of orthodontic appliance and practical construction of same.

DNT 508: Maxillo-Facial Technology II (2, 0, 1) (3 Units: LH 45)

Skull and larynx bones identification using cadaver, Flip charts, slides; identification and construction of maxillo-facial appliances for management of fractures e.g Barrel Bandage skull plates, obturators, jaw exercisers, chin support, Acrylic splints etc., list and identification of materials used in maxillo-facial technology e.g. Silicones, adhesives, ferrous oxides, dyes etc., Definition and explanation of management principles of cleft lip and palate cases – Congenital deformities, cleft lip, cleft palate, unilateral cleft, urula, bilateral cleft fistula, extra-oral anchorage, Description of Anatomy, aetiology and bone growth in paediatric patients with special attention to neo-natal developments, Identification of these developments using slides, flip charts etc. Prominent feature relating to neo-natal development in paediatric patients, Classification of cleft, production of models of the various classification of clefts, procedure for construction of special trays for impression of clefts, principles and procedure for construction of feeding plates, pre-surgical/Haemostatic appliances, pre-surgical orthopaedic appliances, construction of same, Rudimentary facial prostheses e.g ocular, Auricular, nasal prostheses etc. Description of the anatomy of the head, noting the influence of surrounding muscles bones etc on the construction of facial prostheses and construct some commonly used facial prostheses.

DNT 509: Maxillo-Facial Technology I (2, 0, 1) (3 Units: LH 45)

Definition of maxillo-facial prosthetics, introductory treatment of fractures related to maxillo-facial region, importance of maxillo-facial prosthetics in contemporary dental practice, history of maxillo-facial prosthetics, Description of the outlay of a typical

maxillo-facial laboratory and its essential requirements in terms of tools and equipment, Design of maxillo-facial laboratory taking safety precautions into account, Identification of common fracture sites in maxillo-facial region and common maxillo-facial appliance e.g. acrylic splints, eyelet wiring etc.

ENG 501: Biomedical Devices Design (1, 0, 1) (2 Units: LH 30)

The design process – from the recognition of need to prototype development, Principles of reliability and economics in design for production; Factors in design; Machine components; Design of keys and coupling; safety factors, economics, strength, wear, and material considerations in design of devices, fits, limits, tolerances and specifications; Review of force system and stresses usually encountered in design, Design of riveted joints; screw fasteners; springs, pressure vessels and material selection of power screws. Belt and rope drives, chains, brakes and clutches; Cast structures; hydrodynamic lubrication and journal bearing, Computerized designs in biomedical equipment engineering.

ENG 503: Biomedical Devices Manufacturing Process (1, 0, 1) (2 Units: LH 30)

Turning: The lathe and its functions; Driving and feeding work; holding devices; turning on centers; taper turning; screw cutting; eccentric cutting; form turning; boring and saddle; Automatic lathe, turret and capstan lathe – tools and equipment; planning for the work on turret lathes, copy turning lathes. **Milling**: Types of milling machines, milling cutters, machine feed and relations. The driving head, linear indexing and linear graduating, gear cutting, rack cutting attachment. General principles of machining using single point and multiple point cutting tools, chip formation, cutting forces, cutting parameters, Tool temperature, life and wear, cutting thirds, surface roughness, tools materials, Design of single-point and multiple-point cutting tools; Drills and milling cutters; causes of vibration and chatter in machine tool operation. **Casting:** Sand cast, plaster and mould cast, shell moulding, investment cast, permanent mould casting, centrifugal casting, die casting, continuous casting, defects in casting, design of casting, Riser designs, and placement solidification control.

GST 504: Entrepreneurship II (1, 0, 0) (3 Units: LH 45)

Creativity and starting of a business enterprise, Methods of generating ideas: Brainstorming, Synectics, Checklist methods, Gordon method, Reverse brainstorming, Free association, Collective Notebook method, Heuristics, Scientific method, Value analysis, Attribute listing, Matrix charting, Big-dream approach, Parameter analysis. Legal issues in entrepreneurship marketing; Financial and organizational plans; Financing the new business enterprise, Going public; Managing growing and ending enterprise.

DNT 501: Seminar in Dental Technology (0, 0, 2) (2 Units: LH 30)

DNT 512: Implantology In Dental Technology (1, 0, 1) (2 Units: LH 30)

Fundamental terminology in technical implants: Introduction to implant systems, biocompatibility and implant, Design and types, Anatomy of maxilla and mandible, Types of bone, Principles of occlusion, Articulation, occlusal information and transfer of recording, occlusion in implantology; Knowledge of implant surgery; Radiographic, placement hard and soft tissue stents; treatment options for single tooth implants; study cast and diagnostic planning, Screw retained and cement retained restorations implant placing and spacing; Abutment selection; Aesthetic considerations; impression options and guidance techniques. Custom made impression trays materials selection for manufacturing of components, model systems and technical considerations in manufacture.

PHT 508: Health Policy and Administration (2, 0, 0) (2 Units: LH 30)

Introduction to methods and techniques for policy formulation and analysis in the care field, Survey of the principles and methods of administration in public health; including supervision and monitoring of health activities, quality assurance, equity, cost-controls organizing, inter-organization relationships, health care marketing etc. Review of basic principles and methods of budgeting applied to the public health field including preparation and defense of a typical programme budget, budget tracking techniques, budget driven programme implementation, auditing methods, etc.

PHT 516: Rehabilitative Health Technology (1, 0, 1) (2 Units: LH 30)

Principles of tertiary prevention in public health practice, Study of applicable measures and technologies for rehabilitation of handicapped persons; Review of technologies designed to optimize residual functional abilities in disabled persons including measures intended to compensate for loss of functional capacities or fundamental limitations; design and application of technical aids and other measures intended to facilitate functional adjustment or readjustment as may be occasioned by potential consequences of disease, injuries and conditions from birth.

SIW 400: SIWES: Industrial Training

(4 Units: PH 60)

Definition of Terms

i. **Dental Laboratory Technology** is the aspect of dental health care delivery which deals with the art and science of designing, fabrication and servicing of dental, oral and oro-facial appliances (prostheses) for the replacement of missing part of dental and oro-facial tissues. It has to do with the production of dental and maxillo-facial prostheses which are worn by dental patients to restore pathologically or surgically lost oro-facial tissues.

ii. **Dental Technology** as a profession or field of study comprises four (4) broad but interrelated areas with the ultimate aim of producing prostheses worn by dental patients. The goal is to restore the dental and maxillo-facial functions of mastication, speech, and aesthetics while preventing over-eruption of opposing teeth and drifting of adjacent ones. These patients who otherwise may reject the society or may be rejected by the society can now appear in public with improved confidence.

iii. **Department of Dental Technology** is concerned with training students in the art and science of design and fabrication of oro-facial prostheses for the replacement of lost or missing part(s) of oro-facial structures for the use of patients; also with the study and use of dental materials including those from local sources.

iv. **Major Divisions of Dental Technology**: The 4 sub-disciplines /divisions are: prosthodontics, maxillo-facial technology, orthodontic Technology, and conservative technology (crowns and bridges) including implantology.

v. ***Prosthodontics*:** This aspect deals with the replacement of lost teeth and tissues using removable prostheses such as partial and full-full dentures, as well as fixed prosthodontic prostheses. These appliances are made of metals, viz: gold alloy, chromium cobalt alloy; stainless steel etc or plastics such as acrylic resin; porcelain ceramics, polyvinyl chloride (PVC) etc. or combination of two or more of these materials.

vi. ***Maxillo-facial*:** This aspect deals with the application of synthetic and thermoplastic materials for the rehabilitation of oro-facial defects where surgical reconstruction is not feasible or where such is contra-indicated. Such prostheses may be splints; jaw exercisers; Bell's palsy appliances; obturators; artificial ears; lips; nose; eyes and eye lids; brows; surgical implants; skull plates; hearing aid holders and other parts of the face.

vii. ***Orthodontics*:** This aspect deals with the fabrication of either functional or removable appliances for the correction / straightening of irregular,, misplaced or crowded dentition to their correct position within the limit set by biological factors. This aspect is sometimes referred to as "Child Care Dental Technology".

viii. ***Conservative Dental Technology*** (Crowns and bridges): deals with the construction of fixed prostheses for the replacement of lost tooth or missing part of tooth. Such prostheses are Crowns, Bridges, onlays, inlays, jacket and post crowns etc. These can be made in either plastic, acrylic resin, metals, porcelain ceramics or combination of plastics and metals.

ix. ***Implantology:*** This aspect derives from the use of prosthodontic or conservative prostheses on osseointegrated implants for the restoration of oral functions and aesthetics.

3.2 ENVIRONMNTAL HEALTH SCIENCE (B.Sc)

Preamble

The programme is designed to provide the training needed for an understanding of the environment, health and safety to build upon the foundation by exploring in some depths, specific aspect like epidemiology, workplace safety, hazardous and municipal waste management, impact of science and technology on the environment.

3.2.1 Philosophy, Aims and Objectives of the Programme

(a) **Philosophy**

The philosophy of the programme is in the training of personnel to the highest academic and professional standards in the identification and resolution of environmental health and safety issues. The programme will provide higher capacity skilled manpower, trained specifically for promoting health and preventing illness through applying scientific skills to solving real life problems and better management of environmental hazards.

(b) **Aims and Objectives**

The overall objective of the Bachelor of Environmental Health Science Degree Programme is to impart relevant knowledge and skills needed for promotion and sustenance of the health and safety of man in his environment. The specific objectives are:

a. To impart and generate knowledge that pertains to effective recognition and response to environmental health problems
b. To acquaint the students with the knowledge of prevailing communicable disease, their mode of transmission and methods of controlling the biological and physical environment so as to prevent them.
c. To impart the basic knowledge of physical, sociological and biological theories, concepts and principles and application of these in the practice of environmental health.
d. To impart skills and relevant methods used in identification, diagnosis and management of environmental health hazards.
e. To impart on the students attitude of team work, leadership and scientific enquiry in relation to every aspect of his professional activities.
f. To equip students with relevant knowledge and skill for advanced training and research in environmental health

3.2.2 Admission Requirements

(i) **UTME.**

Candidates may be considered for admission to 100 level B.Sc. (EHS) Degree course after passing at the required level, the UME Examination of the Joint Admission and Matriculation Board (JAMB), provided they obtain the West African School Certificate (WASC), National Examination Council (NECO) or the General Certificate

of Education (SSCE/GCE) at a minimum of credit level in five subjects including English Language, Mathematics, Physics, Chemistry and Biology/Health taken and passed at not more than two sittings.

(ii) **Direct Entry.**

(a) In addition to O'Level requirements stipulated above, applicants should possess at least two A'Level papers in relevant subjects.

(b) OND in relevant discipline with at least upper credit grade in addition to the five credit passes as in 1.3.2(a) above.

(c) HND in relevant discipline with at least upper credit in addition to five credit passes as in 1.3.2(a) above may be admitted into 300 level.

(d) A candidate who fulfils normal O'Level admission requirements and in addition holds an ND or HND certificates (minimum upper credit) in the Public Health Inspector's Diploma of the Royal Society of Health Dip RSH) or West Africa Health Examination Board (WAHEB) Diploma for Public Health Superintendents/Health Technologists, National Diploma (ND) (Upper Credit) in Environmental Health Sciences, or Community Health.

Transfer Cases.

Candidates wishing to transfer from one programme to Environmental Health Science for some good reason (s) may be considered for admission at the appropriate level. Any deficiencies in their background should be rectified by taking appropriate courses.

3.2.3 **Graduation Requirements:**

Conditions for graduation as provided in the general section of the Discipline

3.2.4 **Expected Duration of the Programmes**

(a) **UTME**

Five (5) academic sessions or ten (10) semesters)

(b) **Direct Entry**

Four academic sessions or Eight (8) semesters

(c) In general, no student will be allowed to exceed an additional 50% of the normal duration of the programme.

3.2.5 **Learning Outcomes:**

It is expected that at the end of the programme, an environmental health graduate should have acquired the following:

i. ***Regime of Subject Knowledge, to:***

1. describe and apply the scientific principles in the identification, analysis and proffering solutions to Environmental health challenges/problems.

2. identify and apply communication and group dynamic processes necessary to effect behavioural changes in man.
3. Describe, plan and implement appropriate environmental health programmes aimed at solving identified environmental health problems.
4. describe the basic knowledge of physical, sociological and biological theories, concepts and principles and apply them in the practice of environmental health.
5. describe in detail any prevailing/endemic disease in the country, its mode of transmission, seasonal trends and methods of control.
6. apply knowledge of Public and Environmental Health Laws of the country to effect compliance to environmental standards.

ii. ***Competencies and Skills:***

1. To perform accurately, standard laboratory tests employed in the monitoring of environmental media.
2. To design a satisfactory graphic representation of various environmental health infrastructure e.g. water treatment plant, sewage disposal and treatment plants etc.
3. To be able to design management strategy for disease control

iii. ***Behavioural Attribute:***

1. that places premium on team work, accepting and performing leadership and followership role with equal effectiveness.
2. of pride in the contribution of his profession to the health of the nation and hence continually seek self-education and improved effectiveness.
3. of scientific enquiry in relation to every aspect of his professional activity, never taking anything for granted nor prematurely jumping to conclusions.
4. to manage resources adequately and perform required administrative functions.

3.2.6 Resource Requirements for Teaching and Learning

Personnel

Academic Staff and Non Academic Staff

Staff-Student Ratio

Determination of the number of academic staff required for an academic programme is contigent on the approved staff-student ratio for each discipline. The approved Staff-Student ratio in Basic Medical and Health Sciences is 1:15

Staff – Mix by Rank

Academic staff in the Universities are broadly classified into three categories; Professorial (Professor/Reader), Senior lectureship and Lecturers Grade I and below. The Professorial cadre should constitute a maximum of 20 percent of the staff strength while the remaining two should constitute 35 and 45 percent respectively.

3.2.7 **Physical Facilities**

Laboratory

Minimum Laboratory Material Resources and Equipment requirements for Environmental Health Science Programme is as provided in the Appendix in Section Four of the document

3.2.8 **Course Structure and Synopses of the Environmental Health Science Programme**

For uniformity, courses are broadly classified into Core Environmental Health courses and others. The core Environmental Health Courses must be offered as described by this minimum standards in the Department of Environmental Health, while the others may be offered in other Departments and Faculties where such or similar courses exist. The core Environmental Health courses must retain the EHS (Environmental Health Science) code, while the others may retain the relevant departmental course code or carry another code of a similar course offered in another department or faculty.

100 Level – First Semester

Basic 1st year courses as may be applicable to the host faculty in addition to workshop practice and technical drawing or as may be applicable to the host faculty

100 Level- First Semester

Course Code	Course Title	Units	Status	LH	PH
BIO 101	General Biology	3	C	45	-
BIO 107	General Biology Practical I	1	C	-	45
CHM 101	General Chemistry I	3	R	45	-
CHM 107	General Chemistry Practical I	1	R	-	45
CSC 101	Introduction to Computer Science	3	C	30	45
GST 111	Communication in English	2	C	30	-
GST 113	Nigeria Peoples and Culture	2	R	30	-
GST 121	Use of Library, Study Skill & ICT	2	C	30	-
GST 125	Contemporary Health Issues	2	R	30	-
MTH 101	Elementary Mathematics I	3	R	45	-
PHY 101	General Physics I	3	R	45	-
PHY 107	General Physics Practical I	1	R	-	45

100 Level- Second Semester

Course Code	Course Title	Units	Status	LH	PH
BIO 102	General Biology II	3	C	45	-
BIO 108	General Biology Practical II	1	C	-	45
CHM 102	General Chemistry II	3	R	45	-
CHM 108	General Chemistry Practical II	1	R	-	45
GST 112	Logic, Philosophy and Human Existence	2	E	30	-
GST 122	Communication in English II	2	C	30	-
GST 122	Contemporary Health Issues	2	R	30	-
PHY 102	General Physics II	3	R	45	-
PHY 108	General Physics Practical II	1	R	-	45

200 Level - First Semester

Course Code	Course Title	Units	Status	LH	PH
CSC 201	Computer Applications	2	R	15	45
GNS 201	Foreign Language French	1	R	15	-
GNS 203	Innovation & Production Development	2	R	30	-
ANAT 201	Introduction to Human Anatomy	3	C	30	45
MCB 201	General Microbiology	2	R	30	0
MCB 203	Microbiology Practical	1	R		45
BCH 201	General Biochemistry I	2	R	30	
BCH 203	Universal Biochemistry Practical	1	R	-	45
PHY 201	Physiology	3	C	30	45
EHS 201	Introduction to Ecology and Environmental	1	C	15	-
EHS 203	Hygiene Education & Promotion	1	C	15	-
EHS 205	Climate Change & Contemporary Issues	1	R	15	-
	Total	20		195	270

Summary: Total Core Courses= 4, Units=8
Total Required Course= 8, Units=12

200 Level - Second Semester

Course Code	Course Title	Units	Status	LH	PH
CSC 202	Computer Applications	2	R	15	45
GNS 202	Foreign Language French	1	R	15	-
GNS 204	Entrepreneurship I	2	R	30	-
BCH 202	Biochemistry II	3	C	30	45
EHS 202	Fundamentals of Epidemiology	2	C	30	45
EHS 204	Introduction Environmental Health	2	C	15	45
EHS 206	Immunology and Immunization	2	C	15	45
EHS 208	Health Psychology and Sociology	2	C	30	-

EHS 210	Biodiversity and Climate Change	1	C	15	
EHS 212	Biostatistics	2	C	30	-
EHS 214	Human Nutrition & Dietetics	2	C	15	45
	Total	21		240	315

Summary: Total Core Courses= 8, Units=16
Total Required Course= 3, Units=5

300 Level - First Semester

Course Code	Course Title	Units	Status	LH	PH
EHS 301	Basic Instrumentation and Use	*2*	*C*	*30*	-
EHS 303	General Parasitological	2	R	15	45
EHS 305	General Entomology	2	C	15	45
EHS 307	Primary Health Care	2	C	15	45
EHS 309	Basic Pharmacology	2	R	15	45
EHS 311	Introduction Environmental Management	2	C	30	-
EHS 313	Environmental Health Information System	2	C	15	45
EHS 315	Health Safety & Environment	2	C	15	45
EHS 317	Environmental Health Economics	1	C	15	-
	Total	18		195	340

Free Elective Courses (1 Credit unit each)
- EHS 319Introduction to GIS and its Application (1,0,0)
- EHS 321: Industrial Layout, Landscaping and Planning (1,0,0)
- Summary: Total Core Courses= 7, Units=13 Total Required Course= 2, Units=4
  Total Elective Course=1, Units=1

300 Level - Second Semester

Course Code	Course Title	Units	Status	LH	PH
EHS 302	General Pathology	3	R	30	45
EHS 304	Food Hygiene and Safety	2	C	15	45
EHS 306	Sanitary Inspection of Premises	2	C	15	45
EHS 308	Environmental Biotechnology	2	C	15	45
EHS 310	Control of Communicable and Non-Communicable Diseases	2	C	15	45
EHS 312	Housing/Building Construction	2	R	15	45
EHS 314	Environmental Health Services in Emergency Situations	2	C	30	-
EHS 316	Introduction to Demography	1	R	15	-
EHS 318	Water Resources Management	2	R	30	-
	Total	18		195	315

Elective Courses (2 unit each)
- EHS 320: GIS Application in Social Assessment Vulnerability Indicator (SAVI)

- *EHS 322: Reproductive Health (2,0,0)*

Summary: Total Core Courses= 5, Units=10
- Total Required Course= 4, Units=8
- Total Elective Course=1, Units=1

400 Level – First Semester

Course Code	Course Title	Units	Status	LH	PH
EHS 401	Environmental Toxicology	3	C	30	45
EHS 403	Environmental Health Laboratory	1	C	-	45
EHS 405	Environmental Health Administration	2	C	30	-
EHS 407	Research Methodology & Proposal Writing	3	C	30	45
EHS 409	Sanitary Engineering	2	R	15	45
EHS 411	Meat Inspection and Abattoir/ Slaughter slab Management	2	C	15	45
EHS 413	Urban Planning and Sustainable Development	2	R	15	45
EHS 415	Public Utilities and Environmental Health Issues	2	C	15	45
EHS 417	Environmental Health Planning	1	C	-	45
	Total	**18**		**225**	**340**

Elective Courses (1 unit each)
EHS 419Child Survival and Development
EHS 421Eco-Sanitation
Summary:Total Core Courses= 7, Units=14
Total Required Course= 2, Units=4
Total Elective Course=1, Units=1

400 Level – Second Semester

Course Code	Course Title	Units	Status	LH	PH
EHS 402	Industrial Attachment (SIWES)	6	C	-	270
	Total	**6**		**-**	**270**

The Second Semester of the **4th Year** should be used for Industrial Attachment for the students in order to expose them to Environmental Health facilities in rural and urban settings. They are required to visit Environmental Health firms, industries and laboratories to enable them acquire the skills in Environmental Health Sciences. Each student must keep and present log book for assessment at the end of his/her industrial attachment. Log book shall carry not less than 25% of overall industrial attachment score.

500 Level – First Semester

Course Code	Course Title	Units	Status	LH	PH
EHS 501	Seminar	2	C	30	-
EHS 503	Water/Air Quality Management	2	C	15	45
EHS 505	Environmental Epidemiology	2	C	15	45
EHS 507	Environmental Health Lab Practice I	1	C		45
EHS 509	Environmental Health Ethics, Regulations, Policies and Laws	2	C	15	45
EHS 511	EIA/Health Impact Assessment	2	C	15	45
EHS 513	Industrial Safety	2	C	15	45
EHS 515	Emergency Medical care	**2**	**C**	**15**	**45**
EHS 517	Biometeorology	**2**	**C**	**30**	**-**
	Total	**17**		**195**	**315**

Free Elective Course (1 unit)
EHS 519Biomedical and Special waste
EHS 521Community Sanitation
Summary: Total Core Courses= 9, Units=17
Total Required Course= 0, Units=0
Total Elective Course=1, Units=1

500 Level – Second Semester

Course Code	Course Title	Units	Status	LH	PH
EHS 502	Research Project	4	C		180
EHS 504	Occupational Health & Safety	2	C	15	45
EHS 506	Solid Waste Management	2	C	15	45
EHS 508	International Health/Port Health Services	2	C	15	45
EHS 510	Monitoring and Evaluation	1	C	15	0
EHS 512	Sewage and Waste water Management	2	C	15	45
EHS 516	Environmental Health Lab Practice II	1	C		45
	Total	**17**		**180**	**385**

Free Elective Course (1 unit)
EHS 518Radiation Health and Control
EHS 520Pest Management, Methods and Control
Summary: Total Core Courses= 8, Units=17
Total Required Course= 0, Units=0
Total Elective Course=1, Units=1
Total Summary
Total Core Courses = 57.
Total Units of Core Courses = 118
Total Core Required Courses = 30
Total Units of Required Courses = 56
Free Electives = 7
Free Elective Units= 7
Total Credit Units = 178

3.2.9 Course Synopses

CSC 201: Computer Application **(2 Credit Units)**

Content (theory): concept and scope of information technology, Computers for information storage, information seeking, information processing and information transmission. Elements of computer system, computer hardware and software; numeric data, alpha numeric data; contents of a program and processing. Computer organization, block diagram of a computer, CPU, memory. Input devices; keyboard, mouse etc; output devices; VDU and Printer, Scanner and Plotter. Electrical requirements, inter-connections between units, connectors and cables.

Secondary storage; magnetic disks – tracks and sectors, optical disk (CD and DVD Memory), primary and secondary memory: RAM, ROM, PROM etc. Capacity; device controllers, serial port, parallel port, system bus. Exercises on file opening and closing; memory management; device management and input – output (I/O) management with respect of windows. Installation concept and precautions to be observed while installing the system and software . Introduction about Operating Systems such as MS-DOS and Windows. Special features, various commands of MS word and MS-Excel. About the internet – server types, connectivity (TCP/IP, shell); applications of internet like: e-mail and browsing. Various Browsers like WWW (World wide web); hyperlinks; HTTP (Hyper Text Transfer Protocol); FTP (File Transfer Protocol). Basics of Networking – LAN, WAN and Topologies.

Practical: Given a PC, name its various components and list their functions. Identification of various parts of a computer and peripherals. Practice in installing a computer system by giving connection and loading the system software and application software. Installation of DOS and simple exercises on TYPE, REN, DEL, CD, MD, COPY, TREE, BACKUP commands. Exercises on entering text and data (Typing Practice). Installation of Windows 98 or 2000 etc. Features of Windows as an operating system: Start, Shutdown and restore, Creating and operating on the icons, Opening closing and sizing the windows, Using elementary job commands like – creating, saving, modifying, renaming, finding and deleting a file, Creating and operating on a folder, Changing setting like, date, time color (back ground and fore ground), Using short cuts, Using on line help.

MS-WORD: File Management: Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, Giving password protection for a file, Page Set up: Setting margins, tab setting, ruler, indenting, Editing a document:

Entering text, Cut, copy, paste using tool-bars, Formatting a document: Using different fonts, changing font size and colour, changing the appearance through bold/ italic/ underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods: Aligning of text in a document, justification of document ,Inserting bullets and numbering, Formatting paragraph, inserting page breaks and column breaks. Use of headers, footers: Inserting footnote, end note, use of comments, Inserting date, time, special symbols, importing graphic images, drawing tools, Tables and Borders.

Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, and partition of cells, inserting and deleting a row in a table. Print preview, zoom, page set up, printing options, Using Find, Replace options, Using Tools like: Spell checker,

help, use of macros, mail merge, thesaurus word content and statistics, printing envelops and labels. Using shapes and drawing toolbar, Working with more than one window in MS Word, How to change the version of the document from one window OS to another

GNS 201: Foreign Language I (French) **(1 Credit Unit)**
The students are provided with the options of learning any of the listed foreign language with the purpose of empowering them with the ability to communicate and function in global world. The first part of this course will start the students from basics of the chosen language. The detail curriculum is as provided by Language and Literary Studies Department.

GNS 203: Innovation & Production Development **(2 Credit Units)**
The course aimed at enlightening the students on creative business ideas and opportunities. The end result is for each student to come up with creative business idea by the end of the semester. The course is expected to put students through the following: The definitions of Creativity and Innovation. The misinterpretation of Innovation, The Sources of Innovation Opportunities, Creative and Product Development Process, Product Planning and Execution, The Market, The Target, the Consumer and the Creative Sessions/Presentation of Creative Ideas.

ANAT 201: Introduction to Human Anatomy **(3 Units)**
This course briefly reviews the structure of the kidneys including the microstructures enabling an understanding of the functions of the kidneys. The structure of the respiratory system and pelvic organs are discussed. The structure of the brain and its blood supply, spinal cord and neurons will be studied. The endocrine and other secretory organs including the anatomical structures of special senses such as skin, ear, eye, etc. should be taught.

MCB 201: General Microbiology **(2 Units)**
History and scope of microbiology; the general characteristics of microorganisms. Prokaryotic and eukaryotic microorganisms. Bacterial morphology and cell structure. Growth and Reproduction of microorganisms. Microbial metabolism, antimicrobial agents. Systematic classification of bacteria, fungi, viruses, algae and protozoa; Microbial ecology, Microbial growth and identification, Prevention and Control of Microbial Diseases, microbes in relation to environment agriculture and industries, etc.

MCB 203: General MicrobiologyPractical **(1 Unit)**
Students should acquaint themselves with the microbial techniques involving the use of instrumentation, isolation and identification of microbes in different environmental media.

BCH 201: General Biochemistry **(2 Units)**
Review of general biochemistry; Chemical elements and the periodic table; electronic configuration; electronic orbital; valence of atoms; types of chemical bonds; metals and non-metals; acids and bases; Lewis conception; Carbon, sp3 hybridization; the tetrahedron and covalent bonding; functional groups; water and its special properties. Introduction of the cell and hierarchy of organization of living things: macromolecules, organelles, cells, Metabolism, Enzymes, Hormones, Biochemical degradations, Detoxification, Biochemical

techniques in disease screening and detection; Assessment of toxicant in environmental media etc.

BCH 203: General Biochemistry Practical (1 Unit)
Students should acquaint themselves with the biochemical l techniques involving the use of instrumentation in analysing different environmental media.

PHY 201: Physiology (3 Units)
Overview of physiology and its application: cellular physiology, homeostasis and homeostatic mechanisms; physiology of skin; nutrition and gastroenterology; circulatory and cardiovascular physiology; renal physiology; respiratory physiology; reproductive, fetal, and neonatal physiology; endocrinology and neurophysiology; physiological measurements and factors affecting them; neuromuscular systems, Environmental Physiology.

EHS 201: Introduction to Ecology and Environmental (1 Unit)
Introduction to principles of ecology, nature of our environment, atmosphere, chemical, physical and biological factors in the environment, biochemical cycles (carbon cycle, Nitrogen cycle Hydrological cycle), Basic environmental concepts and theories, microbial and parasite ecology, population ecology, food chain and web, energy flow through the biosphere , biotic communities and ecological succession, relationships and interdependence of organisms, human ecology etc.

EHS 203: Hygiene Education and Promotion (1 Unit)
Concepts and theories in Health promotion, principles, methods and strategies, community mobilization, Information, Education and Communication in Environmental health. Comparative assessment. Technologies for Information-Education-Communication in Environmental Health (I.E.C.). Sanitation through participatory approach; promoting sanitation through children (Child to Child approach), Life-Skill based hygiene education, Improving and assessing sanitation in communities and schools; PHAST Initiatives, Using advocacy, social Mobilization and programme commutation to promote sanitation in selected communities. Social marketing for sanitation programmes, private-sector involvement or partnership in promoting sanitation; planning; Principles of sanitation in Emergency situations; case studies in community sanitation.

EHS 205: Climate Change and Contemporary Issues (1 Unit)
Definition of climate change and the climate system, the nature of climate change, green house, climate change: causes, indicators, impacts and ways to reduce global warming. Define solar ultraviolet radiation, causes, effects on human and animal health, the effect on aquatic organisms, the effect on air quality, effects on materials and structures, photo degradation, microbial diversity, microbial decomposition. Ozone and ozone layer, health risks associated with the ozone layer: The absorption of solar energy, hazards to humans, the effects on the eye, effects on immune system, effects on the skin. Ozone depletion, risk assessment of ozone depletion: quantitative assessment, cataract, sunburn, skin cancer, other opportunistic infections, mitigation with replacement of chlorofluorocarbons.

CSC 202:Computer Programming II **(2 Units)**

Conversion between different text editors, software and MS word, MS-EXCEL Starting excel, open worksheet, enter, edit, data, formulas to calculate values, format data, create chart, printing chart, save worksheet, switching, from another spread sheet. Menu commands: create, format charts, organize, manage data, solving problem by analyzing data, exchange with other applications. Programming with MS Excel, getting information while working. Work books: Managing workbooks (create, open, close, save), working in work books, selecting the cells, choosing commands, data entry techniques, formula creation and links, controlling calculations, working with arrays. Editing a worksheet, copying, moving cells, pasting, inserting, deletion of cells, rows, columns, find and replace text, numbers of cells, formatting worksheet. Creating a chart: Working with chart types, changing data in chart, formatting a chart, use chart to analyze data. Using a list to organize data, sorting and filtering data in list. Retrieve data with MS – query: Create a pivot table, customizing a pivot table. Statistical analysis of data. Customize MS-Excel:
How to change view of worksheet, outlining a worksheet, customize workspace, using templates to create default workbooks, protecting work book. Exchange data with other application: linking and embedding, embedding objects, linking to other applications, import, and export document. Internet and its Applications: Log-in to internet, Navigation for information seeking on internet, Browsing and down loading of information from internet, Sending and receiving e-mail, Creating a message, Creating an address book. Attaching a file with e-mail message, receiving a message, deleting a message.

GNS 202: Foreign Language II (French) **(1 Unit)**

As a follow up to the first part of learning of foreign language, the students will be further empowered with the components of understanding the chosen language. The detail curriculum is as provided by Language and Literary Studies Department.

GNS 204: Enterprise Creation and Development **(2 Units)**

This course is designed to be the student' second encounter with the ECSA Programme and business/enterprise creation is expected to form its focus of attention. At the end of this course, every student is expected to have conceived and registered a business enterprise or an organization to be used as the vehicle for the actualization of the dream product (idea) approved at the end of the first semester course GNS 203. The students are to be taken through: Definition and Conceptual Clarification of Entrepreneurship, The Characteristics of Entrepreneurship and Success Secrets, Theories and Psychology of Entrepreneurship, Definition of Business (the Enterprise, the Activity), Business: Its Characteristics and Objectives, Business Classification and Ownership Forms, The Scale of Business Operations and Locations, The Theory of the Business, The Process of Establishing a Business and Practical Registration of a Business Enterprise.

BCH 202:Biochemistry II **(3 Units)**

Introduction and definition of Biochemistry. Biochemistry of the living cells. Principles of the chemical basis of life. The molecular basis of cellular structures-polysaccharides, lipids, protein, nucleic acid. Buffer, acidity and alkalinity; pH and pKa values and their effect on cellular activities. Chemistry of carbohydrates, lipids, amino acid and protein, nucleic acids.

Enzymes and co-enzymes; structure and their roles in cellular metabolism. The micronutrients; Vitamins and minerals. Methods of studying metabolism. Brief metabolism of carbohydrates, lipids, amino acids and proteins, nucleic acids. Biological oxidation and electron transport system. The survey of the fundamental principles of photosynthesis.

EHS 202:Fundamentals of Epidemiology (2 Units)

Historical development, definition, scope and application of epidemiology; Introduction to the basic principles and methods of epidemiology. Epidemiologic model of disease occurrence; Causal inferences in disease causation – Unifactorial model, multi-factorial model, Web of causation, criteria for asserting etiological relationships in disease occurrence; Agent-Host Environment relationships in disease occurrence; Person-Time-Place Descriptive Epidemiological Model; Time-Relationships in disease occurrence – natural history of disease, time of onset of a disease, time of diagnosis of disease, incubation period, time incidence function of a disease, mode of transmission of disease, epidemic curves, epidemiologic year of a disease, Cyclicity (secular versus seasonal) in disease occurrence; Strategies and methods in the prevention and control of diseases; Quantitative and qualitative assessment of screening procedures and their strength. Measurement of health status; Assessment of etiologic relationships based on exposure and susceptibility factors – relative risk, attributable risk, attributable risk percent, population attributable risk and odds ratio; Basic epidemiologic study designs – cross-sectional studies, cohort or prospective studies, case-control studies, randomized clinical trials and community trials. Survey of the applications of epidemiology to diseases, injuries, and non-disease health problems, cause effect relationship.

EHS 204: Introduction to Environmental Health (2 Units)

Concept of environmental health, Components of environmental health, Role of environmental health in disease prevention and control, Qualities of an Environmental Health professional; Environmental health practice in the implementation, regulation and enforcement of environmental health functions at different settings (home, schools, market places, recreational and hospitality facilities, workplace, industries; Development projects etc. Tools of environmental health practice, method of assessment of environmental health practice, skills of environmental health practitioners, roles of environmental health officers and regulators. Ethics in environmental health practice. Inter and intra sectoral collaboration in environmental health practice

EHS 206: Immunology and Immunization (2 Units)

Fundamental principles of immunology with emphasis on the nature of antibodies and antigens, blood groups, antigen-antibody reactions, hypersensitivity, types of immunity and factors affecting immunity, vaccines and vaccination, serological vaccine efficacy and coverage surveys. Principles of immunization; Immunizable diseases, immunization techniques and schedules, cold-chain management, and vaccine development technologies, immunological techniques, adverse reaction etc

EHS208: Health Psychology and Sociology **(2 Units)**

Introduction to sociology, psychology and anthropology, Biological basis for human behaviour – sensation, perception, motivation and emotion, Describe human development, learning and practices, Explain the role of culture, communication and human relationship and public participation, Describe the importance of indigenous knowledge, belief and health practices, Describe social, psychological and biological aspect of environmental planning and built-up environment, Discuss factors relating smoking, alcoholism, drug addiction emotional disorder. Describe factors in inequalities on health. Identify sources of psychological disorders, stresses, and illness behaviours in relation to social medicine and medical psychology. Describe the role of human behaviours in illness and disease causation. Discuss social determinants of health, social epidemiology and health service utilization behaviours.

Application of social science theories towards understanding behavioural aspects of health and medical care. Considerations of human behavioural dimensions in illness and disease, prophylactic behaviour, the role of culture, role of social institutions, stress and health, compliance behaviours, social epidemiology, etc. Also covers topics in social health including Smoking, alcoholism, drug addiction, obesity and nutritional behaviour/disorders, health services utilization behaviour, emotional health and personality disorders, religion and health.

EHS 210: Biodiversity and Climatic Change **(2 Units)**

Introduction to the concept and methods of biodiversity, involving distribution and abundance of organisms in time and space; factors of the environment influencing such distribution and abundance; the role of climate and animal extiction should be emphasized in relation to biological sustainability and animal survival.

EHS 212: Biostatistics **(2 Units)**

Definition, types of data, classification and types of samples, sampling techniques data distribution descriptive and inferential statistics. Vital and health statistics. Use of computer based statistical packages – e.g. statistical package for Social Sciences (SPSS), Epi-Info, Epidata Stata, Stacia, etc.

EHS 214: Human Nutrition and Dietetics **(2 Units)**

Definition concepts and historic perspectives of nutrition, food nutrients and classification; nutritional value of food and its effect on health; food production, storage, processing, transportation, purchasing, preservation, preparation safety, and diet therapy; balance diet. Breastfeeding, selection and formulation of weaning diets; family menu and budgeting, socioeconomic status of the family, various methods of nutritional assessment, biochemistry, biochemical assessment, anthropometric measurement, 24hr dietary recall. Physical and laboratory analysis of nutrients (haemoglobin estimation etc). Diet control in illness, obesity and weight control, local foods, nutrition through the life cycle (diet for different ages and condition), food labelling, food miles and sign posting. Basis for nutritional intervention, food protection, indicators of malnutrition.

EHS 301: Basic Instrumentation and Use **(2 units)**

Introduction to Environmental Health Laboratory, principles and use of basic special instrument in environmental health- spectrophotometer, pH meter, microscope, air oven, incubator, centrifuge, plume imaging, optical air monitoring, air sampling sample collection, 2B technologies Ozone Monitor, Nitrogen dioxide monitor Z01400, TPI Carbon Monoxide analyzer, atmospheric/barometric pressure, barometer, meteorological ballon and preservation and registration, new tech techniques, procedure and precautions for analytical methods in environmental health , Exposure of students to practical and the following theoretical details

EHS 303 General Parasitology **(2 Units)**

Introduction to major human parasites of public health relevance, Phylogeny of parasites parasite physiology; host parasite relationship; evasive mechanism; life-cycle pattern and host specificity, parasite ecology; infection and infestations Pathology, pathogenesis and Symptomology of parasitic diseases e.g. malaria, amoebiasis, schistosomiasis, onchocerchiasis, etc. Screening and Diagnosis of endemic parasitic diseases; Strategies in parasitic diseases control; Emerging and re-emerging parasitic diseases; Chemotherapy and Chemoprophylaxis, Drug resistance etc. Prevention and Control of parasitic infections**.**

EHS 305: General Entomology **(2 Units)**

Introduction to Entomology; Classification and characteristics of insects with particular reference to vectors of diseases. Insect ecology, Insect Anatomy and physiology, Environment and entomology. Methods of insect control, Biological, chemical and physical, pest control (integrated pest management) Insecticides; classification, formulation and application of insecticides. Health implication; handling and safety methods, insect sterilization techniques. International conventions and national policies on pesticides use.

EHS 307: Primary Health Care **(2 Units)**

Development of health system, concept and principles of primary health care services. Components of PHC. Structures and organogramme. Elements of PHC, Oral re-hydration therapy, screening, disease surveillance, immunization techniques, cold chain technology, Essential drugs: drug revolving fund, Control of common endemic diseases, reproductive health, maternal and child health etc. Resources for PHC delivery, SWOT Analysis of PHC. Participatory techniques in PHC delivery. Material and Child survival strategies etc.

EHS 309: Basic Pharmacology **(2 Units)**

Definition and concept of pharmacology; Divisions of pharmacology and their applications; Terminologies and abbreviation; Types and nature of drugs; Pharmacodynamics; Pharmacokinetics; classification of drugs and their importance; controlled drugs, drug use, abuse and addiction; Self medication; introduction to chemical toxicology; General principles of management of poisons.

EHS 311: Introduction to Environmental Management **(2 Units)**

Definition and concept. Characteristics of different environmental media (air, water, soil), Environmental approach to air, water and land pollution. Environmental, effects of

technological advances, radiation noise, pollution of the biosphere. Occupational hygiene; Mycotoxins and nitro-compounds in the environment. Environmental degradation; methods of environmental assessment e.g. remote sensing and GIS, EIA, HIA. Tools for Air, water and soil analyses. Management of degraded environment, re-forestation, erosion control, integrated vector management, integrated waste management, pollution control, international measures to control global warming and climate change remediation meteorology.

EHS 313: Environmental Health Information Systems (EHIS) (2 Units)
Concepts, procedure and structure. Study of contemporary Environmental and health information systems especially as used in morbidity surveys, disease surveillance systems, disease registers, etc. Also includes introduction to computer simulation techniques and life-table techniques. Medical and health data base management; intranet, internet and extranet applications; e-library; geo-informatics information globalization and teleconferencing.

EHS 315: Health, Safety and Environment (2 Units)
Definitions, concepts/ scope, Types of emergencies and services required. Structure, roles and collaboration of agencies. Resources mobilization, allocation and management. Roles of Environmental health officers in emergency situations. Forecasting preparedness and response.

EHS 317: Environmental Health Economics (1 Unit)
Definitions, theories and concepts. Health care financing and their implications to health care delivery. National Health Insurance Scheme, Cost recovery strategies, private sector participation. Socio-economic cost of ill health, Indicators for assessment of cost of ill health. Factors affecting access to health services Economic implications of disease – man-hour, DALY's etc. CEA, CBA etc

EHS 319: Introduction to Geographic Information System (1 unit)
This course covers underlying geographic concepts (world coordinate system and projections, vector map topology, tiled and layered maps), map design and outputs, geo-databases, importing spatial and attribute data, digitizing, geocoding, spatial data processing, and advanced spatial analysis. Other topics such as raster integration, Internet enabled GIS, 3D analysis, network, and advanced spatial analysis will also be addressed. The technical focus of the course includes computer lab tutorials and case studies using the leading desktop GIS software, ArcGIS, from Environmental Systems Research Institute, Inc. (ESRI)
Application areas covered in this course include city and regional planning, community planning and economic and development, education, election, and environmental studies, housing and property evaluation, transit and transportation issues, land use, historic studies, crime analysis and policing, emergency management, public works utilities, census population and demographic studies, health, and business uses including marketing, advertising, and site selection.

EHS 321: Industrial Layout and Landscape Planning and Management (1 unit)
Concept of industry and industrial layout, landscaping and planning, environmental management, layout and landscaping methods, country and regional planning management policies, regulation and laws. Feature of layout- Master Plan, Recreational ground, Burial grounds, prohibited areas, wetland, road types and connections etc. Relevance of layout and landscape planning and management in environment health.

EHS 302:General Pathology (3 Units)
Concepts and scope of pathology. Causes and classification of diseases; Cytology; Organ damage and sequel; Inflammation: types and causes, signs, functions, types and mechanisms; Infection: types and causes of infection. Body defence mechanism, causes and types of infection, some important bacterial, fungal, and viral infections including Tuberculosis, Candidiasis and HIV/AIDS. Growth disorders. Hyperplasia, hypertrophy, dysplasia, dystrophy and malnutrition. Tumours: aetiology, types, classification and characteristics. Cysts: formation and classification; Developmental anomalies or disturbances; Effects of ionizing Radiation on human tissues. Trauma, injuries and dislocations and bleeding. Systems pathology: disorders of blood cells, Body fluids (oedema), febrile conditions (fever) cardiovascular diseases, the heart and selected diseases of the respiratory system, gastro-intestinal tract, bones and joints, skin, endocrine glands, kidney, liver, and central nervous system, Diagnostic and forensic pathology.

EHS 304 Food Hygiene and Safety (2 Units)
Concept of Food chain and food security, food hygiene, Food production, Handling, Transportation, Storage, Preparation. Food Premises, Sanitary Requirements of Food premises, Food Handlers, Hygiene and Health Requirements of food handlers. Food spoilage and food preservation, Food poisoning and food Infections, their prevention and control; Food safety. Sampling of food, Food Quality Control, Food safety laws and Regulations. Licensing of food-preparing and water packaging premises. Licensing Liquor-selling premises. Organization of Workshop programme for food handlers on food safety and hygiene. Describe the general overview of the procedure and process of meat hygiene and inspection.

EHS 306: Sanitary Inspection of Premises (2 Units)
Concept and principles of inspections. Procedure and methodology of premises inspection. Types of premises. Tools for inspection, Report writing. Guidelines, regulations and enforcement.

EHS 308: Environmental Biotechnology (2 Units)
Introduction to biotechnology, types of biotech, methods in biotech, microbial ecology, environmental microbiology, bioremediation and Biodegradation; Application of genetic engineering in environmental health. Insect sterilization techniques, Biological control measures vis-à-vis the more traditional use of insecticides and larvicides. Implications for environmental pollution and toxicity.

EHS 310: Control of Communicable and Non Communicable Diseases (2 Units)
Definition, description and classification; Epidemiological patterns. Stages of diseases prevention. Primordial, Primary, Secondary and Tertiary. Control methods: Biological, Chemical, Environmental and Chemotherapy. Strategies for drug delivery: Selective targeted and mass chemotherapy; Emerging and re- emerging diseases. Definition, description, classification of non-communicable diseases and disorders that are of major public health significance in the country.. Epidemiological patterns, risk factors, signs and symptoms; methods of prevention and control including those for behaviour modification, enforcement, and engineering measures. Examples of diseases/disorders considered include: hypertension, coronary heart disease, diabetes mellitus, major genetic disorders including sickle cell anaemia, cancers (breast, lung, liver, ovary, cervix, leukaemia, lymphomas, etc), asthma, ulcer, among others. Some non-disease chronic conditions with serious health implications such as obesity, nutritional deficiencies, drug abuse, and alcoholism.

EHS 312: Housing /Building Construction (2 Units)
Introduction to Housing. Housing standards. Urban and rural housing. Housing and Health. Building technology- drawing and reading of plan. Housing codes, edicts, or ordinances, laws and legislation of the various Governments levels. International Legislation on Housing. Criteria for building approval. Role of Environmental Health Professionals in building approval and registration.

EHS 314: Environmental Health Services in Emergency Situations (2 Units)
Definitions, concepts/ scope. Types of emergencies and services required. Structure, roles and collaboration of agencies. Resources mobilization, allocation and management. Roles of Environmental health officers in emergency situations. Forecasting preparedness and response.

EHS 316: Introduction to Demography (1 Unit)
Introduction to the principles and methods of demography. Sources of population data; population dynamics and health implications, population structure and population movement. Census: types, methods, principles and practice. Applications of census data. Population data and the planning of social services. Demographic transitions and health/disease patterns and services. Indices of population, health and development, life table techniques and interpretation of related indices.

EHS 318: Water Resources Management (2 Units)
What is emergency, socio-political, legal cultural and security issues; survival supply; water treatment process techniques; water treatment works and urban water supply systems, Measurement of yield and water levels, rapid water quality assessment routines; catchment mapping; water quality analysis, Biological survey; water treatment; treatment Process and Health and safety; background to ground water and aquifers; Rocks and soil identification, ground water investigation.

EHS 320: GIS Application in Social Assessment Vulnerability Indicator (SAVI) (1 unit)
The course teaches student to form questions about their community's needs and services and then to apply SAVI and other Electronic Atlas data to answer those questions. The training materials developed will be applicable to the special needs of environmental health using a comprehensive database of social indicators from the metropolitan Statistical Area that human service agencies and community organizations can use for planning, research, and evaluation. Using a common source for reference geographies, such as school districts, transportation routes, health department districts, and services areas. Using training of GIS, ArchView, SAVI helps to draw information from a wide variety of sources, including census, criminal justice, health, vital statistics, education, welfare, social service agencies, service delivery catchment areas, churches, libraries, and other community facilities, and attitudinal surveys.

EHS 322: Reproductive Health (1 Unit)
Public health aspects of human sexuality and family planning. Health resources and family size relationship, birth control, and family planning methods, prenatal, perinatal and postnatal health care services application of amniocentesis, alpha-fetoprotein (AFP), chorionic villus sampling (CVS), percutaneous umbilical blood sampling (PUBS), magnetic resonance imaging (MRI), non-stress testing (NST), ultrasonography, hematological tests, and other fetoscopic procedures. Relationship between pregnancy and diet, sleep, exercise, cigarette smoking, alcohol, drugs use, exposure to toxic substances, radiation including X-rays and VDTs), diseases (HIV/AIDS, rubella, sexually transmitted diseases, autoimmunity, diabetes, hypertension, tumours, kidney disease, hepatitis, anaemia, genetic abnormalities, blood group incompatibility, etc

EHS 401: Environmental Toxicology (3 Units)
Introduction to chemical pathology and environmental toxicology. Toxicodynamics and toxicokinetics. Pesticides, heavy metals, radioactive materials, food additives, animal toxins, phytotoxins, plastics and psychogenic drugs. Toxic pollutants in air, land and water. Exposure pathways, standards and health implications. System, Organ, Tissue and Cell pathophysiology. Concept of LD and LC. Dose response analysis. Probit analysis

EHS 403: Environmental Health Laboratory (1 Unit)
Introduction to laboratory science; Importance and functions of Environmental Health laboratory; General lab. Construction; Safety precautions in the lab; Preparation and storage of reagents; Instrumentation: Microscopes, autoclaves, incubators, sterilizers, fridge/ freezers, hot air oven, lasers, gas chromatography, spectrophotometer, colorimeter, audiometer, dosimeter, cryostat, PCR etc. Quality assessment and quality control, concept of laboratory log book and record keeping. Field trip to various environmental facilities such as water treatment plant, waste water treatment plant, solid waste management facilities, public health laboratories, markets, selected industries, etc.

EHS 405: Environmental Health Administration (2 Units)
Concepts, theories and application in Environmental health. Institutional arrangement, staffing and funding. Guidelines in environmental health administration. Supervision and

monitoring, quality assurance, equity, cost controls, organizing, inter and intra sectoral collaboration. Budgeting, work plan and programme development, implementation, monitoring and evaluation.

EHS 407: Research Methodology and Proposal Writing (3 Units)
Research Methodology, Qualitative and Quantitative data Samples and mixed methods and sampling methods, types of data and sample size determination. Type and design of questionnaire, focus Group Discussion, Key informant interviews, Environmental Sampling, data collection, Data analysis including use of computer based analytical packages e.g. SPSS, EPI-INFO etc. Proposal and report writing: Topic selection, justification, objectives, literature search, methodology, results and discussion. Referencing.

EHS 409: Sanitary Engineering (2 Units)
Definitions, concepts and theories of sanitary engineering. Environmental problems of urbanization and natural cycle of water. Elementary hydrology, Hydrological cycle, physical, chemical and biological principles of water and waste water treatment. Municipal services – water supply, sanitation facilities e.g. latrines and sewerage systems, urban and community storm water management, drainage layout. State and Federal regulatory standards. Hazardous waste management

EHS 411: Meat Inspection, Abattoir/Slaughter Slab Management (2 Units)
Anatomy and Physiology of Food Animals; Diseases of Food Animals; Zoonosis; Describe the role and function of other agencies involved with meat inspection, slaughter management and food animal husbandry and welfare. Describe the principles of good practice in an abattoir. Describe and apply abattoir planning, construction and management in terms of standard regulations and guidelines. Explain and recognise the requirements and needs for food animal husbandry. Apply the principles of risk assessment to meat inspection and slaughter management. Practical training in meat inspection at an abattoir. Identify factors in abattoir practice and legislation that determine the hygiene and quality of meat. Perform, recognise and describe hygiene and procedures involving food animal slaughter in line with regulations.

EHS 413: Urban Planning and Sustainable Development (2 Units)
Urban renewal of built up environment and provision of essential services: road, drainage etc. Describe layout planning and land use, development, control and land scaping. Describe national and international partners which support sustainable development – policies legislation, Agenda 21, Rio declaration, MDGS, WSSD, NEPAD etc. Concept of urban and regional planning, history of planning and contemporary planning issues – sustainable development; regeneration and pollution core modules e.g. contemporary human geography, earth & ecological systems; planning and built environment; society, space, policy and economy. Urban poverty and planning; town scopes; societies, culture and urban explosion; rural poverty; GIS, EIA, Environmental and spatial qualities; prediction of effect; scenario development; multi-criteria analysis; potential solutions, environmental health feature, flood protection, rural and coastal infrastructure, industrial activities and pollution; spatial planning of industrial sites, etc.

EHS 415:Public Utilities and Environmental Health Issues (2 Units)
Introduction to public utilities and its components, concept of environmental health issues, water supply and distribution, fire services, drainage, sewerage and treatment of sewage, power supply, current environmental health issues-environmental emergencies, climate change, bio-diversity etc.

EHS 417 Environmental Health Planning (1 unit)
Principles and methods of planning health care services programmes and facilities. Planning outcomes; Strategic planning; Systems theory, Chaos theory and dynamic balance; Systems analysis; Types of technologies – definitive, halfway, competing and cost saving varieties; Effects of technology on health status; Forces affecting development and diffusion of technology; need for technology intervention; technology assessment; Technology change defined and modelled; modelling, simulation and gaming methods.

EHS 419: Child Survival and Development (1 unit)
Concept and definition of child survival; Mile stones in Child Development and early Learning; Breastfeeding; Nutrition and Growth; Immunization; Disease control, Malaria, HIV/AIDS, Water Sanitation and Hygiene (WASH) etc;

EHS 421: Eco-Sanitation (1 Unit)
Concept and definition of ecological sanitation; excreta and waste water disposal technologies; sanitizing human excreta, design and management features of ecol-toilets, types of eco-toilets; recycling the nutrient. Grey water characteristics and management, advantages and disadvantages of ecological sanitation.

EHS 402: Industrial Attachment (Introduction to environment health field practice and concurrent field work) (6 units)
Concurrent field practical and internship assessment shall be on Thursday, Evaluation of the quality of entry in the log book by the student - 10% Satisfactory report from the Supervisor 20%, End of practical posting examination 70% , A satisfactory concurrent field work shall be the prerequisite graduation, Last the entire period of the first semester, Field internship shall be for six weeks during the long vacation, Carried out in a practical site designed and management by **anchor institution**, Provide facility for modern waste management scheme, premises inspection, water purification and surveillance, food and meat hygiene, recreational facility, pest control Provide with environmental health facilities to facilitate acquisition of practical skills, Placed on **field internship** attachment with environmental health unit or an Environmental Health Officer with cognate, experience of not less than 15 years preferable an Environmental Health Officer with postgraduate qualification and not below the rank of Assistant Chief.

EHS 501: Seminar (2 Units)

EHS 503: Water/Air Quality management **(2 Units)**

Definitions, concepts, principles and objectives. Standard for Drinking Water Quality. International treaties and Conventions. Procedure for water quality monitoring and surveillance. Protection of water sources including effluent and partially treated water discharge. Concept of air quality, composition of air; Air pollution; Common air pollutants; Measurement of air quality, Air quality modelling, etc. Air quality assessment technologies.

EHS 505: Environmental Epidemiology **(2 Units)**

Definitions, concepts. General introduction to Epidemiology, Environmental epidemiology and domain of environmental epidemiology; Exposure Assessment; Descriptive Analysis, methods of investigation including the use of Time –Trend and Spatial pattern analysis; Poisson Regression; Surveillance, Risk Assessment and management; pollution of air, water and soil, ionizing and non-ionizing radiation; investigation of disease clusters, emphasis is given to critical interpretation of scientific evidence relating to potential environmental hazards to health; Advances in Environmental Epidemiology, use of statistical packages (SPSS, EPI – INFO, Epidata) and vital statistic etc.

EHS 507: Environmental Health Laboratory Practice I **(1 Unit)**

Methods in Environmental Chemistry, soil, water, air, food. Techniques in Parasitology and Microbiology. Assessment of Radiation effects and exposure. Pest management strategies. Pesticide formulation and use. Principles and methods for assessing Allergic hyper sensitivity associated with exposure to chemicals in the Environment. Simulation of cleaning oil spill in water and soil. Methods in gas flaring control. Field and laboratory techniques in Environmental Impact Assessment (EIA), Environmental Audit (EAD), EER, Environmental Statement (ES) etc. Methods of remote sensing, Use of Geographical information System (GIS) in Environmental Health.; Methods in HIA

EHS 509: Environmental Health Ethics, Regulations, Policies and Laws **(2 Units)**

Definition, evolution, concepts and theories; Professional ethics of Environmental health; Ethics of other professions; inter/ intra professional relationships; the role of regulatory authorities in the enforcement of professional ethics. Evolution, Ethical considerations in the design and application of environmental health technology and innovations. Review of the legal aspects of environmental health services with particular emphasis on their implication for the development public health technology. Process of formulation of policies, regulations ethics and making of laws. Critique of existing regulation, policies and laws. Enforcement and role of environmental health officers. Professional ethics, role of environmental health council, case studies etc.

EHS 511: EIA/Health Impact Assessment **(2 Units)**

Definition, concept, evolution and scope. types and components of EIA/HIA/; regulatory requirement of EIA/HIA/SIA, projects requiring EIA/HIA/SIA; procedure, techniques or process of EIA; environmental index and indicator; technical details of impact prediction; case studies; Environmental Audit; ISO 14000, 14001 etc in the management of environmental systems.

EHS 513: Industrial Hygiene and Safety **(2 Units)**

Introduction to industrial hygiene and safety, objectives, structural organization, concept of Health Safety and Environment- Principle of Health Safety and Environment, Fire Safety, Chemical Safety, Ergonomics, Workers Compensation, Hazard Analysis Critical Control Point (HACCP) in Food Hygiene and Safety, Health Safety and Environment Management System. Application and Use of check-list for evaluation of safety assessment.

EHS 515: Emergency Medical Care **(2 Units)**

Basic Skills for First Aid and safety measures for sudden illnesses and injuries in the home, playground, workplace and public places. Management of emergency conditions due to falls, cuts and abrasions, drowning, burns, electric shocks, etc. Skills in cardiopulmonary resuscitation; mouth-to-mouth resuscitation; etc

EHS 517: Biometeorology **(1 unit)**

Definition and Concept. Classification, description and health implication of different types. Prevention and control measures etc.

EHS 519: Biomedical and Special waste **(1 Unit)**

Concept, classification, sources and health impacts, planning, handling and transportation of biomedical and special waste. Waste minimization, recycling and reuse. The role of legislation in biomedical and special waste, treatment technologies, disposal methods, health and safety rules for personnel and associated workers. Infection control and emergencies response. Training and retraining modality for handles of biomedical and special waste.

EHS 521: Community Sanitation **(1 Unit)**

Concept of Community Sanitation and Disease prevalence, measure of improving sanitation, control of sanitation related diseases, sanitary inspection of premises/ institutions, sanitation in market and temporary settlements, disposal of the dead (DOD), methods of cremation, exhumation and embalmment, removal of corps, home burial and modern techniques in achieving sanitation-ecological sanitation, Community Lead Total Sanitation (CLTS) etc.

EHS 502: Research Project **(4 Units)**

EHS 504: Occupational Health and Safety **(2 Units)**

Definition, scope and evolution. Principles and practice of occupational health and industrial hygiene; work environment and productivity; proxemics and ergonomics; basic occupational health team; worksite wellness promotion programs. Common occupational health problems in (industries, agricultural establishments; health care establishments; construction settings). Occupational health policies, regulations and regulatory Agencies. Environmental and occupational hazards, evaluation and measurement of exposure levels. Occupational stress, identification of the role of human and environmental factors in occupational hazards. Methods of prevention and control. Safety procedure in different occupational and safety management.

EHS 506: Solid Waste Management **(2 Units)**

Basic concepts, nature and classification of solid waste. Theory of solid waste collection, handling and disposal. Field and laboratory sampling and monitoring of solid wastes. Analysis of municipal, industrial, hazardous solid wastes. Waste management technologies. Waste management hierarchy-minimization, recycling, waste to wealth concept etc. Solid waste and human health etc.

EHS 508: International and Port Health Services **(2 Units)**

Cross-boundary port health services, International organizations and agencies and non-governmental organizations (NGOs). Constitutions, conventions, treaties, international regulations and agreements. Roles of international organizations in port health. International collaboration and cooperation in port health

EHS 510: Monitoring and Evaluation in Environmental Health **(1 Unit)**

Concept of monitoring and evaluation (M&E). Quality and characteristics of M&E, role of M&E in Environmental Health Services. Monitoring versus evaluation, evaluation matrix, evaluation design, external and internal evaluation, guidelines for evaluation (5 phases), evaluation questions, indicators, matrix plus induction selection, use of IF THEN logic model statement, CAT SOLO Mnemonics (Computer Activities and Target Group). Instrument for gathering qualitative and quantitative information, pretesting and piloting as perquisites to effective M&E

EHS 512: Sewage and Waste water Management **(2 Units)**

Waste water Systems: Population studies: waste water flow rates; runoff; Groundwater Infiltration; Materials for sewers; Hydraulics of sewers. Design of Sewers/drains Combined sewers and Storm water sewers, appurtenances and special structures; Pumps and pumping stations; Design of wastewater treatment plant: Primary treatment processes: – screening, grit removal, flow measurement (weirs and flumes); Design facilities for primary treatment – radial and rectangular sedimentation tanks; Design facilities for secondary/ biological treatment of wastewater; Activated sludge process, Trickling Filters, Stabilization and Oxidation ponds. Treatment and disposal of sludge; Sources of sludge, Quantities and characteristics; Sludge dewatering methods; Uses of sludge; Sources of water supply, and their exploitation: Advanced waste water treatment methods;

Types and sources of waste water; characteristics and flow rates impacts of waste water; treatment objectives and disposal regulation, principles of applied microbiology, wastewater treatment (introduction, primary (screens and communitors, grit removal, flow equalisation, sedimentation and flotation) secondary (Tricking filters, ., rotating biological discs: activated sludge, oxidation pond) physic- chemical treatment, advanced treatment,(Ultra filtration, reverse osmosis, activated carbon filter, UV sterilization, etc) treatment of sludge, disinfection), land disposal , sewer corrosion, design of waste water treatment units.

EHS 516: Environmental Health Laboratory Practice I **(1 Unit)**

Methods in Environmental Chemistry, soil, water, air, food. Techniques in Parasitology and Microbiology. Assessment of Radiation effects and exposure. Pest management strategies.

Pesticide formulation and use. Principles and methods for assessing Allergic hyper sensitivity associated with exposure to chemicals in the Environment. Simulation of cleaning oil spill in water and soil. Methods in gas flaring control. Field and laboratory techniques in Environmental Impact Assessment (EIA), Environmental Audit (EAD), EER, Environmental Statement (ES) etc. Methods of remote sensing, Use of Geographical information System (GIS) in Environmental Health.; Methods in HIA

EHS 518: Radiation Health and Control **(1 Unit)**

This course is designed to enable students appreciate value of radiological emissions and control in the environment as it relates to human health. Specifically, it should cover types of radiological environment, identification of hazards, evaluation and their control. Field visit to clinical and non-clinical radiological environment should be included.

EHS 520: Pesticides Management, Methods and Control **(1 Unit)**

Concept of pest, pest management and control, types and characteristics of pest, assessment of pest status, types of pesticides-organo-chlorines, organo-phosphates, carbamate and pyrethroids, pesticides formulation and use, methods in pest management and control.

3.3 HUMAN ANATOMY (B.Sc. Human Anatomy)

3.3.1 Philosophy, aims And Objectives of the programme

Philosophy

The general philosophy of the programme is borne out of the desire and the need to provide knowledgeable and efficient personnel who should possess the right type of knowledge and skills in human anatomy necessary for training of health personnel in the various fields of health sciences, research, complement ancillary laboratory medical services and develop entrepreneurial expertise in related disciplines.

Aims and Objectives

The programme will be sufficiently broad-based to lead to the production of graduates who will be able to perform the following functions:

a) Assist in the teaching of Anatomy to Medical, Dental, Nutrition, Nursing, Physiotherapy, Pharmacy, Medical Laboratory Sciences students and those of other related disciplines.
b) Acquire competence in the use of basic laboratory equipment.
c) Promote anatomy as a subject through research that will lead to the acquisition of higher qualifications.

3.3.2 Admission and Graduation Requirements

Candidates seeking admission to the Human Anatomy degree programme must possess the minimum requirement for entry into the basic medical science programmes, as contained in the general admission requirements in section 1.3. The requirement for graduation are as shown in section 1.4.

3.3.3 Learning Outcome

Regime of subject knowledge

Students should possess a fundamental knowledge of the terminologies, nomenclature, basic concepts of human anatomy.

Competencies and Skills:

At bachelor degree level in Human Anatomy students are expected to develop the following cognitive and practical skills and abilities in Human Anatomy.

- Knowledge and understanding of essential facts, concepts, principles and theories in basic and applied anatomy which form the theoretical basis for human structure and function.
- Knowledge and understanding of body changes in the interpretation, planning and implementation of Human needs.

Behavioural Attitudes

- Recognizes the essential worth of the individual through internal responses.
- Shows sense of responsibilities for self-direction and personal growth.

3.3.4 Attainment Levels

It is essential that the procedure used for students' assessment should correspond to the knowledge, abilities and skills that are to be developed through their degree programme. These should be based on formal examinations, laboratory reports/records, problem-solving exercises, oral presentations, planning, conduct and reporting of project work and research.

3.3.5 Evaluation

a) Methods for course evaluation All courses taught during each semester shall be examined at the end of each semester.

b) Continuous Assessments shall constitute 30% of marks of all courses, while examination at the end of the semester in which the course is taken will constitute 70% of the marks.

c) Examination Regulations: the pass mark for courses of Anatomy shall be 50% where applicable for other programmes except for the B.Sc. programme where the pass mark shall be 45%

3.3.6 Resource Requirement for Teaching and Learning

The Universities shall ensure the provision of adequate human, physical, equipment and library facilities in all the learning areas. This should include adequate information and communication technology infrastructure.

a) **Academic and Non-Academic Staff:**
The academic staff-student ratio for this programme should be at least 1:15. The academic staff should possess higher degrees in anatomy and/or related disciplines.

b) **Academic and Non-Academic Spaces**
There must be adequate space provision for lecture theatres, seminar rooms, laboratories, practical rooms, offices for teaching and non-teaching staff in accordance with guidelines.

c) **Academic and Administrative Equipment**
Teaching and learning resources must be provided in the right quality and quantity. These should include audio visual materials, phantoms, multimedia and modern information and communication technology networks, adequately equipped laboratories, clinical equipment and instruments, reagents and other consumables.
Modern administrative equipment and adequate consumables must be provided for the administrative staff while the right tools must be available for the technical staff.

d) **Library and Information Resources**
Adequate reading materials and literature must be provided for each programmes in the University/College/Faculty Libraries with modern ICT facilities and internet connectivity.

Where possible, departmental library and reading rooms should be provided for staff and students.

3.3.7 Course Structure and Synopses of the Human Anatomy Degree Programme

Preamble

Courses shall be provided leading to the degree of Bachelor of Science, Human Anatomy which may be awarded to students who have successfully fulfilled all academic requirements and whose conduct conform to that expected of a prospective Anatomist. The training shall be a combination of teacher-directed, tutor-guided, self-learning and problem-based methods.

A: Course Structure

Course structure for 100 Level Human Anatomy Programme

Course Code	Course Title	Units	Status	LH	PH
BIO 101	General Biology I	3	C	45	-
BIO 102	General Biology II	3	C	45	-
BIO 107	General Biology Practical I	1	C	-	45
BIO 108	General Biology Practical II	1	C	-	45
CHM 101	General Chemistry I	3	R	45	-
CHM 102	General Chemistry II	3	R	45	-
CHM 107	General Chemistry Practical I	1	R	-	45
CHM 108	General Chemistry Practical II	1	R	-	45
CSC 101	Introduction to Computer Science	3	C	30	45
GST 111	Communication in English	2	C	30	-
GST 112	Logic, Philosophy and Human Existence	2	E	30	-
GST 113	Nigerian Peoples and Culture	2	R	30	-
GST 121	Use Library, Study Skills & ICT	2	C	30	-
GST 122	Communication in English II	2	C	30	-
GST 125	Contemporary Health Issues	2	R	30	-
MTH 101	Elementary Mathematics I	3	R	45	-
PHY 101	General Physics I	3	R	45	-
PHY 102	General Physics II	3	R	45	-
PHY 107	General Physics Practical I	1	R	-	45
PHY 108	General Physics Practical II	1	R	-	45
	Total		**42**		

LH = Lecture Contact Hours; PH = Practical Contact Hours.

Course Code	Course Title	Units	Status	LH	PH
ANA 201	Introductory Anatomy & Gross Anatomy of Upper & Lower Limbs	4	C	30	90
ANA 202	Histology of Basic Tissues	2	C	15	45
ANA 203	General Embryology	2	C	30	-
ANA 204	Gross Anatomy of Thorax, Abdomen, Pelvis & Perineum	4	C	30	90
ANA 205	Systematic Histology	2	C	15	45
ANA 206	Systemic Embryology (Organogenesis)	2	C	15	45
ANA 299	Students' Industrial Work Experience	3	C	-	135
BCH 201	General Biochemistry I	3	R	45	-
GST 211	Environment and Sustainable Development	2	R	30	-
GST 222	Peace and Conflict Resolution	2	R	30	-
GST 223	Introduction to Entrepreneurship	2	R	30	-
GST 224	Leadership Skills	2	R	30	-
PHE 201	Biostatistics	2	C	30	-
PIO 203	General Physiology	3	R	45	-
	Total	**35**			

Course structure for 200 Level Human Anatomy Programme

Course Structure for 300 level Human Anatomy Programme

Course Code	Course Title	Units	Status	LH	PH
ANA 311	Gross Anatomy of Head & Neck and Neuroanatomy	4	C	30	90
ANA 312	Radiological Anatomy and Techniques	2	C	15	45
ANA 321	Neurohistology &Histology of Special Senses	2	C	15	45
ANA 322	Histochemistry	2	R	15	45
ANA 331	Embryology of the Nervous System & Pharyngeal Apparatus	1	C	15	-
ANA 341	Human Genetics	2	R	30	-
ANA 342	Cell and Molecular Biology	2	C	30	-
ANA 351	Laboratory Techniques for light Microscope	3	C	15	90
ANA 352	Research Methods and Research Ethics	2	C	30	-
ANA 399	Students industrial work experience	3	C	-	135
GST 311	Entrepreneurship	2	R	30	-
PIO 306	Endocrinology I	3	R	30	45
VAN 312	Animal Handling & Comparative Mammalian Anatomy	3	C	15	90
	Total	**31**			

Course Structure for 400 level Human Anatomy Programme

Course Code	Course Title	Units	Status	LH	PH
ANA 411	Surface and Living Anatomy	1	C	15	-
ANA 412	Electron Microscopic Technique and Ultra-structure	4	C	30	90
ANA 421	Anatomical and Museum Techniques	4	C	30	90
ANA 422	Seminar	2	C	30	-
ANA 431	Introduction to Electron Microscopy	2	C	30	-
ANA 432	Laboratory Work Experience	3	C	-	135
ANA 441	Skeletal Biology and Anthropology	2	C	30	-
ANA 450	Biometry and Human Growth	2	C	30	-
ANA 499	Final Year Project	8	C	-	360
ARC 412	Introduction to Archaeology	3	R	45	-
PHY 482	Health Physics	3	R	45	-
	Total	**34**			

B: Course Synopses

200 Level

Preamble
Courses to be taught at this level should include basic medical sciences courses in Anatomy, Physiology, and Biochemistry.

ANA 201: Introductory Anatomy & Gross Anatomy of Upper & Lower Limbs
(4 Units: LH 30;PH 90)

Introductory Anatomy:
Descriptive terms, plans and terms of relationship of the human body, terms of comparison, attachment of muscles, types of muscles, movements of joints. Osteology, Principles of Kinesiology, general organization of body systems.

Upper Limb and Lower Limb:
Pectoral region and mammary gland; axilla and brachial plexus; Back deltoid and scapular regions, arm, forearm, hand, bones and joints. Front and medial sides of the thigh, gluteal region, back of the thigh and popliteal fossa, leg, sole of foot, bones and joints. Surface Anatomy, Applied and Radiological Anatomy of Upper and Lower Limbs.

ANA 202: Histology of Basic Tissues **(2 Unit: LH 15; PH 45)**
Components of the cell, cell cycle, chromosomes, protein secretion and transcription of DNA. Introduction to light microscopy, electron microscopy and units of measurement. Basic tissues of the body, the epithelial, connective tissues, muscle and nervous tissue. Lymphoid Organs.

ANA 203: General Embryology **(2 Units: LH 30)**
Gametogenesis, cyclic changes in the female genital tract, fertilization, cleavage, blastocyst, gastrulation and formation of germ layers, segmentation of mesoderm, folding of embryo foetal membranes, umbilical cord and placentation. Development of limbs and teratology. Developmental anomalies and clinical syndromes.

ANA 204: Gross Anatomy of Thorax, Abdomen, Pelvis & Perineum
(4 Units: LH 30; PH 90)
Thorax: Thoracic wall, pleura, lungs, heart and coronary vessels mediastinum and diaphragm.
Abdomen: Anterior abdominal wall and hernia, external genitalia, peritoneum, stomach and intestines, blood supply. Gut, Liver, Pancreas, Spleen, Kidneys and Suprarenal glands.
Pelvis and Perineum: Male and female perineum, pelvic wall and floor, pelvic peritoneum, viscera, nerves and vessels. Surface Anatomy, Radiological Anatomy.

ANA 205: Systemic Histology **(2 Units: LH 15; PH 45)**

Cardiovascular system, skin, gland of the skin, Structure of the nails and hair. Respiratory system. Digestive system. Urinary and genital systems. Electron micrograph studies of each organ.

ANA 206: Systemic Embryology (Organogenesis) **(2 Units: LH 15; PH 45)**

Development of Cardiovascular system, Integumentary system, Respiratory system, Digestive system, Urogenital system. Developmental anomalies and clinical syndromes.

ANA 211: Systemic and Functional Anatomy **(2 Units: LH 15; PH 45)**

Cell and its functions. An introduction to basic anatomy and physiology of the various systems. Nerves and muscles as agents of communication in the body. Kidney as osmo-regulator of the body. Blood and immunity, protective mechanisms of the body. Circulatory, respiratory, endocrine and digestive systems of the body. Special sense organs. Body homeostasis. Physiology of growth, pregnancy and lactation.

ANA 212: Regional Anatomy **(2 Units: LH 15; PH45)**

The course examines the human body, its general organization, structure and relations. Basic anatomical terminologies. Organization of the human body. The cell as a fundamental unit of structure and its functions, Cell membranes. Tissues, organs and glands. Mitosis and meiosis. Embryology and Histology. Gross anatomy of the upper limb, lower limb, Abdomen, Pelvis and Perineum, and its relations, Head and Neck, Neuroanatomy.

ANA 299: Industrial Training (SIWES) **(3 Units: PH 135)**

Students will be posted to recognised and relevant placement areas of their choice during the industrial training. The twelve weeks will be spent in laboratories offering exposure to skills relevant to human cell and structural biology. Continuous assessment of students will be undertaken jointly by their industrial-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training. Grades are allotted according to ITF directives.

300 Level

Preamble

Courses to be taught at this level should include lectures on Neuroembryology, Neuroanatomy, Neurohistology, Histochemistry, Human genetics, light microscopic techniques, Biostatistics and Entrepreneurship.

ANA 311: Gross Anatomy of Head & Neck and Neuroanatomy

(4 Units: LH 30; PH 90)

Head and Neck: Face and Scalp, Back and Spinal Cord, Cranial Cavity, Orbit, Parotid, Temporal and infratemporal regions, triangles of neck, submandibular region, nerves and vessels in deep dissection of neck, thyroid and parathyroid, pre-vertebral region and joints of neck, mouth and tongue, pharynx, palato-nasal cavity and sinuses, larynx, ear and eye.

Neuroanatomy: Introduction to neuroanatomy, meninges, base of brain and blood supply, hindbrain, medulla, pons, cerebellum and 4th ventricle, midbrain, diencephalon and third ventricle, cerebral hemispheres, sulci and gyri, internal structure of cerebrum and lateral ventricles, basal nuclei, thalamus and hypothalamus, synapses and reflex arcs. Sensory and ascending pathways, motor and descending pathways, cerebellar connections, pathways for hearing, balance, smell and vision. Limbic system. Autonomic nervous system. Radiological and applied anatomy of the Head and Neck, Brain and Spinal Cord.

ANA 312: Radiological Anatomy and Techniques (2 Units: LH 15; PH 45)
Basic principles of Radiological imaging of human tissue. Radiological identification of major body structures. Introduction to modern imaging techniques. Precautionary measures.

ANA 321: Neurohistology and Special Senses (2 Units: LH 15; PH 45)
Neurohistology: Spinal Cord, Brain stem, cerebrum and cerebellum. Organs of Special Sense: Sensory receptors, eyes, ear and nose. Histology of Endocrine organs.

ANA 322: Histochemistry (2 Units: LH 15; PH 45)
Principles and techniques of Histochemistry including Immunocytochemistry.

ANA 331: Embryology of the Nervous System & Pharyngeal Apparatus (1 Unit: LH 15)
Development of the face, pharyngeal derivatives and teratology. Development of nervous system and sense organs. Developmental anomalies and clinical syndromes.

ANA 341: Human Genetics (2 Units: LH:30)
Fundamental human genetic principles, variation in gene expression in man, patterns of inheritances in families (autosomal dominant, autosomal recessive, X-linked dominant, X-linked recessive, Y-linked and sex influenced). Cytogenetics, types and classification of human chromosomes, methods of preparation of human chromosomes and Karyotyping. Types of numerical and structural chromosome aberrations and their causes. Gene Hybridization, Human Genomic Studies.

ANA 342: Cell and Molecular Biology (2 Units: LH 30)
Cell structure. Basic concepts and methods in molecular biology. Application of molecular biology to medical diagnosis and sex-typing.

ANA 351: Laboratory Techniques for Light Microscopy (3 Units: LH 15; PH 90)
The practical step by step method of tissue processing for light microscope study shall be taught and demonstrated. The principles and techniques for the use of advance light microscopes will be taught and where possible demonstrated i.e. Polarizing Microscope, Phase Contrast Microscope, Interference Microscope, Dark-Field Microscope, and Ultraviolet Microscope.

ANA 352: Research Methods and Research Ethics (2 Units: LH 30)
Definitions: Types of research. Preparatory stages: Literature search, Protocol development, Sampling. Methods for acquisition of data. Basics of data processing. Report/Manuscript presentation. Human and animal ethical issues.

ANA 399: Students' Industrial Work Experience (SIWES) II (3 Units: PH 135)
Students will be posted to recognized and relevant placement areas of their choice during the industrial training. The twelve weeks will be spent in laboratories offering exposure to skills relevant to human cell and structural biology. Continuous assessment of students will be undertaken jointly by their industrial-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training. Grades are allotted according to ITF directives

VAN 312: Animal Handling & Comparative Mammalian An atomy
(3 Units: LH 15; PH 90)
Animal House set-up and maintenance. Handling of experimental animals. Comparative gross anatomy of different categories of experimental animals with human structure. This shall be done mainly by Dissection/Demonstration.

400 Level

Preamble
Courses to be taught at this level should include Surface and Living Anatomy, Anatomical and Museum Techniques, Electron Microscopy, Skeletal Biology and Anthropology, Biometry and Human Growth. Students are to do a Research Project.

ANA 411: Surface and Living Anatomy (1 Unit: LH 15)
Practical cum demonstration exercises to map out surface representations of major internal organs of the body. Recognition and demonstration of major visible anatomical features of the living human subject.

ANA 412: Electron Microscopic Technique and Ultrastructure (4 Units: LH 30; PH 90)
Tissue sample acquisition techniques, tissue processing and examination, photographic recording of ultrastructural images shall be taught. Where possible, the practical aspects shall be demonstrated.

ANA 421: Anatomical and Museum Techniques (4 Units: LH 30; PH 90)
Techniques for the preservation of gross anatomical tissues for teaching and research. These will include embalming and cadaver preservation. Wet and Dry specimen preparation techniques for the museum set up and maintenance.

ANA 422: Seminar (2 Units: LH 30)
Topics in areas related to Gross Anatomy, Embryology, Histology and Histochemistry, Molecular Biology, Skeletal Biology and Anthropology, Human growth etc. shall be developed and presented orally at a group seminar.

ANA 431: Introduction to Electron Microscopy **(2 Units: LH 30)**
History of the electron microscope. Types of electron microscope. Basic principles of the structure and functions of the electron microscope.

ANA 432: Laboratory Work Experience **(3 Units: PH 135)**
Students shall be attached to relevant diagnostic laboratories and photographic laboratories to provide opportunity for acquisition of practical on-the-job experience in line with the objectives of entrepreneurial studies.

ANA 441: Skeletal Biology and Anthropology **(2 Units: LH 30)**
Lecture cum practical study of major features of bones of the human skeleton. Measurement of bone parameters and their application to human identification. The practical is integrated in the lectures for better understanding of Anthropometry.

ANA 450: Biometry and Human Growth **(2 Units: LH 30)**
Definitions: Biometry, Growth. Human growth assessment parameters. Factors influencing growth. Growth assessment standards.

ANA 499: Final Year Project **(8 Units: PH 360)**
Students will undertake research project on simple problems in areas of their interest and guided by their supervisors. In addition to experimental work, the students will be required to learn how to search and compile the literature review, collect, arrange and present bibliography.

ARC 412: Introduction to Archaeology **(3 Units: LH 45)**
Definition: History and exploits of Archaeology. World Archaeological sites. The contribution of Archaeology to the understanding of human existence and cultures.

PHY 482: Health Physics and Reactors **(3 Units: LH 45)**
Separation of Isotopes. Cross section of interaction of neutrons, fast and thermal diffusion length. Types of reactors and their start-up and operation. Effects of radiation on living cells, somatic and genetic damage. Uses of radiation. Acute whole body dose syndromes.

3.4 HUMAN NUTRITION AND DIETETICS

(B.Sc., Human Nutrition and Dietetics)

3.4.1 Philosophy, Aims and Objectives

Philosophy

Human Nutrition as a science deals with the foods which the human organism requires, how he utilizes them and how he deals with the waste products due to its activities. Dietetics, on the other hand, is the application of scientific principles of nutrition to the human subject in health and disease conditions. The student of Nutrition and Dietetics is thus engaged in broad multidisciplinary study bridging the gap between the areas of food science, applied medical sciences and management studies.

3.4.2 Aims and Objectives

1) Understand the interrelationships between agriculture, food and nutrition as well as how they relate to health.
2) Assess the main nutritional problems in a community, appreciate the causes and severity of malnutrition and design interventions for their solution.
3) Plan and formulate adequate diets in health and diseases for all the groups and population types.
4) Appreciate the effects of handling methods on the nutritive value of foods and apply these techniques appropriately to improve the quality of local food resources in order to meet the nutritional needs of individuals, community and population groups.
5) Plan, implement, monitor and evaluate nutrition programmes.
6) Have a global view of the problems of malnutrition and agencies involved in solving the problems, especially in Africa.

3.4.3 Admission and Graduation Requirements:

The admission requirements as are stated in section 1.3. The modes of entry are UTME, direct entry and inter-university transfer. To be admitted into the B.Sc. Human Nutrition and Dietetics programme the candidate must meet the stipulated entry requirements.

To graduate, a student shall have undergone 3 or 4 years of study depending on his/her entry point, including 6 months industrial training. Course workload must meet the graduation requirements of the University.

3.4.4 Learning Outcome

a) **Regime of Subject Knowledge**

b) **Competencies and Skills**

Graduates of this programme are expected to:

i) have competence in conceptual, management and entrepreneurial skills;
ii) acquire practical and analytical competence to enable them manage sustainable Nutrition programmes;

iii) be equipped with data processing skills and have ability to interpret data to provide solutions to Nutrition problems;
iv) be able to function in advisory capacity to government and private agencies in areas related to Nutrition.
v) be able to plan, implement, monitor and evaluate appropriate nutrition intervention programmes for benefits of population groups.
vi) be able to acquire leadership qualities that will enable them take on leadership roles in public and private establishments related to Nutrition.
vii) have competences in communication skills and be able to clearly present research/field reports with convincing arguments either in writing or orally;
viii) be equipped with information technology skills required for global communication;
ix) have skills in participatory approach to conservation and utilization of renewable natural resource with a view to enhancing rural development; and
x) be able to execute development programmes in both government and private sectors and create self-employment.

c) **Behavioural Attributes**

The graduate of the programme should appreciate the dignity in labour through competence in conception, planning, execution, monitoring and evaluation of various nutrition programmes and enterprises.

Graduate should be able to adapt to the socio economic and cultural situations of rural setting and integrate with rural community dwellers.

Graduate should also maintain the ethical standards of the profession.

3.4.5 **Attainment Levels**

Graduates should be able to function effectively as Nutritionists/Dieticians. Moreover, they should be able to address familiar as well as unfamiliar problems efficiently and accurately such as to benefit the community who will learn from them.

3.4.6 **Evaluation**

Methods for Course Evaluation

All courses taught during each semester shall be examined at the end of each semester. Continuous Assessments shall constitute 30%-40% of marks of all courses, while examination at the end of the semester in which the course is taken will constitute 60%-70% of the marks.

Examination Regulations:

Pass mark for courses prescribed by the Department of Human Nutrition and Dietetics shall be 50%.

3.4.7 **Resources Requirement for Teaching and Learning**

a) **Academic and Non-Academic Staff**
The requirements for academic and non-academic staff are as stated in section 1.6.1

b) **Academic and Non-Academic Spaces**
These are as stated in section 1.6.2

c) **Academic and Administrative Equipment**
In addition to equipment and laboratories listed in 1.6.2 (b), the following additional laboratories are needed for Nutrition and Dietetics:

Human Metabolic Laboratory for human metabolic studies
Animal House – for animal experiments
Anthropometric Laboratory

d) **Library and Information Resources**
There should be fully computerized library stocked with current books, journals and periodicals and audio-visuals, photocopiers, microfilms CD ROMS etc.

3.4.8 **Course Structure and Synopses of the Human Nutrition and Dietetics Degree Programme.**

Preamble
Courses shall be provided leading to the degree of Bachelor of Science, Human Nutrition and Dietetics which may be awarded to students who have successfully fulfilled all academic requirements. The training shall be a combination of teacher-directed, tutor-guided, self-learning and problem-based methods.

A: Course Structure

Course Structure for 100 Level Human Nutrition and Dietetics Programme

Course Code	**Course Title**	**Units**	**Status**	**LH**	**PH**
BIO 101	General Biology I	3	R	45	-
BIO 102	General Biology II	3	R	45	-
BIO 107	General Biology Practical I	1	R	-	45
BIO 108	General Biology Practical II	1	R	-	45
CHM 101	General Chemistry I	3	C	45	-
CHM 102	General Chemistry II	3	C	45	-
CHM 107	General Chemistry Practical I	1	C	-	45
CHM 108	General Chemistry Practical II	1	C	-	45
CSC 101	Introduction to Computer Science	3	C	30	45
GST 111	Communication in English	2	C	30	-

GST 112	Logic, Philosophy and Human Existence	2	E	30	-
GST 113	Nigerian Peoples and Culture	2	R	30	-
GST 121	Use Library, Study Skills & ICT	2	C	30	-
GST 122	Communication in English II	2	C	30	-
GST 123	Communication in French	2	E	30	-
GST 125	Contemporary Health Issues	2	R	30	-
MTH 101	Elementary Mathematics I	3	R	45	-
NUT 101	Introduction to Home Science & Nutrition	2	C	30	-
PHY 101	General Physics I	3	R	45	-
PHY 102	General Physics II	3	R	45	-
PHY 107	General Physics Practical I	1	R	-	45
PHY 108	General Physics Practical II	1	R	-	45
	Total	**46**			

Course Structure for 200 Level Human Nutrition and Dietetics Programme

Course Code	Course Title	Units	Status	LH	PH
ANA 211	Systemic and Functional Anatomy	2	C	15	45
ANA 212	Regional Anatomy	2	C	15	45
BCH 201	General Biochemistry I	3	R	45	-
BCH 202	General Biochemistry II	3	C	45	-
GST 211	Environment and Sustainable Development	2	R	30	-
GST 222	Peace and Conflict Resolution	2	R	30	-
GST 223	Introduction to Entrepreneurship	2	R	30	-
GST 224	Leadership Skills	2	R	30	-
MIC 221	Introductory Microbiology	3	R	45	-
NUT 203	Agricultural Food Products	2	R	30	-
NUT 204	Introduction to Clinical Nutrition	2	C	30	-
NUT 205	Food Biochemistry	2	C	30	-
NUT 299	Students' Industrial Work Experience	3	C	-	135
PSY 202	Introduction to Psychology	2	R	30	-
PHE 201	Biostatistics	2	C	30	-
MCB 309	Food Microbiology	2	C	15	45
	Total	**34**			

Course Structure for 300 Level Human Nutrition and Dietetics Programme

Course Code	Course Title	Units	Status	LH	PH
GST 311	Entrepreneurship	2	R	30	-
NUT 302	General and Applied Nutrition	2	C	30	-
NUT 304	Food Analysis & Sensory Evaluation	2	C	15	45
NUT 305	Quantity Food Production & Service	2	C	30	-
NUT 306	Institutional Food Service Management	2	C	30	-
NUT 307	Diet Therapy & Hospital Practice I	3	C	15	90
NUT 308	Practice of Nutrition	2	C	30	-
NUT 309	Research Methods in Nutrition	2	C	30	-
NUT 310	Nutrition Education	2	C	30	-
NUT 311	Consumer Education	2	C	30	-
NUT 399	Students' Industrial Work Experience	3	C	-	135
	Total	**24**			

Course Structure for 400 Level Human Nutrition and Dietetics Programme

Course Code	Course Title	Units	Status	LH	PH
NUT 401	Advances in Human Nutrition	2	R	30	-
NUT 402	Recipe Development and Testing	2	C	30	-
NUT 403	Advanced Food Preparation	2	C	30	-
NUT 404	Community Nutrition	3	C	45	-
NUT 405	International Nutrition	2	R	30	-
NUT 406	Clinical Nutrition Practice	3	C	-	135
NUT 407	Diet Therapy and Hospital Practice II	3	C	30	45
NUT 408	Seminar in Human Nutrition and Dietetics	2	C	30	-
NUT 409	Nutrition Planning and Policy	2	R	30	-
NUT 410	Public Health Nutrition	2	R	30	-
NUT 411	Project	6	C	-	270
	Total	**29**			

B: Course Synopses

NUT 101 Introduction to Home Science and Nutrition (2 Units: LH 30)
Definition and goals of studying Home Science and Nutrition; Historical development, philosophy and objectives of Home Science and Nutrition; Career opportunities in Home Science, Nutrition and Dietetics, including the necessary academic preparations and personal qualities required. Basic human needs and the role of Home Science, Nutrition and Dietetics

in meeting these needs; Nature of families and their needs, goals and ideals; Major concept in Nutrition. Nutrients, their functions and sources; malnutrition; adequate diets; nutrient needs/requirements; Relationship between nutrition and health, including HIV/AIDS; Home Science Nutrition and Dietetics in National Development.

200 Level

Preamble
Courses to be taught at this level should include General Agriculture, Biochemistry, Anatomy, Physiology, Microbiology, Statistics, Clinical Nutrition, Food Preparation and Management among others.

MIC 221: Introduction to Microbiology **(3 Units: LH 45)**
Introduction to micro-organisms- viruses, bacteria and fungi. Their structures, reproductive processes and role in industry and agriculture.

NUT 203: Agricultural Food Products **(2 Units: LH 30)**
Different types of foods and agricultural products, their structures and composition. Vegetables, fruits, cereals, palm-wine, roots, and tubers; sugar cane, oil palm, meat, milk, cheese, butter, sausage, ham, fish, orange, mango and other juices. The processing and storage of these food products. Post harvest physiology of food items. Development and marketing of raw food products, techniques and problems of developing, fabricating and merchandising. Ingredient regulations; taste panels, market testing, market research, and patents; making of human food from local foodstuff.

NUT 204: Introduction to Clinical Nutrition **(2 Units: LH 30)**
Malnutrition as a health problem. Classification of nutritional diseases. Discussion of over-nutrition, diseases due to biological and chemical toxicants in foods. Diet and dental diseases. Diet and cancer. Nutritional basis of diseases- renal, liver, gastrointestinal, Diabetes, hypertension etc. Nutritional application to management of diseases. Nutritional problems of public health importance. Causes of Nutritional problems. Prevention of nutritional problems. Inborn errors of metabolism, metabolic diseases and allergies. Nutrition in childhood, adolescence, adulthood, aged, pregnancy and lactation. Nutrition and immunity. Parental nutrition. Review of infant feeding practices in Nigeria and other countries.

NUT 205: Food Biochemistry **(2 Units: LH 30)**
Protein systems in foods; sugars in food technology; peptic substances; plant gums and their uses in foods; non-enzymatic browning; role of lipids in food; lipid oxidation and lipid auto-oxidation in food systems; carotenoids in food systems; terpenes, essential oils and chemistry of food orders; phenolic compounds; respiration; chlorophyll and photosynthesis; biochemical activity of micro-organisms in foods.

NUT 299: Industrial Training SIWES **(3 Units: PH 135)**
Students will be posted to recognized and relevant placement areas of their choice during

the industrial training. The twelve weeks will be spent in standard food service institutions. Continuous assessment of students will be undertaken jointly by their industrial-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training. Grades are allotted according to ITF directives.

MCB 309: Food Microbiology **(2 Units: LH 15; PH 45)**

Pre-requisite:MCB 221/231.

The distribution, role and significance of micro-organisms in food; intrinsic and extrinsic parameters of foods that affect microbial growth, food spoilage and food borne diseases. Micro-organism. Indices of food sanitary growth and food microbiology standards. Disease of animal transmittable to man via food products.

300 Level

Preamble

Courses to be taught at this level should include Diet Therapy & Hospital Practice, Practice of Nutrition, Research Methods in Nutrition, Quantity Food Production & Service, Food Analysis & Sensory Evaluation, Food Chemistry and Toxicology, General and Applied Nutrition. Students at this level are also to undergo the SIWES.

NUT 302: General and Applied Nutrition **(2 Units: LH 30)**

Basic nutrition principles with special emphasis on nutrients; digestion and absorption and their problems. Control of appetite. Nutritive value of tropical foods and Nigeria diets; effect on season and cultural habits. Selection and formulation of balanced diets. Foetus as a parasite. Non-conventional foods. Food enrichment and supplementation in general.

NUT 304: Food Analysis & Sensory Evaluation **(2 Units: LH 15; PH 45)**

Introduction to physical and chemical methods for determining the constituents of food and diets. Data presentation and nutritional interpretation of such data will receive emphasis. Food quality and safety. Development of biological assay; chromatography; introduction to basic analytical equipments

NUT 305: Quantity Food Production & Service **(2 Units: LH 30)**

Dependence on adequate nutritional status on food production and availability. Focus on constraints to food production. Solutions to food shortage problems. Issues of biotechnology and nutrition security.

NUT 306: Institutional Food Service Management **(2 Units: LH 30)**

Organizational structures in food service institutions and hospitals. Effective staffing, staff recruitment, discipline and management. Staff welfare and work-output. Sanitation and safety. Planning institutional catering for all age groups. Menu planning, budgeting, book-keeping. Nutritional consideration of institutional meals.

NUT 307: Diet Therapy and Hospital Practical I (3 Units: LH 15; PH 90)
Introduction to dietary management in disease states, consideration for factors in patients care plan, coordinated nutritional services for patients, therapeutic adaptation of the normal diet and problems of planning therapeutic diets using local foods. Principles or nutritional modification for the underweight, protein energy malnutrition, nutritional care plan and dietary treatment, nutrient need in surgery – postoperative nutritional care following gastrointestinal tract surgery; study of the diet for the vulnerable group, diarrhoea in infants; oral rehydration.

NUT 308 Practice of Nutrition (2 Units: LH 30)
Execution of nutrition surveys of individual and groups in institution, in urban and rural setting. Methods used in nutrition surveys: anthropometry, food balance sheets, morbidity and mortality vital statistics, clinical signs, growth monitoring, growth chart methods construction and use of questionnaires, various parameters used in food consumption surveys. Food composition tables. Coverage of survey results. Calorimetry, measurement of energy expenditure in man. Planning of diets for individuals and groups. Preparation of visual aids and testing of nutrition education materials. Visit to hospital, clinics and nutrition programmes.

NUT 309: Research Methods in Nutrition (2 Units: LH 30)
The thrust of this course is theory and statistical principles of research techniques in human nutrition. Planning of research and investigation methods. Data collection organization and presentation of investigation methods. Data collection organization and presentation of data in acceptable form. Techniques used in Nutrition research involving laboratory animals and man, PER, NPU, BV, NDPE etc. Use of experimental diets and analytical techniques. Interpretation of results, co-relationships, levels of significance, regression analysis, standard error and deviations, sample distribution, use of percentiles and percentages in growth standard.

NUT 310: Nutrition Education (2 Units: LH 30)
Formal and non-formal aspects of nutrition education. Nutrition education by whom to whom, and for what. Methods of nutrition education, improving socio-cultural aspects of foods, including food habits, food taboos, and food choice. Activity oriented programmes adopted in fostering nutrition education and nutritional status of people. Content of nutrition in the dissemination of nutrition education at household, village and institutional levels. Factors influencing teaching and learning. Uses and problems visual aids in nutrition education by various groups. Behaviour and attitude of nutrition education.

NUT 311: Consumer Education (2 Units: LH 30)
Definition and principles of Consumer Education; and analysis of economic forces affecting individuals and families as consumers of goods and services; creating awareness of the rights and responsibilities of consumers in the market place; developing aids and techniques for making intelligent choices of foods and services; political, social, economic and legal implication of consumer decisions and actions.

NUT 399: Students' Industrial Work Experience (3 Units: PH 135)

Students will be posted to recognized and relevant placement areas of their choice during the industrial training. The 3months will be spent in hospitals or nutrition rehabilitation centres. Continuous assessment of students will be undertaken jointly by their industrial-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training. Grades are allotted according to ITF directives.

400 Level

Preamble

Courses to be taught at this level should include Diet Therapy and Hospital Practice, Recipe Development and Testing, Advanced Food Preparation, Consumer Education, Community Nutrition among others. In addition, the students are to carry out a research project to qualify for the award of a degree.

NUT 401: Advances in Human Nutrition (2 Units: LH 30)

Priority areas of research in human nutrition in developing and developed areas of the world. Biochemistry and physiology of malnutrition including starvation. Energy balance in man. Human body compartments. Physiology of pregnancy and lactation. Nutrition, learning and mental development.

NUT 402: Recipe Development and Testing (2 Units: LH 30)

Fundamental principles of food quality evaluation and development of standards, taste, flavour, shape, size, texture, colour and appearance; principles of recipe formulation and presentation. Acceptability trials, selection of participants, analysis of results; emphasis on development and testing of more economical and nutritious foods from familiar and commonly used and acceptable ingredients or new breeds (variety) of food stuffs.

NUT 403: Advanced Food Preparation (2 Units: LH 30)

The application of principles of nutrition and management to planning and preparation of meals for special groups, and occasions; developmental research and controlled experiments with food; developing food demonstration techniques; quality characteristics of some important traditional Nigerian food ingredients; strategies for improving nutrient value and utilization of the traditional and non-traditional meals.

NUT 404: Community Nutrition (3 Units:LH:45)

Assessment of nutritional status of individuals and groups in a community using established anthropometric standards, clinical signs, vital statistics, food consumption and laboratory methods. Use of growth and development chart, economic aspects of nutrition, food budgets, food habits, surveys in rural and urban communities. Assessment of ecological factors. Applied nutrition programmes. Supplementary and group feeding; school lunch programmes. Nutrition procedure in times of disaster including famine relief operations

nutrition rehabilitation centres. Population and food supply. Nutrition and national harmony.

NUT 405: International Nutrition (2 Units) (LH:30)
Internal food security concepts and implementation. Global harmony through nutrition. World food and nutrition policy formulations. Global environmental protection and nutrition. Nutrition programmes during international wars, famine, droughts etc. political dimensions of malnutrition and internal economy of foods. Conceptual approach to the global solutions of nutrition policy. Role of international relief agencies. Relationship of various United National Agency in averting world hunger

NUT 406: Clinical Nutrition Practice (3 Units: PH 135)
Visit to hospital; Participation in ward rounds; observation of food service in the hospitals visited, including translation of patients' nutrient requirements into foods portions for various therapeutic diets; Observation and practice of dietary counselling; Presentation of group talk on a nutrition-related topic in any of the out-patient clinics; and case study of a diet-related disease by students; Submission of a written report

NUT 407: Diet Therapy and Hospital Practice II (3 Units: LH 15; PH 90)
Advanced study in diet disease states. Application of the basic nutritional principles and diet therapy in the treatment of diseases of specific organs, endocrine, pancreas; various metabolic diseases, liver disease, gall-bladder disease, kidney disease, arteriosclerosis, hyperlipidemia, disease of the nervous system, study of allergy, food allergies, allergic reactions and dietary management; diet in skin diseases, study of inborn errors or metabolism and their nutritional care, interaction between drugs, nutrients and nutritional status. Dietary counselling.

NUT 408: Seminar in Nutrition and Dietetics (2 Units: LH 30)
Each final year students is expected to present an oral report and based on library research problems and developments of current interest in the field of Nutrition and Dietetics.

NUT 409: Nutrition Planning and Policy (2 Units: LH 30)
Applied nutrition programme planning and implementation. Role of Agriculture in nutrition programme implementation. Monitoring and evaluation of nutrition programme implementation. Monitoring and evaluation of nutrition programmes at household, village and at national level. Food laws and regulations. Nutrition labelling. Applications of codex alimentarius commission.

NUT 410: Public Health Nutrition (2 Units: LH 30)
Nutritional problems of Nigeria public importance to Nigeria. Socio-economic effect of nutritional problems within low income people. Effect of malnutrition on physical and mental development. Steps to improve health and nutritional status of people. Food sanitation and safety. Environment and nutrition. Development of primary health care and nutrition in Nigeria. Improving social and economic services at all levels with special interest on the vulnerable groups.

NUT 411: Project **(6 Units: PH 270)**

The student is expected to study critically under controlled supervision by an academic staff, a special problem in the area of nutrition and dietetics, present a dissertation and finally defend his/her findings before a panel of examiners.

3.5 MEDICAL LABORATORY SCIENCES (BMLS)

3.5.1 Philosophy, Aims and Objectives of the Degree Programme

Philosophy

The broad philosophy of training in medical laboratory sciences are to:

a) provide sound academic and professional background for the production of Medical Laboratory Scientists who would be capable of working anywhere in Nigeria.
b) produce Medical Laboratory Scientists who would satisfy internationally recognisable standards and who could undertake further training towards specialisation.
c) produce Medical Laboratory Scientists with sufficient management ability to play a leadership role and entrepreneurship in employing others, establishing self, and also in training and general practice of laboratory sciences.

Aims and Objectives

The main aims of the bachelor honours degree programme in Medical laboratory sciences are to:

i) instil in students a sense of enthusiasm for the profession; an appreciation of its application in different contexts (in areas such as general medicine, food and beverages, pharmaceutical industries, utility departments e.g. water corporations; research institutions, etc).
ii) involve the students in an intellectually stimulating and satisfying experience of learning, studying and research.
iii) provide students with a broad and balanced foundation of medical laboratory knowledge and practical skills; performing effectively in clinical diagnostic services, academics and quality assurance; and function independently or in collaboration with other members of the health team in the care of individuals and groups at all levels of health care.
iv) develop in students, the ability to apply their medical laboratory knowledge and skills to the solution of theoretical and practical problems in laboratory medicine.
v) develop in students through an education in medical laboratory sciences, a range of transferable skills of value in medical and non-medical employment.
vi) provide students with a knowledge and skills base from which they can proceed to further studies in specialised areas involving medical sciences.
vii) To generate in students, an appreciation of the importance of medical laboratory sciences in an industrial, economic, environmental, health and social context.
viii) generate students with the ability to produce biological and diagnostic reagents as well as being able to fabricate and maintain laboratory equipment.
ix) empower graduates of Medical Laboratory Sciences with skills that will enable them engage in income yielding ventures.

3.5.2 Admission and Graduation Requirements

The admission and graduation requirements as are stated in section 1.3. The modes of entry are UTME, direct entry and interuniversity transfer. To be admitted into the B.MLS programme the candidate must meet these entry requirements.

The general requirements for graduation are shown in section 1.4. The B.MLS degree programme shall run for 5 years for Joint Matriculation Examination entry candidates and 4 years for direct entry candidates. The pass mark for core courses is 50%. The degree is a non-classified degree.

3.5.3 **Learning Outcomes:**

a) **Regime of Subject Knowledge**

b) **Competencies and Skills**

At bachelors honours level, graduates are expected to have acquired a wide range of abilities and skills; including:

i) Medical laboratory sciences related cognitive abilities and skills relating to intellectual tasks, including problem solving.

ii) Medical laboratory related practical skills i.e. relating to the conduct of laboratory research/work.

iii) Transferable skills that may be developed in the context of laboratory medicine and are of a general nature and applicable in many other contexts.

The main abilities and skills are as follows:

i) Laboratory medicine-related cognitive abilities and skills.

- Ability to demonstrate knowledge and understanding of essential facts, concepts, principles and theories relating to the subject areas identified above.
- Ability to apply such knowledge and understanding to the solution of qualitative and quantitative problems in medical laboratory sciences – both of a familiar and unfamiliar nature.
- Ability to recognise and analyse novel problems and plan strategies for their solution.
- Skills in the evaluation development, interpretation and analysis of laboratory results, researches and data, by having an advanced grip and knowledge of information technology.
- Ability to implement good laboratory practice standards.
- Skills in presenting scientific materials and arguments clearly and correctly in writing and orally to different audiences.
- Computation and data processing skills relating to laboratory information and data.
- Ability to evaluate his or her own desires and prospects for a career as an entrepreneur and select his/her own business.

ii) Medical Laboratory Practice Skills

- Skills in safe handling of laboratory materials, taking into account specific and potential hazards
- Skills required for the conduct of standard laboratory procedures involved in analytical and diagnostic work.

- Competence in planning, design and execution of practical investigation from the problem recognition stage through to the evaluation and appraisal of results and findings - i.e. also including the ability to select appropriate techniques and procedures.
- Skills to operate standard laboratory instrumentation such as that used for laboratory investigations.
- Ability to interpret data derived from laboratory investigations in terms of their significance.
- Ability to conduct risk assessments concerning some laboratory reagents and procedures.

iii) **Transferable Skills**

- Communication skills (both written and oral).
- Problem – solving skills, numeracy and computational skills – including qualitative and quantitative information extending to conditions where evaluations have to be made on the basis of limited information, including error analysis, correct use of units and modes of data presentation.
- Information retrieval skill e.g. on-line computer searches, also other information sources; other information technology skills – word processing; data logging and storage, internet communication.
- Interpersonal skills, fine management and organizational skills – relating to the ability to interact with others and to engage in team-working, ability to plan and implement efficient and effective modes of working.
- Study skills needed for continuing professional development (CPD).

c) **Behavioural Attitudes**

Graduate of this programme would have been well equipped with sound professional ethics for the profession of Medical Laboratory Sciences – including good reputation and fulfilment of professional role with integrity; refraining from its misuse to the detriment of patients particularly in respect to health and safety as well as information confidentiality and general responsibility; discipline and the use of reason, personal relationships – inter and intra professional; Act of good faith, value judgment, skill and care, with well-being of patients. Conscientious in all his undertakings.

3.5.4 **Attainment Levels**

It is essential that the procedure used for students' assessment should correspond to the knowledge, abilities and skills that are to be developed through their degree programme. These should be based on the following:

a) Formal examinations
b) Laboratory reports/records
c) Problem-solving exercises
d) Oral presentations
e) Planning, conduct and reporting of project work and researches.

Additional means of assessments may include:

a) Essay assignments
b) Laboratory exercises undertaken
c) Literature surveys and evaluations – presented as class seminars/tutorials
d) Collaborative project work
e) Preparation and illustrations on project work reports/displays.
f) Reports on external/field trips/laboratory postings

The range of performance will range through the following:

a) (Highest): When knowledge base is extensive, conceptual understanding of subject is outstanding, problems both of familiar and unfamiliar nature solved with efficiency and accuracy, experimental skills are outstanding, showing a thorough analysis and appraisal of results of experiment with appropriate suggestions for improvements. Performance in transferable skills – generally very good.

b) Conceptual understanding and coverage of knowledge base is good. Solutions of problems both of familiar and unfamiliar nature are generally correct or acceptable. Experimental work carried out in a reliable and efficient manner. Performance in transferable skills is sound and shows no significant deficiencies. Knowledge base covers all essentials with some evidence of enquiry beyond this.

c) Knowledge base is sound but largely confined to the content of the programme; level of conceptual understanding is generally sound. Problem solving ability is sound in relation to problems of a familiar type and those that can be tackled through the straightforward application of standard procedures. Experimental work is generally satisfactory and reliable. Performance in transferable skills is largely sound.

d) With basic knowledge and understanding of the content covered in the course, problems of a routine nature are generally adequately solved. Standard laboratory experiments are usually carried out with reasonable success, though significance and limitations of experimental data and/or observations may not be fully recognised. Transferable skills are at a basic level.

e) (Lowest): Knowledge base is acceptable in relation to some of the content covered in the programme. Problem-solving ability extends to simple standard problems, following routine procedures. Experimental skills are rudimentary as well as transferable skills.

Generally, students who are awarded a bachelors honours degree in Medical Laboratory Sciences are expected to demonstrate knowledge, abilities and skills corresponding on balance to at least attainment level (d) above, with a pass mark of 50% in courses taken.

Indicators of different levels of attainments in these performances include the award of Distinction pass for GPAs of 4.5 and above.

3.5.5 Resource Requirements for Teaching and Learning in the Programme

The minimum resource requirements for this programme to enable effective teaching and learning are as detailed in section 1.6.

3.5.6 Course Structure and Synopses of the Medical Laboratory Sciences Programme

Preamble

Courses shall be provided leading to the degree of Bachelor of Medical Laboratory Sciences which may be awarded to students who have successfully fulfilled all academic requirements. The training shall be a combination of teacher-directed, tutor-guided, self-learning and problem-based methods.

A: Course Structure

100 Level

Course Structure for 100 Level Medical Laboratory Sciences Programme

Course Code	Course Title	Units	Status	LH	PH
BIO 101	General Biology I	3	C	45	-
BIO 102	General Biology II	3	C	45	-
BIO 107	General Biology Practical I	1	C	-	45
BIO 108	General Biology Practical II	1	C	-	45
CHM 101	General Chemistry I	3	R	45	-
CHM 102	General Chemistry II	3	R	45	-
CHM 107	General Chemistry Practical I	1	R	-	45
CHM 108	General Chemistry Practical II	1	R	-	45
CSC 101	Introduction to Computer Science	3	C	30	45
GST 111	Communication in English	2	C	30	-
GST 112	Logic, Philosophy and Human Existence	2	E	30	-
GST 113	Nigerian Peoples and Culture	2	R	30	-
GST 121	Use Library, Study Skills & ICT	2	C	30	-
GST 122	Communication in English II	2	C	30	-
GST 123	Communication in French	2	E	30	-
GST 125	Contemporary Health Issues	2	R	30	-
MTH 101	Elementary Mathematics I	3	R	45	-
PHY 101	General Physics I	3	R	45	-
PHY 102	General Physics II	3	R	45	-
PHY 107	General Physics Practical I	1	R	-	45
PHY 108	General Physics Practical II	1	R	-	45
	Total	**44**			

Course Structure for 200 Level Medical Laboratory Sciences Programmes

Course Code	Course Title	Units	Status	LH	PH
ANA 202	Histology of Basic Tissues	2	R	15	45
ANA 211	Systemic and Functional Anatomy	2	R	15	45
ANA 212	Regional Anatomy	2	R	45	45
BCH 201	General Biochemistry I	3	R	45	-
BCH 202	General Biochemistry II	3	R	45	-
BCH 203	General Practical Biochemistry	1	R	-	45
GST 211	Environment and Sustainable Development	2	R	30	-
GST 222	Peace and Conflict Resolution	2	R	30	-
GST 223	Introduction to Entrepreneurship	2	R	30	-
GST 224	Leadership Skills	2	R	30	-
MLS 201	Introduction to Medical Laboratory Science	2	C	15	45
MLS 299	Students' Industrial Work Experience	3	C	-	135
PIO 201	Introduction to Physiology	2	R	30	-
PIO 202	Principle of Cell Physiology	2	R	30	-
PIO 203	General Physiology	3	R	45	-
	Total	**33**			

Course Structure for 300 Level Medical Laboratory Sciences Programme

Course Code	Course Title	Unit	Status	LH	PH
BCH 304	Chemistry and Metabolism of Amino acids and Proteins	2	R	30	-
GST 311	Entrepreneurship	2	R	30	-
MLS 301	Basic Clinical Chemistry	3	R	30	45
MLS 302	Basic Haematology	3	R	30	45
MLS 303	Basic Microbiology	3	R	30	45
MLS 304	Basic Histopathology	3	R	30	45
MLS 305	Basic Immunology	3	R	30	45
MLS 306	Laboratory Posting I	3	C	30	45
MLS 307	Practical Exercise I	4	C	15	13
MLS 308	Fundamentals of blood group	3	R	30	45
MLS 309	Basic Medical Parasitology	3	R	30	45
MLS 399	Students' Industrial Work Experience	3	C	-	13
PHA 301	Basic Pharmacology &Toxicology	3	R	30	45
PIO 301	Endocrine and Reproductive	3	R	30	45
PHE 201	Biostatistics	2	R	30	
Total		**43**			

Course Structure for 400 Level Medical Laboratory Sciences Programme

Course Code	Course Title	Unit	Status	LH	PH
MLS 401	Laboratory Management & Function	3	C	15	90
MLS 403	Medical Laboratory Histopathology I	4	R	30	90
MLS 404	Medical Laboratory Microbiology I	3	R	15	90
MLS 405	Lab Instrumentation & Techniques	4	C	15	135
MLS 406	Research Methodology	2	C	15	45
MLS 407	Medical Entomology	2	R	15	45
MLS 408	Laboratory Posting II	2	C	15	45
MLS 409	Biomedical Engineering	3	R	15	90
MLS 410	Clinical Chemistry I	4	R	30	90
MLS 411	Blood Group Serology	3	R	15	90
MLS 413	Professional Ethics in Med Lab Science	2	C	15	45
Total		**36**			

Course Structure for 500 level Medical Laboratory Sciences Programme

Course Code	Course Title	Unit	Status	LH	PH
MLS 501	General Laboratory Practice	3	C	15	90
MLS 502	Laboratory Posting III	3	C	15	90
MLS 503	Practical Exercises II	3	C	15	90
MLS 504	Research Project	6	C	-	270
MLS 505	Seminar	2	C	-	-
MLS 508	Clinical Chemistry II	3	R	30	45
MLS 509	Clinical Chemistry III	3	R	30	45
MLS 510	Medical Laboratory Haematology II	3	R	30	45
MLS 511	Medical Laboratory Haematology III	3	R	30	45
MLS 512	Medical Laboratory Histopathology II	3	R	30	45
MLS 513	Medical Laboratory Histopathology	3	R	30	45
MLS 514	Medical Laboratory Microbiology II	3	R	30	45
MLS 515	Medical Laboratory Microbiology III	3	R	30	45
Total		**41**			

B: Course Synopses

200 Level

MLS 201: Introduction to Medical Lab. Science (2 Units: LH 15; PH 45)
General introduction to Medical Laboratory subjects, namely: Clinical Chemistry, Haematology, Medical Microbiology, Histopathology and Immunology. Specimen collection, reception and registration, storage and disposal. Specimen bottles. Safety precautions in Pathology laboratories. Microscopy and microtomy, use and care of Microscopes. Sterilization – principle and techniques, Glassware – care and maintenance. Refrigeration – principle, uses and care. Handling of Laboratory animals.

MLS 299: Industrial Training SIWES (3 Units: PH 135)
Students will be posted to recognized and relevant placement areas of their choice during the industrial training. The twelve weeks will be spent in laboratories in hospitals, tertiary education institutions and industry. Continuous assessment of students will be undertaken jointly by their industrial-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training. Grades are allotted according to ITF directives.

300 Level

BCH 304: Chemistry and Metabolism of Amino Acids & Proteins (2 Units: LH 30)
Amino acids as building blocks of proteins; the peptide bond as covalent backbone of proteins. Forces involved in the stabilization of protein structure. Protein isolation, fractionation, purification and characterization. Amino acid analysis of peptides and proteins. Methods for the determination of the sequence of amino acids in proteins. Molecular weight determination of proteins. Techniques in protein biochemistry. Oxidative degradation of amino acids and metabolism of one carbon units. Ammonia toxicity and urea formation. Biosynthesis of amino acids and some derivatives; the urea cycle; metabolism of inorganic nitrogen. Disorders of amino acid metabolism.

MLS 301: Basic Clinical Chemistry (3 Units: LH 30; PH 45)
Traditional and S.I units in Clinical Chemistry; Reference values: Gastric function tests; Agents for Gastric stimulation. Ward procedures and Laboratory Investigation of Gastric Secretions. Intestinal function tests; Digestion and absorption; Causes of Malabsorption. Laboratory investigation of malabsorption. Renal function tests; functions of the kidney; Measurement of Renal plasma flow, Glomerular filtration rate – Creatinine clearance, Insulin clearance, Concentration and Dilution Tests; Urinary Acidification Tests, urine specific gravity/Osmolarity Dye Excretion test. Water and Electrolyte metabolism. Acid base balance; Definition and causes of acidosis and alkalosis; Blood buffers. Transport of blood gases; assessment of acid/base status. Lipids; definition and types of lipids; Formation of free fatty acids, ketone bodies and Lactate; Measurement of plasma lipids and lipoproteins. Plasma proteins and physiologic functions; factors affecting synthesis and

catabolism. Methods for the determining of total protein in serum. Carbohydrate metabolism: Blood glucose homeostasis; hyperglycaemia diabetes mellitus – its causes and investigation; Hypoglycaemia – types causes and investigation.

MLS 302: Basic Haematology **(3 Units: LH 30; PH 45)**

Origin, development and functions of blood cells. Synthesis and breakdown of haemoglobin. Methods of Haemoglobin estimation. Methods of cell counting. Absolute values. Introduction to Homeostasis. Principle and mode of action of common anticoagulants. Principle and components of Haematological stains. Simple tests used in blood coagulation. Blood films-normal and abnormal. Practical Classes.

MLS 303: Basic Microbiology **(3 Units: LH 30; PH 45)**

Scope of microbiology: Historical approach etc. Classification and nomenclature of microorganisms. Introduction to the microbial world; Introduction to Bacteriology, Mycology, Virology and Parasitology (the protozoan).

Bacteriology: The general properties of bacteria, structure, growth, reproduction, requirements both environmental and nutritional. Aspects of Bacterial metabolism, bacterial genetics and variation. Sterilization in Microbiology, bacteria in health and disease: Antibiotics and chemotherapy; infection and immunity; introduction to laboratory techniques and methods including serology.

Viruses: General properties, structure and biology of viruses, classification – various methods, reproduction, resistance, pathology, purification of viruses, propagation of viruses, immunity and diagnosis of viral infection, interferon and interference, inclusion bodies, cytopathic effects. Viral-host interactions and identification.

Fungi: Morphology, groups and classification. Types of lesion and types of mycoses, growth requirements. Characteristics and general features of fungi and their diseases. Identification, and demonstration in the laboratory.

MLS 304: Basic Histopathology **(3 Units: LH 30; PH 45)**

Introduction to Histopathology. Fixation – Autolysis, bacterial decomposition. Effects of fixation, common fixing agents and their uses. Secondary fixation, post-fixation and post-chroming and post-mordanting. Fixation pigments, Decalcification – Aims and applications, decalcifying agents. Tests for clearing of decalcification. Dehydration, clearing and infiltration/embedding. Frozen and celloidin sections. Embedding media. Basic histology of organs. Principles and application of Exfoliate Cytology. Collection and fixation of specimens for cytological examination. Museum technique-colour restoration. Mounting in museum jars. Tissues and cellular injury inflammation. Healing and repairs. Gross appearance of diseased organs in routine post-mortem examination. Slide sections to illustrate common tumours.

MLS 305: Basic Immunology **(3 Units: LH 30; PH 45)**

The Historical background of Immunology. Classification of Immunity. Innate immunity. Development and structure of cells in the Immune System Cellular interaction the expression and regulation of immunity. Acquired Immunity.

MLS 306: Laboratory Posting I **(3 Units: LH 30; PH 45)**

Students are posted to medical laboratories for on-the-job training under the supervision of qualified medical laboratory scientists for 3 days weekly for the entire semester and the whole of the long vacation. Scored log book records are kept for each student per posting.

MLS 307: Practical Exercise I **(4 Units: LH 15; PH 135)**

The student is expected to carry out practical exercises in all the disciplines:

Clinical Chemistry: Titration: presentation of volumetric analysis. Methods for chloride determination. Determination of bicarbonate in plasma, percentage purity of carbonate. Determination of the composition of the mixture $NaOH/Na_2CO_3$, NACl/HCl, specific gravity, reactions with ferric chloride, urobilinogen, bilirubin, indican, myoglobin, cystine, protein, Bence-Jones protein, blood, reducing substances, ketone bodies, phenyl pyruvic acid. Spectroscopy of plasma and urine CSF analysis – sugar, protein.

Haematology and BGS: Blood film, WBC count, haemoglobin estimation, Absolute values, eosinophil count, recticulocyte count. Osmotic Fragility. Blood grouping techniques, Antiserum titration, Anti-human globulin (AHG) direct and indirect, Antibody screening. Donor screening, secretor status.
Histopathology: Preparation of fixatives, removal of formalin pigments, testing of end point of decalcification using chemical methods. General tissue staining by haematoxylin and counter-staining with eosin. Demonstration of elastic and collagen fibres. Prussian blue reaction for iron in tissues. Gram and Ziehl-Nielsen (Z-N) staining methods. Use of automatic tissue processors. Microtome.

Medical Microbiology and Parasitology: Safety precautions in the Microbiology laboratory. Getting acquainted with basic tools of microbiologist. Preparation of films and basic staining techniques, the Gram stain, Ziehl-Nielsen stain, spores, capsule and negative staining procedures. Wet preparation and microscopy, Motility tests, Media preparation and culturing. Plate reading Demonstration of the ubiquity of micro-organisms especially bacteria from different environment. Recognition of different types of haemolysis. Sensitivity testing. Use of autoclave. Wet mount for parasites. Identification of trophozoites, cysts and ova of different protozoa and helminths in stool. Thin and thick films preparation for malaria microfilaria and Trypanosome parasites. Staining techniques: Giemsa, Wrights, Fields and leishman Stains. Identification of Trichomonas spp, paragonimus Trichuris and other helminthes and protozoa of medical importance including Schistosomes. Skin snips. Urine microscopy. Concentration techniques for stool and sputum for ova and cysts. Examination and recognition of helminthes from tissue Biopsy.

MLS 308: Fundamentals of Blood Group Serology (3 Units: LH 30; PH 45)

ABO and Rhesus Blood Groups, Inheritance, distribution and Genetic Theory. Blood Grouping Techniques – principles, disadvantages and advantages. Preparation of antisera – antiserum titration, avidity, Potency and specificity. Plant lectins –Preparation and Standardization of antisera from lectins e.g. *Dolochos biflorus* Anticoagulants used in BGS, ACD, CPD-CPA-A etc Modes of Action, Side effects. Blood Bottles (MRC) and Plastic Bags – Advantages and disadvantages. Donor Screening- using $CuSO_4$ method – other methods of screening. Preparation of blood products – cryoprecipitate, platelet rich plasma, packed cell fresh frozen plasma, fibrinogen etc.

Storage of blood and blood products – various methods, advantages and disadvantages Blood banking-organisation, structures, facilities and records. Blood group specific substances – synthesis, identification method(s) and application. Quality control of physical, chemical and reagent. Practical/tutorials ABO and Rhesus grouping methods, Antiserum Titration DCT and ICT antibody screening.

MLS 309: Basic Medical Parasitology (3 Units: LH 30; PH 45)

Introduction to the parasites. Classification of protozoa, (the amoebas, the ciliates, the flagellates, Nematodes. (Ascaris, strongloides, trichuris, guineaworm, hookworms, trichinella, Enterobius etc). Life cycle and pathogenicity of Cestodes. (The tapeworms, Larval forms of cestodes). Life cycle and pathogenicity of the Trematodes (The Schistosome, Fasciola, Paragonimus, etc). Methods of demonstration of parasites in blood, faeces, vagina, urine, urethra, pus from lung and liver, skin snips, etc, Mechanisms of their disease production; Epidemiology and control of parasitic diseases.

MLS 399: Students Industrial Work Experience (SIWES) (3 Units: PH 135)

Students will be posted to recognized and relevant placement areas of their choice during the industrial training. The 3 months will be spent in hospitals, industrial or educational laboratories. Continuous assessment of students will be undertaken jointly by their industrial-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training. Grades are allotted according to ITF directives

PHA 301: Basic Pharmacology & Toxicology (3 Units: LH 30; PH 45)

Pharmacological terms. Drugs, sources and nature including structure/activity relation. Bioassays. Routes of administration, absorption, biotransformation and Elimination. Drug receptors and receptor isolation. Fluorescent, radio-isotopic and chromatographic methods in drug studies. Methods of evaluation of toxins, mutagens and carcinogens.

PIO 301: Endocrinology and Reproduction Physiology (3 Units: LH 30; PH 45)

General principles of endocrinology, functions and regulation of the pituitary, thyroid, parathyroid, pancreatic and adrenal secretions. Male and female reproductive physiology.

400 Level

MLS 401: Laboratory Management and Functions (3 units: LH 15; PH 90)
Principles and functions of Management. Personnel Management, Staff/Management relationships, stock control, record keeping. Management and administrative practices. Ecology of administration. Inventory and quality control Accounting and budgeting. Medico-legal aspects of medical laboratory Sciences. Professional ethics. Laboratory planning. Introduction to statistical procedures and biological research estimation, analysis of variance, tests of significance, goodness of fit, correlation and regression. Theory and practice of quality control – setting up quality control, various methods of quality control; factors affecting quality of output.

MLS 402: Medical Laboratory Haematology I (4 Units: LH 30; PH 90)
Iron metabolism, folate and B2 metabolism. Nomenclature, classification and investigation of common haemoglobinopathies, haemolytic anaemias, myeloproliferative disorders, lymphoproliferative disorders, haemostasis and disorders of haemostasis; investigation of bleeding disorders. Bone marrow. Practical classes.

MLS 403: Medical Laboratory Histopathology I (4 Units: LH 30; PH 90)
Students should be introduced to: Principle of histochemical methods. DNA – demonstration by Feulgen techniques. Silver impregnation methods. Genes and genetic code. Tissue culture techniques; chromosome analysis. Autoradiography – Definition and principle of organization of a medical museum. Methods of colour maintenance. Fixation and storage of museum specimens. Special museum techniques e.g. Dawson's Method. Principle of Photography Preparation of stained sections for micro photography. Preparation of specimens for preparation of stained sections for micro photography. Cytological normal cells. Histology of tissues. Atypical and malignant cells. Collection of cytological smears and processing and screening. Principles of general pathology. Systemic pathology. Gastrointestinal tract. Urogenital, cutaneous. Principle of Electron microscopy materials for electron microscopy. Respiratory – Tuberculosis. Nephropathy associated with infestations and infections. Embalming techniques and demonstrations and infections. Practical based on the topics.

MLS 404: Medical Laboratory Microbiology I (3 Units: LH 15; PH 90)
Epidemiology of communicable diseases and disease spectrum and control. Aspects of public Health and Environmental Microbiology. Applied Microbiology; aspects of food and Industrial Microbiology. Diagnostic Microbiology. Vaccines production and immunization. Preservation of cultures and cultural methods. Pathogenic mechanisms of bacteria. Antibiotic assays and monitoring from body fluids etc. anaerobiosis and methods. Phage typing; Research Methods and other techniques in Microbiology. Use of metabolic pathways in identification of bacteria, fluorescent antibody methods. Quality control and Instrumentation. Practical based on the above topics.

MLS 405: Laboratory Instrumentation & Techniques (4 Units: LH 15; PH 135)

Instrument aspects of qualitative and quantitative analysis – theory and practise of some common analytical techniques: colourimetry, spectroflorimetry flame photometry, conductometry, polarography, etc. Osmometry, Rephelometry, Turbidimetry, pH Measurement by ion specific electrodes – Separation techniques including electrophoresis, - paper, cellulose acetate, Agar gel, starch and polyacrylamide gel, Isoelectric focusing, Isotaphoresis, Chromatograpy – paper, Thin Layer Chromatography, Gas Liquid Chromatography, Ion exchange, gel filtration, molecular sieves; Dialysis filtration, solvent extraction, Centrifugation – Ultracentrifugation. Immuno-electrophoretic techniques, Radioimmunoassay, Competitive protein binding, Isotope dilution techniques, Enzyme Immuno Assays, Receptor Assays, Automation, Micro and Ultramicro Analysis. Practical based on the above topics.

Theory and practice of some common Analytical techniques including tissue processing, Microscopy and other basic Microbiological Equipment, Principles and working of haematological Equipment, other applied techniques in the Medical Laboratory with emphasis on general Medical Laboratory Instrumentation. Practical exercises on the above topics.

MLS 406: Research Methodology (2 Units: LH 15; PH 45)

Introduction to research methodology. Collection of literature review articles Problem definition. Sampling technique Experimental designs of medical and public health studies. Questionnaire design and collection analysis. Interpretation and utilization of research findings. The role of research in health and social welfare. The need for Institutional and Governmental ethical clearance for some research projects. Research proposals and sourcing of funding for research projects. Art of scholarly publications and Instructional design.

MLS 407: Medical Entomology (2 Units: LH 15; PH 45)

Arthropods of medical importance – the crustaceans, Arachnida, Hexapoda, Myiasis etc their biology, life cycles and control. Life history as disease vectors; various diseases of importance transmissible by insects. Biology of mosquito in relation to transmission of malaria, filariasis, and viral infections etc.

MLS 408: Laboratory Posting II (2 Units: LH 15; PH 45)

Students are posted to the various laboratories for on-the-bench training in the different analytical techniques used in the Department. Students participate in the routine operation of the laboratory. Scored log book records per bench are kept for each student per posting.

MLS 409: Biomedical Engineering (3 Units: LH 15; PH 90)

Workshop practice. Principles of use maintenance and repair of common apparatus and laboratory equipment. Principles of applied and general electronics. Circuit diagrams, Computer programming. Improvisation. Glass blowing and construction of simple laboratory equipment. Design techniques, improvement on existing equipment, review and modifications of laboratory methods.

MLS 410: Clinical Chemistry I **(4 Units: LH 30; PH 90)**

Porphyrin, causes, symptoms and laboratory investigation of porphyrinaemia, porphyria and Porphyrinuria, Haemoglobin, synthesis, function. Glycosylated haemoglobins. Abnormal haemoglobins and haemoglobinopathies, Liver function Tests.

Mechanism of Enzyme action and kinetics: Clinical Enzymology; Isoenzymes in medicine, Coenzymes and Vitamins. Definition, causes, consequences and investigation of some inborn errors of metabolism; Phenylketonuria, galactosaemia fructose intolerance, Albinism, aminoacidurias, Endocrine glands and functions; the hypothalamus, the pituitary, the parathyroid, adrenal cortex, adrenal medulla, the gonads and reproductive endocrinology. Foeto-placental function. Calcium and bone metabolism. Pancreatic function tests. Basic neurochemistry, CSF – normal composition and changes in disease.

MLS 411: Blood Group Serology **(3 Units: LH 15; PH 90)**

Blood groups – Other blood groups e.g. MNS, Duff, kell, kidd etc. Grouping techniques and antibody screening, clinical significance, secretor status, antenatal Serology – screening and Titration. Compatibility procedures – different methods, advantages and disadvantages, Blood Transfusion reactions – causes and types; Investigation, Risks attendant in blood transfusion – Diseases, Anaphylactic, haemolytic and allergic reactions. Screening of Donor blood for disease agents e.g. HbAgs, HIV, VDRL. Practical/tutorials. Compatibility procedures – advantages and disadvantages. Practical based on the above topics.

MLS 413 : Professional Ethics in Medical Laboratory Science (2 Units: LH 15; PH 45)

Introduction to the Science and profession of Medical Laboratory Science. The different arms of medical Laboratory Sciences. Hall marks characterizing the lives of all professions; licensing to practice, Group culture patterns. Justice, rights and responsibilities as a professional.

The concept of duty, professional standards and Laboratory management. Authority and discipline. The use of reason. Personal relationships – inter and intra professional, Act of good faith. Place of religion in the hospital. Value judgment, exercise of professional judgment, skill and care charge and well being of patients.

Patients - professional relationship – confidentiality, communication skills; trust; seeking to safe guard patients, particularly in respect to health and safety and information. Research training, professional development, knowledge and skill, quality control in the field of medical laboratory sciences and practice: Reputation. Fulfilment of professional role with integrity, refraining from its misuse to the detriment of patients, employers and colleagues. Medico-legal aspects.

500 Level

MLS 501: General Laboratory Practice **(3 Units: LH 15; PH 90)**

Theory and practice of some common Analytical techniques including tissue processing, Microscopy and other basic Microbiological Equipment use, and principles of Histological Equipment, principles and working of haematological clinical chemistry Equipment; other applied techniques in the Medical Laboratory with emphasis on general Medical Laboratory Instrumentation. Practical Classes based on the above topics. General Review and

appraisals of all subjects and practice of medical laboratory sciences to be examined as a common General paper.

MLS 502: Laboratory Posting III **(3 Units: LH 15; PH 90)**

Students are posted to the laboratory of their specialty for further practical experience in Laboratory Techniques and Management for all disciplines under the supervision of Laboratory Scientists. Students participate in all the routine activities of the laboratory.

MLS 503: Practical Exercises II **(3 Units: LH 15; PH 90)**

Each student carries out practical based on the Area of Major Specialty.

Clinical Chemistry

Determination of blood glucose, glucose tolerance test. Determination of calcium and phosphate, uric acid, cholesterol, creatinine clearance, electrolytes and urea, total protein albumin and globulin. Plasma protein electrophoresis. Determination of plasma enzymes:- aspartate transaminase, alanine transaminase, acid and alkaline phosphatase. Demonstration. Blood gases and pH by Astrup Technique. Paper and thin layer chromatography, Immuno-electrophoresis and agar gel immuno-diffusion techniques.
Demonstration: Radioimmunoassay of hormones in blood. Estimation of 17-oxo and Oxogenic steroids in urine. Estimation of urinary buffers. Calculation from first principle. Absorption and calibration curves. Colour Equivalence of artificial standards. Fractional test meal. Calculi analysis.

Haematology and Blood Group Serology

Investigations in paternity dispute. Investigation of haemorrhagic and preparation of cryoprecipitate, haemolytic disease of the newborn (HDN), haemoglobinopathies, auto-immune haemolytic anaemia, enzymopathies. Preparation of anti-sera, bovine albumin, anti-human globulin. Gamma globulin neutralization test. Forensic application of Blood Group Serology. Differential leucocytes counts. Cytochemical procedures. Advanced techniques e.g. Demonstration of Iron, Foetal Haemoglobin, Ham's Test etc.

Histopathology

Special staining methods – PAS, Manson trichrome, Iron Impregnation Methods. Cytological staining methods and collection of cyctological samples. Chromosome analysis. Autoradiography. Museum techniques. Cyto-screening and slide reporting. Cutting sections using the microtomes. Tissue (cell) culturing, Fungi, amyloid, enzyme and other specialized demonstration methods.

Medical Microbiology and parasitology

Examination, culture and identification of bacteria in CSF pleural, ascitic fluid. Blood culture, High vaginal swab, wound swabs, ear, eye, nasal and other swabs. Stool bacteriology. Sputum bacteriology, Urine bacteriology. Systemic fungal culture and identification. Semen analysis. Special serological tests. ASO Widal, VDRL, rheumatoid factor, Complement fixation, neutralization, haemagglutination tests for identification of

viruses. General identification of micro-organisms by animal inoculation. Biochemical tests for the identification of v*ibrio* cholera, Shigella, Candida, Neisseria.

MLS 504: Research Project **(6 Units: PH 270)**
A research project and dissertation to be undertaken on any topic of interest and relevance to Medical Laboratory Science.

MLS 505: Seminar **(2 Units)**
Detailed literature search followed by presentation at a departmental Seminar of a scientific topic, which must be of microbiological or biotechnological interest.

MLS 508: Clinical Chemistry II **(3 Units: LH 30, PH 45)**
Analytical Techniques. Birth of a new method, devising new techniques, Biological trials and tests for acceptability. Solid/dry phase chemistry, dipstick technology, thin film technology. Immobilized enzymes. Analytical techniques employed in qualitative and quantitative determination of (a) Enzymes: phosphatases, transaminases, dehyrodrogenases, Kinases (b) Hormones: catecholoamines and metabolites peptide and steroid hormones (c) Proteins: total proteins albumin and globulin, specific proteins (d) Lipids: cholesterol, triglycerides, glycerol, fatty acids and lipoproteins. (e) Trace elements – Fe, Cu Zn, Mg, Selenium (f) Non-protein nitrogen – Urea, creatinine, creatine, uric acid, amino acids and ammonia Urinalysis; determination of urine specific gravity, osmolarity; qualitative tests for protein, glucose.. and reducing substances, Ketone bodies, bilirubin urobilinogen and blood. Haemoglobin and haemoglobin derivatives in urine. Spectroscopy of haemoglobin and its derivatives in blood and urine.

MLS 509: Clinical Chemistry III **(3 Units: LH 30; PH 45)**
Causes and Laboratory investigation of disorders of Iodine metabolism. Plasma proteins in health and disease. Definition, causes and investigation of paraproteinaemia; Bence-Jones proteinuria and significance. Diseases of muscle. Lipidaemias. Definition, causes and investigation of hyperlipoproteinaemia and hypolipoproteinaemia. Causes and investigation of nutritional disorders. Definition, causes and investigation of diabetes mellitus, hypoglycemia. Types, causes and features of glycogen storage diseases. Definition, Investigation and Treatment of water and electrolyte imbalance. Homeostasis in clinical chemistry. Acid-base balance. Biotechnology-recombinant DNA. Hybriodoma. Biochemistry of neoplastic disorders. Kidney diseases, aminoacidurias. Trace elements – bioavailability function, interaction. Toxicology. Diseases of the nervous system.

MLS 510: Medical Laboratory Haematology II **(3 Units: LH 30; PH 45)**
Anaemias, Disorders of Iron metabolism, vitamin B12 and Folate deficiencies, Haemochromatosis and related storage disorders; Radioisotopes in Haematology; Automation in Haematology, Haemoglobinopathies. Cytochemical procedures, Lymphocyte Transformation Tests. Myelomatosis and order paraproteinaemias. Test. Advanced Techniques.

MLS 511: Medical Laboratory Haematology III (3 Units: LH 30; PH 45)
Ante-natal Serology; Haemolytic disease of the new born. Hepatitis B antigens. Applied Blood Group Serology. Other Blood Groups. Preparation and standardization of AHG. Iso-antibodies Auto-Immunization – IgG, IgA antibodies. Quality Control in Serology – Advanced Techniques.

MLS 512: Medical Laboratory Histopathology II (3 Units: LH 30; PH 45)
Theory and Methodology of Histochemistry – Chromaffin tissues, Schmols, Diazo and Perls and other histochemical techniques. Enzyme histochemistry: Acid and alkaline phosphatase, Oxidative enzymes. Genetic diseases. Karyotype abnormalities. Chromosome techniques. Tissue culture technique. Chromosome staining techniques Slide reporting.

MLS 513: Medical Laboratory Histopathology III (3 Units: LH 30; PH 45)
This course exposes the students more in general Cytology, Histology pathology, control of results and management of Histopathology laboratory. More facts of Electron microscopy and Autoradiography are highlighted. Cytology of cells. Epithelial cells and tissues, atypical and malignant cells. Gynaecological cytology. Hormonal evaluation. Cells and other constituents, sputum, effusions, Urine and other fluids. Cytological fixatives and stains, cyto-screening. Principles of general pathology applied to individual organs. Systemic Pathology. Hypertensive heart disease, heart failure and cardiomyopathies. Respiratory – Tuberculosis. Nephropathy associated with infestations and infections. CNS, special senses. Malignant lymphomas, liver – cirrhosis, liver cell carcinoma, Hepatitis virus. Electron microscopy – preparation of materials for electron microscopy, Embedding reagents used in Electron microscopy. Techniques involved in autoradiograph, Laboratory Management. Quality control and automation in histopathology laboratory.

MLS 514: Medical Laboratory Microbiology II (3 Units: LH 30; PH 45)
General characteristics of fungus diseases, types of mycoses and properties; opportunistic fungi Diagnosis and chemotherapy. Systemic mycoses (cryptococcosis, blastomycoses, histoplasmosis, coccidioidomycoses). Opportunistic mycoses (candidiasis, phycomycoses, aspergilloses etc). subcutaneous mycoses. (e.g. maduromycoses, sporotrichoses, chromoblastmycosis, etc. Cutaneous mycoses – dermatophytoses. Superficial mycoses etc. General properties, pathogenesis, diagnosis, epidemiology and control and recognition of fungi. Dermatropic and viscerotropic viruses. Smallpox, cowpox and vaccination; measles, rubella, chickenpox and shingles, Herpes viruses. Yellow fever; Lassa fever, Hep A and B, Influenza, arbo viruses. The neurotropic viruses (rabies, poliomyelitis, encephalitis, lymphocytic choriomeningitis virus, mumps viral transformation and types of tumours and viruses. Oncogene theory etc. Viral gastroenteritis; Miscellaneous viruses.

MLS 515: Medical Laboratory Microbiology III (3 Units: LH 30; PH 45)
History of pathogenic microbiology. Host parasite relationships, sources of vectors of infection, laboratory diagnosis and identification, immunization, serology of bacterial infections. The pyogenic cocci, (staph, strep, pneumococci and neisseriae). The enterobacteriaecea, coliforms, gastroenteritis, salmonellosis, shigellosis cholera, vibrios, pseudomonas, bacteriodes etc). the haemophlic bacilli (haemophilus, brucellae, yersinia,

bordetella etc. Anaerobic Spore formers, Aerobic Spore formers. (Bacillus anthracis. The Clostridia, The spirochetes, the mycobacteria, the Fungus-like bacteria (actinomycetes) – corynebacteriae, rickettsiae, Chlamydiae Mycoplasma, L-forms, Listeria, Erysipelothrix, Bartonella etc. General pathology, epidemiology, features, diagnosis, control and therapy.

3.6 NURSING SCIENCES (B.NSc.)

3.6.1 Philosophy, Aims and Objectives of the Degree programme

Philosophy

The Philosophy of the Nursing degree programme is hinged on the believes that Man is a bio-psycho-social being and his needs are the focus of all nursing activities in its efforts towards achieving a high level of wellness.

Aims and Objectives

i) To offer liberal or general and professional education to be able to utilize psycho-social and physical factors in health promotion, health maintenance and of health restoration.

ii) To prepare the student nurse to think effectively, to communicate thought and to discriminate among values.

iii) The programme aims to produce Polyvalent Nurse Practitioner, capable of performing nursing skills in a variety of settings, therapeutically assisting individuals, family and Community with diverse back grounds and health problems to attain optimal health.

iv) The programme prepares nurse-practitioners who are capable of relating the role of health services to the broader social system and who will be engaged in life-long and self-directed learning.

3.6.2 Admission and Graduation Requirements

The admission and graduation requirements as are stated in section 1.3. The modes of entry are UTME, direct entry and interuniversity transfer. In addition, candidates possessing Registered Nursing Certificate (RN) and the required five subjects at 'O' level may be admitted by direct entry. To be admitted into the B.NSc. programme the candidate must meet these entry requirements.

The general requirements for graduation are shown in section 1.4. The B.NSc degree programme shall run for 5 years for Joint Matriculation Examination entry candidates and 4 years for direct entry candidates. The pass mark for core courses is 50%. The degree is a non-classified degree.

Duration of Programme

The duration of the B.NSc. Degree Course is 5 years for Joint Matriculation Examination Entry candidates and 4 years for Direct Entry Candidates. As a professional degree, the B.NSc shall not be classified. However, it shall be awarded as follows:

2.40 – 5.00	Pass

3.6.3 **Learning Outcome**

By the end of the academic programme, the graduate of the B. NSc. programme should demonstrate knowledge content, competencies and skills and behavioural attributes consistent with the qualities expected from the programme as stipulated below:

a) **Regime of Subject Knowledge**

i) The scientific principles basic to the nursing care of individuals of all ages in a variety of physical and social settings;
ii) The nursing process;
iii) The communication process and group dynamics;
iv) The process of scientific inquiry: and
v) The functions of members of the health team and their inter-relatedness and interdependency.

b) **Competencies and Skills**

i) Identifying health needs, planning and giving comprehensive nursing care to individuals of all ages a variety of settings;
ii) Applying Basic Scientific and Nursing Theories, Principles and concepts in the practice of Nursing and Midwifery;
iii) Selecting appropriate nursing intervention and performing technical skills with maximal dexterity.
iv) Effective communication by organizing thought and expressing it in the manner in which it could be easily comprehended;
v) Planning and effecting health promotion activities;
vi) Working co-operatively as a member of the health team in primary health care by sharing information, accepting responsibility and limitation willingly, participating in group activities, initiating and developing entrepreneurship in health services for the underserved and unserved areas.

c) **Behavioural Attitudes**

i) Recognises the essential worth of the individual through her interpersonal responses.
ii) Appreciates varieties in human behaviour which may influence the care of the individual.
iii) Shows commitment to the role of the nurse and to the nursing profession
iv) Shows sense of responsibility for self-direction and personal growth.

3.6.4 **Attainment Levels**

Students in the Nursing Degree programme must attain sufficient level of cognitive knowledge, practical skills and attitudinal orientation to be able to pass the degree and the professional examination.

The relevance of the Nursing Curriculum shall be maintained by each University through:

i) feed backs from graduates of the programmes and their employers and the regulatory bodies;
ii) review of the curriculum every 5 years;
iii) course evaluation by students and teachers;
iv) incorporation of research findings and innovations in curriculum design, implementation and evaluation.

3.6.5 Evaluation

The methods for course evaluation should be as follows:

i) Course Unit System
ii) Continuous Assessment
iii) Observational Techniques
iv) Anecdotal and Critical Records
v) Check-list and Rating scales in Clinical Areas
vi) Individual and Group Presentations
vii) Project Quizzes and Tests.

Summative Evaluation – There shall be Final Examination in all courses. Continuous Assessment results should form 30% of the overall final grade.

In addition to individual university examination regulations, the following regulations shall apply to the B.NSc. programme:

i. Before a student graduates, she/he should have taken and passed all the courses and fulfilled all other requirements for graduation by the university.
ii. For all Nursing courses, the pass mark shall be 50%.
iii. For all other courses, the pass mark shall be according to the regulations governing the courses.
iv. Students should pass all courses that are pre-requisite to other courses before moving to the next level in the programme. A student who fails one or two courses in a semester should be allowed to take make-up examinations in that semester before moving to the next level.

A student who fails more than two clinical courses shall repeat the year.

3.6.6 Resource Requirements for Teaching and Learning

The details of the general resource requirements are spelt out in Section 1.6 and are applicable to this programme. Additional requirements peculiar to this programme are described below.

a) **Academic and Non-Academic Staff**

Lecturers in B.N.Sc. programme will be drawn from the various disciplines required for the B.N.Sc. curriculum. Where the relevant courses already exist in other Departments in the particular University, the Nursing students will receive lectures with their counterparts in those Departments.

Lecturers in the Department of Nursing must possess academic qualification in a nursing specialty area and satisfy the minimum requirement for teaching in the University. The academic staff/student ratio should be 1:15 for the programme.

Academic support staff should include Clinical Instructors, Laboratory Technicians and administrative staff. A Clinical Instructor should be a registered Nurse/Midwife with a minimum of two years clinical experience. Possession of the fellowship of the West African College of Nursing should be an added advantage. There shall be one clinical Instructor per Nursing sub-specialty.

b) **Academic and Non-Academic Spaces**

The Nursing Degree programme should be located in a Department of Nursing in the University. Provisions should be made for seminar rooms and laboratories for nursing and midwifery demonstrations

c) **Academic and Administrative Equipment**

There should be Head of Department office adequately furnished with Secretariat office attached, each department shall have an Administrative office. Each lecturer should have an office space. The clinical Instructors should have office space in the University and in the Hospital. Each room should be adequately furnished and provided with PC and Audio Visual materials. Equipment for demonstrating basic nursing procedure should be available in the nursing laboratory. In addition, audio-visual aids and computer/information technology facilities should be available in the Department of Nursing. Equipment and other facilities in the clinical areas should conform to the prescribed standards.

d) **Library and Information Resources**

The Department should have a library space with up to date Nursing journals and Nursing books in the core areas of Nursing (e.g. Medical-Surgical, Maternal and Child Health, Mental Health and Nursing Research). There should be a learning resource room with phantoms and audio visual aids.

3.6.7 Course Structure and Synopses of the Nursing Science Degree Programme

Preamble

Courses shall be provided leading to the degree of Bachelor of Nursing Sciences, which may be awarded with honours or as a pass degree.

Courses to be taught at this level should include English, Mathematics, Biology, Chemistry, and Physics. Students are also introduced to computer science.

A: Course Structure

Course Structure for 100 Level Nursing Sciences Programme

Course Code	Course Title	Units	Status	LH	PH
BIO 101	General Biology I	3	C	45	-
BIO 102	General Biology II	3	C	45	-
BIO 107	General Biology Practical I	1	C	-	45
BIO 108	General Biology Practical II	1	C	-	45
CHM 101	General Chemistry I	3	R	45	-
CHM 102	General Chemistry II	3	R	45	-
CHM 107	General Chemistry Practical I	1	R	-	45
CHM 108	General Chemistry Practical II	1	R	-	45
CSC 101	Introduction to Computer Science	3	C	30	45
GST 111	Communication in English	2	C	30	-
GST 112	Logic, Philosophy and Human Existence	2	E	30	-
GST 113	Nigerian Peoples and Culture	2	R	30	-
GST 121	Use Library, Study Skills & ICT	2	C	30	-
GST 122	Communication in English II	2	C	30	-
GST 125	Contemporary Health Issues	2	R	30	-
MTH 101	Elementary Mathematics I	3	R	45	-
PHY 101	General Physics I	3	R	45	-
PHY 102	General Physics II	3	R	45	-
PHY 107	General Physics Practical I	1	R	-	45
PHY 108	General Physics Practical II	1	R	-	45
	Total	**42**			

Course Structure for 200 Level Nursing Sciences Programme

Course Code	Course Title	Units	Status	LH	PH
ANA 211	Systemic and Functional Anatomy	2	C	15	45
ANA 212	Regional Anatomy	2	C	15	45
GST 211	Environment and Sustainable	2	R	30	-
GST 222	Peace and Conflict Studies	2	R	30	-
GST 223	Introduction to Entrepreneurship	2	R	30	-
GST 224	Leadership Skills	2	R	30	-
NSC 201	Foundations of Nursing Science	3	C	45	
NSC 205	Developmental Psychology	2	R	30	-
NSC 206	Biochemistry – General and Medical	3	R	45	-
NSC 207	Medical Microbiology and	3	R	45	-
NSC 208	General and Cellular Pathology	3	R	45	-
NSC 299	Students' Industrial Work	3	C	-	135
PHE 201	Biostatistics	2	C	30	-
POL 201	Political Science	2	R	30	-
	Total	**33**			

Course Structure for 300 Level Nursing Sciences Programme

Course Code	Course Title	Units	Status	LH	PH
GST 311	Entrepreneurship	2	R	30	-
PHA 301	Pharmacodynamics and	3	C	45	-
NSC 301	Epidemiology	2	C	30	-
NSC 302	Environmental Health	2	C	30	-
NSC 303	Basic Community Health Nursing	5	C	30	-
NSC 304	Nursing ethics and Jurisprudence	3	R	45	-
NSC 305	Human behaviour in health and	2	C	30	-
NSC 306	Basic Medical & Surgical Nursing	5	C	60	-
NSC 307	Human Nutrition	3	R	45	
NSC 399	Students' Industrial Work	3	C	-	135
PHA 301	Pharmacodynamics and	3	R	45	-
	Total	**30**			

Course Structure for 400 Level Nursing Sciences Programme

Course	Course Title	Units	Status	LH	PH
NSC 401	Basic Mental health and Psychiatric	3	C	45	-
NSC 402	Basic Maternal and Child Health	6	C	60	90
NSC 403	Advanced Medical Surgical Nursing	12	C	120	180
NSC 404	Research Methodology	3	C	45	-
NSC 405	Principles of Education and Teaching	3	E	45	-
NSC 406	Management of Nursing Services	3	C	45	-
NSC 407	Practicum in Teaching and	2	C	-	90
	Total	**32**			

Course Structure for 500 Level Nursing Sciences Programme

Course	Course Title	Units	Status	LH	PH
NSC 501	Advanced Mental Health and	5	C	30	135
NSC 502	Advanced Maternal and Child Health	5	C	30	135
NSC 503	Advanced Community Health Nursing	5	C	30	135
NSC 505	Nursing Seminars	2	C	30	-
NSC 506	Nursing Entrepreneurship	2	R	30	-
NSC 507	Health Economics	2	C	30	-
NSC 508	Research Project	4	C	-	180
NSC 509	Electives in Nursing specialties	6	E	45	135
	Total	**31**			

B: Course Synopses

200 Level

NSC 201: Foundations of Nursing Science **(3 Units: LH 45)**

The course provides a foundation of concepts, theories and principles which enables the student understand and integrate the content that is the composite of nursing as a science and an art. Introduction to Professional Nursing, Meaning of Health and illness. Nursing as it relates to health care, social and cultural set up. Concepts and trends in Nursing. Interpersonal relationships in Nursing. Ethics and philosophy of Nursing. Concepts of Primary Health Care. Components of Primary Health Care. Care of client. Comfort and safety measures. Diagnostic measures. Health Education.

The Nursing process and the utilization of scientific principles in the practice of Nursing. Philosophy of Nursing, Physical assessment, Theoretical basis for nursing practice.

NSC 205: Developmental Psychology **(2 Units: LH 30)**

Emphasis in this course is on development from conception through childhood and adolescence. Theories of learning, Psychology of Education and the nurse. Human growth and development. The nature and structure of intelligence, Individual difference. Determinants of health behaviour

NSC 206: Biochemistry-General and Medical **(3 Units: LH 45)**

The course deals with the chemistry of important biological compounds stressing their biogenesis and reaction mechanism.

Introduction to Biochemistry. Introductory kinetics and energetic. Chemistry of proteins and enzymes Chemistry and metabolism of carbohydrates, Lipids, Vitamins as co-enzymes. Integration of metabolism, Oxidation, Nucleic acids, RNA and protein synthesis, Diet, Food value, and Vitamin deficiency.

NSC 207: Medical Microbiology and Parasitology **(3 Units: LH 45)**

The course covers the study of the characteristics and classification of microorganisms. It enables the student identify infective agents that cause disease in man and to apply the knowledge of disease processes in terms of personal and communal health.

Characterisation and classification of characteristics of bacteria morphology, physiology, reproduction and metabolism of bacteria. Host – parasite relationship.

Infection, pathogenicity and virulence. Exo-and endotoxins. Susceptibility and resistance to infection, natural resistance, phagocytosis, antibodies. Natural and acquired immunity, Immunization – active and passive. Anaphylaxis, Hypersensitivity and Allergy.

Control of microorganisms, sterilization, disinfection. Chemotherapeutic agents and Antibiotics.

NSC 208: General and Cellular Pathology **(3 Units: LH 45)**

The course covers general mechanisms, the pathogenesis of disease and the dynamic nature of disease as it evolves from its incipient stage to its full expression. The effect of disease on organs and distant parts of the body are discussed.

Pathology and the nature of disease. Chemistry of cell damage and the dying cell. Inflammation and infection. Inflammatory response and chemical mediators. Immunity and cellular immune response. Principles of repair and reorganization of cell structure.

NSC 299: Students' Industrial Work Experience (SIWES) **(3 Units: PH 135)**

Students will be posted to recognized and relevant placement areas of their choice during the industrial training. The twelve weeks will be spent in hospitals. Continuous assessment of students will be undertaken jointly by their industrial-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training. Grades are allotted according to ITF directives.

POL 201: Political Science **(2 Units: LH 30)**

The course introduces the student to social organization and mechanisms of government. It stresses the needs and problems of politics as they affect Nigeria, Africa and the health professions.

Introduction to political science and African Politics Dependence, struggle for independences of African States. Politics in Africa as it affects the development of African people and the health profession. Nigerian politics as it affects Nursing profession. Elements of Administration, rule of law, role of the executive, legislature and the judiciary. Political parties and pressure groups. The role of the media.

300 Level

NSC 301: Epidemiology **(2 Units: LH 30)**

The course introduces students to the principles and methods of epidemiology as they apply to the study of communicable and non-communicable diseases. Types of epidemiological Studies; clinical applications.

NSC 302: Environmental Health **(2 Units: LH 30)**

The course is designed to examine the effect of environmental factors on the health of the community, community assessment and action to improve the quality of the environment is emphasized. Man and his physical environment. Environmental factors that affect health; noise, gas pollution, waste products, air, water.
Environmental sanitation: Waste disposal, vector control, Housing and water supply. Food Hygiene and Environmental health. Relationship of occupation to environmental factors, Rural Urban migration.

NSC 303: Basic Community Health Nursing **(5 Units: LH 45; PH 90)**

Introduction to basic concepts, historical development and scientific principles and practice of community health nursing and primary health care; the development community nursing and primary health care; conceptual foundation of community health practice; elements of community health nursing and primary health care; role and responsibilities of a community health nurse; community health nurse as a PHC practitioner; introduction to planning, programming and evaluation methods in community health nursing and primary health care - community health nursing diagnosis, through organized exposure to community health/primary health care programmes. The organized exposure of students, using problem-based approach, to community is as follows:

i) A period of experience in a defined rural/urban geographical-political community;
ii) Collection of data for the assessment of health status of the community;
iii) Analysis and presentation of the data to describe community health problems, social and health needs, and draw inferences for service objectives related to specific preventive, promotive and health maintenance strategies.

NSC 304: Nursing Ethics and Jurisprudence **(3 Units: LH 45)**

This course is designed to enable the student identify nursing ethics as a component of medical ethics in her practice as a member of the health team. It introduces the student to the status and common law as they affect the nursing profession and nursing practice. It enables her to develop a personal philosophy of nursing.
Foundation of Nursing Ethics (National and International) Nursing ethics in Nigeria (Problems and prospects). Laws and regulations governing nursing practice in Nigeria.

Ethical considerations and dilemmas. Nursing ethics as it relates to the health team. Ethical/moral principles. Professional ethics and constraints imposed by institutions. The health care system and individual rights: informed consent, abortion, dying and death, behaviour control. Discussion of ethical dilemmas and the nurse as an advocate.

NSC 305: Human Behaviour in Health and Illness (2 Units: LH 30)

This course is designed to enable the student acquire the knowledge of a socio-psychological determinants of health behaviour. It enables her initiate compliance behaviour by utilizing the principles of guidance and counselling. Human development, culture factors and behaviour: beliefs, taboos and behaviour in health and illness. The health-illness continuum. The socialization process: Development of personality and character formation; role identity and role function. Patterns of marriage and childrearing practices. Group dynamics, leadership, group norms, interpersonal relations, communication. Principles and technique of guidance and counselling.

NSC 306: Basic Medical & Surgical Nursing (5 Units: LH 60; PH 45)

The courses builds on foundation of professional nursing by in-depth study of steps in nursing process and health assessment; holistic approach to nursing care; disrupted homeostasis and psychophysiologic response to illnesses and nursing interventions; Experiences are provided in the nursing of selected individuals and families to facilitate the theoretical learning and to further develop skills in nursing practice.

NSC 307: Human Nutrition (3 Units: LH 45)

The course discusses the historical perspectives of nutrition as a science. The nutritional values of food and its effect on health is emphasized. Food purchasing, presentation, preparation and diet therapy are studies to enable the students provide well balanced diets to clients and patients.

Historical perspectives. Nutrition as a science. Classification of food and their nutrients Relationship of digestion and absorption of food. Nutrient quality of local foods and diets. Selection and formulation of balanced and weaning diets. Use of food composition tables. Nutrient requirements and recommended daily calorie requirements. Food in relation to the life cycle. Dietetics and diet in illness.

NSC 399: Students' Industrial Work Experience (SIWES) (3 Units: PH 135)

Students will be posted to recognized and relevant placement areas of their choice during the industrial training. The twelve weeks will be spent in hospitals. Continuous assessment of students will be undertaken jointly by their industrial-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training. Grades are allotted according to ITF directives.

PHA 301: Pharmacodynamics and Chemotherapy (3 Units: LH 45)

The course is designed to enable the student acquire the knowledge of the derivation, action and functions of drugs on the systems of the body. It considers problems of drug therapy and the contributions of traditional chemotherapeutic measures to health maintenance.

Drugs: derivations and standardization, classification of drugs dosage, administration and body's reaction to drug therapy, principles of therapy, prophylaxis and control of bacterial, parasitic and viral infections. Chemotherapy for parasitic infections. Therapeutic drugs and their action on cells. Diet therapy, toxicology and drug abuse, Nurses role in drug therapy.

400-Level

NSC 401: Basic Mental Health and Psychiatric Nursing (3 Units: LH 45)
This course enables the student to relate the knowledge of growth and development to mental health disorders and behavioural problems. It encourages her to develop an awareness of acceptance of behavioural changes of the mentally sick. The legal aspects of psychiatric nursing and the nurses role are stressed. History of mental health movement, national and international. Growth and development theories, relationship of growth and development of behaviour. Classification of mental health disorders, discussion of specific behaviours.
Intervention by health care providers: individual and group approach, therapeutic care, behaviour management. Nurse's role: legal coverage.

NSC 402: Basic Maternal & Child Health Nursing (6 Units: LH 60; PH 90)
The course deals with the health of the family during its child bearing and child rearing years, emphasizing the needs of the mother and the new born during the maternity cycle, the role of the nurse in family planning and genetic counseling. History of maternal and child health nursing: National and international. The reproductive phase of the life cycle. Obstetric and Gynaecological conditions. Family planning and family health. Family Health Care. Child welfare and school health programmes. Domiciliary midwifery practice Field work – 6 weeks, Health care institutions practice.

NSC 403: Advanced Medical and Surgical Nursing (12 Units: LH 120 PH 180)
Expand the knowledge based on disease processes as they affect the systems of the body. Concept of cellular growth and proliferation, medical care and scientific nursing management of client/patients with specific acute and chronic ailments. Concept of metabolism: disturbances of ingestion, digestion and elimination. Hepatic functions. Glucose metabolism and hormonal disturbances. Concept of oxygenation and disturbances of oxygen carrying mechanism, blood pumping mechanism and blood vessel distribution. Concept of perception and coordination. Vascular and inflammatory disturbances.
Nurse's role in the operating theatre, intensive care unit, ward and clinic situation.

NSC 404: Research Methodology (3 Units: LH 45)
The course is designed to create an awareness of and the need for research as a means for improving nursing care. The student is assisted to acquire the basic skills and knowledge required of a researcher and to conduct simple studies in her clinical area of practice.
Introduction to research methodology, the role of research in health and social welfare. Institution versus problem solving and the scientific approach. Research designs.
Application of principles of data collection, analysis and interpretation. Interpretation and utilization of research findings. Utilization of research methodology for individual and group research projects. Review of selected studies in the health care industry.

NSC 405: Principles of Education and Teaching Methodology (3 Units: LH 45)

This course is designed to introduce the student to the principles of education and educational methodology. It stresses the role of the student as a teacher and health education. Principles of education, principles of Teaching/Learning philosophy and objectives of education in Nigeria. Relationship of the national policy and philosophy on education to the education of nurses. Qualities of a teacher. Teacher/Learner interaction.

The learning environment, The learner, deductive and inductive reasoning. Concepts of motivation development of instructional objectives. Development of course content. Methods of evaluation.

Traditional and modern/innovative teaching methods as they apply to health professional education. Educational communication media. Development and implementation of teaching plans in clinical settings.

NSC 406 : Management of Nursing Services (3 Units: LH 45)

The course is designed to introduce the student to the philosophy, theory, principles and techniques of management as they relate to nursing care services. Essential tools for the management of nursing care and the evaluation of response to care will be discussed.

Introduction to management: Philosophy, purpose and objectives. The health care delivery system: (National and International). Tools of management, Communication and interpersonal relationship. Interviewing skills. Concepts of guidance and counselling. Elements of nursing management. Standards of Nursing practice. Management of human and material services. Budgeting and staffing. Supervisory process. Concepts of evaluation of clinical settings. Accountability and the role of research in practice.

NSC 407: Practicum in Teaching and Management (2 Units: PH 90)

The course enables the student to utilize the principles and techniques of teaching and management in health care settings. Opportunity is given for health education at the primary, secondary and tertiary levels of health care.

500 Level

NSC 501: Advanced Mental Health & Psychiatric Nursing (5 Units: LH 30; PH 135)

The course deals with preventive aspects of mental health and involves the role of traditional healers as they affect the mental/psychiatric disease interpretation in urban and rural settings. The role of the mental/psychiatric health care in schools, industries and homes. The nurse as a therapeutic agent. Social issues affecting the nature of mental illness. Research and mental/psychiatric health. Mental health, culture and the Nigerian society.

NSC 502: Advanced Maternal and Child Health Nursing (5 Units: LH 30; PH 135)

This course is designed to enable the student transfer the theoretical knowledge of maternal and child health nursing to practice settings. Growth and development of the child. Child health and genetics. Family care studies are essential. Domiciliary Midwifery Practice. Immunization: Expanded Programme on Immunisation. Oral Rehydration Therapy. Physical assessment, nursing diagnosis, the use of standing order and implementation of nursing

intervention. Family planning and post natal exercises. Health education and the monitoring of growth and development.

NSC 503: Advanced Community Health Nursing (5 Units: LH 30; PH 135)

The course is on further development of students' knowledge and skills in the planning, organisation, and administration of community health nursing and primary health care services. The course emphasizes the application of integrated knowledge in the development, implementation and evaluation of community health nursing and primary health care programmes, using a model of Community Health Planning Cycle of, "Need Assessment or community health diagnosis; development, of Care Plans; implementation of care Evaluation" and building on earlier community-based exposure at 300 level.

The course will involve:

i) A period of attachment to PHC programmes and public health facilities;
ii) Further attachment to a defined rural/urban geographical-political community for the collection, analysis and presentation of data for in-depth assessment of community health problems or programmes;
iii) Planning with groups concerned with heath care in the communities;
iv) Implementation of care plan through participation and working with community agencies;
v) Programme evaluation.

The course will also cover other traditional areas of public health, particularly international health, port health, social welfare services and occupational health and tools and technique of health promotion and disease prevention.

NSC 505: Nursing Seminar (2 Units: LH 30)

The course is designed to enable students identify issues and trends in nursing and health care. In-depth knowledge is derived through literature review and interaction with members of the health team. Case studies will also be presented.

NSC 506 : Nursing Entrepreneurship (2 Units: LH 30)

Introduction to basic definitions, objective, theories and practice, market survey and business plan; legal aspects, exploration of opportunities and possibilities; financing an enterprise; managing human, financial and other resources; legal aspects; case studies of successful and failed private nursing enterprises.

NSC 507: Health Economics (2 Units: LH 30)

The course is designed to allow grasping of the concepts of demography and social stratification as it influences access to nursing services. Introduction of notion of social welfare, problems of production, scarcity, choice and opportunity cost. The costing of health and nursing services, availability and distribution. Cost recovery of services. Role of nurses in the Natural Health Insurance Scheme.

NSC 508: Research Project (4 Units: PH 180)

Students are guided in the development, execution and writing of their research project.

NSC 509: Electives in Nursing Specialties **(6 Units: LH 45; PH 135)**

Each student decides on a clinical area of special interest for in-depth study and practice. Application of theoretical knowledge is emphasized.

3.7 OPTOMETRY (O.D. Doctor of Optometry)

3.7.1 Philosophy, Aims and Objectives of the Degree programme

Philosophy

The Philosophy of the programme is borne out of the necessity to appreciate recent advances in technology to meet the modern day challenges in Optometry education to meet the present day practice by seeking to impart body of knowledge necessary to cope with these advances through the development of abilities, expertise, skill and responsibilities

Aims and Objectives

The aims and objectives of the degree programme are:

i. To provide students with a broad and balanced foundation of knowledge in optometry as well as practical and clinical skills.
ii. To instil in students a sense of enthusiasm for optometry, an appreciation of its application in different contexts and to involve them in an intellectually stimulating and satisfying experience of learning and studying.
iii. To develop in students the ability to apply their knowledge in optometry and skills to the solution of theoretical and practical problems in Optometry.
iv. To develop in students through an education in optometry, a range of transferable skills of value in optometry and non-optometry related employment.
v. To provide students with knowledge and skills base from which they can proceed to further studies in specialized areas of Optometry.
vi. To generate in students an appreciation of importance of Optometry in an Industrial, Clinical, Economic, Environmental and Social context.

3.7.2 Admission and Graduation Requirements

The general admission requirements are as contained in Section 1.4. The modes of entry are UTME, direct entry and interuniversity transfer. To be admitted into the programme the candidate must meet these entry requirements.

Duration of Programme

The programme shall run for 6 years for Joint Matriculation Examination entry candidates and 5 years for direct entry candidates. The pass mark for core courses is 50%. The degree is a non-classified degree.

2.40 – 5.00	Pass
See statement on Probation and Withdrawal in 1.6.6 & 1.6.7 above	

3.7.3 Learning Outcome

By the end of the academic programme, the graduate of the programme should demonstrate knowledge content, competencies and skills and behavioural attributes consistent with the qualities expected from the programme as stipulated below:

a) **Regime of Subject Knowledge**:

It is expected that at the end of an programme, the graduate must be proficient in:

(i) Handling of both diagnostic and major therapeutic ophthalmic drugs.
(ii) Effective use of the Ophthalmoscope, Slit Lamp Biomicroscope Retinoscope Tenometer, Visual field equipment and other modern equipment.
(iii) Ophthalmic dispensing.
(iv) Be able to function effectively in interdisciplinary eye care team whether in a hospital, industrial or any other setting for that matter.
(v) Be proficient in Community / Public Ocular Health Services.

b) **Competencies and Skills**

At the end of training in the programme, a graduate is expected to develop a wide range of different abilities and skills. Some of the main abilities and skill expected of the graduate are as follows:

i) Optometric related cognitive abilities and skills.
ii) Ability to recognize and analyse ophthalmic problems and plan strategies for their solution.
iii) Skills in the evaluation and interpretation of Ophthalmic/Clinical information and data.
iv) Skills in presenting clinical cases clearly and correctly in writing and orally to a range of audiences.
v) Information – Technology Skills such as word-processing and spreadsheet use, data-logging and storage, internet communication etc.

c) **Behavioural Attributes**

The graduate should exhibit the following attributes:

i) Integrity and commitment to sanctity of facts.
ii) Demonstrate tolerance and accommodation to others, irrespective of differences as a reflection of bias free attitudes acquired through training.
iii) Conversant with and subscribe to acceptable professional ethics in handling clinical patient information.
iv) Subscribe to acceptable professional ethics on the handling of dangerous microorganisms in relation to storage transportation and use in research.

3.7.4 **Attainments Levels**

It is essential that the procedure used for students' assessment should correspond to the knowledge, abilities and skills that are to be developed through their degree programme. These should be based on:

i) Formal examinations
ii) Laboratory reports/records
iii) Problem-solving exercises
iv) Oral presentations
v) Planning, conduct and reporting of project work and researches.

3.7.5 Resources Requirements for Teaching and Learning

a) **Academic and Non Academic Staff**

The academic staff- student ratio should not exceed 1: 15 for the programme. The Lecturers for programme are expected to have acquired the PhD degree and should account for at least 70% of the total number. In addition candidates possessing higher academic qualifications such as M.Sc/ PhD in relevant specialties can be employed as a lecturer. Academic staff should be in the right mix in accordance with stipulated guidelines.

b) **Academic and Non Academic Spaces (See section 1.6 for details)**

The Head of Department and other Lecturers should have their offices, while the HOD's office should have a complementary office with serving secretarial staff. Lecturers should not be more than two in an office. Adequate classrooms for lectures, Adequate laboratories/demonstration and Clinical Rooms should be available.

c) **Library and Information Resources**

The should be a departmental/ faculty/ college library stocked with relevant books, journals and reference materials including PCs and audiovisual materials.

3.7.6 Course Structure and Synopses

100 Level

A: Course Structure

Course Structure for 100 Level Optometry Degree Programme

Course Code	Course Title	Units	Status	LH	PH
BIO 101	General Biology I	3	C	45	-
BIO 102	General Biology II	3	C	45	-
BIO 107	General Biology Practical I	1	C	-	45
BIO 108	General Biology Practical II	1	C	-	45
CHM 101	General Chemistry I	3	R	45	-
CHM 102	General Chemistry II	3	R	45	-
CHM 107	General Chemistry Practical I	1	R	-	45
CHM 108	General Chemistry Practical II	1	R	-	45
CSC 101	Introduction to Computer Science	3	C	30	45
GST 111	Communication in English	2	C	30	-
GST 112	Logic, Philosophy and Human Existence	2	E	30	-
GST 113	Nigerian Peoples and Culture	2	R	30	-
GST 121	Use Library, Study Skills & ICT	2	C	30	-
GST 122	Communication in English II	2	C	30	-

GST 125	Contemporary Health Issues	2	R	30	-
MTH 101	Elementary Mathematics I	3	R	45	-
PHY 101	General Physics I	3	R	45	-
PHY 102	General Physics II	3	R	45	-
PHY 107	General Physics Practical I	1	R	-	45
PHY 108	General Physics Practical II	1	R	-	45
	Total	42			

Course Structure for 200 Level Optometry Degree Programme

Course Code	Course Title	Units	Status	LH	PH
ANA 211	Systemic and Functional Anatomy	2	C	15	45
ANA 212	Regional Anatomy	2	C	45	45
GST 211	Environment and Sustainable Development	2	R	30	-
GST 222	Peace and Conflict Studies	2	R	30	-
GST 223	Introduction to Entrepreneurship	2	R	30	-
GST 224	Leadership Skills	2	R	30	-
BCH 201	General Biochemistry I	3	E	45	-
BIO 201	Genetics I	2	E	30	-
GST 211	Environment and Sustainable Development	2	R	30	-
MCB 221	General Microbiology	3	E	30	45
MTH 102	Elementary Mathematics II	3	E	45	-
OPT 200	Optics Laboratory	2	C	-	90
OPT 208	Ocular Anatomy Laboratory	2	C	-	90
OPT 210	Geometrical Optics	2	C	15	45
OPT 217	Ocular Anatomy I	2	C	30	-
OPT 220	Physical Optics	2	C	15	45
OPT 299	Students' Industrial Work Experience	3	C	-	35
PIO 203	General Physiology	3	C	45	-
PHE 201	Biostatistics	2	E	30	-
	Total	**43**			

Course Structure for 300 Level Optometry Degree Programme

Course Code	Course Title	Units	Status	LH	PH
BCH 301	Enzymology	3	R	45	-
BCH 306	Analytical Methods in Biochemistry	3	R	30	45
GST 311	Entrepreneurship	2	R	30	-
OPT 300	Physiological Laboratory	2	C	30	-
OPT 301	Ophthalmic Optics Laboratory	2	C	30	-

OPT 310	Physiological Optics I	2	C	30	-
OPT 311	Ophthalmic Optics I	2	C	30	-
OPT 312	General Optometry 1	2	C	30	-
OPT 317	Neurophysiology	3	R	45	-
OPT 318	General Pathology	2	R	30	-
OPT 320	Physiological Optics II	3	C	30	45
OPT 321	Ophthalmic Optics II	2	C	30	-
OPT 322	General Optometry II	2	C	30	-
OPT 327	Ocular Physiology	2	C	30	-
OPT 328	General Pharmacology	2	R	30	-
OPT 399	Students' Industrial Work Experience	3	C	-	13
	Total	**37**			

Course Structure for 400 Level Optometry Degree Programme

Course Code	Course Title	Units	Status	LH	PH
OPT 400	Physiological Optics Laboratory.	2	C	-	90
OPT 403	General Optometry Laboratory.	3	C	15	90
OPT 404	Contact Lens Laboratory.	2	C	15	45
OPT 410	Physiological Optics III	3	C	15	90
OPT 412	General Optometry III	2	C	15	45
OPT 414	Contact Lens I	2	C	15	45
OPT 417	Ocular Pathology I	2	C	30	-
OPT 418	Ocular Pharmacology	2	C	30	-
OPT 420	Physiological Optics IV	3	R	15	90
OPT 422	General Optometry IV	2	C	30	-
OPT 424	Contact Lens II	2	C	15	45
OPT 427	Ocular Pathology II	2	C	30	-
OPT 432	Optometric Instrumentation	2	C	15	45
OPT 433	Epidemiology	2	R	30	-
OPT 435	Functional Optometry	2	C	30	-
OPT 437	Health Science for Optometry	2	E	30	-
	Total	**35**			

Course Structure for 500 Level Optometry Degree Programme

Course Code	Course Title	Units	Status	LH	PH
OPT 500	Mechanical Optics	2	R	15	45
OPT 501	Clinical Optics	2	C	15	45
OPT 503	Primary Optometry Clinic	4	C	-	180
OPT 504	Contact Lens Clinic	2	C	15	45

OPT 505	Speciality Optometry Laboratory.	4	C	-	180
OPT 512	Paediatric Optometry	3	C	15	90
OPT 515	Strabismus and Amblyopia	2	C	15	45
OPT 519	Practice Management	2	R	30	-
OPT 522	Geriatric Optometry	2	C	15	45
OPT 524	Rehabilitative Optometry	2	R	30	-
OPT 525	Orthoptics	2	C	30	-
OPT531	Scientific Research Methods	2	C	30	-
OPT 536	Neuropathology	2	R	30	-
OPT 537	Applied Psychology for Optometrists	2	R	30	-
OPT 538	Endocrinology and Nutrition	2	R	30	-
OPT 539	Community Optometry	2	R	30	-
	Total	**37**			

Course Structure for 600 Level Optometry Degree Programme

Course Code	Course Title	Units	Status	LH	PH
OPT 600	Research Project	6	C	-	270
OPT 602	Primary Optometry Clinic	6	C	-	270
OPT 603	Externship	7	R	-	315
OPT 604	Paediatric Clinic	2	C	15	45
OPT 605	Rehabilitative Clinic	2	C	-	90
OPT 606	Environmental Vision	3	C	45	-
OPT 609	Advanced Practice Management	2	C	30	-
OPT 631	Seminar in Research Topics	2	E	30	-
OPT 632	Hospital Practice	2	E	-	90
	Total	**32**			

Course Synopses

200 Level

MCB 221: General Microbiology **(3 Units: LH 30; PH 45)**
Nutrition and biochemical activities of micro-organisms. Antigens and antibodies. Identification and economic importance of selected microbial groups. Microbial variation and heredity.

MTH 102: Elementary Mathematics II (Calculus) **(3 Units: LH 45)**
Function of a real variable, graphs, limits and idea of continuity. The derivative, as limit of rate of change. Techniques of differentiation. Extreme curve sketching. Integration as an inverse of differentiation. Methods of integration, definite integrals. Application to areas, volumes.

OPT 200: Optics Laboratory **(2 Units: PH 90)**
Optical bench experiments; object-image relationship, with Lenses and Mirrors, Magnification. Aberration; Ray tracing. Optical principles of lensometry. Co-requisite - OPT 210.

OPT 208: Ocular Anatomy Laboratory **(2 Units: PH 90)**
Prepared slides of various section of the eye. Identification of bones and sutures, fossi of the orbits and Cranium. Dissection of Bovine eye.

OPT 210: Geometrical Optics **(2 Units: LH 15; PH 45)**
Principles of geometrical optics including reflections and refractions, spherical and cylindrical lenses mirrors, thin and thick lenses, lens systems, ray tracing, apertures, prisms, aberrations, lens design and optical instruments. Transposition and specification of ophthalmic lenses. Laboratory work is included.

OPT 217: Ocular Anatomy I **(2 Units: LH 30)**
An overview of the anatomy of the eye and orbit. Structure of the orbit, eye lids, lachrymal apparatus, conjunctiva, sclera, cornea, anterior chamber iris, posterior chamber, lens, ciliary body and extra ocular muscles.

OPT 220: Physical Optics **(2 Units: LH 15; PH 45)**
Principles of wave optics, interferences, diffraction, polarization, radiometry, holography, quantum nature of light, spectroscopy, lasers. Relativistic optics. Laboratory work is included. Pre-requisite: OPT 210.

OPT 299: Students' Industrial Work Experience **(3 Units: PH 135)**
Students will be posted to recognized and relevant placement areas of their choice during the industrial training. This will last for twelve weeks. Continuous assessment of students will be undertaken jointly by their host supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training. Grades are allotted according to ITF directives.

300 Level

BCH 301: Enzymology **(3 Units: LH 45)**
Discovery, classification and nomenclature of enzymes. Vitamins and co-enzymes; minerals in enzyme biochemistry. Fat and water soluble vitamins. Structures and functions of vitamins and co-enzymes. Genetics of enzymes. Enzyme inhibition. Mechanisms of enzyme-

catalysed reactions. Effects of temperature, pH, ions and inhibitors on enzyme catalysed reactions. Derivation and significance of Michaelis-Menten equation. Allosteric/Regulatory enzymes. Active sites of enzymes. Estimation of kinetic parameters of enzyme activities. Zymogen activation, digestive enzymes etc. Production, isolation, purification and characterization of enzymes. Recent advances in enzymology.

BCH 306: Analytical Methods in Biochemistry (3 Units: LH 30; PH 45)
Tissue and cell culture techniques, immunoassays, blotting, and isotopic techniques. Principles, methodologies, instrumentation and applications of electrophoresis, manometry and centrifugation techniques. Chromatographic techniques including paper, thin layer, column, gas, and high performance chromatographic techniques. . Spectroscopic techniques including ultraviolet, visible, infra-red, nuclear magnetic resonance and mass spectrometry. Fluorimetry, polarographic including potentiometric and electrometric measurements. This course includes laboratory practical classes which will provide students opportunity to practice the various techniques and familiarise themselves with the types of equipment used for the techniques.

OPT 300: Physiological Laboratory (2 Units: LH 30)
Schematic eye, Visual acuities; Vernier acuity, Stereoacuity, Optometer, Contrast sensitivity. "AC/A Ratio" "Co-requisite OPT 310"

OPT 301: Ophthalmic Optics Laboratory (2 Units: LH 30)
Ophthalmic Lens, manufacture, surfacing and edging. Insertion of lenses into frames and frame repairs. Co-requisites: OPT 311.

OPT 310: Physiological Optics I (2 Units: LH 30)
The eye as an optical instrument; Reduced and schematic eyes; Anomalies of refraction and optical aberrations of the eye. The Badal optometer; Resolution and visual acuity. Laboratory work is included. Co-requisite: 312.

OPT 311: Ophthalmic Optics I (2 Units: LH 30)
The history and development of ophthalmic lenses and lens materials; Spherical, cylindrical and sphero-cylindrical lenses. Transposition, toric surfaces, centration and decentration, ophthalmic prisms and prismatic effects. Special lenses.

OPT 312: General Optometry 1 (2 Units: LH 30)
The development of optometry as a profession and its relationship with other allied health-care professions including opticianry and ophthalmology. The function and scope of the optometrist and other vision-care professionals at present and in the future. Legal recognition of optometry and the role of professional organizations. An introduction to optometric terms and instrumentation. The types and incidence of refractive errors. Co-requisite: OPT 310. adaptation 1.1

OPT 317: Neurophysiology **(3 Units: LH 45)**
Anatomy, Physiology and functions of the Supraretinal System; Ganglion Cells. Optic nerve, Lateral geniculate body, Visual cortex, forebrain, superior colliculus, pre-tectal and tectal regions, Cerebellum, Vestibular system, inferior Co1liculus. Broadman and the 'V' classifications of the brain. Functional Mappings in the brain like colour, memory etc.

OPT 318: General Pathology **(2 Units: LH 30)**
Introduction to the study of disease. Fundamental pathological processes; anomalies of cellular functions and human immunology; disorders of organ systems. Pre-requisite: OPT 207, 228. Co-requisite: OPT 318.

OPT 320: Physiological Optics II **(3 Units: LH 30; PH 45)**
The extra-ocular muscles, their electrophysiology, actions, and innervation. Accommodation, convergence, the AC/A ratio and binocular co-ordination. Fusion, fusional vergence, retinal disparities and the horopter. Laboratory work is included. Pre-requisite: OPT 310 Co-requisite: OPT 322.

OPT 321: Ophthalmic Optics II **(2 Units: LH 30)**
Bifocal and multifocal lenses; absorptive lenses; optics of contact lenses and low vision devices. Pre-requisite: OPT 311.

OPT 322: General Optometry II **(2 Units: LH 30)**
Clinical techniques used to evaluate the optical properties of the eye; theory and measurement of visual acuity and retinoscopy. An introduction to keratometry, ophthalmoscopy and external examination techniques. Accommodation: Its measurement and relationship to convergence. Ocular deviations: Phorias, tropias, and an introduction to their measurement. Pre-requisite: OPT 312 Co-requisite: OPT 320

OPT 327: Ocular Physiology **(2 Units: LH 30)**
The physiology of the eye. Functions of the eyelids, lachrymal apparatus. Conjunctiva sclera, cornea, anterior and posterior chamber, iris lens, ciliary muscle, retina, choroid and optic nerve. Production and drainage of extra and intraocular fluids. Intra ocular pressure. Metabolism. Laboratory work is included. Pre-requisite: OPT 227, 228 Co-requisite: OPT 317

OPT 328: General Pharmacology **(2 Units: LH 30)**
General principles of pharmacology; principles and classification of autonomic drugs. Pre-requisite: BCH 220

OPT 399: Students' Industrial Work Experience **(3 Units: PH 135)**
Students will be posted to recognized and relevant placement areas of their choice during the industrial training. The 3 months will be spent in hospitals. Continuous assessment of students will be undertaken jointly by their industrial-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a

seminar on major duties performed and skills acquired during the training. Grades are allotted according to ITF directives.

400 Level

OPT 400: Physiological Optics Lab **(2 Units: PH 90)**
Pulfrich phenomenon, Postpoint, Pre-adaptatlon, Colour Vision, Horopter, fixation disparity, Desk adaptation Labs, Optical illusions Holography, Entoptic phenomenon. Co-requisite: OPT 410.

OPT 403: General Optometry Lab. **(3 Units: LH:15; PH 90)**
Techniques learnt in OPT 412 are practised and developed preparatory to examining patients. Pre-requisite: OPT 322 Co-requisite: OPT 412

OPT 404: Contact Lens Laboratory **(2 Units: LH 15; PH 45)**
Pre-fitting examination, contact lens selection and fitting, evaluation of fit, insertion and removal. Lens inspection and verification. Lens modification (Hard lens) ordering and dispensing. Co-requisite: OPT 414.

OPT 410: Physiological Optics III **(3 Units: LH 15; PH 90)**
The photochemistry of vision. Sensory aspects of vision; thresholds and adaptation. The mechanisms of colour vision; colour vision defects, their detection and significance. Electrophysiology of the retina and visual pathway. Laboratory work is included. Pre-requisite: OPT 310, 320.

OPT 412: General Optometry III **(2 Units: LH 15; PH 45)**
The optometric examination: Visual acuities, cover testing, test of versions and vergences, near point of convergence, fusion test and keratometry. Techniques of photometry Von Graefe phoria testing and prism vergence testing. Static and dynamic retinoscopy subjective sight testing, fogging, fan-dial, monocular cross cylinder, monocular and binocular balancing. Methods of measuring amplitude of accommodation and determining the near addition.
Pre-requisite: OPT 312, 322 Co-requisite: OPT 403

OPT 414: Contact Lenses I **(2 Units: LH 15; PH 45)**
History and development of contact lenses and their physical and optical properties. The anatomical and physiological implications of contact lens wear. Patient selection and contraindications to contact lens wear. Basic fitting techniques and contact lens design. Assessing success of contact lens therapy.
Co-requisite: OPT 404

OPT 417: Ocular Pathology I **(2 Units: LH 30)**
Mechanism in ocular pathology; Patho-physiology, detection and management of anterior segment disorders. Pre-requisite: OPT 317, 318 Co-requisite: Co-requisite: OPT 418

OPT 418: Ocular Pharmacology **(2 Units: LH 30)**
Principles of ocular pharmacology. Choice and administration of diagnostic and prophylactic ophthalmic drugs. Anti-infective preparations. Examination under drugs-interpretation and allowances. Precautions and adverse effects from use of ophthalmic drugs. Therapeutics Clinical work is included.
Pre-requisite: OPT 327.

OPT 420: Physiological Optics IV **(3 Units: LH 15; PH 90)**
The perception of depth, direction, size, shape distance, motion and time through the visual medium. Optical illusions and entoptic phenomena; their causes and significance to the visual system. Laboratory work is included. Prerequisite: OPT 320

OPT 422: General Optometry IV **(2 Units: LH 30)**
A continuation of OPT 412. The case history and its relationship to optometric examination; the integration of individual findings. Visual analysis, graphical analysis, diagnosis, prognosis and therapy. Introduction to specialized techniques such as tonometry, ophthalmoscopy, lensometry, biomicroscopy, stereoacuity testing, gonioscopy perimetry, colour vision testing and sphygmomanometry.
Pre-requisite: OPT 412 Co-requisite: OPT 403

OPT 424: Contact Lenses II **(2 Units: LH 15; PH 45)**
A continuation of OPT 414. Advanced fitting techniques; toric and bi-toric lenses, keratoconic patients. Monitoring contact lens wearers and fitting presbyopic patients. Pre-requisite: OPT 414.

OPT 427: Ocular Pathology II **(2 Units: LH 30)**
A continuation of OPT 417. Patho-physiology, detection and management of posterior segment disorders; Ocular emergencies. Pre-requisites: OPT 417.

OPT 432: Optometric Instrumentation **(2 Units: LH 15; PH 45)**
Principles of Operation, basic maintenance and repairs of common Optometric Instruments.

OPT 433: Epidemiology **(2 Units: LH 30)**
General epidemiologic concepts. Distribution and dynamics of diseases. Natural history, epidemiologic methods, Infectious disease epidemiology, decision analysis and clinical decision study design, core study.

OPT 435: Functional Optometry **(2 Units: LH 30)**
Analytical methods in evaluating Optometric data. Optometry extension programme methods. Case analysis the DEP techniques.

OPT 437: Health Sciences for Optometry **(2 Units: LH 30)**
Consideration of prevalent diseases that are of interest to the Optometrist; Systemic diseases with Ocular side effects, Ocular and general emergencies.

500 Level

OPT 500: Mechanical Optics **(2 Units: LH 15; PH 45)**
Ophthalmic lens manufacture, surfacing and edging insertion of lenses into frames and frame repair. Pre-requisite: OPT 321.

OPT 501: Clinical Optics **(2 Units: LH 15; PH 45)**
Ophthalmic frames, facial measurement and frame sizes. Placement of Optical Centres, bifocals and multifocal segments. Adjustment of frames and minor repairs. Order writing. Co-requisite: OPT 500.

OPT 503: Primary Optometry Clinic **(4 Units: PH 180)**
Examination diagnosis, and treatment of patients in the optometry clinic under the supervision of an optometrist. Emphasis is placed on the routine optometric examination and the detection of pathology. Pre-requisite. OPT 422, 403.

OPT 504: Contact Lens Clinic **(2 Units: LH 15; PH 45)**
Advanced fitting techniques; toric and bi-toric lenses, Keratoconic patients Monirory Contact lens. Wearers and fitting presbyopic patients.
Pre-requisite: OPT 404,414.

OPT 505: Speciality Optometry Laboratory **(4 Units: PH 180)**
Laboratory exercises in Orthoptics, Geriatric, Paediatric Clinics. Use of instrument and techniques in these fields. Co-requisite: OPT 515, 525

OPT 512: Paediatric Optometry **(3 Units: LH 15; PH 90)**
A review of the development of vision and the distribution of refractive errors among infants, common congenital disorders, clinical assessment procedures for the young patient (birth through elementary school), identification of learning disorders and recommendation of appropriate remedial programme. Clinical work is included. Pre-requisite: OPT 412 Co-requisite: OPT 505

OPT 515: Strabismus and Amblyopia **(2 Units: LH 15; PH 45)**
Requisites for normal binocular vision. Incidence and classification of strabismus and amblyopia. Neuro-physiological basis for binocular vision. Causes of strabismus and Amblyopia. Adaptive conditions commonly associated with strabismus. Clinical characteristics. of eyes with amplyopia. Routine examination of strabismus patients and anisometropia amblyopia. Clinical work is included. Co-requisite: OPT 505.

OPT 519: Practice Management **(2 Units: LH 30)**
The various modes of practice; single, partnership, group practice, employed practice in hospitals, government and industry. The development and management of an optometric practice. Office location and layout and the development of inter-and intra-professional relationships.

OPT 522: Geriatric Optometry **(2 Units: LH 15; PH 45)**

Defining the geriatric patient. Psychological, Physiological, social and ocular problems of the elderly. Techniques for refraction, binocularity and ocular health assessment of the elderly with emphasis on involutional and pathological changes. Special ocular-visual problems of concern to the elderly patient. Presbyopia, cataracts, aphakia, visual field losses, low contrast sensitivity and colour vision. Handling, counselling the elderly patient. Problems of therapy, management and compliance. Special problems of the hospitalized and bedridden elderly patients. Clinical work is included. Pre-requisite: OPT 505.

OPT 524: Rehabilitative Optometry **(2 Units: LH 30)**

Principles of low vision; Magnification, telescopic systems. microscopic systems and magnifiers. The definition and aetiology of low vision. Prognosis and management; illumination control, optical and non-optical aids. Ocular prostheses. Aniseikonia. Pre-requisite: OPT 210 Co-requisite: OPT 523.

OPT 525: Orthoptics **(2 Units: LH 30)**

An introduction to the binocular vision anomalies of both the strabismus. and non-strabismus patient. The treatment of problem of convergence and divergence, accommodation, fusional reserves. The detection, measurement and treatment of strabismus, eccentric, fixation, micro-strabismus, etc. The prognosis for a functional or cosmetic cure of binocular vision anomalies.

OPT 531: Scientific Research Methods **(2 Units: LH 30)**

Introduction to the basic principles of scientific research -Definition of scientific problem; Review of current literature. Experimental design; Data collection; Analysis of data and interpretation of results; Preparation of a complete, readable and correct report of the research.

OPT 536: Neuropathology **(2 Units: LH 30)**

Review of human anatomy. Pupillary and accommodative anomalies in Neurological diseases. Headaches, migraines, and other photopsic episodes. Optic nerve disorders, supra-nuclear, nuclear and intra-nuclear. Oculomotor presentations, nystagmus, practical approach to some common non- ocular neurological complaints. Pre-requisite: OPT 317.

OPT 537: Applied Psychology for Optometrists **(2 Units: LH 30)**

Introduction to clinical psychology. Role of behavioural sciences in optometric practice; clinician-patient relationship. Psychopathology; identification and management, crisis intervention. Clinician- patient communication. Suggestion and hypnosis.

OPT 538: Endocrinology and Nutrition **(2 Units: LH 30)**

Basic human endocrine systems, their general functions, modes of action, regulation and transport. Metabolic disturbances related to dietary deficiencies and excesses. Pre-requisite: OPT 209

OPT 539: Community Optometry **(2 Units: LH 30)**
Epidemiology – definition, principles and methods, Health Education, Environmental Health, Occupation Health, Public Health Administration/Health Care. Epidemiology of communicable and non-communicable diseases. Social medicine. National and International regulations relating to health.

600 Level

OPT 600: Research Project **(6 Units: PH 270)**
An investigation is carried out in specialized areas of optometry under the supervision of academic staff and a thesis embodying the results is submitted and defended at the end. Pre-requisite: OPT 531

OPT 602: Primary Optometry Clinic **(6 Units: PH 270)**
Clinical practice with emphasis on total scope of optometric patient care including general care of children, adults and geriatric populations; diagnosis of ocular disease; contact lenses; visual training and dispensing.
Pre-requisite: OPT 503, 504, 505.

OPT 603: Externship **(7 Units: PH 315)**
Optometric patient care provided in interdisciplinary and non- interdisciplinary health care setting (external to University) by students under strict supervision.
Pre-requisite: OPT 503, 504, 505.

OPT 604: Paediatric Clinic **(2 Units: LH 15; PH 45)**
Examination, diagnosis, treatment and management of infants to adolescents. Orthoptics practice. Pre-requisite: OPT 505, 512, 525.

OPT 605: Rehabilitative Clinic **(2 Units: PH 90)**
Examination, diagnosis, treatment and management of Geriatric and low vision patients. Pre-requisite: OPT 505, 522, 524.

OPT 606: Environmental Vision **(3 Units: LH 45)**
Radiation and illumination, protection against radiation and other hazards; Evaluation and design of Lighting; Vision through the atmosphere; Problems of vision under water; Human factors in the solution to visual problems.
Pre-requisite: OPT 433.

OPT 609: Advanced Practice Management **(2 Units: LH 30)**
Financing the optometric practice; Initial purchase of equipment and stock; Accounting procedures; Investments; Limited Liability Companies. Introduction to the Legal system; Employment agreements. Pre-requisite: OPT 519, 537.

OPT 631: Seminar in Research Topics **(2 Units: LH 30)**

Recent developments in Optometry. Current research methods, advantages and disadvantages. Review of current literature. Current diagnostic and therapeutic techniques, advantages and drawbacks. Co-requisites: OPT 600.

OPT 632: Hospital Practice **(2 Units: PH 90)**

This involves attending to patients within health care setting external to the University: Hospitals, Health Centres and ambulatory care services. Inter-disciplinary practice. Pre-requisite: OPT 417, 427, 503. Co-requisite: OPT 603.

3.8 PHARMACOLOGY (B.Sc. Pharmacology)

3.8.1 Philosophy, Aims and Objectives of the Degree Programme

Philosophy

To train high level manpower in the area of drug development so as to fill in the gaps in the pharmaceutical industry, research institutes, and as
trainers in the school of nursing and allied health sciences

Aims and Objectives

To train students to become:

i) Scientists and researchers in health-related industries
ii) Skilled health care workers in pharmaceutical industries in the area of drug development
iii) Broad knowledge pharmacologists who will be able to specialize in different areas of the field.
iv) Future pharmacology teachers in the University most especially in the School of Medicine, and allied health sciences.

3.8.2 Admission and Graduation Requirements

The general admission and graduation requirements are stated in section 1.3
The programme duration shall be for a period of 4 academic sessions for UTME candidates and 3 academic sessions for direct entry candidates

To be eligible for the award of a Bachelor of Science Degree, a student must obtain a minimum total of **90 Units** in the three-year programme or **120 Units** in the four-year programme, inclusive of the university course requirements

3.8.3 Learning outcomes

a) **Regime of Subject Knowledge**

The graduate of the programme is expected to have acquired:

i) Working knowledge of sources of drugs and drug information
ii) Knowledge and skills in understanding mechanisms of action of drug how drug works in the body
iii) Understanding of careful selection and testing of drugs and natural products before application in medicine
iv) Understanding of basic techniques in the pharmacological investigations of drugs and natural products.
v) A broad knowledge of issues in drug control and in our environment.

The product of the programme should develop skills covering written and oral communication in teaching, in carrying out practicals and training of other health scientists who may desire knowledge in the area of drug development and management.

b) **Competencies and Skills**

The graduate of the programme shall be able to:

i) Render scientific information on drugs
ii) Render service on proper laboratory evaluation of our natural products that may be use in treatment of different diseases
iii) Perform simple laboratory investigations on the action or in action of any medical products and be able to carry out basic pharmacological screening.
iv) Use evidence – based pharmacological investigations to certify drugs and natural products
v) Interpret medical inserts and marketing and post marketing surveillance

c) **Behavioural Attributes**

The graduate of the programme shall have basic knowledge about scope of drug action and the pharmacological and therapeutic use of drugs and natural products. The graduate is therefore well equipped to offer services in research institutes, drug companies, universities and other areas of health sciences research.

3.8.4 **Attainment Levels**

Students in the Pharmacology Degree programme must attain sufficient level of cognitive knowledge, practical skills and attitudinal orientation to be able to pass the degree and the professional examination as well as demonstrate competence and proficiency.

3.8.5 **Resources Requirement for Teaching and Learning**

The University shall have adequate human and physical resources before commencement of the programme. These shall be library facilities with strong information technology backing. Full equipped laboratories and classrooms and facilities.

a) **Academic and Non-Academic Staff**

The minimum standards for staff requirements are as stated in section 1.6.

Staff/Student Ratio

i) The minimum ratio of academic staff to students in the pharmacology programme shall be 1:15. The mix of academic staff shall be as stated in section 1.6.

b) **Academic and Non-Academic spaces**

The University shall provide adequate and appropriate physical spaces to meet the teaching requirements of the different areas of this curriculum as stated in section in section 1.6:

Lecture/Seminar Rooms/Laboratories

There must be a lecture theatre/auditorium large enough to accommodate all the students. The department should have a seminar room/s for tutorials. There should be adequate laboratory spaces.

It is desirable to have a departmental research laboratory for academic staff and for postgraduate students in the department.

Heads of the departments and academic staff should have adequate offices headed by a confidential secretaries
Office Spaces shall be provided for all academic and non-academic staff as stated in section 1.6.

c) **Academic and Administrative Equipment**
There must be adequate teaching and research facilities
i) Audio -Visuals
ii) Tutorials and Seminars
iii) Laboratory investigation/practice
iv) Project writing and presentation /defence
v) Research methods and instrumentation

d) **Library and Information Resources**
i) There shall be a well-equipped library with sufficient reading space and adequate supply of up-to-date journals, periodicals and reference text books
ii) Departmental libraries and reading room shall be provided.
iii) There shall be a virtual library with ICT facilities

3.8.6 **Course Structure and Synopses**

100 Level

A: Course Structure

Course Structure for 100 Level Pharmacology Programme

Course Code	Course Title	Units	Status	LH	PH
BIO 101	General Biology I	3	C	45	-
BIO 102	General Biology II	3	C	45	-
BIO 107	General Biology Practical I	1	C	-	45
BIO 108	General Biology Practical II	1	C	-	45
CHM 101	General Chemistry I	3	R	45	-
CHM 102	General Chemistry II	3	R	45	-
CHM 107	General Chemistry Practical I	1	R	-	45
CHM 108	General Chemistry Practical II	1	R	-	45
CSC 101	Introduction to Computer Science	3	C	30	45
GST 111	Communication in English	2	C	30	-
GST 112	Logic, Philosophy and Human Existence	2	E	30	-
GST 113	Nigerian Peoples and Culture	2	R	30	-
GST 121	Use Library, Study Skills & ICT	2	C	30	-
GST 122	Communication in English II	2	C	30	-
GST 125	Contemporary Health Issues	2	R	30	-
MTH 101	Elementary Mathematics I	3	R	45	-

PHY 101	General Physics I	3	R	45	-
PHY 102	General Physics II	3	R	45	-
PHY 107	General Physics Practical I	1	R	-	45
PHY 108	General Physics Practical II	1	R	-	45
	Total	**42**			

200 Level

A: Course Structure

Course Structure for 200 Level Pharmacology Programme

Course Code	Course Title	Units	Status	LH	PH
ANA 202	Histology of Basic Tissues	2	R	15	45
BCH 201	General Biochemistry I	3	R	45	-
GST 211	Environment & Sustainable Development	2	R	30	-
GST 222	Peace and Conflict Studies	2	R	30	
GST 223	Introduction to Entrepreneurship	2	R	30	-
GST 224	Leadership Skills	2	R	30	-
PCH 201	Pharmaceutical Inorganic Chemistry	3	R	30	45
PCH 202	Pharmaceutical Physical Chemistry	3	R	30	45
PCH 203	Pharmaceutical Organic Chemistry	3	R	30	45
PHA 299	Students' Industrial Work Experience	3	C	-	135
PHE 201	Biostatistics	2	C	30	-
PIO 203	General Physiology	3	R	45	-
PIO 205	Physiology for Pharmacy I	3	C	30	45
PIO 206	Physiology for Pharmacy II	3	C	30	45
	Total	**36**			

300 Level

A: Course Structure

Course Structure for 300 Level Pharmacology Programme

Course Code	Course Title	Units	Status	LH	PH
GST 311	Entrepreneurship	2	R	30	-
PHA 301	General Principles of Pharmacology	2	C	15	45
PHA 302	Pharmacokinetics and Pharmacogenetics	2	C	15	45
PCH 303	Autonomic Pharmacology I	2	R	15	45
PHA 304	Autonomic Pharmacology II	2	R	15	45

PHA 305	Neuropharmacology: CNS Depressants and Stimulants	2	C	15	45
PHA 306	Pharmacology of Organ Systems	4	C	30	90
PHA 307	Experimental Pharmacology I	4	C	15	135
PHA 308	Endocrine and Reproductive System Pharmacology	2	R	15	45
PHA 309	Vitamins and Nutritional Haemopoietic Agents	2	R	15	45
PHA 310	Toxicology	2	C	15	45
PHA 311	Methods in Toxicology	2	C	15	45
PHA 312	Chemotherapy of Tropical Infections. Antiseptics &	2	R	15	45
PHA 313	Ethics in Pharmacology	2	R	30	-
PHA 399	Students' Industrial Work Experience	3	C	-	145
Total		**35**			

400 Level

A: Course Structure

Course Structure for 400 Level Pharmacology Programme

Course Code	Course Title	Unit	Status	LH	PH
PHA 401	Chemotherapy of Microbial Diseases Vaccines and Sera	2	C	15	45
PHA 402	Chemotherapy of neoplastic Diseases, Anti-neoplastic agents	2	C	15	45
PHA 403	Immuno-Pharmacology:, Inflammation, Allergy and Anaphylaxis	2	C	15	45
PHA 404	Experimental Pharmacology II	4	C	15	13
PHA 405	Psycho-pharmacology	2	R	15	45
PHA 406	Ethnopharmacology	2	R	15	45
PHA 407	Seminars in pharmacology	2	C	30	-
PHA 408	Projects in Pharmacology	6	C	15	22
PHA 409	Breeding & Care of Laboratory Animals & Laboratory Management	3	R	15	90
PHA 412	Quantitative Pharmacology	3	R	30	45
Total		**28**			

B: Course Synopses

200 Level

PCH 201: Pharmaceutical Inorganic Chemistry (3 units: LH 30; PH 45)
Introduction to inorganic pharmaceutical chemistry. Occurrence, sources, control and removal of impurities in pharmaceuticals and their limit tests. Atomic and molecular structure and bonding. Periodic table and electronic confijuration of the elements. Inorganic substance pharmaceuticals and medicinal agents. Principles and applications of volumetric and gravimetric analysis

PCH 202: Pharmaceutical Physical Chemistry (3 units: LH 30; PH 45)
Basic knowledge of the physical non-electrolyte solutions. Colligative properties and solubility of pharmaceuticals.Osmotic pressure and isotonic solutions. Chemical and ionic equilibra. General concepts; acid-base equilibra, buffer solutions and pharmaceutical applications. Electtrochemical methods of analysis of pharmaceuticals. Electrolyte solutions and electrochemistry. Conductimetry. Potentiometry: principles, instrumentation and applications in pharmaceutical analysis. Amperiometric and dead-stop titration, polarography

PCH 203: Pharmaceutical Organic Chemistry (3 units: LH 30; PH 45)
Fundamental concepts and techniques of organic chemistry. Functional group chemistry. Strengths of acids and bases. Introduction of stereochemistry of compounds. Molecular dysmmetry,
recemization and resolution methods.

PHA 299 Students' Industrial Work Experience (3 Units)
Students will be posted for twelve weeks to recognized and relevant placement areas of their choice during the industrial training. Continuous assessment of students will be undertaken jointly by their industrial-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training. Grades are allotted according to ITF directives.

300 Level

PHA 301: **General Principles of Pharmacology (2 Units: LH 15; PH 45)**
Introduction: History of Pharmacology and relationship of Pharmacology to other Pharmaceutical and clinical subjects. Pharmacology Textbooks and journals. Definition and sources of Drugs. Routes of Drug Administration. Drug Absorption, Distribution, Elimination and factors affecting them. Enzyme induction and enzyme inhibition. Mechanisms of drug action – Receptor and non-receptor theory. Drug dosage and dose response curves. Measurement of some pharmacological parameters.

PHA 302: **Pharmacogenetics and Pharmacokinetics** **(2 Units: LH 15; PH 45)**

Pattern of transmission of single gene trait. Hardy-Weinberg Law Conditions for its Validity, application. On concepts of continuous and discontinuous variation. Pharmacogenetics (drug metabolism, tissue metabolism and receptor alterations). Compartment models (one and two) kinetics after intravenous and oral dosing. Bioavailability, Drug distribution, Protein binding. Renal excretion of drugs. Urinary excretion data in Pharmacokinetic analysis.

PHA 303: Autonomic Pharmacology I **(2 Units: LH 15; PH 45)**

Cholinergic (Parasympathetic) Mechanisms

Theory of Chemical Neurotransmitters – Evidence for Acetylcholine as a Cholinergic neurotransmitter. Detection and Bioassay of acetylcholine. Cholinergic receptors, sites of action of acetylcholine at the Neuromuscular junction. Agonists and antagonists of cholinergic transmission. Parasympathomimetic and parasympatholytic drugs. Cholinesterases and Anti-Cholinesterases. Properties and use of anti-cholinesterases. Neuromuscular transmission and drugs which enhance neuromuscular transmission. Neurovascular Blockade. Smooth muscle relaxants. Ganglion stimulation and blockade. Properties of ganglion stimulants and blockers. Structure – Activity Relationships ;among the cholinergic and anticholinergic agents.

PHA 304: Autonomic Pharmacology II **(2 Units: LH 15; PH 45)**

Adrenergic (Sympathetic) Mechanisms

Theory of chemical neurotransmitter – Evidence for Noradrenalin as an adrenergic neurotransmitter, Synthesis, storage, release, metabolism, and uptake of catecholamines. Detection and bioassay of Adrenaline and Nor-adrenaline. Adrenergic receptors – Types of adrenoceptors. Concept of agonists and antagonists.

Sympathomimetic amines – Catecholamines, properties and uses. Sympatholytic drugs (Adrenergic Blockers) properties and uses. Structure – Activity Relationships among the sympathomimetic amines and beta-Adrenergic Blockers.

PHA 305: Neuropharmacology: CNS Depressants and Stimulants
(2 Units: LH 15; PH 45)

Hypnotics, sedatives Tranquilizers. Anticonvulsants and related disorders. Anxiolytic drugs. Tricyclic antidepressants and other CNS Stimulants and analeptics. Centrally acting appetite suppressants. Antiparkinsonism drugs. Narcotics and non-narcotic analgesics. General and local anaesthetics

PHA 306: Pharmacology of the Organ Systems **(4 Units: LH 30; PH 90)**

Cardiac muscle. physiology. Cardiac glycosides. Anti hypertensive Drugs. Anti Arrhythmic Drugs. Anti-Angina Drugs. Anti-Obesity drugs. Anti-lipidaemic drugs. Respiratory Stimulants. Anti-tussives and Expectorants. Drugs in Asthma, Bronchitis and Pneumonias. Renal Physiology and Diuretics. Anti-Diuretics and Anti-Uricaemia Drugs. Drugs in Urinary tract infections. GIT Physiology. Anti-ULCER Drugs. Emetic & Anti-emetics. Purgatives and Laxatives. Anti-Diarrhoea; Anti-Spasmodic Drugs. Digestants. Drugs acting on the Uterus.

PHA 307: Experimental Pharmacology I **(4 Units: LH 15; PH 135)**
Selected experiments to illustrate the theoretical principles.

PHA 308: Endocrine & Reproductive System Pharmacology **(2 Units: LH 15; PH 45)**
Thyroid and anti-thyroid drugs. Parathyroid and Calcitonin. Anterior Pituitary hormones and related substances. Insulin and oral hypoglycaemic agents, hyperglycaemic agents. Oestrogen and progesterone – |Oral contraceptives and Fertility agents. Androgen and Anabolic steroids.

PHA 309: Vitamins and Nutritional Haemopoietic Agents **(2 Units: LH 15; PH 45)**
Water soluble Vitamins 1.Water Soluble Vitamins II. Fat soluble Vitamins 1.Fat soluble Vitamins II. Drugs effective in iron deficiency anaemias and other hypochromic anaemias. Drugs in the treatment of megaloblastic and Pernicious anaemias. Anti-coagulants Antithrombotic and Thrombotic Agents. Management of haemorrhage

PHA 310: Toxicology **(2 Units: LH 15; PH 45)**
Introduction. Origin and scope of Toxicology. Introduction to Laboratory Methods. Toxicological Evaluation. Purpose and Value of ED_{50} and LD_{50} Determination. Metabolism of some toxic substances. Pesticides, Insecticides, Cyanide. Teratology. Carcinogens, Mutagens. Systemic toxicology. Cosmetics Testing. Clinical toxicology. Poisoning and Antidotes. Management of Drug Poisoning. Environmental Pollution. Industrial Toxicology including Food Additives. Forensic Toxicology.

PHA 311: Methods in Toxicology **(2 Units: LH 15; PH 45)**
ED_{50} LD_{50} Determination, Acute and Chronic Poisoning in Rabbits, Antidote, Cosmetics, Test Identification of drugs by, Thin Layer Chromatography, TLC Experiment (contd.)Experimental procedures for analysis of toxicological agents. Use of U.V., I.R., NMR, TLC, HPLC for qualitative and quantitative assay.

PHA 312: Chemotherapy of Tropical Infections Disinfectants and Antiseptics
(2 Units: LH 15; PH 45)
Life Cycle of Malarial Parasite. Life Cycle of E. histolytica. Drugs used in the treatment of malaria, Amoebiasis, Trypanosomiasis, Leishmaniasis, Helminthiasis. Disinfectants and Antiseptics

PHA 313: Ethics in Pharmacology **(2 Units: LH 30)**
Principles of Bioethics, ethical issues in use of animals

PHA 399: Students' Industrial Work Experience **(3 Units: PH 135)**
Students will be posted to recognized and relevant placement areas of their choice during the industrial training. Continuous assessment of students will be undertaken jointly by their industrial-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training. Grades are allotted according to ITF directives

400 Level

PHA 401 Chemotherapy of Microbial Diseases,Vaccines and Sera
(2 Units: LH 15; PH 45)

Antibacterials/Antibiotics
The sulphonamides and Trimethoprim. The penicillins and cephalosporins. Tetracyclines and Chloramphenicol. The Aminoglycosides. The Macrolides etc.
Miscellaneous Antimicrobials, Polypeptides.
Antifungal and antiviral agents. Drugs used in the treatment of Tuberculosis and Leprosy Vaccines and Sera.

PHA 402: Chemotherapy of Neoplastic Diseases Anti-Neoplastic Agents
(2 Units: LH 15; PH 45)
Alkylating Agents, Antimetabolites, Hormones. Other anti-neoplastic agents (Antibiotics, Plant alkaloids and Miscellaneous).

PHA 403: Immunopharmacology: Inflammation, Allergy and Anaphylaxis
(2 Units: LH 15; PH 45)
Introduction: Definition, Types, Characteristics and pathophysiology of pain, inflammation and anaphylaxis. Experimental models and Screening techniques for analgesics and anti-inflammations, Non-Steroidal, anti-inflammation Evaluation of analgesic activity, Hot-plate method. Anti-inflammatory drugs useful in gout. Vasoactive peptides that mediate pain a) Kinins, substance compound 4840 etc.; b) Angiotensin; c) Prostaglandins. Pathophysiology of allergic and immune reactions.

PHA 404: Experimental Pharmacology II **(4 Units: LH 15; PH 135)**
Methodology in evaluation of chemotherapeutic. agents. Determination of therapeutic indices. Isolated Tissue and Whole Animal Experiments as in Laboratory Manual.

PHA 405: Psychopharmacology **(2 Units: LH 15; PH 45)**
History of Psychopharmacology. Developmental. Psychopharmacology. Blood-Brain Barrier and other membrane phenomenal in Psychopharmacology. Nutritional Psychopharmacology. Behavioural Pharmacology of CNS Stimulants. Drug abuse and drug Addition Clinical uses of Psychotherapeutic Agents. Toxicology of Psychotherapeutic Agents.

PHA 406: Ethnopharmacology **(2 Units: LH 15; PH 45)**
Definitions, historical and religious basis of ethnomedicine – The medicine of Avicena, Esculapius and Galen. Traditional medicine in folklore the calabar bean, South American arrow poison, Coca chewing and opium poppy smoking of the American Indians etc.
Race and cultural influence of traditional medicine Herbal medicine and orthodox medicine – Homeopath; Naturopaths, Chinese acupuncture African Medicine.
Socio-economic, politico-religious and technological influence on drug development and medical practice.

Important plant and animal sources of modern medicine from belladona to digitalis, from cinchona bark to opium poppy. Scientific methods of evaluation of herbal preparations. Desirability or not of merging orthodox and traditional medical practices. The African pharmacopoeia.

PHA 407: Seminars in Pharmacology (2Units: LH 30)

Students are expected to attend all Departmental Seminars. Each student will be given topics to work on, write up as well as present during seminars.

PHA 408: Projects in Pharmacology (6 Units: LH 15; PH 225)

Experimental research project on a topic of interest.

PHA 409: **Breeding and Care of Laboratory Animals and Laboratory Management (2 Units: LH 15; PH 45)**

Care of laboratory animals. Breeding of different laboratory animals.

PHA 412: Quantitative Pharmacology (2 Units: LH 30; PH 45)

Introduction; Drug – Receptor Interaction; Affinity and Intrinsic activity; Occupancy theory; Rate Theory; Drug receptor Interactions; Law of Mass Action, Enzyme; Substrate interaction – Dose

Response relationship – Graphical; Law of Mass action and Derivation of affinity PD_2; Competitive Antagonism; The Gaddum-Schild Equation for Affinity constant of competitive antagonists; Non-competitive antagonism, Partial agonist; Competitive non-competitive antagonism. Pharmacodynamic prediction from pharmacokinetic data (one compartment model). Receptor desensitization, Mechanisms of Post-receptor transduction. Introduction to Biostatistics, Normal distribution, Mean probit transformation standard Deviation and standard Error. T-tests paired and unpaired chi-square Test, Analysis of variance, Poison Distribution.

3.9 PHYSIOLOGY (B.Sc. Physiology)

3.9.1 Philosophy, Aims and Objectives of the Degree Programme

Philosophy

The philosophy of the undergraduate physiology programme is to train students in theoretical, practical and applied physiology to make such graduates suitable to utilize the basic knowledge for future problem solving and other applications – like practice of medicine, nursing, pharmacy, physiotherapy, etc. The graduates should be able to function as entrepreneurs whether in public service or self-employed.

Aims and Objectives

(i) To train students to acquire basic knowledge of physiological principles.
(ii) To train students to acquire sufficient practical knowledge and practical skills in experimental physiology.
(iii) To train students to have knowledge of applied physiology as used in medicine, pharmacy, nursing, veterinary medicine and allied sciences.
(iv) To train students who will be able to apply physiology knowledge to life situations.
(v) To train students in physiological knowledge sufficient for them to proceed for further studies in physiology and related fields of specialization.
(vi) To train students who can adapt themselves after schooling, to various life situations including entrepreneurship.

3.9.2 Admission and Graduation Requirements

Candidates seeking admission into the programme should possess the minimum entry requirements as contained section 1.3. Medical Students who have successfully completed 300 Level may be admitted for 1 year intercalated programme.

3.9.3 Learning Outcome

a) **Regime of Subject Knowledge**

b) **Competencies and Skills**

In addition to the subject specific knowledge enumerated above, students on completion of the course of study should acquire the following levels of competence and skills.

i) The students should be trained to achieve cognitive or intellectual abilities to study physiology of ever-increasing modern knowledge on their own during and after the training.
ii) The students should attain practical proficiency and skills such as all basic practical topics in each of the physiology benchmark outlines stated above.
iii) The students should acquire enough practical skills that will enable them engage in physiology or physiology-related postgraduate study or research laboratory anywhere in the world.
iv) Students should have skills and ability to tackle new innovative cases and problem solving, or development of new ideas.

v) Students should be able to retrieve and store information, including literature search, using computer as well as other retrieval media (current contents, index medicos, science situation index, excerpter medical etc).
vi) Students should be able to learn scientific writing in all forms e.g. conference paper, poster presentation, thesis and dissertation, paper for journal publication etc.
vii) Students should be able to acquire enough skills to use computer as well as long hand for data analysis, graphical preparation and presentation, statistics, word-processing, spreadsheet, internet etc.

c) **Behavioural Attributes**

Graduate should demonstrate high sense of medical ethics, the use of human experiments, clinical Trials, the Helsinki Declaration on Animal or Human experiment, the morality of animal experimentation, informed consent; medical cover before experiments with human subjects, working with human blood and other human specimens.

3.9.4 **Attainment Levels**

For the degree students in physiology the level of knowledge and practical skills to be attained must reach a degree standard, such that progression to postgraduate programme or research in physiology or related fields will be easy for the graduate.

The graduate must attain sufficient knowledge and skills to be employable at university and other tertiary institutions as well as at secondary levels, or even in public service and industries.

3.9.5 **Resource Requirement for Teaching and Learning**

The general requirements are contained in section 1.6

a) **Academic and Non-Academic Staff**

Academic Staff: Student ratio should be 1:15

b) **Academic and Non-Academic Spaces**

Lecture Rooms should be adequate, in addition:
i) Each department should have seminar rooms for tutorials
ii) There should be adequate laboratory spaces for teaching and research.

c) **Academic and Non-Academic Equipment**

There should be a computer based information services with PC audiovisual aids e.g. CDROM, DVD.

d) **Library and Information Resources**

The Department should have well-stocked library with up to date journals and books. There should be a computer based information services with PC audiovisual aids e.g. CDROM, DVD.

3.9.6 Course Structure and Synopses for the Physiology Programme

A. Course Structure

100 Level

Course Structure for 100 Level Physiology Programme

Course Code	Course Title	Units	Status	LH	PH
BIO 101	General Biology I	3	R	45	-
BIO 102	General Biology II	3	R	45	-
BIO 107	General Biology Practical I	1	R	-	45
BIO 108	General Biology Practical II	1	R	-	45
CHM 101	General Chemistry I	3	R	45	-
CHM 102	General Chemistry II	3	R	45	-
CHM 107	General Chemistry Practical I	1	R	-	45
CHM 108	General Chemistry Practical II	1	R	-	45
CSC 101	Introduction to Computer Science	3	C	30	45
GST 111	Communication in English	2	C	30	-
GST 112	Logic, Philosophy and Human Existence	2	E	30	-
GST 113	Nigerian Peoples and Culture	2	R	30	-
GST 121	Use Library, Study Skills & ICT	2	C	30	-
GST 122	Communication in English II	2	C	30	-
GST 125	Contemporary Health Issues	2	R	30	-
MTH 101	Elementary Mathematics I	3	R	45	-
PHY 101	General Physics I	3	R	45	-
PHY 102	General Physics II	3	R	45	-
PHY 107	General Physics Practical I	1	R	-	45
PHY 108	General Physics Practical II	1	R	-	45
	Total	**42**			

200 Level

Course Structure for 200 Level Physiology Programme

Course Code	Course Title	Unit	Status	LH	PH
ANA 202	Histology of Basic Tissues	2	R	15	45
ANA 211	Systemic and Functional Anatomy	2	R	15	45
ANA 212	Regional Anatomy	2	R	15	45
BCH 201	General Biochemistry I	3	R	45	-
BCH 202	General Biochemistry II	3	R	45	-
BCH 203	General Biochemistry Practical I	1	R	-	45
GST 211	Environment and Sustainable Development	2	R	30	-
GST 222	Peace and Conflict Studies	2	R	30	-

GST 223	Introduction to Entrepreneurship	2	R	30	-
GST 224	Leadership Skills	2	R	30	-
PHE 201	Biostatistics	2	R	30	-
PIO 201	Introduction to Physiology	2	C	30	-
PIO 202	Principles of Neurophysiology	2	C	30	-
PIO 203	Introduction to Cardiovascular & Respiratory Physiology	3	C	45	-
PIO 204	Introduction to Laboratory Physiology	3	C	-	135
PIO 299	Students' Industrial Work Experience	3	C	-	135
PSY 201	Introduction to Psychology	2	E	15	45
Total		**38**			

300 Level

Course Structure for 300 Level Physiology Programme

Course Code	Course Title	Unit	Status	LH	PH
BCH 301	Introductory Enzymology	3	E	45	-
BCH 304	Chemistry and Metabolism and amino acids and proteins	2	E	30	-
GST 311	Entrepreneurship	2	R	30	-
PHA 301	General Principles of Pharmacology	2	R	15	45
PIO 302	Embryology & Reproduction	3	R	30	45
POI 304	Gastrointestinal Physiology I	3	R	30	45
PIO 305	Fluid & Renal Physiology I	3	R	30	45
PIO 306	Endocrinology I	3	C	30	45
PIO 307	Cardiovascular Physiology I	3	C	30	45
PIO 308	Blood Physiology	3	C	30	45
PIO 309	Neurophysiology I	3	C	30	45
PIO 310	Physiology of Excitable tissues	3	R	30	45
PIO 311	Functional Histology	3	R	15	90
PIO 399	Students' Industrial Work Experience	3	C	-	135
Total		**39**			

400 Level

Course Structure for 400 Level Physiology Programme

Course Code	Course Title	Unit	Status	LH	PH
PIO 401	Seminar presentation	1	C	15	-
PIO 402	Fluid & Renal Physiology II	3	R	30	45
P1O 403	Gastrointestinal Physiology II	3	R	30	45
P1O 404	Endocrinology II	3	R	30	45
PIO 405	Neurophysiology II	3	R	30	45
PIO 406	Neurophysiology III	3	R	30	45
P1O 407	Cardiovascular Physiology II	3	R	30	45
PIO 408	Functional Neuroanatomy	3	E	30	45
PIO 411	Animal Experimentation	3	C	15	90
PIO 412	Membrane transport	3	E	30	45
PIO 414	Comparative/Environmental Physiology	3	E	30	45
PIO 415	Endocrinology III	3	E	30	45
PIO 492	Research Project	6	C		270
Total		**40**			

B: Course Synopses

200 Level

PIO 201: Introduction to Physiology (2 Units: LH 30)
Introduction and history of physiology. Structure and functions of cell membranes. Transport process. Biophysical principles. Homeostasis and control systems including temperature regulation. Biological rhythms. Blood – functions of erythrocytes, leukocytes and thrombocytes. Haemopoiesis; Haemostatis, Blood groups.

PIO 202: Principles of Neurophysiology (2 Units: LH 30)
Membrane potentials, Nerve impulse and its physiological properties; Synaptic transmission. Mechanism of force production; functional adaptations of muscles. Functional organization of CNS, autonomic neurotransmitter and autonomic effects.

PIO 203: Introduction to Cardiovascular & Respiratory Physiology (3 Units: LH 45)
The heart; events of the cardiac cycle cardiac output and control of cardiac contractility. The vessels; Functional Anatomy; Haemodynamics; Arterial blood pressure and its regulation; Cardiovascular reflexes. Peripheral resistance and local control of the circulation; Regional blood flow; Cardiovascular haemostasis in stress situations.
Respiratory – Functions of upper respiratory tract. Mechanics of respiration including compliance, surfactant, lung volume and capacities; pulmonary gas exchange. Blood gas

transport. Pulmonary function tests; Nervous and chemical control of respiration. Response to hypoxia, high altitude and exercise. Artificial respiration.

PIO 204: Introduction to Laboratory Physiology (3 Units: PH 135)
Physiology laboratory techniques. Laboratory sessions on basic physiology experiments, especially those related to the nerve cell and blood functions

PIO 205: Physiology for Pharmacy I (3 units: LH 30; PH 45)
Introduction and history of physiology. Structure and functions of cell membranes. Transport process. Biophysical principles. Homeostasis and control systems including temperature regulation. Blood – functions of erythrocytes, leukocytes and thrombocytes. Haemopoiesis; Haemostasis, Blood groups.

PIO 206: Physiology for Pharmacy II (3 units: LH 30; PH 45)
Membrane potentials, Nerve impulse and its physiological properties; Synaptic transmission. Mechanism of force production; functional adaptations of muscles. Functional organization of CNS, autonomic neurotransmitter and autonomic effects.

PIO 299: Students' Industrial Work Experience (3 Units: PH 135)
Students will be posted to recognized and relevant placement areas of their choice during the industrial training. Continuous assessment of students will be undertaken jointly by their industry-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training.

PSY 201: Introduction to Psychology (2 Units: LH 30)
Learning process, Theories of Learning, Types and characteristics of learning, Memory

300 Level

PIO 302: Embryology and Reproduction (3Units: LH 30; PH 45)
Fertilization, structures of ectodermal, mesodermal and endodermal origins and embryogenesis of different organs. Medical genetics. The sex hormones. Oestrous and menstrual cycles. Physiology of pregnancy, parturition and lactation. Foetal and neonatal circulation and respiration.

PIO 304: Gastrointestinal Physiology I (3Units: LH 30; PH 45)
Digestive secretions — their composition, function and control mechanism of the Alimentary canal.

PIO 305: Fluid & Renal Physiology I (3Units: LH 30; PH 45)
Composition and estimation of body fluid compartments. Concept of water and electrolyte balance. Role of kidney in body fluid homeostasis.

P10 306: Endocrinology I **(3Units: LH 30; PH 45)**
Functions and control of the secretions of the thyroid gland, parathyroid gland, pancreas, pituitary and adrenal gland. Abnormalities of endocrine function Normal Integration in the control of calcium and glucose metabolism. The kidney as an endocrine gland.

P10 307: Cardiovascular Physiology1 **(3Units: LH 30; PH 45)**
Heart-cardiac electrophysiology. Properties of cardiac muscle. Cardiac cycle. Cardiac output - measurement and control Haemodynamics. Cardiovascular changes in exercise and haemorrhage.

PIO 308: Blood Physiology **(3Units: LH 30; PH 45)**
– Composition and functions of blood haemopoiesis. Plasma proteins, coagulation fibrinolysis and platelet functions.

PIO 309: Neurophysiology 1 **(3Units: LH 30; PH 45)**
General arrangements of the nervous system. Nerve generation and conduction of impulses. Synapses and synaptic transmission. Peripheral nervous system -the reflex arc and general properties of reflexes. Receptors. Muscle: structure, excitation, theories of contraction. Introduction to the central nervous system.

PIO 310: Physiology of Excitable Tissues **(3Units: LH 30; PH 45)**
Structure and functions of nerves, cardiac muscle, smooth muscle and skeletal muscle.

PIO 311: Functional Histology **(3Units: LH 15; PH 90)**
The microscope, Histological techniques. Identification of microscope structure of tissues of the body.

PIO 399: Students' Industrial Work Experience **(3 Units: PH 135)**
Students will be posted to recognized and relevant placement areas of their choice during the industrial training. Continuous assessment of students will be undertaken jointly by their industry-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training.

400 Level

PIO 401: Seminar presentation **(1unit: LH 15)**
Literature review, on different areas of physiology, presented at seminars.

P10 402: Fluid and Renal Physiology II **(3Units: LH 30; PH 45)**
Macroscopic, microscopic and ultra-structure of the kidney. Elements of renal functions. Glomerular filtration, Clearance, Tubular reabsorption and secretion. Renal blood flow. Body fluid and electrolyte balance. Buffer mechanism and pH regulation.

PIO 403: Gastrointestinal Physiology II **(3Units: LH 30; PH 45)**
Gastric acid and Histamine and gastrin metabolism. Gastrointestinal motility Basic experimental techniques on gastrointestinal physiology.

PIO 404: Endocrinology II **(3Units: LH 30; PH 45)**
Nature of Hypothamo-hypophyseal relationship. Synthesis, storage and release of the neurohypophyseal hormones. Function of the hypothalamus to include regulation of body temperature, thirst appetite and food intake regulation of adenophypophyseal function and higher autonomic control.

PIO 405: Neurophysiology II **(3Units: LH 30; PH 45)**
The human brain —brain stem, basal ganglia, thalamus and cerebella. Cerebrospinal fluid and the blood\brain barrier. Electrophysiology of the cerebral cortex the electroencephalogram alertness and sleep. Postural regulation and postural reflexes.

PIO 406: Neurophysiology III **(3Units: LH 30; PH 45)**
Physiology of hearing, vision, taste and smell

PIO 407: Cardiovascular Physiology II **(3Units: LH 30; PH 45)**
Further consideration of the heat as a pump. Regional circulations coronary, pulmonary, cerebral, coetaneous muscle, sphlanchnic, renal their measurement, special features and control. Auto-regulation mechanism in the heart and peripheral circulation.

PIO 408: Functional Neuroanatomy **(3Units: LH 30; PH 45)**
The brain-surface anatomy and major divisions of cranial nerves, meninges and cerebral vessels. The brain stem acid it stem and its centres and connections. Anatomy of circulation and of the cerebrospinal fluid.

PIO 411: Animal Experimentation **(3Units: LH 30; PH 45)**
Handing of laboratory animals *in vivo* and *in vitro* preparations. Choice of animals and \or isolated tissue. Introduction to laboratory methods and design in physiological experimentation. Biological assay techniques interpretation and statistical analysis of results.

PIO 412: Membranes Transport **(3Units: LH 30; PH 45)**
General considerations. Methods of study. Special transport mechanism in amphibian bladder, kidney, gall bladder, intestine, astrocytes and exocrine glands.

PIO 414: Comparative and Environmental Physiology **(3Units: LH 30; PH 45)**
Comparative physiology of different mammals and non-mammals vertebrate species. Human and animal physiological responses and adaptation to extreme conditions of heat, cold, attitude, pressure and gravity circadian rhythms.

PIO 415: Endocrinology III **(3Units: LH 30; PH 45)**
Further consideration of the formation, storage, release and functions of endocrine organs. Extraction and purification of hormones, mechanisms of hormone actions, Methods in

hormones research. A comparative study of hormone particularly as exemplified by vasopressin, thyroxin and gastrin.

PIO 492: Research Project **(6 units: PH 270)**

Independent research findings into selected areas/topics of interest to the supervising academic staff. Students will be required to carry out literature survey on the topics, perform experiments and produce reports (preferably at the end of second semester). Students will be subjected to both seminar and oral examination on the projects undertaken.

3.10 PHYSIOTHERAPY (B. Physiotherapy)

3.10.1 Philosophy, Aims and Objectives

Philosophy

The Philosophy is to train and produce highly knowledgeable and skilled Physiotherapists who will continue to search for more knowledge and professional skill and apply the same for treatment, rehabilitation, prevention, health promotion and other health needs of the patients and the community using Physiotherapy modalities.

Aims and Objectives

The general objectives of the Physiotherapy programme is to train Physiotherapy Professionals equipped with adequate theoretical knowledge, clinical skills, sense of purpose and devotion to patient care.

The specific aims and objectives are to produce physiotherapists that will:

i) be able to work in Hospitals, Rehabilitation facilities and other Health Establishments as members of the Health Team; in Physiotherapy Training Institutions, Research Centres and other Academic environments after undergoing relevant postgraduate training; in Sports, Physical Fitness and Health promotion Facilities; and in Industrial workplace and other occupational environments.

ii) evaluate physical ailments and disabilities, plan and carry out a programme of treatment according to the patient's clinical state.

iii) recognize the role of the Physiotherapist in Health Care delivery in the community and in the Health Team.

iv) participate in clinical research with others as a means of further study and professional enhancement.

v) acquire, develop and maintain rapport with professional colleagues, patients, their relatives and members of the Health Care Team.

vi) acquire a sense of commitment to patients and the profession at all times.

vii) acquire knowledge in health policies, health management, global health issues and socio-cultural health issues.

3.10.2 Admission and Graduation Requirements

The admission requirement into the programme are as contained under general issues for Basic Medical and Health Sciences.

The Physiotherapy degree programme training shall normally take 5 years for candidates admitted to through the UTME; and 4 years for Candidates admitted by direct entry. Candidates shall graduate with unclassified degree as pass or pass with distinction.

3.10.3 Learning Outcome

a) **Regime of Subject knowledge**

i) Graduate of the programme is expected to possess knowledge in basic and medical sciences which confer a working knowledge of the structure and

function of the human body in health and disease and how these can be modified by external, physical and psycho-social factors.

ii) Details of the knowledge and skill of the basic physiotherapy modalities of thermotherapy, cold therapy, hydrotherapy, exercise therapy, manual therapy, actinotherapy, ultra-sound therapy, LASER therapy, Electrical Stimulating currents (therapeutic and diagnostic) and the use of assistive devices as well as adequate hand-on skill of the techniques of application of all the above listed Physiotherapy modalities, first on models and later on patients.

iii) Basic Requirements of clinical practice Assessments of patients (subjective and objective evaluation including joint assessment, muscle assessments, functional assessments, outcome measures of treatment, etc)

iv) Planning of treatment. Giving treatment. Evaluation of treatment outcome. Communication skills with patients, other members of the Health Care Team and relatives of patients. Documentation of patients' records. Safety of the environment of treatment, equipment and persons during patient care. Quality assurance strategies.

v) Knowledge and understanding of ethics of Physiotherapy Practice with emphasis on the concept of team work in health services as well as Socio-cultural modifications of utilization of health services and socio-cultural modification of utilization of health care services.

b) **Competencies and Skills**

At the end of the Physiotherapy training programme, the graduate should have acquired skills in;

i) Comprehensive physical examination and clinical assessment of patient's health to arrive at a physiotherapy diagnosis from the medical diagnosis.

ii) Planning patient's treatment based on; the outcome of patient's assessment, available physiotherapy facilities and precautions to avoid contra-indications to the treatment.

iii) Giving treatment to patient employing evidence-based practice as well as being mindful of the safety of patient, self, equipment and treatment environment.

iv) Evaluation of outcome of treatment using standard outcome measures or specifically designed outcome measure based on clinical and socio-cultural considerations.

v) Modifying treatment appropriately based on the outcome of evaluation of treatment.

vi) Effective and appropriate Communication Skills (Including counselling and psychotherapy).

vii) conduction of research including proposal writing, data collection and analysis, interpretation of findings and report writing for dissertation or publications in learned journals.

viii) Ability to give physiotherapy services in non-hospital based situations e.g. Community base, sports field, industry, rehabilitation home, private practice, other entrepreneurial situations etc.

ix) Ability to apply the outcome of clinical researches in patient care.

x) Practical/Clinical Practice
xi) Patients assessment techniques
xii) to carry out fundamental procedures in physiotherapy.
xiii) relating to non-professional subjects such as computer literacy, general communication, administrative, entrepreneurial and organizational skills.
xiv) psychotherapy and health education for the preventive and health promotion aspects of physiotherapy.
xv) equipment handling and maintenance.

c) **Behavioural Attributes**
Graduate should respect the dignity of the patient and exhibit high sense of responsibility in patient care. They shall be law abiding and practice within the ethical limits of the profession.

3.10.4**Attainment Levels**

The degree shall be unclassified. Excellence shall be recognised through the awards of distinction and prizes.

3.10.5**Evaluation**

Methods for course evaluation
All courses taught during each semester shall be examined at the end of each semester. Continuous Assessments shall constitute 30%-40% of marks of all courses, while examination at the end of the semester in which the course is taken will constitute 60%-70% of the marks.

Examination Regulations
The Pass mark for course prescribed by the Department of Physiotherapy shall be 50%.

3.10.6**Resources Requirement for Teaching and Learning**

The University shall ensure the provision of adequate human, physical, equipment and library facilities in all the learning areas with strong information communication technology infrastructure for the implementation of these minimum standards.

a) **Academic and Non-Academic Staff.**
The minimum ratio of academic staff to students in Basic Medical and Health Sciences shall be 1:15. The programme should have at least 70% of its total possessing PhD degree and no lecturer shall aspire to Senior Lectureship without a PhD degree in Physiotherapy.

b) **Academic and Non-Academic Spaces**
The University shall provide adequate appropriate physical spaces to meet the teaching requirements of the different areas of this curriculum.

c) **Academic and Administrative Equipment**

The University shall provide adequate and appropriate equipment to meet the teaching of the different areas of this curriculum, with adequate maintenance back-up.

d) **Library and Information Resources**

There shall be a dedicated medical library with adequate provision of current books and journals periodicals and bibliographic indices on Physiotherapy. The library shall have modern information communication facilities for electronic access and retrieval of information.

3.10.7 **Course Structure and Synopses of the Physiotherapy Degree Programme**

Preamble

Courses shall be provided leading to the degree of Bachelor of Physiotherapy, which may be awarded to students who have successfully fulfilled all academic requirements and whose conduct conform to that expected of a prospective Physiotherapist. Physiotherapy training shall be a combination of teacher-directed, tutor-guided, self-learning and problem-based methods.

A: Course Structure

Course Structure of 100 Level Physiotherapy Programme

Course Code	Course Title	Units	Status	LH	PH
BIO 101	General Biology I	3	C	45	-
BIO 102	General Biology II	3	C	45	-
BIO 107	General Biology Practical I	1	C	-	45
BIO 108	General Biology Practical II	1	C	-	45
CHM 101	General Chemistry I	3	R	45	-
CHM 102	General Chemistry II	3	R	45	-
CHM 107	General Chemistry Practical I	1	R	-	45
CHM 108	General Chemistry Practical II	1	R	-	45
CSC 101	Introduction to Computer Science	3	C	30	45
GST 111	Communication in English	2	C	30	-
GST 112	Logic, Philosophy and Human Existence	2	E	30	-
GST 113	Nigerian Peoples and Culture	2	R	30	-
GST 121	Use Library, Study Skills & ICT	2	C	30	-
GST 122	Communication in English II	2	C	30	-
GST 125	Contemporary Health Issues	2	R	30	-
MTH 101	Elementary Mathematics I	3	R	45	-
PHY 101	General Physics I	3	C	45	-
PHY 102	General Physics II	3	R	45	-
PHY 107	General Physics Practical I	1	R	-	45
PHY 108	General Physics Practical II	1	R	-	45
Total		**42**			

Course Structure of 200 Level Physiotherapy Programme

Course Code	Course Title	Units	Status	LH	PH
ANA 201	Introductory Anatomy & Gross Anatomy of Upper & Lower Limbs	3	C	45	-
ANA 202	Histology of Basic Tissues	2	C	15	45
ANA 204	Gross Anatomy of Thorax, Abdomen, Pelvis & Perineum	3	C	30	45
BCH 304	Chemistry and Metabolism of Amino Acids & Proteins	2	R	30	-
BCH 305	Chemistry & Metabolism of Nucleic	2	R	30	-
GST 211	Environment and Sustainable	2	R	30	-
GST 222	Peace and Conflict Studies	2	R	30	-
GST 223	Introduction to Entrepreneurship	2	R	30	-
GST 224	Leadership Skills	2	R	30	-
PHY 202	Introduction to Electric Circuits &	3	R	30	45
PHY 204	General Physics IV (Waves &	3	C	45	-
PIO 201	Introduction to Physiology	2	R	30	-
PIO 202	Principles of Cell Physiology	2	R	30	-
PHE 201	Biostatistics	2	R	30	-
	Total	**29**			

Course Structure of 300 Level Physiotherapy Programme

Course Code	Course Title	Units	Status	LH	PH
ANA 311	Gross Anatomy of Head & Neck &	3	R	30	45
GST 311	Entrepreneurship	2	C	30	-
PST 310	Introduction to Physiotherapy	3	R	45	-
PST 311	Introduction to Kinesiology	3	R	45	-
PST 312	Exercise Physiology	3	R	45	-
PST 320	Thermotherapy	2	C	30	-
PST 321	Cryotherapy	2	C	30	-
PST 322	**Practical Electro-Therapy	3	C	-	135
PST 323	Introduction to Movement	2	C	30	-
PST 324	Manual Therapy	2	C	30	-
PST 325	Pathokinesiology	2	C	30	-
PST 326	***Practical Exercise and Manual	3	C	-	135
PST 327	Prosthetics & Orthotics	2	C	15	45
PST 328	Introduction to Clinical	2	C	30	-
PST 329	Introductory Pathology	2	C	30	-
PST 330	300 Level Vacation Clinical Posting	4	C	-	180
PST 399	Student's Industrial Work	3	C	-	135

SOC 202	Introduction to Social Institutions	3	R	45	-
	Total	**46**			

**The practical aspects of PST 320 and 321 shall be examined under PST 322.
***The Practical aspects of PST 323, 324 & 325 shall be examined under PST 326. The externally moderated practical examinations shall be conducted at the end of 2nd Semester 300 level i.e. they require moderation by External Examiners.

Course Structure of 400 Level Physiotherapy Programme

Course Code	Course Title	Units	Status	LH	PH
PST 410	Low Frequency Electrical	2	C	30	-
PST 411	Actinotherapy and Ultrasonic	2	C	30	-
PST 412	*Practical Electrotherapy II	3	C	-	135
PST 413	Muscle Strengthening and Joint	2	C	30	-
PST 414	Therapeutic Exercises	2	C	30	-
PST 415	Hydrotherapy	2	C	30	-
PST 416	**Practical Exercise Therapy	3	C	-	135
PST 417	Clinical Measurements &	2	C	30	-
PST 418	Physical Diagnosis & Clinical	4	C	-	180
PST 419	Pharmacological Considerations in	2	R	30	-
PST 420	Skeletal Injuries &Disorders &	3	C	45	-
PST 421	Cardio-respiratory Disorders &	3	C	45	-
PST 422	Neurological Disorders &	2	C	30	-
PST 423	Soft Tissues Disorders &	2	C	30	-
PST424	Community Physiotherapy &	2	C	30	-
PST 425	Physiotherapy in women's Health	2	C	30	-
PST 426	Research Methodology and	2	C	30	-
PST 427	Joint disorders & Rehabilitation	2	C	30	-
PST 428	Clinical Practice II	4	C	-	180
PST 499	Students' Industrial Work	3	C	-	135
	Total	**49**			

*Practical aspects of PST 410 and PST 411 shall be examined under PST 412.
**Practical aspects of PST 413, PST 414 and PST 415 shall be examined under PST 416.

Course Structure of 500 Level Physiotherapy Programme

Course Code	Course Title	Units	Status	LH	PH
PST 510	Manipulative Therapy	3	C	45	-
PST 511	Neurological Disorders and	2	C	30	-
PST 512	Specialty Lectures	3	C	45	-
PST 513	Gerontology	2	C	30	-
PST 514	Introduction to Physiotherapy Administration and Management	2	C	30	-
PST 515	Physiotherapy in Disorders of Blood & Lymph Vessels	2	C	30	-
PST 516	Research Project Seminar	2	C	30	-
PST 517	Intensive Care Physiotherapy	3	C	45	-
PST 518	Clinical Practice III	4	C	-	180
PST 520	Skin Disorders & Rehabilitation	3	C	45	-
PST 521	Sports Physiotherapy	3	C	45	-
PST522	Physiotherapy in Pain management	3	C	45	-
PST 523	Palliative care in Terminal illnesses	3	C	45	-
PST 524	Policy Issues in Health Care	3	C	45	-
PST 525	Research Project	6	C	-	270
	Total	**44**			

B: Course Synopses

200 Level

PHY 202: Introduction to Electric Circuits and Electronics (3 Units: LH 30; PH 45)
Pre-requisite -PHY 102
D.C. Circuits; Kirchoff's Laws, sources of end and current, network analysis and circuit theorems. A.C. Circuits. Inductance, capacitance, the transformer, sinusoidal wave-forms runs and peak values, power, impedance and admittance series RLC circuit, Q factor, resonance, Network analysis and circuit theorems, filters. Electronics; semiconductors, the pn-junction, Amplification and the transistor; field effect transistors, bipolar transistors, Characteristics and equivalent circuits, amplifiers, feedback, oscillators; signal generators. There should be alternate week laboratory work.

PHY 204: General Physics IV (3 Units: LH 45)
(Waves and Optics)
Pre-requisites -PHY 101, PHY 102, and MTH 102
Wave phenomena; Acoustical waves; the harmonic oscillator; waves on a string; energy in wave motion; longitudinal waves; standing waves; group and phase velocity; Doppler effect; Physical Optics; Spherical waves; interference and diffraction, thin films; crystal diffraction, holography; dispersion and scattering. Geometrical Optics; Waves and rays; reflection at a spherical surface, thin lenses, optical lenses and applications of lenses in optical instruments e.g. microscopes, telescopes,

300 Level

PST 310: Introduction to Physiotherapy Profession **(3 Units: LH 45)**
The philosophy and underlying principles on which physiotherapy practices are based. History, ethical orientation and scope of practice. Roles of Physiotherapy in preventive, promotive, curative and rehabilitative care.

PST 311: Introduction to Kinesiology **(3 Units: LH 45)**
A study of bio-mechanical principles as related to human motion. Relationship of anatomic structure to function. Muscular analysis of common movements in sports, gymnastics and daily activities. Principles of motion and force as they apply to the body in action and in equilibrium.

PST 312: Exercise Physiology **(3 Units: LH 45)**
Physiological adjustments of major body systems to various types of exercise in health and disease. Muscle structure and function. Energy systems and body fuels. Final common pathway of metabolism. Body response to acute exercise and adaptations to chronic exercise. Effects of exercise on body composition

PST 320: Thermotherapy **(2 Units: LH 30)**
Physical principles and procedures governing the use of heating modalities in physiotherapy. Production, physiological effects, indications, therapeutic uses and contraindications. Dangers and precautionary safety measures for each of the various heat producing modalities.

PST 321: Cryotherapy **(2 Units: LH 30)**
Historical development. Principles of chemical preparations for cold therapy and endothermic reactions. Physiological effects, therapeutic uses, indication and contraindications. Methods and techniques of application. Dangers and safety measures.

PST 322: Practical Electrotherapy 1 **(3 Units: PH 135)**
This is to test practical aspect of PST 320 and PST 321.

PST 323: Introduction to Movement **(2 Units: LH 30)**
Classification of movement. Fundamental and derived starting positions. Relaxed and forced passive movements. Free and resisted active movements. Types of resistance used for treatment.

PST 324: Manual Therapy **(2 Units: LH 30)**
History and developments in definitions of manual therapy. Preparation for massage. Classification of manipulations and individual techniques. Techniques for various body regions and specific cases like scars, ulcers etc. Bandaging: types and techniques.

PST 325: Pathokinesiology **(2 Units: LH 30)**

Principles, classifications and applications of motor skills. Identification and analysis of normal and abnormal human postures and movements. Corrective therapy for abnormal human motions and postures.

PST 326: Practical Exercise Therapy 1 **(3 Units: PH 135)**

This is to test the practical aspect of PST 323, PST 324 and PST 325

PST 327: Orthotics and Prosthetics **(2 Units: LH 30)**

An appraisal of the different assistive devices: techniques, methods of fabrication and application of these devices.

Different types of Orthotics and prosthetic devices for correcting or assisting specific problems. Biomechanical principles in giving prosthesis and Orthotics and the criteria for selection. Physiotherapy in the rehabilitation of the amputee. Patient' education on care, maintenance and uses of orthosis and prosthesis. Dangers, complications and contraindications in use of the different assistance/corrective devices. Care, uses and prescription of wheelchairs and other assistive devices for activities of daily living e.g. crutches, walking frames and sticks.

PST 328: Introduction to Clinical Physiotherapy **(2 Units: LH 30)**

Introduction to clinical physiotherapy – importance of patients in health care, and patient's family in treatment. Responsibilities of the clinician and the patient. Student/patient relationship. Respect and confidentiality.

Patient care communication – Professional conduct and ethical practice. Teamwork. Listening and interviewing skills. Use and interpretation of verbal and non verbal communication. Emotional responses to, and strategies for managing patient's behaviour, patient's safety and comfort

Fundamental procedures in physiotherapy – muscles assessment. Functional assessment. Joint evaluation.

General Nursing – Total care of the patient. Fundamental procedures in physiotherapy and general nursing. Bed making patient lifting, observation of vital signs, skin care and bed sore prevention, wound dressing, first aid, use of suction machine and intensive care of patients

PST 329: Introductory Pathology **(2 Units: LH 30)**

Pathology of diseases. Cellular basis of diseases. Inflammation and healing, Immune mechanisms, physical agents in injury and disease, Drug and chemical injury, radiation injury, Atrophy, Hypertrophy, Degeneration, Oedema, Thrombosis, Infarction, Bacterial and Viral diseases, fungal infections, Tumours and inherited diseases.

PST 330: 300 Level Vacation Clinical Posting **(4 Units: PH 180)**

Patient's assessment, treatment plan and programme. Relating theory to practice in patient handling, effective communication, professional attitude and responsibility

PST 399: Students' Industrial Work Experience (3 Units: PH 135)
Students will be posted to recognized and relevant placement areas of their choice during the industrial training. The twelve weeks will be spent in standard food service Continuous assessment of students will be undertaken jointly by their industry-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training.

SOC 202: Introduction to Social Institutions (3 Units: LH 45)
Comparative study of human societies and cultures. Particular emphasis on institutional arrangements such as economy, politics, family, religion, education, art, health systems. Attention will be paid to socio-cultural change processes as well as the rise of radical perspectives relevant to our contemporary situation

400 Level

PST 410: Low Frequency Electrical Stimulating Currents (2 Units: LH 30)
Physical principles and procedures governing the use of low frequency electrical stimulating currents. Use, production, physical/physiological effects, therapeutic uses, indications contraindications for, dangers of and precautionary measures to be taken in each type of low-frequency current. Positioning and operation of the different types of machine. Treatment record. Merits of each type of current. Electro-diagnosis. Electro-analgesia. Current innovations in electrotherapy

PST 411: Actinotherapy and Ultrasonic Therapy (2 Units: LH 30)
Physical principles and procedures governing the use of ultrasound and ultraviolet rays. Production and use. Physiological effects and therapeutic uses. Indications and contraindications for, dangers of and precautionary safety measures. Positioning and operation of machines. Treatment record. Merits of each modality

PST 412: Practical Electrotherapy II (3 Units: PH 135)
This is to test the practical aspect of PST 410 and PST 411.

PST 413: Muscle Strengthening and Joint Mobilization Techniques (2 Units: LH 30)
Principles of muscle strengthening in health and disease as applied to major muscles of the body. Modalities for strengthening muscles and basis for choice. Role of motor unit in muscle strengthening. Clinical measurement, evaluation and instrumentation in strength development. Indications for strength development in health and disease. Techniques for strengthening major muscles in the body. Techniques of mobilizing various joints of the body after loss of full Range of Motion (ROM). Normal ROM and evaluation. Causes of loss of full R.O.M. and indications for mobilization of mobilization of joints. Modalities for joint mobilization and basis for choice. Mobilization techniques for all major joints.

PST 414: Therapeutic Exercises (2 Units: LH 30)
Exercise for the treatment of specific types of disease conditions. Group therapy, suspension therapy, traction, breathing exercises, relaxation techniques, facilitated movement, and

neuromuscular coordination exercises, health promotion, principles of exercise prescription. Lower motor neuron lesions, amputees, arthritis, back pain, pulmonary diseases, hemiplegia and paraplegia

PST 415: Hydrotherapy (2 Units: LH 30)
Historical background. Origin, types and characteristics of spas, facilities in modern spa, indications and contraindications of hydrotherapy. Special skills for hydrotherapy. General and special properties of water, such as surface tension, floatation, direction of flow of water currents, temperature of water etc. Hydrotherapy pools, safety of patients and physiotherapist, temperature of treatment pools, humidity, ventilation, hydrometer. Baths, types and classifications, effects and mode of application. Function of skin in relation to baths. Treatment in pools, whirl pools for hydrotherapy- effects and uses. Techniques in treating conditions- poliomyelitis, spasticity, rheumatoid and orthopaedic conditions. Types of pool, care and maintenance. Exercises in and out of water. Water diseases; prevention and treatment.

PST 416: Practical Exercise Therapy (3 Units: PH 135)
This is to test the practical aspect of PST 413, PST 414 and PST 415

PST 417: Clinical Measurements and Instrumentation (2 Units: LH 30)
Measurements, measuring instruments and evaluation. Selecting and development of, measuring instruments. Concepts of validity, reliability and administration. Measurement of discrete variables- pain, muscle strength (static, isotonic, isokinetic), range of motion, anthropometric measurements, cardio respiratory fitness measurements (stress test), lung function tests, motor function tests; etc.

PST 418: Physical Diagnosis and Clinical Practice I (4 Units: PH 180)
Techniques of physical diagnosis and physical findings in common diseases. General principles, physical examination, vital signs. Clinical assessment of the respiratory, cardiovascular, musculoskeletal and neurological systems.

PST 419: Pharmacological Considerations in Physiotherapy (2 Units: LH 30)
Introduction to Pharmacology. Routes of drug administration. Basic principles of pharmacokinetics. Absorption, distribution and biotransformation of drugs. Drug reception interactions. Non-Steroidal Anti Inflammatory Drugs (NSAID). Muscle relaxants, sedatives and analgesic agents. Anti hypertensive drugs. Bronchodilators etc.

PST 420: Skeletal Injuries and Disorders and Rehabilitation (3 Units: LH 45)
Principles and physical management of skeletal disorders. Epidemiology, pathology and clinical features of skeletal disorders. Assessment procedures and physical treatment of patients. Principles of physiotherapy in the total management of fracture. Management, definition, classification, complications, conservative and surgical management of fractures. Bone infection. Disorders of osteoid formation and maintenance. Disorder of bone mineralization.

PST 421: Cardiorespiratory Disorder and Rehabilitation (3 Units: LH 45)
Basic physiological principles involved in respiration and the dynamics of circulation. Relation of pathophysiology to methods of physiotherapy management. Specific respiratory and cardiovascular disorders. Principles of cardiac rehabilitation and cardiac massage.

PST 422: Neurological Disorders and Rehabilitation 1 (2 Units: LH 30)
Review of the physiology of central and peripheral nervous system. Proprioceptive neuromuscular facilitation. Maturational reflexes and reactions. Components of motor development. Principles of neurological assessment. Sensory and motor dysfunctions. Lesions within the skull resulting in hemiplegia, Parkinson's disease, cerebral palsy, head injuries and tumours. Lesions within the spinal column –could result in paraplegia, quadriplegia, tabes dorsalis, disseminated sclerosis, polyneuritis, peripheral neuropathy, syringomyelia, spinal bifida, poliomyelitis, myasthenia gravis, meningocoele etc. Medical, surgical and physiotherapy management of conditions.

PST 423: Soft Tissue Disorders and Rehabilitation (2 Units: LH 30)
Principles of physical management of disorders of skeletal muscle and adjoining soft tissue. Infection of skeletal muscles Muscular dystrophies – Progressive, muscular, myotonic, fascia, scapulohumeral, distal muscular and ocular myodystrophy: Amyotonia and myotonia congenital; abnormalities of the foot and hand. Myasthenia gravis. Management of chronic and acute soft tissue injuries (muscular, tendinous and ligamentous injuries, tendinitis etc,) Acquired and congenital abnormalities of the foot and hand.

PST 424: Community Physiotherapy and Ergonomics (2 Units: LH 30)
Definition of work environment: Appraisal; of vocation: Adaptations of machines and general conditions; normal/apparently healthy individual: physical/mentally handicapped individual: Human characteristics and work task. Open and closed systems. Accidents and safety in industry, the home and transportation; existing legislation; causes of accidents and prevention: heat stress and heat stroke. Assessment of physical, psychosocial and chemical abuses in industries. Health Education, Community clinic and itinerant and domiciliary physiotherapy services. Philosophies of primary health care (PHC)

PST 425: Physiotherapy in Women's Health and Nutrition (2 Units: LH 30)
Obstetrics – The structure, function and injuries of the pelvic floor. Physiological and metabolic changes in pregnancy and complications. Pre and post natal physiotherapy. Parturition. Caesarean section. Weak abdominal and pelvic floor muscles. Gynaecological – Pelvic inflammatory diseases. Incontinence. Vesico-vagina fistula, pelvic floor repair. Retroverted and prolapsed uterus. .Menopausal changes.
Nutritional Disorders – Nutritional factors in diseases. Aetiology of nutritional disorders, quantitative and qualitative aspects of nutrition. Protein-caloric malnutrition – Kwashiorkor, nutritional marasmus. Vitamins and disorders due to vitamin deficiency-rickets, osteomalacia, osteoporosis. Nutritional neurological syndromes- nutritional and alcoholic polyneuropathies. Obesity, prevention of nutritional disorder.

PST 426: Research Methodology and Biostatistics (2 Units: LH 30)

Research in physiotherapy, research problems, literature review, research design/protocol, data collection and storage, referencing, simple statistics in research. Central role of statistics in medicine, variables, routines and special data collection sampling, reduction. Summarization and presentation of data. Probability, normal distribution, sampling methods, tests of hypothesis. Measurement of health.

PST 427: Joint Disorders and Rehabilitation (2 Units: LH 30)

Degenerative joint disorders, Osteoarthritis, Cervical and lumber spondylosis, intervertebral disc lesion; low back pain syndrome. Infectious Joint Disorders- septic arthritis, tuberculous arthritis. Polyarthritis of unknown cause- Rheumatoid arthritis, Juvenile rheumatoid arthritis, ankylosing spondylitis. Crystal arthritis and gout.

PST 428: Clinical Practice II (4 Units: PH 180)

Application of the knowledge of physiotherapy assessment skills and physiotherapy modalities on patients for preventive, alleviating and health promotion purposes under the supervision of experienced physiotherapists.

PST 499: Students Industrial Work Experience Scheme (SIWES) (3 Units: PH 135)

This is to expose students to physiotherapy practice outside their hitherto ideal Teaching Hospital, set up. Rotation through the following areas during the long vacation to promote entrepreneurship skills: community physiotherapy and ergonomics, sports medicine, private physiotherapy practice, rehabilitation homes, psychiatric hospitals, leprosarium, industrial health clinics, general hospitals, orthopaedic hospitals etc.

500 Level

PST 510: Manipulative Therapy (3 Units: LH 45)

Passive and forced means of joint manipulation. Manual traction with relaxed passive movement. Prolonged stretching of tissues to correct deformity. Introduction to the manipulative techniques of the various schools of thought e.g. Maitland, Nwuga, McKenzie etc.

PST 511: Neurological Disorders And Rehabilitation II (2 Units: LH 30)

Continuation of PST 422.

PST 512: Specialty Lectures (Anaesthesia, Radiology, Psychiatry, Pathology, Occupational, Therapy, Medical Social Work and Primary Health Care). (3 Units: LH 45)

Surgery – Observation of operating theatre procedures in the general, neurological and plastic surgery units. Clinical psychology – Personality development and assessment, learning and clinical Applications, human motivations and emotions, Memory and forgetting, Attitude and behaviour. Medical Social Sciences - Services rendered and funding, psychiatric and paediatric social work, problems involved in medical social practice. Paediatrics – Neonatal tetanus, cerebral malaria, kernicterus, burns, T.B., meningitis, post

measles encephalitis, poliomyelitis, cerebral palsy. Metabolic and deficiency diseases – diabetes, rickets, beriberi, kwashiorkor, radiology –recognition of fractures, dislocations, degenerative changes in the joints including the vertebrae, recognition of chest conditions- pre and post operation, X-ray in medical and surgical care. Pathology- degeneration, inflammation, healing and repair processes of soft tissue, bone and specialized tissues, disturbances of growth (Hypertrophy, hyperplasia, metaplasia, atrophy etc), disturbances of circulation (Thrombosis, embolism, infarction), pigment disturbances, neoplasm.
Psychiatry- psychological disorders, neurosis including schizophrenia, personality disorders, epilepsy, organic brain syndromes, mental retardation, behaviour disorders of childhood and adolescence. Anaesthesia- Use of stethoscope, general principles of respiratory care, endotracheal and tracheotomy tubes, use and care of suction apparatus, use and care of drainage tubes and drips, management of the unconscious patient, syncope and electrical shock resuscitation, cardiac arrest and external cardiac massage, artificial respiratory complication.

PST 513: Gerontology **(2 Units: LH 30)**
Methods of evaluation and management of geriatric disorders, diabetes mellitus, cardiovascular disorders, musculoskeletal disorders and debilitating conditions. Home care and institutional care. Multidisciplinary approach to gerontology.

PST 514: Introduction Physiotherapy Administration and Management
(2 Units: LH 30)
Elements of managerial process. Analysis of problems involving the planning, developing, organizing and administering physiotherapy services. Physiotherapy department, organization and management, principles of management, human relations, management techniques, personnel management, communications, financial management, legal responsibilities.

PST 515: Physiotherapy in Disorders of Blood and Lymph Vessel **(2 Units: LH 30)**
Atherosclerosis, arteriosclerosis, aneurism, Buerger-Raynaud's disease, phlebitis, thrombosis, embolism, varicose veins, sickle cell diseases.

PST 516: Research Project Seminar. **(2 Units: LH 30)**
Each student writes a research proposal under the supervision of a lecturer and presents this as a departmental seminar. The student is graded for the quality of the seminar, his ability to respond intelligently to questions raised, and his attendance and participation when his colleagues present seminars.

PST 517: Intensive Care Physiotherapy **(3 Units: LH 45)**
General principles of intensive care. Types of incision, anaesthesia and the respiratory, circulatory and musculoskeletal complications due to anaesthesia. Intensive care of the burnt patients. Care of the unconscious patient and the critically ill patient.

PST 518: Clinical Practice III **(4 Units: PH 180)**
Same as Clinical Practice II but with greater responsibilities in patient care.

PST 520: Skin Disorders And Rehabilitation **(3 Units: LH 45)**

The use of physiotherapy modalities in the management of skin disorders such as; pressure points and pressure ulcers, varicose ulcers, decubitus ulcers, buruli ulcers, acne vulgaris, psoriasis, vitiligo, alopecia areata and totalis, eczema, burns, skin disorders in leprosy and diabetes mellitus etc.

PST 521: Sports Physiotherapy **(3 Units: LH 45)**

The role of physiotherapy in sports. Relationship with sportsmen, coaches, trainers, sports psychologists, sports medical team etc. Prevention and treatment of sports injuries. Health promotion for sportsmen through the attainment and maintenance of adequate physical fitness levels. Assessment of physical fitness status of sportsmen i.e., cardio-pulmonary and musculo-skeletal fitness. Ethics of sports physiotherapy practice. Good working knowledge of the rules of each sport, intrinsic and extrinsic causes of sports injuries for each sport. Good clinical judgment to carry out prompt and effective assessment of the severity of sports injuries as well as give prompt, appropriate and effective treatment,

PST 522: Physiotherapy in Pain Management **(3 Units: LH 45)**

Assessment and management of pain as a clinical entity. Pain is considered in all its ramifications; physical. pathological, emotional, social, psychological, financial, spiritual etc. The role of the physiotherapist in the holistic assessment and management of pain in all its presenting ramifications as a member of the pain clinic.

PST 523: Palliative Care in Terminal Illnesses. **(3 Units: LH 45)**

Philosophical issues in palliative care. Psycho-social issues. Introduction to pain control; pain syndromes in cancer and HIV/ AIDS. Pharmacological management of cancer pain. Other symptoms and their control with emphasis on the GIT, psycho-neurological and urinary symptoms. Roles of Radiotherapy, Chemotherapy, Surgery and physiotherapy in palliation. Communication skills with patient and relatives, spiritual and psychological supports dying and death, bereavement.

PST 524: Policy Issues in Health Care (Seminars). **(3 Units: LH 45)**

Seminars on topical issues such as the International Health definitions and classifications; ICF (formally ICIDH). Determinants of health, disease prevention and health promotion. The Nigerian health environment, policies and statistics. Concept of “Evidence Based” decision making and practice. Health care focus on selected population (women, children and the elderly). Ethical issues in general clinical practice with emphasis on ethical issues in physiotherapy practice. Public and private funding of health care services. The National Health Insurance Scheme. Entrepreneurship in health care. HIV/AIDS. Cancers etc.

PST 525: Research Project **(6 Units: PH 270)**

The student undertakes and reports his independent research findings as a dissertation which is submitted to the Department of Physiotherapy in partial fulfilment for the award of Bachelor of Physiotherapy degree of the University. The dissertation is examined in its written form and a Viva Voce.

3.11 PROSTHETICS AND ORTHOTICS (BSc)

3.11.1 Philosophy, Aims and Objectives of the Programme

Philosophy

The undergraduate degree in Prosthetics and Orthotics (P & O) programme of studies is to train P & O professionals equipped with adequate theoretical knowledge, clinical skills, sense of purpose and devotion to patients care using prosthetic and orthotic devices/appliances.

Aims and Objectives:

To train Prosthetics and Orthotics (P & O) professionals that will be able to design, assemble and fit prosthetic and orthotic appliances on patients and clients in conformity with the prescription of medical rehabilitation practitioners in the rehabilitation of patients.

The objectives of P & O professionals on completion of this programme should be able to:

i. Design all forms of prosthetic and orthotic devices
ii. Fabricate prosthetic and orthotic appliances according to prescription
iii. Identify component parts of prosthetic and orthotic appliances.
iv. Interprets specifications for prosthetic and orthotic appliances.
v. Assembling and fitting of prosthetic and orthotic components.
vi. Produce basic prosthetic and orthotic appliances.
vii. Participate in clinical assessment of prosthetic and orthotic cases
viii. Maintain prosthetic and orthotic appliances.

3.11.2 Basic Admission Requirements

There are three different pathways by which candidates can be admitted into the programmes in the discipline: the Unified Tertiary Matriculation (UTME), the Direct Entry, and Inter-University Transfer.

Unified Tertiary Matriculation Examination (UTME)

Candidates seeking enrolment into the B.Sc. (Prosthetics and Orthotics Programme must obtain O level passes at credit level (at not more than two sittings) in five subjects including Mathematics, Physics, Chemistry, Biology and English Language.

Direct Entry

Candidates seeking enrolment into the B.Sc. Prosthetics and Orthotics Programme must obtain two A Level passes in WAEC or GCE in Biology, Chemistry and Physics, provided they have satisfied the requirements of UTME as stated in (a) i above.

Inter-University Transfer Mode

Students can transfer into 200-Level courses provided they have the relevant qualifications and the requisite CGPA.

3.11.3**Learning Outcome**

Regime of Subject Knowledge

Anatomy, physiology, biomechanics, physics, biochemistry and basics and application of; psychology, medical sociology, computer science and mathematics.

i. The above listed subjects will enable the students to have a working knowledge of the structure and function of the human brain in health and disease and how these can be modified by external physical and psycho-social factors.

ii. Application of the knowledge of the subjects in the 200 level will also help students to understand the physiological and therapeutic effect of prostheses and orthoses devices.

iii. Identification of materials commonly used in P & O e.g. steel and its alloys, nonferrous metals and their alloys, plastics, wood, leathers, POP, and adhesives and elastics.

iv. Fabricate/assemble and fitting of prostheses and orthoses appliances for patients and clients in conformity with prescription.

v. Maintenance of the tools and equipment used in prostheses and orthoses

Competences and Skills

At the end of the prosthetics and orthotics training programme, graduates shall have acquire skills to;

i. Fabricate/assemble and undertake fitting of prostheses and orthoses appliances for patients and clients in conformity with prescription.

ii. Undertake assessment and casting of orthoses devices for patients with limb, spinal or other relevant deformities.

iii. Undertake assessment and fabricating of prostheses devices for patients with limb amputation.

iv. Modifying treatment appropriately based on the outcome of evaluation of treatment.

v. Equipped with effective and appropriate communication skills (including counselling and psychotherapy).

vi. Equipped with skills for conduction of research including proposal writing, data collection and analysis, interpretation of findings and report writing for dissertation or publication in learned journals.

vii. Equipped with basics skills of equipment handling and maintenance

Behavioural Attributes

The products of P & O programme shall be professional who have acquire high level of theoretical knowledge, clinical skills and sense of purpose. They should have a good mastery of the basic P & O procedures, shall exhibit understanding of the concept of the health care system and health care. They shall respect the dignity of the patients and exhibit high sense of responsibility in patients care. They shall be law abiding and practice within the ethical limits of the profession.

3.11.4**Course Structure**

YEAR I

100 LEVEL COURSES

Course Code	Course Title	Units	Status	LH	PH
BIO 101	General Biology I	3	**C**	**45**	**-**
BIO 102	General Biology II	3	**C**	**45**	**-**
BIO 107	General Biology Practical I	1	**C**	**-**	**45**
BIO 108	General Biology Practical II	1	**C**	**-**	**45**
MAT 101	Elementary Mathematics I	2	**C**	**30**	**-**
PHY 101	General Physics I	3	**C**	**45**	**-**
PHY 102	General Physics II	3	**C**	**45**	**-**
PHY 107	General Physics Practical I	1	**C**	**-**	**45**
PHY 108	General Physics Practical II	1	**C**	**-**	**45**
CHM 101	General Chemistry I	3	**C**	**45**	**-**
CHM 102	General Chemistry II	3	**C**	**45**	**-**
CHM 107	General Chemistry Practical I	1	**C**	**-**	**45**
CHM 108	General Chemistry Practical II	1	**C**	**-**	**45**
CSC 101	Introduction to Computer Science	2	**C**	**30**	**-**
MAT 102	Elementary Mathematics II	2	**C**	**30**	**-**
GST 101	Use of English I	2	**C**	**30**	**-**
GST 102	Use of English II	2	**C**	**30**	**-**
GST 113	Nigerian Peoples and Culture	2	**C**	**30**	**-**
	Total	**36 Units**			

YEAR II

200 LEVEL COURSES

Course Code	Course Title	Units	Status	LH	PH
ANA 201	Anatomy I (Upper Limb and Spinal Column)	2	**C**	**30**	**-**
PHG 201	Physiology I (General Physiology)	2	**C**	**30**	**-**
PHM 201	Introductory Pharmacology	2	**C**	**30**	**-**
BCH 201	General Biochemistry	2	**C**	**30**	**-**
POT 201	Electro-Technology	3	**C**	**30**	**-**
POT 202	First Aid in Prosthetics & Orthotics	2	**C**	**30**	**-**
POT 203	Wood and Metal Vacuum Techniques	2	**C**	**30**	**-**
STA 201	Basic Statistics	2	**C**	**30**	**-**
SOC 201	Medical Sociology	2	**C**	**30**	**-**
ANA 202	Anatomy II (Lower Limb)	2	**C**	**30**	**-**
PHG 202	Physiology II	2	**C**	**30**	**-**
POT 204	Material Technology	3	**C**	**45**	**-**
POT 205	Neuroscience for Prosthetics & Orthotics	2	**C**	**30**	**-**
POT 206	Rehabilitation Science	3	**C**	**45**	**-**
PSY 201	Introductory Psychology	2	**C**	**30**	**-**
POT 207	Applied Technical Skill for Prosthetics & Orthotics	2	**C**	**30**	**-**
	TOTAL	**35 Units**			

YEAR III

300 LEVEL COURSES

Course Code	Course Title	Units	Status	LH	PH
POT 301	Biomechanics I	2	**C**	**30**	**-**
POT 303	Lower Limb Orthotics I	2	**C**	**30**	**-**
POT 305	Spinal and Upper Limb Orthotics I	2	**C**	**30**	**-**
POT 307	Lower Limb Prosthetics I	2	**C**	**30**	**-**
POT 309	Plaster and Casting Techniques I	3	**C**	**30**	**15**
POT 311	Upper Limb Prosthetics	2	**C**	**30**	**-**
POT 313	General Clinical Practice in P & O	3	**C**	**30**	**15**
POT 317	Clinical Pathology	2	**C**	**30**	**-**
POT 302	Biomechanics II	2	**C**	**30**	**-**
POT 304	Lower Limb Orthotics II	2	**C**	**30**	**-**
POT 306	Spinal and Upper Limb Orthotics II	2	**C**	**30**	**-**
POT 308	Lower Limb Prosthetics II	2	**C**	**30**	**-**
POT 310	Plaster and Casting Techniques II	3	**C**	**30**	**15**

POT 312	Early Detection of Disabilities	2	**C**	**30**	**-**
POT 314	Clinical Pharmacology	2	**C**	**30**	**-**
POT 315	Therapeutic Skills &Spintage, Slings & Bandages	3	**C**	**30**	**15**
POT 316	Research Methodology	2	**C**	**30**	**-**
POT 318	Dissertation Seminar	2	**C**	**30**	**-**
POT 320	SIWES	6	**C**	**-**	**90**
	TOTAL	**46**			

YEAR IV

400 LEVEL COURSES

Course Code	Course Title	Units	Status	LH	PH
POT 401	Orthopeadic Pathology I	2	**C**	**30**	**-**
POT 402	Orthopeadic Pathology II	2	**C**	**30**	**-**
POT 405	Traumatologyfor Prosthetics & Orthotics	3	**C**	**30**	**15**
POT 407	Biomechanics III	3	**C**	**30**	**15**
POT 409	General Orthotics Practice	3	**C**	**30**	**15**
POT 411	Administration and Ethics in Prosthetics & Orthotics	2	**C**	**30**	**-**
GST 401	Entrepreneurship	2	**C**	**30**	**-**
POT 403	Orthopeadic Pathology III	2	**C**	**30**	**-**
POT 404	Prosthetics and Orthotics Components and Production	3	**C**	**30**	**15**
POT 406	General Prosthetics Practice	3	**C**	**30**	**15**
POT 408	Public & Primary Health Care	2	**C**	**30**	**-**
POT 410	Laboratory Mgt. in Prosthetics and Orthotics	3	**C**	**30**	**15**
POT 412	Research Project	4	**C**	**60**	**-**
	Total	**34Units**			

3.11.5**Course Descriptions**

100 Level Courses

General Studies 100 Level

GST 111: Communication in English **(2 Units: LH 30)**

Effective communication and writing in English; Language skills; writing of essay answers; Comprehension; Sentence construction; Outlines and paragraphs; Collection and organization of materials and logical presentation; Punctuation.

GST 112: Logic Philosophy and Human Existence **(2 Units: LH 30)**

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 bi- conditionals qualification theory. Types of discourse; Nature or 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 113: Nigerian Peoples and Culture **(2 Units: LH 30)**

Study of Nigerian history, culture and arts in pre-colonial times, Nigerian's perception of his 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; Norms and values; Negative attitudes and conducts (cultism and related vices); Re-orientation of moral Environmental problems.

GST 121: Use of Library, Study Skills & ICT **(2 Units: LH 30)**

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. Development of modern ICT, Hardware technology Software technology, Input devices, Storage devices, Output devices, Communication and internet services, Word processing skills (typing, etc).

GST 122: Communication in English II **(2 Units: LH 30)**

Logical presentation of papers, Phonetics, Instruction on lexis, Art of public speaking and oral communication, Figures of speech, Précis, Report writing.

GST 123: Communication in French **(2 Units: LH 30)**

Introduction to French, Alphabets and numeric for effective communication (written and oral), Conjugation and simple sentence construction based on communication approach, Sentence construction, Comprehension and reading of simple texts. OR 18

GST 123: Communication in Arabic **(2 Units: LH 30)**

Introduction to Arabic alphabets and writing systems, Elementary conversational drills, Basic reading skills, Sentence construction in Arabic.

General Studies 200 Level

GST 211: Environment and Sustainable Development **(2 Units: LH 30)**

Man – his origin and nature, Man and his cosmic environment, Scientific methodology, Science and technology in the society and service of man, Renewable and non-renewable resources – man and his energy resources, Environmental effects of chemical plastics, Textiles, Wastes and other material, Chemical and radiochemical hazards. Introduction to the various areas of science and technology. Elements of environmental studies.

GST 222: Peace Studies and Conflict Resolution **(2 Units: LH 30)**

Basic Concepts in peace studies and conflict resolution, Peace as vehicle of unity and development, Conflict issues, Types of conflict, e. g. Ethnic/religious/political/economic conflicts, Root causes of conflicts and violence in Africa, Indigene/settler phenomenon, Peace – building, Management of conflict and security. Elements of peace studies and conflict resolution, developing a culture of peace, Peace mediation and peace-keeping, Alternative Dispute Resolution (ADR).

Dialogue/arbitration in conflict resolution, Role of international organizations in conflict resolution, e.g. ECOWAS, African Union, United Nations, etc.

GST 223: Introduction to Entrepreneurship **(2 Units: LH 30)**

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 capital; Financial planning and management; Starting a new business, Feasibility studies; Innovation; Legal Issues; Insurance and environmental considerations. Possible business opportunities in Nigeria.

GST 224: Leadership Skills **(2 Units: LH 30)**

Transformation is a fundamental shift in the deep orientation of a person, organization or society such that the world is seen in new ways and new actions and results become possible that were impossible prior to the transformation. Transformation happens at the individual level but must be embedded in collective practices and norms for the

transformation to be sustained. Leadership Development Programme (LDP) proposes novel approaches to teaching and learning, which emphasizes the practical involvement of participants. It is interactive and involves exercises and actual implementation of breakthrough projects by teams that make difference in the lives of the target population. In this course, leadership concepts comprising of listening, conversation, emotional intelligence, breakthrough initiatives, gender and leadership, coaching and leadership, enrolment conversation and forming and leading teams will be taught

General Studies 300 Level

GST 311: Entrepreneurship (2 Units: LH 30)

Some of the ventures to be focused upon include the following: Soap/Detergent, Tooth brushes and Tooth paste making. Photography; brick, nails, screws making; dyeing/Textile blocks paste making; rope making, plumbing, vulcanizing, brewing, glassware, production/Ceramic, production Paper production; Water treatment/Conditioning/ Packaging; Food processing/packaging/preservation; Metal working/Fabrication – Steel and aluminium door and windows; Training industry; Vegetable oil/and Salt extractions; Fisheries/Aquaculture; Refrigeration/Air conditioning; Plastic making; Farming (crop); Domestic Electrical wiring; Radio/TV repairs; Carving; Weaving; Brick laying/making; Bakery ; Tailoring; Iron welding; Building drawing; Carpentry; Leather tanning; Interior decoration ;Printing; Animal husbandry (Poultry, Piggery, Goat etc); Craft – Blacksmith, Tinsmith etc ;Sanitary wares; Vehicle maintenance; Bookkeeping;

Common Science courses-100 Level

BIO 101: General Biology I (3 Units: LH 45)

Characteristics of living and non-living things. Scientific methods to biology concepts. Taxonomy of living organism – Microbes. Plants including field and herbarium methods. Morphology and life cycles of phyla and plant kingdoms. Cell concepts, structure, organization, functions, and chemical and physical characteristics. Plant and tissues and organism systems. Elements of biological chemistry – aspects of organic, inorganic and physical chemistry relevant to biology.

BIO 102: General Biology II (3 Units: LH 45)

Genetics and its scope. Mendel and his laws of inheritance. Physical and chemical basis of inheritance. Man as an object of genetics. Modifications of classical Mendelian ratios. Heredity and environment. Probability and the chi square test Quantitative and multiple allelic inheritance. Sex development, sex linkage and sex abnormalities. Mutations, Heredity, Eugenics and the future of mankind.

BIO 107: General Biology Practical I (1 Unit; PH 45)

Laboratory experiments designed to illustrate the topics covered

BIO 101 BIO 108: General Biology Practical II (1 Unit; PH 45)

Experiments designed to emphasise the practical aspects of topics of course

BIO 102 CHM 101: General Chemistry I (3 Units: LH 45)

Atoms, molecules and chemical reactions. Modern electronic theory of atoms. Electronic configuration, periodicity and building up of the periodic table. Hybridization and shapes of simple molecules. Valence Forces; Structure of solids. Chemical equations and stoichiometry; Chemical bonding and intermolecular forces, kinetic theory of matter. Elementary thermochemistry; rates of reaction, equilibrium and thermodynamics. Acids, bases and salts. Properties of gases. Redox reactions and introduction to electrochemistry. Radioactivity.

CHM 102: General Chemistry II (3 Units: LH 45)

Historical survey of the development and importance of Organic Chemistry; Electronic theory in organic chemistry. Isolation and purification of organic compounds. Determination of structures of organic compounds including qualitative and quantitative analysis in organic chemistry. Nomenclature and functional group classes of organic compounds .Introductory reaction mechanism and kinetics. Stereochemistry. The chemistry of alkanes, alkenes, alkynes, alcohols, ethers, amines, alkyl halides, nitriles, aldehydes, ketones, carboxylic acids and derivatives. The Chemistry of selected metals and non-metals. Comparative chemistry of group IA, IIA and IVA elements. Introduction to transition metal chemistry.

CHM 107: General Chemistry Practical I (1 Unit: PH 45)

Laboratory experiments designed to reflect topics presented in courses CHM 101 and CHM 102. These include acid-base titrations, qualitative analysis, redox reactions, gravimetric analysis, data analysis and presentation.

CHM 108: General Chemistry Practical II (1 Unit: PH 45)

Continuation of CHM 107. Additional laboratory experiments to include functional group analysis, quantitative analysis using volumetric methods.

CSC 101: Introduction to Computer Science (3 Units: LH 30, PH: 45)

Survey of computers and information processing and their roles in society. This course introduces a historical perspective of computing, hardware, software, information systems, and human resources and explores their integration and application in business and other segments of society. Students will be required to complete lab assignments using the PC's operating system, and several commonly used applications, such as word processors, spreadsheets and graphics presentations applications. Internet and on-line resources, browsers and search engines.

MTH 101: Elementary Mathematics. (3 Units: LH 45)

Elementary set theory, subsets, union, intersection, complements, venn diagrams. Real numbers; integers, rational and irrational numbers, mathematical induction, real sequences and series, theory of quadratic equations, binomial theorem. Complex numbers; algebra of complex numbers; the Argand diagram. De-Moivre's theorem, nth roots of unity. Circular measure, trigonometric functions of angles of any magnitude, addition and factor formulae.

PHY 101: General Physics I (3 Units: LH 45)

(Mechanics, Thermal Physics and Waves)Space and time, units and dimension, kinematics; Fundamental laws of mechanics, statics and dynamics; work and energy; Conservation laws. Moments and energy of rotation; simple harmonic motion; motion of simple systems; Elasticity; Hooke's law, Young's shear and bulk moduli, hydrostatics; Pressure, buoyancy, Archimedes' principles; Surface tension; adhesion, cohesion, capillarity, drops and bubbles; Temperature; heat, gas laws; laws of thermodynamics; kinetic theory of gases; Sound. Types and properties of waves as applied to sound and light energies. Superposition of waves. Propagation of sound in gases, solids and liquids and their properties. The unified spectra analysis of waves. Applications.

PHY 102: General Physics II (3 Units: LH 45)

(Electricity, Magnetism and Modern Physics) Electrostatics; conductors and currents; dielectrics; magnetic fields and electro- magnetic induction; Maxwell's equations; electromagnetic oscillations and waves; Coulomb's law; methods of charging; Ohm's law and analysis of DC circuits; AC voltages applied to Inductors, capacitors and resistance.

PHY 107: General Practical Physics I (1Unit: PH 45)

This introductory course emphasizes quantitative measurements, the treatment of measurement errors, and graphical analysis. A variety of experimental techniques should be employed. The experiments include studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity, etc., covered in PHY 101 and PHY 102. However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis and deduction.

PHY 108: General Practical Physics II (1 Unit: PH 45)

This is a continuation of PHY 107

200 Level Courses

ANA 201: Anatomy I (Upper limb & the Spinal Column)(2 Units: LH 30)

Bones and Joints of the Upper limbs. Soft tissues of the upper limbs, Muscles, Ligaments, Fascia, Tendon sheath, Retinaculum etc. Joint Structure and stability. Description of Movement of upper limb joints. Anatomical landmarks. Applied/Clinical Anatomy of upper limb. Bones and Joints of the Vertebral Column.

Soft tissues of the Vertebral Column, Muscles, Ligaments, Fascia, Tendon sheath, Retinaculum etc. Joint Structure and stability. Description of Movement of Vertebral Column, Anatomical landmarks of the Vertebral Column, Applied/Clinical Anatomy of the Vertebral Column

ANA 202: Anatomy I (Lower limb)(2 Units: LH 30)

Bones and Joints of the lower limbs. Soft tissues of the lower limbs, Muscles, Ligaments, Fascia, Tendon sheath, Retinaculum etc. Joint Structure and stability .Description of Movement of lower limb joints .Anatomical landmarks. Applied/Clinical Anatomy of Lower limb

PHG 201: Physiology I (General Physiology) (2 Units: LH 30)

Introduction to Physiology: the place of Physiology in Medicine; solving problems in clinical medicine, cell membrane, nucleus/nucleolus, endoplasmic reticulum mitochondria, Golgi apparatus, Chromosomes/peroxisome, microtubules/microfilaments, intercellular connections. Transport across the cell membrane: simple diffusion, osmosis, solvent drag, facilitated diffusion, active transport, endocytosis (Phyagocytosis, pinocytosis), exocytosis (emeiocytosis). Homeostasis and control system. Biophysical Principles, membrane Potentials (molecular and ionic baxis), Physiology of excitable tissues. Molecular Biology.Problem Based Learning – Methods in Medicial Physiology.

PHG 202: Physiology II(2 Units: LH 30)

GIT, Nutrition, Metabolism and Autonomic Nervous System. General organization and functional anatomy of the GIT system. Movements of gastro-intestinal tract (GIT motility): mechanisms and control of mastication (chewing), deglutition (swallowing), gastric motility, small intestinal motility, colonic motility, defaecation, GIT secretion and hormones: secretory cells (or glands), composition, control and function of salivary secretion, gastric juice and gastrin, small intestinal secretion and hormones, colonic secretions, pancreatic and bile secretions, Digestion and absorption of carbohydrates, proteins, lipids and absorption of water, minerals, vitamins, liver and its functions. Nutrition and metabolism. Gastrointestinal disorders. Nutrition: Carbohydrates, proteins, lipids, vitamin, electrolytes etc. Metabolism (BMR and factors that affect it).

POT 201: Electro-Technology (2 Units: LH 30)

Explain the following terminologies:- current, charge, potential difference, resistance, electromotive force and circuit. Explain above the application of current, charge, resistances, in prosthetics and orthotics. Describe resistors in series. Describe resistors in parallel. Describe resistors in series and parallel. Measure resistors in series only, resistors in parallel only and resistors in series and parallel.

Explain and describe types of sine wave and sinusoidal waves. Explain what transformers are.

POT 204: Materials Technology(2 Units: LH 30)

1.1Identification of materials commonly used in prosthetics and orthotics e. g.
(a) Steel and its alloys
(b) Nonferrous metals and their alloys, e.g. aluminum, aluminum, etc.
(c) Plastics, thermoforming, thermosetting, composites
(d) Wood
(e) Leather
(f) Plaster of Paris
(g) Adhesives and Elastic

2.1 Explain the chemical composition and properties of the materials listed in 1.1 above.
(1) Plaster of Paris – Powdery Cao4+ H_2o
(2) Steel – hard vest, tough
(3) Wood – breakable, dry season
(4) Aluminum etc make able
(5) Leather etc soft, hide/skin
(6) Plastic – breakable, hand.

2.2 State the physical properties of the materials; e.g.
(a)Metals and alloys
(i) Solid at room temperature, (ii) has high melting point, (iii) sliming when cut, (iv) forms alloys. (v) Strong and tough, (vi) can be hammered into shape, (vii) good conductor of heat and electricity.
(b) Non Metals e.g. Leather, plaster of paris, plastics, adhesives,
(i) Low melting and boiling point, (ii) dull in appearance, (iii) brittle (breakable, (iv) poor conductor of electricity

2.3 Describe the effect of acid, gases and salts on
(a) Metals and alloys, non-metals used for prostheses and orthoses.

2.4 Describe the effect of corrosion on metals for prostheses and orthoses.
Describe the difference in textures, permeability strength and weight in non-metals.

3.1 Identify the uses of metals and alloys in prosthetics and orthotics devices
e.g. calipers, braces, etc

3.2 Identify the uses of plastics in prosthetics and orthotics; e.g. KAFO, AFO, SPLINTS Etc.

3.3 Identify uses of wood in prosthetics e.g. Artificial limb, SACH foot, Knee piece

3.4 Identify uses of leather in prosthetics and orthotics, e.g. ring padding, knee pad, cuff suspension, orthopaedic shoes, etc.

Identification of the sources of the following materials used in Prosthetics and Orthotics.
METALS, PLASTICS, WOOD, LEATHER, PLASTER OF PARIS (POP), ADHESIVES
Identification of the following tools and equipment used in Prosthetics and Orthotics.
a.) Vice to hold materials, b.) Hard saw to cut, c.) Guillotine machine to cut, d.) Sheer machine to cut, e.) Grinding stones/machine, f.) Welding machine, g.) Vacuum machine, h.) Suction machine, i).Oven, j.) Drill press m/c, k.) Lathe machine, l.) Craftsman carver, m.).Skiving machine.
Maintenance of the tools and equipment used in Prosthetics and Orthotics.
Identification of METALS materials to make calipers and braces.
Identification of LEATHER materials to make Orthopaedic shoes, knee pads, etc, and

Identification of LEATHER materials to make plaster cast technique.
Identification of THERMOPLASTER MATERIALS to mould socket and spaces.
Identification of WOOD materials to carve socket in limbs.
Identification of FOAM (PEDILENE) materials to make extension in devices for cosmetic light finish.
Identification of ADHESIVES materials to form wood, leather plastic, etc.

POT 202: First Aid in Prosthetics & Orthotics(2 Units: LH 30)

Definition of First Aid, The qualities of First Aider, TRIAGE and the process of TRIAGE in First Aid. The process of sorting out cases based on severity of injuries i.e. bleeding, airway problem, cardio vascular problem. The principles of First Aid.

The health conditions requiring 1st Aid: i.e. Trauma e.g. RTA etc, Non – Trauma e.g. sync pal attacks, shock, febrile conditions etc. Definition of Basic Trauma Life Support (BTLS).Identification the levels of BTLS. Airway/cervical spine control; Breathing, Circulation, Exposure, Neurological

Description of the process involved in the support and transport of injured persons. The materials required for 1st Aid.

POT 207: Applied Technical Skills for Prosthetics & Orthotics(2 Units: LH 30)

The development of psychomotor skills in the application of contemporary technology, specifically to implement the treatment plan for appropriate patient care. The goal is to use specialized set of technical skills in the assessment, measurement and fabrication processes to create an appropriate orthoses/prosthesis that will successfully implement the treatment plan.

PHM 201: Clinical Pharmacology (2 Units: LH 30)

Clinical implication of current pharmacological treatment based on commonly medicated pathologies encountered in patient care. Recognizing effects of medication and its impacts on the clinical decision making process. These clinical effect include physiological function (volume management, cardiac performance, pain, spasticity, dermatological) and cognitive function. This include the ability to identify problematic signs and symptoms necessitating referral to appropriate healthcare providers.

POT 205: Neuroscience for Prosthetics & Orthotics (2 Units: LH 30)

Study of the anatomical substrate related to function of the nervous system. Topics include neuroanatomy, cellular and intercellular physiology, neuroplasticity, development of the nervous system and the somatic and motor systems. Neural disorders encountered in clinical practice are emphasized. Clinical correlation will provide an understanding of neurological disorders and deficits.

POT 206: Rehabilitative Science(2 Units: LH 30)

The scope and variance of rehabilitation practices within sociocultural contexts. Includes models of disability, understanding of practice from the perspective of all stakeholders and the implication of such clinical decision making and clinical and functional outcomes.

300 Level Courses

POT 301: Biomechanics I (2 Units: LH 30)

Identification of the anatomical parts of the human body; Explain the following human anatomical terms; coronal plane, saggital plane, medial, Lateral, superior, inferior
Draw annotated diagram of the human limbs – leg to show bones or joints; muscles
Draw annotated diagram of the human to body to show bones; limbs and muscle.
Describe the function of the various bones, joints and muscles and their interaction in human movement. Identify all the planes and reference point of the human body.
Identify types of joints in the body. E.g. Upper & Lower limb joints; Explain the functions of the various joints in the body. Explain the interactive biomechanical forces of the body.
Identify the various joints of the body using the full skeleton.
Identify the major muscles of the upper and lower limbs. Describe functions of the action of the various muscles of the body. Explain the agonistic and antagonists of the muscle action in the upper and lower limbs of the human body.

POT 302: Biomechanics II (2 Units: LH 30)

Define the following terms: gait cycle, heel strike, stance phase, swing phase, toe-off
Describe the sub-divisions of the stance phase thus: Heel strike, Foot – flat, Mid – Stance, Push – Off.
Describe the sub-divisions of the swing phase: (a) acceleration, mid-swing, deceleration
Describe the normal and abnormal human locomotion. Describe the human gait cycle. Explain the normal and abnormal human gait cycle. Determine the division of gait cycle.
Define the word "forces" and its application to various joints and muscle activity. List the various forces in the upper and lower joints and muscles. Identify forces involved in normal human locomotion and gait cycle. Demonstrate the action of the gravitational force to joint motions in human locomotion.
Explain the forces involved in walking. Identify the muscles that generate forces in various joints necessary for the following: support, balance, locomotion in relation to both upper and lower limbs. Identify the effect of external forces on normal human locomotion. Demonstrate the effect of external forces on normal human locomotion

POT 303: Lower Limb Orthotics I (2 Units: LH 30)

Describe the various techniques used in bending orthotic materials to shape. Identify tools for bending in orthotic production. Bend various materials to different shapes to produce orthoses.

Explain the importance of holes in orthoses. Describe how holes are made on different orthotic materials. Make holes on relevant orthotic materials.

POT 304: Lower Limb Orthotics II(2 Units: LH 30)

The concept of transfer of patterns. Describe the indications for arch support. Cut out materials for fabrication of arch support. Fabricate arch support using stainless steel. Fabricate arch support using aluminum. Fabricate arch support using plastics materials. Identify patterns for producing stirrups. Transfer patterns for producing stirrups. Cut metal into different patterns. Make Rigid ankle stirrups Make flexible ankle stirrups for dorsi flexion and plantar flexion. Identify the relevant materials for making bolts and nuts. Identify tools for making ankle foot orthoses. Make individual components of ankle foot orthoses. Assemble individual components. Construct ankle foot orthoses using plastics. Construct ankle foot orthoses using metals. Describe the peculiarity of different designs of ankle foot. Identify tools for making knee ankle foot orthoses. Make individual components of knee – ankle foot orthoses. Assemble individual components of knee-ankle foot orthoses. Construct knee-ankle foot orthoses using plastics. Construct knee-ankle foot orthoses using metals. Describe the process of moulding. Identify different materials for moulding. Moulding with different materials.

POT 305: Spinal and Upper Limb Orthotics I (2 Units: LH 30)

Define and explain terms used in orthotics, such as: Orthotics, Orthosis, Orthotist, Orthoses.
Identify and explain the basic materials for producing spinal and upper limb orthoses.
Identify the materials for fabricating; Cervicalorthoses, Spinal jacket, Lumbar corset and belts
Identify the following materials for fabricating;
(a) Finger orthoses, (b) Cock up splints,(c) Aeroplane splint, (d) Shoulder abduction splint.

POT 306: Spinal and Upper Limb Orthotics II (2 Units: LH 30)

Identify orthoses for management for specific conditions; Scoliosis, Kyphosis, Kyphoscoliosis. Prepare patient for measurement for spinal and upper limb orthoses. Take appropriate measurements for spinal and upper limb orthoses. Confirm measurements taken from negative cast. Confirm measurements taken after modification. Fabricate orthoses for the following spinal conditions:- Scoliosis, Kyphosis, Kyphoscoliosis and Lordosis. Orthosis fittings.

POT 307: Lower Limb Prosthetics I (2 Units: LH 30)

Identify a prosthetic laboratory and its layout. Describe the layout of a prosthetic laboratory.

Sketch a prosthetic laboratory layout. Identify the functions of each part of the prosthetic laboratory.
Identify various tools used in the fabrication of prostheses. Identify various machinery used in the fabrication of prostheses. Explain the functions of various tools and machines used in the fabrication process of prostheses. List various tools and machines used in a prosthetic workshop. Sketch some of the hand tools used in prosthetics laboratory. Identify ankle and partial foot prosthesis.

Describe the functions of an ankle and partial foot prosthesis. Identify the component parts of an ankle and partial foot prosthesis. Take measurements of ankle and partial foot amputee. Take casts of ankle and partial foot amputee. Fabricate ankle and partial foot prostheses. Identify faults on an ankle and partial foot. Identify a transtibial prosthesis. Describe the functions of transtibial prosthesis.
Identify the component parts of such prosthesis. Take measurements of a transtibial amputee.
Take the cast of such amputee. Fabricate a transtibial prosthesis. Identify the faults on such prosthesis e.g. socket or foot breakage.

POT 308 Lower Limb Prosthetics II (2 Units: LH 30)

Identify knee disarticulation prosthesis. Describe the functions of knee disarticulation prosthesis.

Identify the component parts of a knee disarticulation prosthesis. Take measurements of a knee disarticulation amputee. Take cast of a knee disarticulation amputee. Fabricate the following component of the knee disarticulation prosthesis of the foot, knee & socket using appropriate materials.

Identify faults on knee disarticulation prosthesis e.g. joint breakage, damage to the socket etc.

Identify a trans-femoral prosthesis. Describe the functions of a trans- femoral prosthesis. Identify the component parts of a trans-femoral prosthesis. Take measurements of a trans-femoral amputee. Take cast of a trans-femoral amputee. Fabricate socket, knee and foot of a trans-femoral prosthesis using appropriate materials. Identify faults on a trans-femoral prosthesis e.g. socket breakage, joint breakage, damage, foot breakage etc. Identify a hip disarticulation prosthesis. Describe the functions of a hip disarticulation prosthesis. Identify the component parts of hip disarticulation prosthesis. Take measurements of a hip disarticulation amputee. Take cast of a hip disarticulation amputee. Fabricate the following components of the hip disarticulation prosthesis-socket from resins. Identify faults on hip disarticulation prosthesis e.g. socket breakage, joint breakage, damage, foot breakage etc.

POT 311: Upper Limb Prosthetics (2 Units: LH 30)

Identify a prosthetic laboratory and its layout. Describe the layout of a prosthetic laboratory.

Identify the functions of each aspect of the laboratory. Identify the various tools and machines used in the fabrication of upper limb prostheses. Explain the functions of various tools, machines and materials used in fabrication of upper limb prosthesis. List the tools, machines and materials used in upper limb prostheses. Identify wrist disarticulation prosthesis. Know the functions and component parts of wrist disarticulation prosthesis. Take measurements, fabricate and cast of a wrist disarticulation amputee.

Identify faults in such prosthesis e.g. broken socket, malfunctioning hand.

Identify trans-radial prostheses and describe the functions of Trans – radial Prostheses. Identify the measurement, fabricate, take cast and component parts of a Trans – Radial Prostheses. Identify faults in Trans- radial prostheses.

Explain the functions and Identify Trans – humeral prostheses. Identify the measurement, cast, fabricate and component parts of a Trans – humeral prostheses. Identify faults in Trans - humeral prosthesis.

POT 309: Plaster Casting Technique I (3 Units: LH 30 & PH 45)

Define plaster of Paris. Outline the historical development of plaster of Paris and plaster casting.
Explain the relevance of orthopaedic plaster in the management of bone fractures.
Explain the roles of plaster expert in the management of orthopaedic and trauma conditions.
Explain the chemical composition of plaster of Paris.
Describe the physical characteristics of plaster of Paris. Explain the uses of plaster of paris.
Describe the building facility structure, ventilation, illumination, entry and exit routes of a typical plaster room. Identify the human resources needed in the Plaster casting room.
Identify the materials needed in the plaster room such as furniture, equipment instrument etc.
Explain the financial resources and budgeting for an ideal plaster room.
Explain the system of management of the plaster room.
Identify all equipment and instrument needed in the plaster room e.g. Plaster cutter/shears, Plaster bender, Plaster scissors. Explain the use of each equipment/ instrument listed in above.
Describe different types of plaster cast application e.g. colles' cast, scaphoid cast etc.
Describe the methods of plaster cast making. Identify complications associated with use of plaster e.g. swelling compression, Damage to blood vessels, Damage to nerves.
Describe the process for dealing with the complications of plaster. Describe the process of care of patient in plaster cast. Describe the procedure of removal of plaster cast.
Identify the instruments for plaster cast removal. Explain possible reasons for removal of plaster cast.
Describe possible complications associated with the removal of plaster cast.
Identify possible hazards that may arise in the plaster room e.g. electrical wiring, slippery floor.
Identify protective wears for plaster room work. Apply the safety precaution to hazards
Identify other materials that can be used for casting. Identify different types of synthetic casts.
List the advantages and disadvantages of synthetic casts over plaster of Paris. Explain the chemical composition of synthetic cast. Molding of synthetic casts.
List different types of lifts for lifting and handling of patient in plaster. Describe mechanism of muscle contraction. Explain the terms – posture gravity and balance. Differentiate between lifting and dragging.
Explain the different methods of lifting and their techniques. Identify different positions used in lifting.

Lift and handle patients in plaster cast.
Identify different parts of upper extremities of human being.
Describe slab plaster casts used for the management of bone fractures of upper extremities of human.
Identify the materials used in making slab of casts.
Make the following slab casts: below elbow back, above elbow back slab, cock up splint, anterior slab
Identify the different parts of the lower extremities.
Identify different slab plaster casts used for the management of bone fractures of the lower extremities.
Identify the plaster bandages and padding materials used in plaster casting.
Describe the process of making removable and non – removable below knee slab plaster cast.
Make removable and no removable slab casts. Counsel patient after applying slab cast.

POT 310: Plaster Casting Techniques II (3 Units: LH 30 & PH 45)

Identify different parts that make up the upper extremities of human being.
Identify plaster casts used for the management of bone fractures of upper extremities. E.g. Colle's plaster cast, Scaphoid plaster cast, Bennet plaster cast, Below elbow cast, Hanging cast
U' cast. Identify different parts of the lower extremities of the human being. Identify plaster casts used for the management of bone fractures of the lower extremities of human. Identify the materials used to make the plaster casts of the lower extremities.
Making of the following plaster cads of the lower extremities of the human being; Boot plaster cast, Below knee cast, Above Knee cast, High above Knee cast cylinder cast, Counsel patients after plaster cast application. Define wedging and explain the need for wedging a dry cast. Identify materials used for wedging of a cast. Identify all supportive devices in plaster casting. Identify materials used in making the supportive devices e.g. Heel raising wooden, block for weight bearing leg plaster cast, Walking stick, Pairs of crutches, Collar & cuff bandage. Explain the function/ uses of the supportive device. Maintain supportive devices. Identify complications that may arise from the use of supportive devices listed in above. Describe the technique of wedging of plaster casts. Wedge plaster casts. Define synthetic plaster bandage. Identify the synthetic plaster. Identify the tools used in applying synthetic plaster cast. Explain the chemical components of synthetic plaster bandage. Differentiate between plaster of paris and synthetic plaster bandage. Demonstrate the application of synthetic bandage to make a plaster cast. Mould a synthetic plaster on a limb. Define cast bracing. Explain the purposes of cast Bracing. Identify the different metal braces used in cast bracing. Make the following bracing: Femoral cast bracing Tibial cast bracing. Define spica, Identify different types of spica such as: Shoulder spica, Single (unilateral) hip spica, Double (bilateral) hip spica, One and a half hip spica. Explain different types of spica. Apply plaster spica to patients. Counsel patient in plaster spica. Identify different parts of human body trunk.
Define body jacket cast. Identify different types of body jackets such as: Modified Minerva body jacket, Full minerva body jacket, Halo-pelvic body jacket. Explain the uses of body jackets. Make different body jackets. Counsel patients in body jackets. Define sarmiento

plaster cast. Explain the uses of sarmiento cast. Identify materials used in making sarmiento cast. Explain the procedure of making a sarmiento cast. Counsel patients and clients on sarmiento cast. Describe frog cast. List indications for frog cast. Identify materials required for making frog cast. Identify parts of human hand. Define Volar Slab Cock-up splint and their uses. Differentiate between Volar Slab and Cock-up Slab (Splint). Identify materials used for: Volar slab, Cock up splint, Make – Volar slab and Cock up splint. Identify materials required in making traction embedded in plaster cast. Describe the process of making traction embedded in plaster cast. Apply traction embedded in plaster cast.
Describe plaster bed. List indications for plaster. Identify materials required for making plaster bed.

POT 312: Early Detection of Disabilities (2 Units: LH 30)

Define disability; identify the common disabilities in a rural community. Identify the diseases causing disabilities e.g. Poliomyelitis, Tuberculosis; Jaundice; Hypertension; stroke; spondylitis, cerebral-palsy. Etc. Identify the common disabilities in a community e.g. Paralysis of upper/lower limb, spinal deformities, etc. Adopt the measures to prevent disabilities e. g. Good antenatal and delivery services, Post natal clinic, Immunization and educating the communities on importance of cleanliness.

POT 313: General Clinical Practice in P & O (3 Units: LH 30 & 45 PH)

Demonstration and assessment of the ability of student's competence to complete the following essentials of the patient evaluation process competently;

Perform a comprehensive assessment of the patient using standard tools and methods to obtain an understanding of the individual potential orthotic/prosthetic needs that includes the specific competencies in (5)
Determine methods and criteria for referring patients to other health care professionals
Document services using established record-keeping techniques to record patient assessment and treatment plan, to communicate fabrication requirements and to meet standards for reimbursement and regulations of external agencies
Establish a relationship and effectively communicate with the patient or caregiver to gather cogent and useful information for orthotic/prosthetic assessment.
Specific competencies for patient assessment

Students must be knowledgeable in commonly encountered pathologies when assessing patients and the potential impact on the treatment plan, including but not limited to:

A Patient History
i Medical
ii Pathologies/dysfunctions
iii Wounds
iv Testing results from other disciplines
v Surgeries
vi Medications
vii Diagnostic imaging reports

viii Determine potential for safe se of device, including understanding instructions and gadgets tolerance.
ix Patients goals
x Personal implication of impairment
xi Vocation
xii Recreational activities
xiii Activities of daily living (ADL)
xiv Patient social activities
xv Financial information about patient

B Patient Assessment
i Muscle strength
ii Joint integrity and range of motion
iii Sensory testing
iv Proprioceptive sense
v Joint stability
vi Volumentirc measurement/Oedema
vii Pain and effect
viii Muscle tone
ix Neuromuscluloskeletal integration
x Observational gait analysis
xi Postural evaluation
xii Balance evaluation
xiii Motor control
xiv Cognitive ability
xv Relevant psychological/emotional assessments
xvi Skin integrity
xvii Functional measures
xviii Evaluation of current orthotic/prosthetic management
xix Reviewing chartered evidence of vital signs, including blood pressure, etc

C Consult with other caregivers and other health care professionals.

D Possess a basic understanding of surgical procedures related to orthotic and prosthetic care and how these surgical techniques impact orthotic and prosthetic design and function: Amputation, Rotationplasty, joint replacement, Tendon surgery, ligamentous surgery skin grafting, etc
Hospital visitation; participation in ward rounds under supervision of experts.

POT 315: Therapeutic Skills in Splintage, Slings & Bandages 3 Units: LH 30 & PH 45)

Define the terms Splints and Splintage and explain types of splinting materials; emergency splints, wooden splints, metal splints, plastic splints, application splints on patients. The principles of splintage. Complication that may arise from improperly applied splints. Define the term sling and types. Demonstrate correct application of sling. Explain the relationship between Sling and bandage. Define the terms bandage, bandaging, Explain

type of bandaging material such as cotton bandage, crepe bandage, calico, plastic adhesive, elastic adhesive, Identify type of bandages such as collar and cuff, figure of 8, T – bandage etc. Explain principles of bandaging, Explain implication of improperly applied bandages. Differentiate between types of bandaging techniques and bandage types.
Define traction and List the type of traction system such as; fixed traction and balanced traction. Identify equipment and materials needed in applying traction such as orthopaedic bed with Balkan beam, traction kit, weight, Thomas' splint, Bohler Brown splint. Explain the basic principles of traction application. Explain the care of traction and patient in traction. Identify implication of improperly applied traction. Define the following terms: Posture and Gravity. Explain principles of muscle contraction. Identify different types of lifting: fore and aft, dragging method, foreman's lift, four handed seat, chair carry method, human crutch, four man lift, six man lift, stretcher method, cradle method. Describe implication of faulty technique in lifting.

POT 316: Research Methods (2 Units: LH 30)

Types and Nature of Research. Writing Research Proposal. Format for Seminars Presentation
Research Problems, & Research Design, Data Collection & Storage, Referencing Styles.
Population and Samples. Hypothesis & Hypotheses testing. Reporting Results of Clinical Research. Presentation & Interpretation of Clinical Research.

POT 317: Clinical Pathology(2 Units: LH 30)

Pathology of diseases. Cellular basis of disease. Inflammation and healing. Immune mechanism, physical agents in injury and disease, drug and chemical injury, radiation injury, atrophy, hypertrophy, degeneration, oedema, thrombosis, infarction, bacterial and viral disease, fungal infections, tumours and inherited disease.

POT 318:Dissertation Seminar (2 Units: LH 30)

Seminars presentations in orthotics and prosthetics in preparation for the final year research project in the students chosen area. This will be graded by departmental panel of examiners and average mark awarded appropriately.

POT 319: Student Industrial Work Experience Scheme (SIWES)4 Units

This is to expose student to P & O practice outside their ideal teaching/orthopaedic hospital set up. Rotation through all the areas of prosthesis and orthoses during the long vacation to promote entrepreneurship skills, community P & O, rehabilitation/old people homes, leprosarium etc.

400 Level Courses

POT 401: Orthopedics Pathology I (2 Units: LH 30)

Define different orthopaedic conditions.
State the classification of orthopaedic conditions; congenital and acquire types
List the causes of orthopaedic conditions under each classification: Congenital & Acquire.

Define congenital deformities. Identify congenital deformities. Describe the various types of congenital deformities. State the problems associated with congenital deformities.
Define acquired deformities. Identify types of deformities. Describe the various types of acquired deformities. State the problems associated with acquired deformities.
Material needed for the treatment of orthopaedic pathological conditions.

POT 402: Orthopedics Pathology II (2 Units: LH 30)

Identify Orthopaedic conditions affecting the Spine e. g. TB of the Spine, Prolapsed Disc, Lordosis, Scoliosis, Kyphosis, Spondylosis, Spondylolithesis. Describe the aetiology and clinical manifestations of the Orthopaedic conditions. Identify the materials necessary for the treatment of each of the following condition; Plaster casts, collars, and corsets.
The production of materials necessary for the treatment of spinal Orthopaedic conditions.
Identify the Orthopaedic conditions affecting the joints e.g. Osteoarthritis, Septic Arthritis, Inflammatory Arthritis, Angular Deformities, genuvarum & genuvalgum, Describe the aetiology and clinical manifestations of the Orthopaedic conditions listed above.
Identify and describe Orthopaedic conditions resulting from metabolic disorders; e.g. Rickets, Osteoporosis, Osteomalacia, Pagets disease and identify the materials necessary for the treatment of each conditions.

POT 403: Orthopedic Pathology III (2 Units: LH 30)

List the various types of pathological conditions prevalent in orthopaedic: Gait problems, Deformities, Hip problem, Problem of the knee, Osteoarthritis, Septic arthritis etc. Identify the effects of pathological conditions on the patients. Identify materials necessary for the treatment of patients with pathological conditions. Assemble the materials needed for the treatment of patients with pathological conditions. Apply the materials necessary for the treatment of patients with orthopaedic pathological conditions. State the rationale for the choice of the materials applied in pathological conditions.
State the rationale for the applications of materials in treating pathological condition.

POT 404: Prosthetics and Orthotics Components and Production(3 Units: LH 45)

Identify the following major component parts for upper limb prostheses. elbow unit, Wrist unit, Hand unit. Identify the following component parts for lower limb prostheses. Knee units, Prosthetic feet e.g. SACH, Socket. Identify the major component parts for upper limb orthoses. Cock up splints, shoulder abduction splint, etc. Identify the major component for lower limb orthoses. Knee Ankle Foot Orthosis (KAFO), Ankle Foot – Orthosis (AFO) and other various orthopaedic devices.
Identify the following materials for producing the component parts prosthesis and orthoses; metal e.g. aluminum, plastics like polyethylene, leather, wood for SACH
Produce the foot using wood, rubber, non – elastic webbing. Produce knee piece using wood metal, etc.
Produce socket using wood, metal and plastics. Produce lower limb orthotic devices such as KAFO, splints of various types and sarmiento (or PTBO) i.e. Patella.Tendon bearing orthoses. Produce functional trunk orthoses e.g. Lumbar corset, Thoracolumbar corset, Cervical Thoracolumbar corset, Cervical Thoracolumbar and sacral corset.

POT 405: Traumatology for Prosthetics & Orthotics(3 Units: LH 45)

Define terminologies used in Traumatology e.g. Trauma, Injuries, Wounds, Fractures and Dislocations

List the types of traumatic injuries e.g. RTA's – Road Traffic, Sporting injuries, Falls from Height, Industrial Injuries, Assaults.

List the causes of injuries, based on the types:

- RTA i.e., Industrial injuries
- Vehicles, bicycles,
- Motor cycles, etc
- Sporting injuries i.e.
- Football, swimming,
- Any form of sport
- Fall from Height i.e.
- Maintain Climbing
- Falls from houses, trees e.t.c.
- Assaults i.e. Wife battering, beating etc.

Identify the Clinical manifestations of the various injuries listed above and likely complications.

State the types of psycho-social problems associated with injuries:

- Depression, Fear/anxiety, Frustration, Financial problems, Poor illness
- Behaviours, Societal attitude

List the dangers associated with the intervention of TBS and Quacks in the treatment of injuries.

Define infections and types. List microorganisms associated with the development of infections. Describe the pathogenesis of infections and state the effect of infections on an Injuries. Describe measures for the prevention of infections of an injuries. Define sub-tissue damage and causes. List the possible soft tissue injuries. State the effect of soft tissue damage an injuries. Describe the measures for the control.

POT 406: General Prosthesis Practice (3 Units: LH 30 & PH 45)

Measurement and casting of a transtibial amputee using Plaster of Paris and measuring tape.

Measure and cast trans femoral, trans radial and trans humeral amputees. Prepare a positive mould using plaster and paris (P.O.P.) powder. Modify the mould above to measurements. Cover the mould above with laminates i.e. P.V.A sleeve, stockinette, fibre glass, resin and reagents. Allow the socket above to cure. Cut out and trim the socket. Assemble the component parts of prostheses i.e. socket, ankle block and foot.

Bench align component parts above and bond. Fit the patient statically i.e. without moving. Carry out dynamic alignment on the prostheses.

Observe patient's gait and make corrections where necessary after fitting with prostheses. Finish the prosthesis by shaping and lamination. Check that the patient's prosthesis is as prescribed. Make the patient ambulate with the prosthesis.

Educate the patient on prosthetic care – cleaning, routine appointment and limitations.

POT 407: Biomechanics III (3 Units: LH 30 & PH 45)

Describe the different types of amputation. Stump and socket design.
Identify the different types of stump in Patients. Explain the magnitude of pressure between The stump and socket. Determines a typical stump/socket pressure. Explain the importance of the shape of the Socket to the stump pressure distribution. Describe the bench alignment procedures in prosthesis. Identify the component required for alignment. Procedures in prosthesis.e.g. knee component, foot component, socket component insert. Assemble the component identified.
Explain the terms "static (standing) alignment" and dynamic (walking) alignment.
Demonstrate the bench alignment, static alignment and dynamic alignment on patients. Define pathological gait and pattern in a patient e.g. dipping gait, lateral trunk, bending, vaulting e.t.c. Explain the causes of the pathological gaits. Describe the orthotic devices for the treatment of each of the patterns in the pathological gait. Define Orthosis and list major types. State the functions and hazards of orthosis. Describe and give functions of the following orthotic devices; ankle foot orthosis, knee-ankle foot orthosis, Hip-knee-ankle foot orthosis, orthopaedic shoes, and assistive locomotive aid.
Define the following: bench alignment, dynamic alignment, static alignment with effect on muscle action of human body. Explain the law of inert a, momentum and its application to normal- human locomotion. Explain the use of the functional terminal devices in upper limb prosthesis and orthosis. Describe body alignment to prosthetic and orthotic fitting.
Define normal gait. Describes pathological gait .Identify phases of gait cycle, Identify types of gait cycle, Identify gait deviations. Describe qualitative and quantitative gait variables. Describes different gaits patterns associated with lower limb amputees. Discuss how normal gait can be achieved in patients with lower limb amputees.

POT 409: General Orthosis Practice (3 Units: LH 30 & PH 45)

Assess measure and cast a patient with lower foot deformities. Assess measure and cast a patient for paraplegic, polio aid. Prepare a positive mould using plaster of Paris powder.
Modify the mould above to measurement. Measure and cut out thermoplastic sheets for quad and PLS. Put sheets in oven at appropriate temperature. Apply sheets on positive mould. Allow to cool, then trim. Assemble the component parts of orthoses i.e. the plastic mould, laminate side bars, knee pads and straps.
Bench align the component parts.Check alignment of orthoses of joints.Carry out static fitting of the patient.Carry out dynamic alignment and fitting on the patient.Observe patients gait and make corrections where necessary.Finish the orthoses by riveting. Check that orthotic device is as prescribed.
Make the patient ambulate to achieve optimal gait with the orthoses. Counsel the patient on the use and care of the orthotic device – cleaning routine appointment and limitation

POT 411: Administration & Ethics in Prosthetics and Orthotics (2 Units: LH 30)

Define Ethics and explain the ethical principles and philosophy of prosthetics and orthotics. List the professional ethics required of prosthetics and orthotics technologist e.g. confidentiality, privacy, integrity, respect for client, patience. Explain importance of prosthetics and orthotics in health care provision. Describe prosthetics and orthotics as a rehabilitation tool. List the professional responsibilities of a prosthetics and orthotics technologist in the rehabilitation team. Explain the professional responsibilities a

prosthetics and orthotics expert. Explain the relationship between the technologist and the physician in the medical rehabilitation. Identify the legal aspects of prosthetics and orthotics practice e.g. Injury Limitations; Injury Claims, Insurance claim, Disability assessment, Malpractice claims

Explain the responsibilities and function of ISPO, NAPO and Medical Rehabilitation Council as a regulatory body. Explain the concept of accountability in prosthetics and orthotics practice. List areas of responsibility in decision making. Explain decision making in relation to accountability.

POT 412: Research Project(4 Units :)

Students will undertake research project on simple problems in areas of their interest and guided by supervisor(s). In addition to experimental work, the students will be required to learn how to search and compile literature review, collect arrange and present references/bibliography.

3.12 PUBLIC HEALTH (B.Sc)

3.12.1 Philosophy, Aims and Objectives of the Degree Programme

Philosophy

The philosophy of the public health programme is to provide a broad-based academic, professional training and competence that reflect the emphasis on the current national preventive health care system and services.

Aims and Objectives

The aims and objectives of the programme are to:

(i) Enable the students acquire competences in Public Health, carry out community diagnosis, immunization, community mobilization, health education and apply statistical and mathematical methods to the design and analysis of public health problems.

(ii) Enable students conduct biomedical research, nutrition and growth monitoring, environmental monitoring and disease surveillance.

(iii) Prepare public health professional to take up effective leadership and management position in the community, work places, school settings and health centres/institutions.

3.12.2 Admission and Graduation Requirements

Candidates seeking admission into the programme must have at least credit level passes at the Senior Secondary School Certificate (SSCE/NECO/GCE) examinations in English Language, Biology or Health Science, Chemistry, Mathematics, Physics or any other science subject. Other candidates such as Registered Nurses.

To graduate for the award of the B.Sc. (Hons.) Degree in Public Health, the student must have completed and passed the prescribed courses and electives totalling 120 Credit Units minimum for students that entered the programme through UTME.

3.12.3 Learning Outcome

a) **Regime of Subject Knowledge**

Graduates of the degree programme are expected to have acquired:

i) Working knowledge of the basic biological, social sciences and humanities,

ii) Knowledge and scale of community diagnosis and identification of the common health problems of the community.

iii) A broad knowledge of the use of the environment, community and occupation as they affect human health.

vi) understanding of the organization and management of the health services and lastly

iv) Understanding of fundamental technique and methodology of research in public health sciences

b) **Competencies and Skills**

The graduate of the programme should have acquired skills in:

i) function adequately with other members of the health team at local, national and international settings to increase the knowledge, skills and motivation necessary for individuals to assume greater responsibility for their health status;
ii) perform full community diagnosis using the indicators of health prior to community intervention;
iii) participate actively in community mobilization processes prior to implementation of community health programs;
iv) produce Information Education Communication (IEC) materials for health communication;
v) plan and implement patient education and counselling on health consumer issues in the health facilities/clinics/hospital and community settings
vi) participate in immunization exercises and perform nutrition assessment of infants, children of school age, adolescents and adults in the community;
vii) monitor the environment for pollutants and ensure safety at work sites;
viii) plan and implement school health education programmes for substance abuse reduction, sexuality and nutrition education;
ix) plan and describe the details of epidemiology of communicable diseases;
x) design methods of investigation and control of disease outbreaks in the community;

In addition, the graduates of the programme are expected to possess the following practical Skills

i) organize a communicable disease campaign and surveillance;
ii) interview, counsel and work with clients in the clinics and homes;
iii) assess the health status of pregnant women and children and undertake systematic observations;
iv) perform anthropometric measurements of children 0-5 years and school children 6-18 years and have the indices recorded, analyzed and graphed;
v) manage the resources (material and human and keep appropriate and accurate records;
vi) record and calculate simple and reliable indices of the outcome of maternal and child health services;
vii) perform Laboratory procedures appropriately as directed for water, soil and specimen analysis;
viii) identify environmental health hazards in the community and take appropriate action access the nutrition states or individual, community and establish appropriate actions;
ix) recognize emergency conditions and initiate immediate actions through the appropriate referral system;
x) recognize community mental health problems and take appropriate action;
xi) identify the main occupational hazards in the work place and in the community and initiate appropriate actions;

xii) identify problems relating to the aged and the handicapped and refer as appropriate;
xiii) assess the health of a child with respect to growth, development, nutrition and immunization status and take appropriate action;

c) **Behavioural Attributes**

The trainee and the product of the programme shall be public health professionals who have mastering of basic public health skills, spirit of service and understanding of team work based on good interpersonal relationships. They shall respect the dignity of their clients and be sensitive to various cultural practices in the society and communities. They shall be thoughtful users of resources and committed to good practices and show strong leadership qualities. These behavioural attributes should reflect in their ability to:

i) assess maternal and child health needs and resources in the community and assist in planning, implementing, maintaining and evaluating services;
ii) initiate and implement research findings to strengthen all areas of public health;
iii) maintain good information and working relationship with community leaders, representatives of other agencies and other health personnel;
iv) participate in community development activities in cooperation with community leader and representatives of other agencies;
v) use existing guidelines to manage common ailments and refer the more serious conditions as appropriate;
vi) participate in reproductive health activities and advise on child spacing; and
vii) observe and practice under supervision, circumcision, incision and drainage.

3.12.4**Attainment Levels**

It is essential that the procedure used for students' assessment should correspond to the knowledge, abilities and skills that are to be developed through their degree programme. These should be based on:
formal examinations, laboratory reports/records, problem-solving exercises, oral presentations, Planning, conduct and reporting of project work and researches.

3.12.5**Resources Requirement for Teaching and Learning**

a) **Academic and Non-Academic Staff**

The selection of a staff member shall be based on; educational qualifications, experience, scholarly achievements in research and community service, teaching and positive-influence personality. See the academic staff requirements for the Discipline.

b) **Academic and Non-Academic Spaces**

The general requirements are as stated in section 1.6

c) **Academic and Administrative Equipment**

The following Equipment shall be available in the stated minimum quantity:
1. At least 1Computer to 5 students

2. Computers and Printers for the Department
3. Overhead projector with its accessories
4. Photocopying machine
5. Photo Camera
6. Video Camera
7. Audio visual equipments for the Media Center
8. Video/Tape Recorders/Player
9. Television
10. VCR (Video recording / Playback)
11. DVD/CD players
12. Multimedia Projector
13. Slide Projector and Slide
14. Equipment for field work e.g. scales height and measurement
15. White Board

d) **Library and Information System**

There shall be enough learning resources materials such as text books, periodicals, Journals in the relevant subject areas. Also, there should be advanced Information technology equipment and resource materials available.

3.12.6 Course Structure and Synopses of the B.Sc. Public Health Programme

A: Course Structure

Course Structure for 100 Level Public Health Programme

Course Code	Course Title	Units	Status	LH	PH
BIO 101	General Biology I	3	C	45	-
BIO 102	General Biology II	3	C	45	-
BIO 107	General Biology Practical I	1	C	-	45
BIO 108	General Biology Practical II	1	C	-	45
CHM 101	General Chemistry I	3	R	45	-
CHM 102	General Chemistry II	3	R	45	-
CHM 107	General Chemistry Practical I	1	R	-	45
CHM 108	General Chemistry Practical II	1	R	-	45
CSC 101	Introduction to Computer Science	3	C	30	45
GST 111	Communication in English	2	C	30	-
GST 112	Logic, Philosophy and Human Existence	2	E	30	-
GST 113	Nigerian Peoples and Culture	2	R	30	-
GST 121	Use Library, Study Skills & ICT	2	C	30	-
GST 122	Communication in English II	2	C	30	-
GST 125	Contemporary Health Issues	2	R	30	-
MTH 101	Elementary Mathematics I	3	R	45	-
PHY 101	General Physics I	3	R	45	-

PHY 102	General Physics II	3	R	45	-
PHY 107	General Physics Practical I	1	R	-	45
PHY 108	General Physics Practical II	1	R	-	45
Total		**42**			

Course Structure for 200 Level Public Health Programme

Course Code	Course Title	Units	Status	LH	PH
GST 211	Environment and Sustainable Development	2	R	30	-
GST 222	Peace and Conflict Studies	2	R	30	-
GST 223	Introduction to Entrepreneurship	2	R	30	-
GST 224	Leadership Skills	2	R	30	-
MCB 221	General Microbiology	3	R	30	45
PHE 201	Biostatistics	2	C	30	-
PHE 202	Principles of Epidemiology and disease Surveillance	2	C	30	-
PHE 203	International Health	1	C	15	-
PHE 204	Health Anthropology	2	C	30	-
PHE 205	Psychological Foundations of Health Behaviour, & Change process	2	C	30	-
PHE 206	Fieldwork I (Community Health Care Practice)	2	C	-	90
PHE 207	Anatomy	3	C	30	45
PHE 208	Physiology	3	C	30	45
PHE 209	Introduction to Cell Biochemistry	3	R	45	-
PHE 210	Seminars in Public Health I	1	C	15	-
PHE 211	Developmental Psychology	2	R	30	-
PHE 299	Students' Industrial Work Experience	3	C	-	135
	Total	**37**			

Course Structure for 300 Level Public Health Programme

Course Code	Course Title	Units	Status	LH	PH
GST 311	Entrepreneurship	2	R	30	-
PHE 301	Applied Epidemiology (infectious disease epidemiology and Immunization techniques)	3	C	30	45
PHE 302	Principles of Health Information, Education and Communication (IEC)	2	C	30	-
PHE 303	Health Programme Planning and Evaluation.	2	C	30	
PHE 304	Demography and Social Statistics in Public Health	2	C	30	

PHE 305	Environmental Health and Public Health Laws	3	C	30	45
PHE 306	Family Health and Human Reproductive Health (MCH)	2	C	30	
PHE 307	Community Health Practicum II	2	C	-	90
PHE 308	Community Health Practicum III	3	C	-	135
PHE 309	Seminars in Public Health II	1	C	15	-
PHE 310	Seminars in Public Health III	1	C	15	-
PHE 311	Health Problems of the Adolescents, Adults and The Handicapped	2	C	15	45
PHE 312	Public Health Nutrition	2	C	15	45
PHE 313	School Health Education	2	C	30	-
PHE 314	Occupational Health	2	C	30	-
PHE 315	Community Mental Health	2	C	15	45
PHE 316	Research Methods and Proposal writing in Public Health Education	2	C	30	
PHE 317	Public Health Microbiology and Parasitology	3	C	15	90
PHE 399	Students' Industrial Work Experience	3	C	-	135
	Total	**41**			

Course Structure for 400 Level Public Health Programme

Course Code	Course Title	Units	Status	LH	PH
PHE 401	Health Systems Management	2	**C**	30	-
PHE 402	Training Methods	2	C	30	-
PHE 403	Health Sociology	2	C	30	-
PHE 404	Communication for Health and Media Technology	2	C	30	-
PHE 405	Seminars on Contemporary Issues in Public Health	3	C	45	-
PHE 406	Principles of Pharmacology, Therapeutics, and Substance Abuse	2	C	30	-
PHE 407	Contemporary Issues in Public Health	3	C	45	
PHE 408	Community Health Care Practicum (Field Work IV)	3	C	-	135
PHE 409	Epidemiology, Disease Control &Surveillance	1	C	15	-
PHE 410	Environmental Health/Occupational Health	1	C	15	-
PHE 411	Human Nutrition	1	C	15	-
PHE 412	Health Systems, Planning, Management and Administration	1	C	15	-

PHE 413	Community/Family and Reproductive Health	1	C	15	-
PHE 418	Public Health Information, Education & Communication	1	C	15	-
PHE 490	Internship**	10	C	-	450
PHE 499	Research Project	6	C		
	Total	**41**			

Note:** See Internship PHE 490

B: Course Synopses

200 Level

MCB 221: General Microbiology **(3 Units: LH 30; PH 45)**
Nutrition and biochemical activities of micro-organisms. Antigens and antibodies. Identification and economic importance of selected microbial groups. Microbial variation and heredity.

PHE 201: Biostatistics **(2 Units: LH 30)**
The course is planned to equip the undergraduates in all the disciplines of health sciences with the necessary tools and skills for collecting, analyzing, interpreting data quantitatively. Topics to be covered include: The central role of statistics in health sciences disciplines, data description, elements of probability, description of random variables, applications of the binomial and normal distributions, estimation and confidence intervals, contingency tables, regression and variance analysis, study design and hypothesis testing. For practical purposes, students are provided with specific data to work on and are also required to develop simple questionnaire protocols for analysis.

PHE 202: The Principles of Epidemiology and Disease Surveillance (3 Units: LH 30)
This is an introductory course designed to acquaint the student with the basic principles of epidemiology. It is intended for the undergraduates in the medical, nursing, public health, medical laboratory sciences and other health-related programs. Attention is focused on the historical context and developments, definition of terms and concepts, scope, uses, concepts of disease causation, measures of disease frequency, levels of prevention, types and methods of epidemiological investigations. Students for demonstration and illustration use available medical information and statistics as laboratory materials. The approach is to provide opportunity for students to become acquainted with the basic principles of epidemiology which are important tools in Public Health Sciences.

PHE 203: International Health **(1 Units: LH 15)**
The course introduces the students in the public health program to the historical perspective of the international health agencies. It also highlights the policies governing international collaboration and coordination on issues relating to health and development at the global level. Various agencies involved and activities of these bodies are also highlighted.

Historical backgrounds to the development of international collaboration in health issues are covered. Special attention is devoted to the activities of the United Nations Agencies, particularly those of the W.H.O, UNICEF, UNDP, UNFPA and Bilateral agencies such as ODA, USAID, the World Bank, amongst others The policies governing International Coordination of Global health are also reviewed.

PHE 204: Health Anthropology (2 Units: LH 30)

The course examines the relationships between ill health states and culture. The course also examines customs, and beliefs in relationships to life styles, social interactions and developmental processes within groups, sub-groups and lineages. The course further provides the student with a better understanding of the dynamics of ill-health states from the cultural perspectives. Lastly, the course reviews and explains relevant and appropriate behavioural models to clarify topical anthropological issues and situations.

PHE 205: Psychological Foundations of Health Behaviour, Health Education And Change Process (2 Units: LH 30)

The course focuses on the theories of individual behaviour and highlights the relationships between the various psychological variables, which form the basis of personality and on which lifestyles, and health practices are hinged. Specific health behaviour models are presented to illustrate issues and situations and to clarify specific psychological behavioural actions. Specific examples are cited so that the student's will acquired a good understanding of behaviour dynamics. Such specific examples motivate the student to design behavioural model-based intervention strategies. In addition the course highlights concepts relevant to group behaviour (small & large) at difference stages of their developments and outcomes. Laboratory sessions are utilized to mimic roles of individuals or groups. Behavioural science theories are cited to explain the dynamics of these processes.

PHE 206: Field Work I (Community Health Care Practice) (2 Units: LH 90)

Students at this level conduct community diagnosis to orientate them towards PHC approach in the delivery of health care and to ensure the development in each student a team approach towards the promotion of community health, and for the individual students to develop an inquisitive style of learning.

The students are involved in the following processes: obtaining a detailed map of the community, taking a close inventory of the socio-cultural, physical/chemical and biological environments; using a structured- type data collection instrument to identify specific landmarks and the institutions in the community.

Student groups are assigned field sites where they spend some time under staff supervision. In the field, students are involved in community diagnosis (mentioned in the above paragraph), applying the principles of community development, social planning and social action consistent with emphasis on primary health care. The students are to analyze the data collected, have them analyzed and presented.

PHE 207: Anatomy (3 Units: LH 30; PH 45)

This course briefly reviews the structure of the kidneys including the microstructures enabling an understanding of the functions of the kidneys. The structure of the respiratory

system and pelvic organs are discussed. The structure of the brain and its blood supply, spinal cord and neurons will be studied. The endocrine and other secretory organs including the anatomical structures of special senses such as skin, ear, eye, etc. should be taught.

PHE 208: Physiology (3 Units: LH 30; PH 45)

The physiological functions of the central nervous system including neurotransmission will be studied. Renal, respiratory, and other regulatory system physiology such as control of electrolyte/water and buffers will be taught. Membrane physiology, particularly its functions as transport system for nutrients and electrolytes including electrophysiology of excitable tissues are studied.

PHE 209: Introduction to Cell Biochemistry (3 Units: LH 45)

The course introduces the students of Health Sciences to a survey of the chemical structures and cellular functions of biological molecules that are the basic units of life. Emphasis is placed on their historical discovery, cell types/structures, specific metabolic and homeostatic functions to provide basic understanding of how these molecules participate in energy production in the mammalian cell.

A review of the biochemical basis of health and disease forms the focus of the course. This approach enables the student to appreciate the relevance of biochemistry in chemical pathology, environmental health and industrial/occupational applications.

PHE 210: Seminars in Public Health I (1 Unit: LH 15)

The Students discuss specific topics relating to their field experiences in a class setting. Problems and difficulties are highlighted and solutions are proffered. In addition to the above students are encouraged to participate actively in all activities.

PHE 211: Developmental Psychology (2 Units: LH 30)

The course gives a broad introduction to the nature and concept of the psychology of child development from conception, through the prenatal years to the childhood and adolescent stages. It includes close observations of the tripartite interrelationship of the physiological, social and psychological environments. Different developmental stages of the child is presented, reviewed, and analyzed. The development of the child from conception to two years, pre-school years and the school years; the nature and structure of intelligence and their implications are also highlighted.

PHE 299: Students' Industrial Work Experience (3 Units: PH 135)

Students will be posted for twelve weeks to recognized and relevant placement areas of their choice during the industrial training. Continuous assessment of students will be undertaken jointly by their industry-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training.

300 Level

PHE 301: Applied Epidemiology (Infectious disease epidemiology and immunization techniques) (2 Units: LH 30; PH 45)

The course is an extension and continuation of (PHSC 202); Principles of Epidemiology. The course focuses on the essential activities needed to carry out information collection and processing. Materials discussed will include: a review of epidemiological perspectives, routine epidemiological methods in relation to characteristics of the population, national health information systems management methods (the national diseases notification systems), health systems research methods, special epidemiological investigations and logistics, data collection, recording, analyzing, presenting, communicating and forwarding processes.

Students are expected to propose an appropriate epidemiological problem; identify a population; choose a method and design for sampling from the population; choose and propose records for ascertainment and classification of diseases and risk factors; outline a plan of action for data collection and presentation.

Students are expected to participate actively in fieldwork assignments and to submit reports. Both communicable and non-communicable morbidity and mortality patterns and trends in Nigeria and elsewhere are highlighted.

PHE 302: Principles of Health Education, Information, Communication (IEC) & Counselling (2 Units: LH 30)

This course introduces the students to the principles of health education, communication (IEC) concepts, and examines the relevance of these concepts to health education processes. It also highlights the principles of counselling on the various issues under consideration. The course will review various communication theories and models of mass communication. Theories of adoption of innovation are also considered. Students critically assess various communication and counselling strategies in planning and evaluating communication aspect of health programs.

PHE 303: Health Programme Planning and Evaluation (2 Units: LH 30)

The course is intended to prepare public health and students of the health sciences to organize health programs that meet specific and identified community needs.. The course also highlights the critical issues and logical questions in health planning, the main functions of managements, the implementation function, the supports systems to implements health care programs, the evaluation processes and the health information format. Skills include setting goals and objectives, selecting strategies, assessing and mobilizing internal and external recourses linking implementing and evaluating results

PHE 304: Demography and Social Statistics in Public Health (2 Units: LH 30)

The course provides introduction to demographic and the emphasis is on the use of demographic materials and methods for planning, policy analysis, and evaluative research in public health, emphasis would be placed on the demographic features of the Nigeria population. The course gives an overview of the Nigerian population policies. Trends in general population growth are featured prominently in the course Topics cover includes:

sources and quality of data from census, special surveys, and vital and other registration systems. Students are to be present the descriptive statistics and graphics with reports writing and submitted on assigned projects.

PHE 305: Environmental Health and Public Health Laws (2 Units: LH 30; PH 45)
The course is designed for the undergraduates in public health and others in the health sciences programs. The course highlights the three cardinal areas of the environment i.e: the biological, physical/chemical and the socio-cultural environments. Specific areas to be highlighted includes: The rural & urban environments in relation to housing and health, water sources and supplies, sewage and refuse disposal systems, sanitary control of food, pollution and the effect on man, environmental degradation. Visits could be made to specific side to observe conditions existing with regards to air pollution, food sanitation and solid wastes disposal

PHE 306 : Family Health and Human Reproductive Health (2 Units: LH 30)
The course explores the meaning and significance of family health in the context of primary health care. A review of the various social structures of the family provides the student with an understanding of the types of family structures they may likely encounter during practice. Knowledge relating to organization of family health services are covered. Special areas of emphasis include contemporary issues on gender preference, genital mutilation, human sexuality, reproductive health and population dynamics are also featured.

PHE 307: Community Health Practicum II (2 Units: LH 90)
The Fieldworks at this level are extensions of the (PHSC 206), Community Health care Practicum I. The students at this stage utilized a structured household questionnaire to collect information on health of families in the community. The structured questionnaires are patterned after those of the primary health care system. The information collected by each of the student groups are recorded, analyzed and submitted as a report of the fieldwork activities. The practice gives the students an opportunity to translate theoretical concepts and principles in public health into practical experiences needed for program formulation, planning and implementation.

PHE 308: Community Health Practicum III (3 Units: PH 135)
The Fieldworks at this level are extensions of the (PHSC 206), Community Health care Practicum I. The students at this stage utilized a structured household questionnaire to collect information on health of families in the community. The structured questionnaires are patterned after those of the primary health care system. The information collected by each of the student groups are recorded, analyzed and submitted as a report of the fieldwork activities. The practice gives the students an opportunity to translate theoretical concepts and principles in public health into practical experiences needed for program formulation, planning and implementation.

PHE 309: Seminars In Public Health II (1 Unit: LH 15)
Each Semester, the students are required to prepare weekly reports of the field activities and periodically present written reports as case- studies at seminars under the supervision of the supervising staff. (1 unit per semester)

PHE 310: Seminars In Public Health III **(1 Unit: LH 15)**

Each Semester, the students are required to prepare weekly reports of the field activities and periodically present written reports as case- studies at seminars under the supervision of the supervising staff. (1 unit per semester)

PHE 311: Health Problems of Special Groups (Adolescents, Aged and Adults)
(2 Units: LH 15; PH 45)

This course takes a critical look at problems relating to the special groups in term of social, material, health needs. as well as protection also the tradition values of family responsibilities to the aged, the role of the individual , family, local government, state government and the NGOs in the circumstances. The course will expose the students to the different type of handicaps and to the methods used in rehabilitating the handicapped and of caring for the aged and assisting the adolescents to cope with life in modern times. Students will visit the homes, the community and the special institutions to familiarize themselves with real-life situations

PHE 312: Public Health Nutrition **(2 Units: LH 15; PH 45)**

The course deals with nutrition issues, which affect the nutritional states of the community. The topics presented are developed within the framework of specific age groups.. Areas covered include identification of community nutritional problems, needs, and resources available. Also emphasis will be directed on planning and administration of programs and services, evaluation of program effects and developments of skills in the areas of nutrition, education, and communication. Attention will also be focused on national nutrition goals.
Skills will be directed at community nutrition surveys in children 0 – 5 years and school children up to the age of 18 years. National nutrition policy, government work plans will be reviewed to assess the dietary patterns in the community. Special diets in health and during illness are discussed. Students are expected to participate actively in community and institutional nutritional surveys using the structured questionnaire prepared by staff and students.

PHE 313: School Health Education **(2 Units: LH 30)**

Major elements of school health program are reviewed, including needs assessment, problem diagnosis. The health education component of school curriculum is examined carefully to identify its importance in evolving a healthier school environment The specific areas to be addressed include: immunization needs of the school child, problems of growth and feeding, personal hygiene, modalities for developing working relationship with child and mother in communication techniques and steps in establishing relationship and factors influencing growth and development. The students are expected to visit various schools to observe conditions existing and to write and present reports.

PHE 314: Occupational Health **(2 Units: LH 30)**

The course is designed for the undergraduates in public health and others in the health Sciences programs. The course gives an overview of the history of occupational health in Nigeria and elsewhere. Attention is focused on selected occupational health problems of the

various industries and occupations. Also, the various target organs and systems affected by specific hazards are highlighted. The course further addresses specific areas relating to health hazards from new environmental pollutants, early detection of impairments. Various legislations concerning safety measures for the workers and the work environments are reviewed. Visits are made to the various industrial setting and other places of interest to identify specific problems. Students are expected to documents observations and present reports emanating from their observations.

PHE 315: Community Mental Health (2 Units: LH 15; PH 45)

The course provides the students with an opportunity to be acquainted with psychopathological basis of mental illness and classifications of mental disorders. The objectives of a mental health program such as promotion of mental health, prevention of mental disorders and provision of mental health care are highlighted. Emphasis are placed on the changing concepts of mental health care, traditional systems of care for the mentally ill, facilities available for mental health care in Nigeria, and the roles of the Federal, State and the Local governments in the provision of mental health care facilities. A working knowledge of the elements of programs and the legal aspects of community mental health are important to public health and other health professionals.

PHE 316: Research Methods & Proposal Writing in Public Health Education (2 Units: LH 30)

The course is designed to introduce the undergraduate to the elements of research design and principles. The course takes the student into the basic characteristics of research. The focus is on knowledge and skill in planning and conducting epidemiological and health systems research. The areas of coverage includes: issues in health and social sciences research, types of research methods to include: Health Systems (Operations) Research, project formulation and proposal writing, study design methods of data collection, processing and analyses, dissemination of findings and utilization of results.

PHE 317: Public Health Microbiology and Parasitology (3 Units: LH 15; PH 90)

The Course covers the study of the characteristics and identification of microorganisms particularly different species of bacteria and parasites. Emphasis is placed on the specific microbial and parasitic agents of communicable and parasitic diseases prevalent in the community. Environmental factors favouring their reservoir, spread and communicability as well as salient features for their control will be highlighted.

Current issues regarding the control intervention, and prevention strategies of these infections and infestations are discussed. Additional emphasis will be placed on the identification of microbial pollutants and contaminants in food and water sources. Laboratory exercises will be used extensively to identify the organisms and visits will be made to water treatment sites, food storage, food handling/preparation point to identify sources of contaminants thereby providing the basis for personal and community health stance

PHE 399: Students' Industrial Work Experience (3 Units: PH 135)

Students will be posted for twelve weeks to recognized and relevant placement areas of their choice during the industrial training. The twelve weeks will be spent in standard food service

Continuous assessment of students will be undertaken jointly by their industrial-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training. Grades are allotted according to ITF directives**.**

400 Level

PHE 401: Health Systems Management (2 Units: LH 30)

The course is designed to acquaint Student in the discipline of health sciences with management information and skills in matters relating to all aspects of the national health care systems, (the primary health care, the secondary health care and the tertiary health care systems).

The course gives an overview of the national health policy and the development of the national health systems. The roles of governments at each of the levels and those of the NGOs are highlighted. Modern concepts and elements of management by objectives are reviewed in the context of health planning, implementation and health programme monitoring and evaluation. Modalities for leading health team and organizing health care activities are as well highlighted Methods and means of managing human and material resources are also covered. The course covers also various aspects of selected international health care system.

PHE 402: Training Methods (2 Units: LH 30)

The course focuses attention on the modalities used in training through the approaches of the instructional design methodology. The students are expose to different areas of educational methods including approaches in curriculum planning and designing. The emphasis is in training of health workers in terms of assessments of training needs, training logistics, instructional materials designing.

The course highlights the different components of training, identification of agencies requiring the services of the trainers, identification of the operational processes involved in training of the different cadres of health workers, formulation of instructional objectives, identification of equipment used for teaching and demonstration, presentation, methods of teaching assessments and evaluation and developing plans for different tasks and activities.

The course stresses the importance of adequate training particularly training of professionals. The course also stresses the need to train and equip health workers well for the challenges a head in the health care system. The students would have an opportunity to organize actual training program and conduct evaluation of different processes involved in training different cadres of health workers.

PHE 403: Health Sociology/Anthropology (2 Units: LH 30)

This course reviews the social issues in health with particular reference to the services offered such as welfare services, care of the motherless babies, care and rehabilitation of the handicapped, care of the elderly and the care of destitute/beggars The course also focuses on specific problems areas such as natural and man-made emergency situations, disasters and refuge problems. The course provides an opportunity for students to become acquainted with what happens in such situations

PHE 404: Communication For Health And Media Technology (2 Units: LH 30)
The course introduces the students to communication principles, concepts, and examines the relevance of these concepts to health education process. The course will review various communication theories, models of mass communication. Theories of adoption of innovation would also be considered. Students critically assess various communication strategies in planning and evaluating communication aspects of public health programs. The course considers also a variety of simple audiovisual methods of communication, discussing their relevance and appropriateness in health information dissemination within the context of culture and technology. Efforts in practical production of media materials are featured.

PHE 405: Seminars in Public Health IV (3 Units: LH 45)
The students would have the opportunity to prepare and present reports of fieldwork at seminars organize during the course. Part of this will be used to present research proposals prior to engaging in research project in the last semester of the program

PHE 406: Principle of Pharmacology, Therapeutics & Substance Abuse (2 Units: LH 30)
The course is designed to provide the students with an understanding of the sources of drugs, classification and composition of drugs, herbal medicines, use and abuse of drugs, use and abuse of alcoholic beverages, action and reaction of drugs and alcoholic beverages (prophylactic, therapeutic and toxicological effects) legal control of drugs and alcoholic beverages, the concepts of drugs and alcoholic beverage use and abuse.

PHE 407: Contemporary Issues in Public Health (3 Units: LH 45)
Contemporary issues on health in transition and health technologies are areas of emphasis, providing the students certain awareness in public health. Particular emphasis will be given to the priority health problems presenting. Amongst these would include: malaria, polio, HIV/AIDS, tuberculosis/leprosy, cerebrospinal meningitis, maternal mortality and infant mortality. In addition, information technology and interdisciplinary collaboration presents challenges to contemporary health workers in a constantly changing global community.

PHE 408: Community Health Practicum IV (3 Units: PH 135)
The third fieldwork is an extension of the Community Health Practicum (PHSC 307/308). It gives the students the opportunity to participate in on-going intervention programs and activities at the Local Government, the community and health facility levels. The students are to produce reports on health systems research based on their experiences at different levels of activities. (3 units per semester)

Note* *This consists of lectures and guided visits to various public health programmes including the following: Environmental health services including visits to water treatment works, sewage treatment plants, market and other food processing factories and abattoirs, refuse disposal systems etc. Community Welfare Services, lectures and visits to Remand home. Homes for motherless and handicapped children, prisons, schools for the deaf etc. Public Health Department: Lectures and visits to familiarize with the activities of the*

department. Maternal and Child Health Services; lectures and visits. Public Health Laboratories; lectures and demonstration on their activities including testing of water etc. Control of Communicable diseases, lectures and visits to the tuberculosis clinic and the infectious diseases clinics. Occupational Health Services; lectures and visits to selected industries.

PHE 409: Epidemiology, Disease Control and Surveillance (1 Unit: LH 15)
The course gives the students an overview of epidemiology, disease control and surveillance. Specific areas highlighted include the uses of epidemiology; Epidemiology protocols and survey methods; Epidemiology of communicable and non-communicable diseases; Vital statistical and national health information systems; human ecology and disease processes; public health laboratory practices and methods; and Intervention Strategies in Disease Control and Surveillance. Students are expected to participate actively in Disease control, surveillance as well as in the monitoring and evaluation processes of selected endemic diseases at the national, state and local government operational levels.

PHE 410: Environmental Health/Occupational Health (1 Unit: LH 15)
The course reviews the components of the environment, the various environment and occupational health; the problems, deteriorating forms/characteristics of the man-made environments with attendant consequences. The important topics in the course include: Urban and rural environments with particular emphasis on the housing problems; Water and sanitation; refuse/solid wastes disposal and management; Occupational health hazards; Air and water pollution particularly in the riverine areas; the various Agencies involved in environmental protection in relation to policies, laws, regulation codes and ordinances. Students chose specific topics of interest for project presentation at class seminars.

PHE 411: Human Nutrition (1 Unit: LH 15)
The course revolves around the problem of human nutritional problems particularly those affecting the most vulnerable groups such as the under fives, (infants), the nursing mothers and the aged. The topics include: Classification of food; food security and safety; Cultural and environmental factors in food & nutrition; nutrition and infection; Malnutrition and under-nutrition; socio-economic aspects of food; problems of over-nutrition and disease of the affluence; Adventist Health Policies/Principles on Food choices, diet in health and disease; International/National food & nutrition policies and programs; Public Health nutrition education plans & strategies. The students have the opportunity of conducing field nutrition surveys.

PHE 412: Health Systems, Planning, Management & Administration (1 Unit: LH 15)
The course reviews the overall health system in terms of planning, management and administration. It takes a critical review of the national policy on health and the strategies underscoring its formulation. Health program planning, monitoring and evaluation strategies of the federal, state and local governments are critically examined. Aspects of health economics and quality assurance in the health care systems are reviewed. The importance of personnel training, material resource management and control as well as other means of management by objectives are also reviewed, comparative International health systems are

highlighted to illustrate succinct points and for students project presentations at class seminars.

PHE 413: Community/Family and Reproductive Health (1 Unit: LH 15)
The course begins with a general review of reproductive anatomy, physiology, contraception and contraceptive methods. Topics covered include: the organization and delivery of family health/planning programs and services; national population policy; International Agencies policies and Programs Health and Psycho-social/anthropological problems of the adolescents; community mental health policies, programs and strategies; Gender issues and Safe motherhood Initiatives; Students have the opportunity of visiting family health clinics where contraception devices are offered to the clients. The clients will also have the opportunity of expressing their views and experiences different devices in use. Students will also have the opportunity to health educate the clients on the need to use these commodities as advised.

PHE 418: Public Health Information, Education and Communication (1 Unit: LH 15)
The course gives the students an overview of the salient areas of health Information, Education and Communication. The specific topics include: (i) Advanced principles of health information, education and communication; (ii) Behavioural sciences foundation in IEC; (iii) Advanced group dynamics and change processes; (iv) Advanced media strategies (v) I.E.C programme planning and evaluation strategies; and school health services. The students are expected to conduct literature review of a particular topic and present at seminar organized for the course.

PHE 490: Internship (10 Units: PH 450)
A compulsory supervised field internship is an integral part of the program, which takes place towards the end of the program and should last a period of 10 weeks in which periodic reports are expected to be submitted by the student. The students are rotated in groups through the local government primary health care departments and the State Ministry of health as well as through NGOs involved in health care delivery.

Note:*Internship shall be for three months (i.e. three weeks for a month) possibly organized during the summer months with the final examination at the beginning of the 400 level. For the assessment of the internship, as part, s*tudents for the Public Health Programme are required to sit and pass a comprehensive examination covering three papers consisting Paper I: Public Health Science; Paper II: Behavioural Science; and Paper III: HealthCare systems Management Science.*.

PHE 499: Research Project (6 Units)
Each student is expected to identify an area of research interest and develop a research proposal that would enable the student to conduct a study under the supervision of faculty staff.

3.13 RADIOGRAPHY AND RADIATION SCIENCES (B. Sc. Radiography and Radiation Sciences)

3.13.1 Philosophy, Aims and Objectives of the Degree Programme

Philosophy

Radiological Sciences has experienced rapid and tremendous changes in the recent past due to technological advances in medical imaging and associated role development. Consequently, the body of knowledge necessary to cope with these advances and abilities, expertise, skills and responsibilities have similarly expanded. Radiography education must thus address these issues in frame work and be poised for a continuous review as the need arises.

Aims and objectives

The programme is designed to fulfil the following objectives:

i. To prepare students with sufficient theoretical scientific knowledge base and practical skills that enable them assume professional positions as radiographers who can use the most complex medical imaging equipment and procedures.
ii. To develop in students the relevant practical and technological competence in radiography practice at primary, secondary and tertiary levels of healthcare.
iii. To assist students in the development of interpersonal skills necessary to function as members of the health team.
iv. To develop in students a high level of proficiency in conventional radiography and a good working knowledge of other imaging modalities (medical ultrasound, C.T., MRI) and radiotherapeutic procedures.
v. To prepare students with sufficient knowledge and analytical skills that equip them for further studies, and research development.
vi. To generate in students an appreciation of the role of radiography in healthcare delivery, environmental and social relevance, e.g. photography, bioinformatics and information technology.
vii. To develop in students the spirit of entrepreneurship so that on graduation, they can cope with self-employment

3.13.2 Admission and Graduation Requirements

The general admission requirements are as stated in section 1.3. In addition to the general admission requirements, candidates with Diploma Certificate in Radiography with five credits at GCE ordinary level or Senior Secondary School Certificate (SSCE) may be considered for direct entry.

The programme shall be a five-year course leading to the award of a Bachelor of Science (B.Sc.) Radiography and Radiation Sciences.

3.13.3 Leaning Outcome

a) Regime of Subject Knowledge

It is expected that the graduate of the programme should be adequately knowledgeable in the following main aspect of radiography and other imaging modalities:

i. Fundamentals, terminologies, nomenclature, basic concepts and units relevant practical knowledge.

ii. Simple nursing procedures and patient observation.
iii. Hospital practice principles and care of patients. Medico-legal issues
iv. Psychology in ill-health and applications in patient care
v. Radiation Physics, Bio-effects, Bio-safety and its management
vi. Good knowledge of principles and instrumentation of varieties of X-ray imaging equipment.
vii. Knowledge, appreciation and technical operation of other imaging equipment, including U/S, C.T., MRI, DF and thermography.
viii. Image formation theories, processing, storage and retrieval.
ix. Image receptor, accessories, characteristics, management and quality control.
x. Basic pathology, corresponding radiographic/imaging appearances and their recognition.
xi. General Radiographic Techniques, special/contrast techniques.
xii. Pharmacology of contrast agents, principles of administration and possible reaction.
xiii. Community Health and Biostatistics
xiv. Principles of research in medical imaging
xv. Basic Principles of Radiotherapy and Imaging Techniques in Oncology.

b) Competencies and Skills

At the end of the training, the graduate is expected to exhibit the following cognitive and practical skills in Radiography.

i. Ability to demonstrate knowledge and understanding of essential facts, concepts, principles and theories in basic and applied sciences identified above that form the theoretical basis for radiography and radiation sciences.
ii. Abilities to apply such knowledge and understanding in the planning, implementation and processing of radiography protocols.
iii. Abilities to recognize medical imaging problems and plan strategies for their solution including modifications and development of technique.
iv. Computation and data processing skills relating to medical imaging (C.T.; U/S/, MRI and DF) and information management.
v. Skill in presentation of scientific materials and arguments clearly, correctly in writing and orally to a range of audiences.

c) Behavioural Skills

i. Communication skills that demonstrate the recognition of the essential worth of the individual.
ii. Demonstration of sense of responsibility for self-direction and personal growth.

3.13.4**Attainment Levels**

It is essential that the procedure used for students' assessment should correspond to the knowledge, abilities and skills that are to be developed through their degree programme.

3.13.5**Evaluation**

These should be based on formal examinations, laboratory reports/records, problem-solving exercises, oral presentations, planning, conduct and reporting of project work and researches.

3.13.6**Resources Requirements for Teaching and Learning**

The Universities shall ensure the provision of adequate human, physical, equipment and library facilities in all the learning areas with strong information and communication technology infrastructure for the implementation of these minimum standards.

a) Academic and Non-Academic Staff

The academic staff-student ratio should not exceed 1:15 in the programme. Professionally qualified radiographers with higher degrees in radiography and/or related disciplines as well as holders of higher degrees in related sciences are eligible to be considered as academic staff. However, qualified professionals may be employed on part-time basis as Instructors.

b) Academic and Non-Academic Spaces

The general space requirements for the programme are as outlined in section 1.6
Accommodation should be provided within the hospital premises for student Radiographers during clinical posting.

c) Academic and Administrative Equipment

There should be a Departmental Demonstration Laboratory, which should house.

(i) A simulator X-ray unit and Tomographic equipment and Accessories.
(ii) A well-equipped dark room large enough to accommodate at least 10 students at a time.
(iii) Audiovisual aids/viewing boxes.
(iv) Phantoms/models.
(v) Quality assurance kit
(vi) Trolleys.
(vii) Radiation Protection materials such as Lead rubber shields, lead gloves, gonadal shields, lead aprons, wedged lead, dosimetry equipment
(viii) Equipment for care of patients
(ix) An ultrasound unit with linear/sector transducers

There should also be a Physics Equipment Laboratory: This should have image intensifiers, X ray tubes, cathode ray tubes, moving coil meters, avometers, viewing boxes, Circuit boards, Rheostats, Geiger-Muller Counters, ionisation chamber complete with densitometers. Other laboratories should be as obtained in the parent departments offering the courses e.g. Physics.

The hospital Radiology departments where students are posted for radiographic practice should be those approved by the relevant regulatory authority.

d)Library and Information Resources

There shall be a departmental library, which should house enough learning resources materials, in addition to books, journals and publications radiographs for demonstration and teaching. Also, there should be advanced Information technology equipment and resource materials available.

3.13.7 Course Structure and Synopses

A: Course Structure

Course Structure for 100 Level Radiography and Radiation Science Programme

Course Code	Course Title	Units	Status	LH	PH
BIO 101	General Biology I	3	R	45	-
BIO 102	General Biology II	3	R	45	-
BIO 107	General Biology Practical I	1	R	-	45
BIO 108	General Biology Practical II	1	R	-	45
CHM 101	General Chemistry I	3	R	45	-
CHM 102	General Chemistry II	3	R	45	-
CHM 107	General Chemistry Practical I	1	R	-	45
CHM 108	General Chemistry Practical II	1	R	-	45
CSC 101	Introduction to Computer Science	3	C	30	45
GST 111	Communication in English	2	C	30	-
GST 112	Logic, Philosophy and Human Existence	2	E	30	-
GST 113	Nigerian Peoples and Culture	2	R	30	-
GST 121	Use Library, Study Skills & ICT	2	C	30	-
GST 122	Communication in English II	2	C	30	-
GST 123	Communication in French	2	E	30	-
GST 124	Communication in Arabic	2	E	30	-
GST 125	Contemporary Health Issues	2	R	30	-
MTH 101	Elementary Mathematics I	3	R	45	-
PHY 101	General Physics I	3	C	45	-
PHY 102	General Physics II	3	C	45	-
PHY 107	General Physics Practical I	1	C	-	45
PHY 108	General Physics Practical II	1	C	-	45
	Total	**42**			

200 Level

Course Structure for 200 Level Radiography & Radiation Science Programme

ourse Code	Course Title	Units	Status	LH	PH
ANA 201	Introductory Anatomy and Gross Anatomy of Upper and Lower Limbs	4	C	30	90
ANA 203	General Embryology	2	C	30	-
ANA 204	Gross Anatomy of Thorax, Abdomen, Pelvis and Perineum	4	C	30	90
ANA 206	Systemic Embryology and Genetics	2	E	15	45
BCH 201	General Biochemistry I	3	C	45	-
PHE 201	Biostatistics	2	C	30	-
GST 211	Environment and Sustainable Development	2	R	30	-
GST 222	Peace and Conflict Studies	2	R	30	-
GST 223	Introduction to Entrepreneurship	2	R	30	-
GST 224	Leadership Skills	2	R	30	-
PIO 201	Introduction to Physiology	2	C	30	-
PIO 202	Principles of Cell Physiology	2	C	30	-
PIO 203	General Physiology	3	C	45	-
RAD 202	Hospital Practice & Basic care of patient	1	C	15	-
RAD 203	Psychology for Radiography	1	C	15	-
RAD 204	Basic Physics in Radiology/Radiation Physics I	3	C	30	45
RAD 205	Basic Physics in Radiology/Radiation Physics II	3	C	45	-
RAD 299	Students' Industrial Work Experience	3	C	-	135
	Total	**43**			

Course Structure for 300 Level Radiography and Radiation Science Programme

Course Code	Course Title	Unit	Status	LH	PH
ANA 311	Gross Anatomy of Head, Neck and Neuroanatomy	2	C	15	45
GST 311	Entrepreneurship	2	R	30	-
PAT 301	General Pathology	3	C	30	45
PIO 306	Endocrinology I	3	C	30	45
PIO 309	Neurophysiology I	3	C	30	45
RAD 301	Radiographic Anatomy 1	2	C	15	45
RAD 302	Radiographic Anatomy 11	2	C	30	-
RAD 303	Radiobiology/Radiation Protection and Dosimetry	3	C	45	-
RAD 311	Radiographic Technique 1	3	R	30	45
RAD 312	Radiographic Technique 11	3	R	30	45
RAD 321	Radiographic Imaging 1	3	C	30	45
RAD 331	Radiographic Equipment 1	3	C	30	45
RAD 341	Clinical Posting 1	4	C	-	180
RAD 399	Students' Industrial Work Experience	3	C	-	135
	Total	**39**			

Course Structure for 400 Level Radiography and Radiation Science Programme

Course Code	Course Title	Unit	Status	LH	PH
RAD 401	Radiological Health Management	2	C	30	-
RAD 403	Community Health	2	E	30	-
RAD 407	Pharmacology	2	C	30	-
RAD 409	Research Methodology	2	E	30	-
RAD 411	Radiographic Technique 111	3	C	30	45
RAD 412	Radiographic Technique 1V	3	C	30	45
RAD 421	Radiographic Imaging 11	2	C	-	90
RAD 422	Radiographic imaging 111	2	C	-	90
RAD 431	Radiographic Equipment 11	2	C	30	-
RAD 432	Radiographic Equipment 111	2	C	-	90
RAD 441	Clinical Posting 11	5	C	-	225
RAD 442	Clinical Posting 111	5	C	-	225
RAD 451	Other Imaging Modalities 1	2	C	30	-
RAD 452	Other Imaging Modalities 11	2	C	30	-
	Total	**36**			

Course Structure for 500 Level Radiography and Radiation Science Programme

Course Code	Course Title	Unit	Status	LH	PH
RAD 502	Seminar	2	C	30	-
RAD 503	Project	4	C	-	180
RAD 511	Radiographic Technique V	3	C	45	-
RAD 512	Radiographic Technique VI	3	C	45	-
RAD 521	Radiographic Imaging 1V	2	C	-	90
RAD 522	Radiographic Imaging V	2	C	-	90
RAD 531	Radiographic Equipment 1V	2	C	15	45
RAD 532	Radiographic Equipment V	2	C	-	90
RAD 541	Clinical Posting 1V	6	C	-	270
RAD 542	Clinical Posting V	6	C	-	270
RAD 551	Radiotherapy/Oncology I	2	C	30	-
RAD 552	Radiotherapy/Oncology II	2	C	-	90
RAD 561	Imaging Critique/Pattern Recognition	1	C	15	-
RAD 562	Quality Assurance	2	E	30	-
	Total	**39**			

B: Course Synopses

200 Level

RAD 202: Hospital Practice and Basic Patient Care (1 Unit: LH 15)
Basic first Aid, Principles of Nursing, general and special preparation, General and special care, professional attitude of the Radiographer. Hygiene; Infection and Principles of Asepsis Special and Emergency Care of the Patient. Use of Hospital and Nursing Equipment. Moving and lifting. Drugs, Hospital Practice: The Radiographer in the hospital team. Design of Radiodiagnostic and Radiotheraphy Facility. Medico-Legal aspects. Health Services Organisation and Management. Professional Ethics.

RAD 203: Psychology for Radiography (1 Unit: LH 15)
The Psychology of the sick patient, management of children, the elderly, the disabled. Potentially violent patients, and patients in terminal stages of disease. Communication. Communication with and general care of patients' relatives, professional attitude of the Radiographer, Relationship with staff, Acceptance of responsibility for care of patient. Motivation and emotional adjustment.

RAD 204: Basic Physics In Radiology/Radiation Physics I (3 Units: LH 30; PH 45)
Electrostatics, Physical Factors governing capacitance, charging and discharging capacitor and their uses in Radiological Equipment, basic X-ray circuitry, etc. Basic computer Architecture and peripherals; Electromagnetic induction, Mutual and Self induction; principles and construction of the transformer.

RAD 205: Basic Physics In Radiology/Radiation Physics II (3 Units: LH 45)
Transformer Parameters, uses of mutual and self inductance in autotransformers and High Tension transformers, solid conductor devices, principles and uses in Radiology, concept of energy, wave and Quantum methods of Energy Transfer; Bohr's atom; and applications in radiology, Rectification, production of X-rays, Radioactivity and radioactive decay, half life; counters, units of activity and measurement, K-capture. The atom, isotopes, isobars, isomers, nuclear binding energies, and inverse square law; effects of filtration. Luminescence and their applications. Physics of u/s computed tomography and MRI

RAD 299: Students' Industrial Work Experience (3 Units: PH 135)
Students will be posted for twelve weeks to recognized and relevant placement areas of their choice during the industrial training. Continuous assessment of students will be undertaken jointly by their industry-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training.

300 Level

PAT 301: General Pathology (3 Units: LH 30; PH 45)
Introduction to Pathology. Tissue and Cellular Injury. Reaction to Cellular Injury. Healing and repair. Disturbance of cell growth – cellular adaptation and neoplasia. Principles of general pathology as applicable to individual organ with emphasis on those diseases commonly encountered in the environment; hypertension, heart failure, renal tumours; tuberculosis, etc.

RAD 301: Radiographic Anatomy I (2 Units: LH 15; PH 45)
Conventional and contrast Radiographic Anatomy of the systems. Anatomy applied to ultra sound and nuclear Medicine Surface anatomy.

RAD: 302: Radiographic Anatomy II (2 Units: LH 30)
Identification and recognition of normal and pathological Anatomical structures and Physiological processes. Basic Manifestations and presentation of various pathological conditions and disease entities on Radiographs, covering the major organs and systems of the body.

RAD: 303 Radiobiology/Radiation Protection and Dosimetry (3 Units: LH 45)
Cell Theory and genetic Apparatus, Radiation Chemistry, Effect of Radiation on DNA molecules, amino acid, protein etc. Cellular damages, Survival curves. Theories of Biological effects of Radiation, short and long term effect (stochastic and non Stochastic, Radiosensitivity and Modifiers, post irradiation clinic events, Organ pathology Syndromes, Evidence from Hiroshima and Nagasaki. Target Theory and lethal Dose. Units of radiation measurement. Role of International Committee on Radiological protection, Radiation Dosimetry and instrumentation. The purpose and scope of Radiation protection. Systems of Dose Limitation. Radiological Design materials, Personnel monitoring.

RAD 311: Radiography Techniques I **(3 Units: LH 30; PH 45)**
Introduction to Radiography. Principles of Image formation, Factors affecting image quality. Radiation Protection in a clinical setting. Appropriate Technique Presentation format. Identification and preparation of the patient for the radiographic examination of the upper extremity: Fingers, thumb, hand, etc. Shoulder girdle and thorax

RAD 312: Radiographic Technique II **(3 Units: LH 30; PH 45)**
Radiographic technique for lower limb, pelvic girdle and Hip, and vertebral column, including cervical, cervico-thoracic, thoracic and thoraco-lumbar etc.

RAD 321: Radiographic Imaging I **(3 Units: LH 30; PH 45)**
Photographic Principles. X-Ray film materials and structure, The Radiographic Image, latent Image formation, fluorescence and its Application in Radiography, Intensifying Screens, X-Ray film Cassette, Structure, and Care, Cassette function tests.

RAD 331: Radiographic Equipment I **(3 Units: LH 30; PH 45)**
Mains supply, Basic Principles of Generators including Falling load generators and frequency multipliers. Control and stabilizing equipment. Higher tension circuits, Meters, Exposure Timer and Switching.

RAD 341: Clinical Posting I **(4 Units: PH 180)**
Students should attend clinical posting at designated hospitals 12 hours per week 2 days release.

RAD 399: Students' Industrial Work Experience **(3 Units: PH 135)**
Students will be posted for twelve weeks to recognized and relevant placement areas of their choice during the industrial training. Continuous assessment of students will be undertaken jointly by their industry-based supervisors, ITF officials and institutional supervisors. Finally, students on returning to the institution will present a seminar on major duties performed and skills acquired during the training.

400 Level

RAD 401: Radiological Health Management **(2 Units: LH 30)**
Application of Managerial functions, Health Management Structure Health care Policy. Inter-dependence of various departments. Radiology department and organizational structure. Financial resources and management. Vital Personnel Management, Management and communication process. Patient – flow and appointment system. Public Relations. Evaluation of Management principles and performance.

RAD 403: Community Health **(2 Units: LH 30)**
Epidemiology – Definition, Principles and methods, Health Education, Environmental health, Occupation Health, Public health administration/Health Care. Epidemiology of

communicable and non-communicable diseases. Social medicine. National and International Regulations relating to health.

RAD 407: Pharmacology (2 Unit: LH 30)

Origin and sources of Drugs; Routes of Administration of Drugs; Pharmacokinetics; Absorption of Drugs; Excretion of Drug; Drug Toxicity, Adverse drug Reactions; Drug Interactions; Cholinergic and adrenergic; Vomiting – Antiemetic; Constipation – purgatives; H2 receptor antagonists; Oxygen therapy, Bronchodilator Drugs; Asthma, Cough Suppressants; Respiratory Stimulants; Anticoagulants Heparin, Fibrinolysis; Vasodilator; Diuretics; renal failure; Immunity; Major Features of Malignant Disease; Principles of Cancer Chemotherapy; radio-activity; Nervous system Stimulants; Anticonvulsant Drugs.

RAD 409: Research Methodology (2 Units: LH 30)

Application of bio-statistical tools and methods. Types of Scientific enquiry. Research design. Formulation of Hypotheses. Data collection methods. Validity and reliability issues and their importance, sensitivity and specificity issues. Methods of data presentation deductive, inductive and inferences. Ethics of Medical research

RAD 411: Radiographic Techniques III (3 Units: LH 30; PH 45)

Radiographic examination of the skull, Dental Radiography, Skeletal surveys, Plain Radiography of the viscera and soft tissue. Accident and Emergency Radiography. Introduction to investigations involving contrast media. Pharmacy Radiography.

RAD 412: Radiographic Technique IV (3 Units: LH 30; PH 45)

The contrast examination of the gastrointestinal system, excretory system, obstetrics and gynaecological examinations. Also, sialography, cystography, arthography. Myelography, Mammography; operating theatre techniques.

RAD 421: Radiographic Imaging II (2 Units: LH 90)

Chemistry of Processing solutions, Hazards, Densitometry, Storage of X-ray films. Identification and Presentation of radiographs. Viewing or Radiographs. Processing: Manual and Automatic.

RAD 422: Radiographic Imaging III (2 Units: LH 90)

Daylight systems, Duplication and subtraction of radiographs Automated film handling systems. Photography. Dark room design. Principles of fibre optics and video transmission.

RAD 431: Radiographic Equipment II (2 Units: LH 30

Fuses, Switches, Circuit breakers, Interlocking circuits, The X-ray Tube; Construction and Operation, High Tension Cables, Tube stands. Effect and control of Scatter Radiation. General Principles of Grid, Collimators and Beam Centring devices, portable and Mobiles Equipment.

RAD 432: Radiographic Equipment III **(2 Units: LH 90)**
Special Equipment – Tomographic Equipment, Fluoroscopic Equipment, Dental Equipment, Mammographic Equipment, Equipment for Neuroradiography, accident and emergency equipment, Image Intensifiers, Rapid series Equipment.

RAD 441: Clinical Posting II **(5 Units: PH 225)**
Students should attend clinical posting at designated hospitals 12 hours per week 3 days release.

RAD 442: Clinical Posting III **(5 Units: PH 225)**
Students should attend clinical posting at designated Radiology Department or Imaging Department 15 hours per week.

RAD 451: Other Imaging Modalities I **(2 Units: LH 30)**
Computerized Tomography, Ultrasound, instrumentation. Basic Scanning techniques, Patient care, safety Precautions Hazards and protection.

RAD 452: Other Imaging Modalities II **(2 Units: LH 30)**
Magnetic Resonance Imaging, Radio Nuclide Imaging and Thermography. Instrumentation, Basic Techniques, Applications. Patient preparations, Safety Precautions.

500 Level

RAD 502: Seminar **(2 Units: LH 30)**
Presentation of a paper by each student on an approved topic at a Departmental colloquium.

RAD 503: Project **(4 Units: PH 180)**
Each student must produce a bound project report on an approved topic based on any acceptable area of study. It must be a research work carried out by the student under an approved supervisor.

RAD 511: Radiographic Technique V **(3 Units: LH 45)**
Other contrast examinations, arteriography, venography, Bronchography, ventriculography, Encephalography, Sinography. Fistulography Ward radiography.

RAD 512: Radiographic Technique VI **(3 Units: LH 45)**
Geriatric/Paediatric Radiography, Principles of Tomography, Macro radiography Xeroradiography, Digital Imaging.

RAD 521: Radiographic Imaging IV **(2 Units: PH 90)**
Silver Recovery Imaging, Principles of Special Imaging Techniques, Video recording, photographic and Electronic methods of Video Image Recording and Storage, Care and protection of Videotapes and Videodiscs. Subtraction techniques.

RAD 522: Radiographic Imaging V **(2 Units: PH 90)**
Practical based on all Imaging courses. Student should demonstrate ability to design and guide in the structural set up and functional operation of an X-ray Department.
Dark room, knowledge, care, Maintenance and minor repairs of X-ray dark room equipment, including conventional and Day light system.

RAD 531: Radiographic Equipment IV **(2 Units: LH 15;PH 45)**
Practical and "Trouble shooting" knowledge based on all the courses in Radiographic Equipment.

RAD 532: Radiographic Equipment V **(2 Units: PH 90)**
Practical and "Trouble shooting" knowledge based on all the courses in Radiographic Equipment.

RAD 541: Clinical Posting IV **(6 Units: PH 270)**
Students attend posting in accredited and designated Hospitals with adequately equipped imaging department 19 hours per week.

RAD 542: Clinical Posting V **(6 Units: PH 270)**
Posting of students to hospitals at least for 18 hours weekly. This forms part of the final clinical examination/*Viva/Voce*. i.e. continuous assessment.

RAD 551: Radiography/Oncology I **(2 Units: LH 30)**
Application of Ionising Radiation to Tumours and other Diseases. Superficial and Deep Therapy. Heat and Immunotherapy. Nature and Types of Cancer, staying of cancer, causes and Management. Radiotherapy and Chemotherapy Equipment for production of Radiation Therapy Beam. Radiation Beam measurement/Isodose curves. Radiation protection Beam Modifiers/applicators. Simulator and their uses, Manual and automatic Planning.

RAD 552: Radiotherapy/Oncology II **(2 Units: PH 90)**
Treatment fields and applications. Radiotherapeutic procedures for selected organs. Mould room and their uses. Management of Patient and Post Treatment Patient Care Drugs.

RAD 561: Image Critique/Pattern Recognition **(1 Unit: LH 15)**
Radiographic film critique and quality control (Film faults) Ability to identify common basic faults on radiographs, in order to be able to carry out necessary modification of additional projections.

RAD 562: Quality Assurance **(2 Units: LH 30)**

Importance of quality assurance in Radiology. Type testing acceptance testing and on going quality Assurance on the following: Imaging equipment, processing units, Image receptors. Management/Evaluation of quality Assurance programmes.

SECTION FOUR:

LABORATORY AND EQUIPMENT REQUIREMENTS FOR BASIC MEDICAL AND HEALTH SCIENCES PROGRAMMES

4.1 Laboratory And Equipment Requirements For Dental Technology

4.1.1 Laboratory Facilities Required

These constitute the most important laboratory facilities in a Department of Dental Technology. Each of these operatives equipped with equipment and materials are used by students under the supervision of members of staff.

1. Wax knife big
2. Wax knife small
3. Le cron carver; Stainless Steel
4. Ash Fig. 5 carver Stainless Steel
5. Ash Fig 4 carver Stainless Steel
6. Plaster knife medium
7. Plaster knife big
8. Plaster knife small
9. Spatula; Stainless Steel big
10. Spatula Stainless Steel small
11. College Tweezers, Stainless Steel
12. Spatula, (wooden handle) big
13. Spatula (wooden handle) small
14. Plaster bowl extra large
15. Plaster bowl big
16. Plaster bowl medium
17. Plaster bowl small
18. Glass mixing slab (big)
19. Glass mixing slab (small)
20. Vulcanite file
21. Bastard file
22. Wire Brush
23. Caliper gauge (inches and millimeters)
24. Spring divider (small
25. Spring Divider (big)
26. Fret saw frames
27. Fret saw blades
28. Burnsen Burner

29. Impression tray (Ash)
30. Impression tray (de tray)
31. Impression tray (Zelgan)
32. Plaster nippers
33. Hammer (metal)
34. Hammer Wooden)
35. Mallet (Rubber)
36. Wire cutter
37. Pneumatic chisel
38. Rubber base spatula
39. Adams 64 pliers
40. Adams 65 pliers
41. Adams Universal pliers
42. Hollow chop pliers
43. Half round pliers
44. Laboratory motor (trimming Machine)
45. Illumination Headlamp
46. Laboratory chair
47. Laboratory work stations
48. Single vacuum Units
49. Instrument cabinets
50. Dental Surveyor
51. Dental surveyor accessories
52. Hand pieces
53. Articulators (simple Hinge)
54. Articulators (Average movement)
55. Articulators Anatomical/Dentatus)
56. Indelible pencil
57. Flat plane
58. Mixing vessel/cube/pot
59. Tungsten carbide burs
    i. Round plain cut
    ii. Cone
    iii. Inverted cone
    iv. Rose head
    v. Oval shaped
    vi. Pear shaped
60. Steel burs
61. Cylinderical
62. Pear shaped

63. Oval
64. Burs
65. Diamond Burs
    i. Round plain cut
    ii. Fissured long head
    iii. Tappered fissure(flat)
66. Cutting discs (metal)
67. Cutting discs (Brittle)
68. Flexible Abrasive Discs
69. Spirit lamp
70. Modelling wax
71. Sticky wax
72. Blue inlay wax
73. Preformed metal wax former
74. Dental napkins
75. Air syringe
76. Liquid tin foil
77. Metallic tin foil sheets
78. Lingual bars
79. Articulating papers
80. Camel hair brush
81. Rubber cups/point/ wheels
82. Shade guide

4.1.2 **Plaster Room Requirements**

Plaster room and fitted desk or concrete slab with Adequate water sink fitted to it, others are:-

1. Model Trimmers
2. Orthodontic model trimming machine
3. Preumatic bench press
4. Vaccum investor for crown and Bridges
5. Manual bench press
6. Vibrators – Large
7. Vibrators – medium
8. Vibrators- small
9. Set of flasks (maxillo- facial)
10. Clamps (Acrylic, Maxillo-facial crown and Bridge)
11. Plaster/stone dispensers
12. Sand blasting machines

13. Investment Rings (metal)
14. Investment Rings (plastic)
15. Tungsten carbide sculptor
16. Humidors
17. Weighing scales (manual and Electronic)
18. Measuring tubes and cylinders
19. Duplicating flasks
20. Rubber moulds

4.1.3 **Packing And Processing Requirements**

1. Pneumatic bench press
2. Manual bench press
3. Polymerizing units
4. Automatic boil-out units
5. Set of Acrylic mixing vessels and spatulas
6. Pressure forming unit with compressor
7. Refrigerator

4.1.4 **Polishing Room Requirements**

1. Polishing Unit Complete with duct extractors and lighting units
2. High speed lathe polishing machine
3. Polishing brushes (Assorted)
4. Polishing mops and wools
5. Grinding stones
6. Electrolytic polishing/plating unit
7. Ultrasonic cleaners
8. Storage cabinets

4.1.5 **Casting Room Requirement**

1. Set of properly isolated Oxy-Acetylene gas cylinders with Gas nozzles
2. Set of gas blow gas blow torch
3. Pre-heating furnace
4. Induction casting machine
5. Centrifugal casting machine
6. Dipping Bath (Bees wax Unit)
7. Gas chamber/cup board
8. Fume Extractor
9. Casting rings (Assorted)
10. Crucible former, ceramic crucible
11. Tongs and asbestos Gloves

12. Storage cabinets
13. Spot welding machine)
14. Soldering unit machine
15. Safety goggles

4.1.6 **Sundry Room Requirements**

1. Crown and bridge porcelain furnace with vacuum pump and other accessories
2. Agar-Agar Duplicating Machine
3. Dry heat furnace
4. Sterilizing unit
5. Spanners for instruments change
6. Shades guide
7. Separating Discs
8. Plaster of Paris
9. Artificial stone
10. Artificial stone Kafir D
11. Artificial stone Calstone (De tray)
12. Artificial stone Vel mix (kerr)
13. Copper ring
14. Stock teeth
    a. Upper Anterior
    b. Lower Anterior
    c. Upper posterior
    d. Lower posterior
15. Stellon teeth powder (Acrylic)
16. Porcelain powder kit
17. Heat cure Acrylic powder (veined)
18. Heat cure Acrylic powder (plain/unveined)
19. Heat cure Acrylic powder (clear)
20. Heat cure Acrylic liquid
21. Self-cure Acrylic powder (veined)
22. Self-cure Acrylic powder (plain/ unveined)
23. Self-cure Acrylic powder (clear)
24. Self-cure Acrylic liquid
25. Carving wax
26. Orthodontic wires (stainless steel)
    -0.4mm- 0.8mm
    -0.7 mm- 0.9mm

4.1.7 **Alloy Requirements**

1. Silver
2. Chrome cobalt
3. Student alloy
4. Palladium
5. Alginate mould seal
6. Alginate impression material
7. Compound impression
8. Rubber base impression material
9. Polysulphide
10. Zinc Oxide Eugenol impression paste
11. Dental cement (Zinc phosphate)
12. Pumice powder
13. Carving wax
14. Rouge
15. Whitening
16. Sand paper
17. Tripoli
18. Sandarach Varnish
19. Borax Powder
20. Soldering Flux
21. Cristoballite
22. Gypsum bonded refractory investment material
23. Phosphate bonded refactory investment material
24. Casting wax
25. Sprue wax
26. Gutta percha
27. Absorbent paper point
28. Dowell pins
29. Post pins
30. Turpentine
31. Plasticine
32. Methylated spirit (industrial)
33. Petroleum Jelly
34. Fixative spray (fixo dent)
35. Denture cleanser
36. Soldering Alloy (various types)
37. Agar-Agar Duplicating material.

4.2 Environmental Health Science

4.2.1 Minimum Laboratory Material Resources and Equipment

SN	Description of items	Quantity
	Demonstration/Instrumentation Museum	
1.	Sweep net	2
2.	Insect boxes	2
3.	Specimen bottles	2
4.	Magnifying glass	2
5.	Trap nets	2
6.	Lamps Light traps	2
7.	Sticky traps	2
8.	Sampling knives	2
9.	Specimen cage	2
10.	Cage traps	2
11.	Back – break traps	2
12.	Wooden/metallic insect cabinet	2
13.	Working table wall charts of insects	2
14.	Molluscs, Formalin Preserved pests etc	2
15.	Insect displaying boards	2
16.	Scalpels	2
17.	Kidney dish	2
18.	Lamps	2
19.	Empty /expired vaccine vials	2
20.	Steam sterilizer	2
21.	Cold Boxes	2
22.	Vaccine carrier	2
23.	Needles and syringes	2
24.	Immunization charts	2
25.	Model of Ventilated Improve Pit-latrine	5
26	Model of chemical closet	5
27.	Model of incinerators	5
28.	Hand gloves of different sizes (Rubber, Woollen and Disposables)	5
29.	Bricks models for bricks making	5
30.	Models of bonding	5
31.	Model of Damp-Proof Course	5
32.	Model of Footings/Foundation	5
33.	Video player/VCD	2
34.	Slide projector	2
35.	Overhead projector	2
36.	Film projector	2
37.	Magnetic board	2
38.	Public address system	2

SN	Description of items	Quantity
	Demonstration/Instrumentation Museum	
39.	Mini Television set	2
40.	Cameras (Video camera)	2
41.	LCD (Power Point Projector)	2
43	Computer sets (not <10 units)	3
44	Flip charts	2
45	Audio tape recorder	2
46	Technical Drawing Table	2
47	Water colours	10
48.	Drawing pencils	10
49.	Drawing pens	10
50.	Display Cabinets and Boards	5
51.	Hatch kit for chlorine, dissolved oxygen, pH and temperature	5
52.	Portable incubator (for microbiological, for water quality test in the field)	3
53.	Sampling bottles BOD bottles	3
54.	Thermometer	10
56.	Dosimeter	5
57.	Audiometer	5
58.	pH metre (Stationery)	2
59.	pH meter (portable)	5
60.	Anemometer	5
61.	Dust detector (Air sample)	5
62.	Spring balance/ Digital balance	5
63.	Mechanical lever balance	5
64.	Weighing Scale	5
65.	Electronic balance	5
66.	Cold boxes	5
67.	Distiller	5
68.	Incubator	3
69.	Centrifuge	3
70.	Suction pressure	3
71	Electron microscope	2
72.	Test tubes	20
73.	Steam sterilizer	3
74.	Mini refrigerator	2
75.	Heating Gas Stand	1
76.	Autoclave	1
77.	Hot plate	3
78.	Pneumatic sprayer	3
79.	Motorized sprayer	1
80.	Electrodyne sprayer	2
81.	Handy sprayer (flit gun)	10

SN	Description of items	Quantity
	Demonstration/Instrumentation Museum	
82.	Knapsack sprayers (CP3)	3
83.	Knapsack sprayer (CP15)	3
84.	Pesticides (Fungicides, Herbicides etc)	3
85.	Sphygmomanometer	2
86.	Stethoscope	2
87.	Anatomical charts/model	5
88.	Skeleton model	1
89	Long and short syringe and needles	5 Packets
90	Glassware of different types	3
91.	Samples of equipment for measuring pollution	
	a. Wet Scrubbers	3
	b. Plume Imaging	5
	c. Optical Air monitors	3
	d. Air Samplers	3
	e. Spectrophotometers	3
	f. Ozone Monitor (UV Light)	3
	g. TPI Carbon Monoxide Analyser	3
	h. Nitrogen Dioxide Monitor (Z-1400)	3
	i. 2B Technologies Ozone Monitors	3
93	Housing Models	5
94	Fumigation Apron	2
95	Respirators	10
96	Goggles	10
97	Fumigator Caps	10
98	Sample of Model Uniform	2
99	Uniform Accessories	5
100	Model Sanitary Well	1
101	Can food consignments	5
102	Ammonia Solution	1
103	Hydrogen Peroxide	1
104	Dichloro-Diphenyl-Triochloroethane (DDT)	1
105	Malathion Solution and Wettable Powders	1
106	Formalin Solution	1
107	Nuvanol Pesticides	1
108	Ship Vessels Model	1
109	Copies of Aircraft Declaration of Health	10
110	Booklets of Bill of Health (Sea Vessels)	10
111	Booklets of Derating & Derating Exemption Certificates	10
112	Booklets of Abatement Notice	10
113	Booklets of Court Summons	10
114	Booklets of Charge Sheet	10
115	Booklets of Bench Warrant	10
116	Booklets of Commitment to Remand	10

SN	Description of items	Quantity
	Demonstration/Instrumentation Museum	
117	Booklets of Destruction Certificates	10
118	Copies of Approved Building Plan	5
119	Model Caskets	2
120	Water Analyser	2
121	Models of Food Vending Boxes	5
122	First Aid Box	2
123	Aerosol Disinfectants	5
124	Residual Insecticides	5
125	Human Stretchers	2
126	Long forks	5
127	Diggers	2
128	Wheel Barrows	2
129	Head Pan	3
130	Measuring Tape (Bigger size Brown cylindrical)	10
131	Simple Measurement tape rule	10
132	Building Plum	10
133	Lawn Mower	1
134	Apron Overall	5
135	Pairs of Rain Boot	5
136	Long Bench	3
137	Tables and Chair	1

4.2.2 **Environmental Village**

SN	Description of Item	Quantity
1	Ventilated Improved Pit Latrine (Single/Double Compartment)	1
2	Sanitary Well	1
3	Bake house	1
4	Incinerator	1
5	Barometer	1
6	Anemometer	1
7	Four Cardinal Points pole	1
8	Rain gauge	1
9	Abattoir /Slaughter slab	1

4.3 Human Anatomy Laboratory

4.3.1 Gross Anatomy

The gross anatomy dissection hall should be a spacious laboratory, with adequate illumination, ventilation, climate control, and wired for internet connections, audio-visual presentations and telemedicine. There should be storage lockers for students. Toilets and hand washing receptacles and at least two decontamination showers should be provided. An embalmment room, a specimen preparation room and a bone store should be adjacent to the dissection hall. There should be a bone and soft tissue museum adjacent to the laboratory. A soft tissue incinerator should be part of the complex. The following items of laboratory equipment and materials are required.

1. Dissecting Tables, stainless steel,: 1 to 8 students
2. Embalmed Bodies – minimum of 1 Cadaver to 8 Students
3. Gurneys and Trolleys (2 each)
4. Embalming Machine (2)
5. Storage tanks for cadavers
6. Electric Saws (2)
7. Electric Drills (2)
8. Articulated Skeleton (20 sets)
9. Disarticulated Skeletons (1 to 8 students)
10. X-Ray Viewing Machine (10)
11. Computers (2)
12. Multimedia projector (1)

4.3.2 Histology

The histology laboratory should be a spacious laboratory, with adequate illumination, ventilation, climate control, and wired for internet connections, audio-visual presentations and telemedicine. There should be an adjacent specimen handling and slide preparation room and adequate space for storage. The following items are required

1. Hydra-headed teaching microscope
2. Microscope (2) – Rotary/Sledge
3. Microtome Knives (5 re-usable and 100 packets of disposable)
4. Microtome knife sharpener (1)
5. Binocular Light Microscopes – at least1 to 2 students
6. Vacuum Pump (1)
7. Cryostat (1)
8. Automatic Tissue Processor (1)
9. Microscope Slide Projector (1)
10. Multimedia Projector (1)

4.3.3 Embryology

The histology laboratory should be a spacious laboratory, with adequate illumination, ventilation, climate control, and wired for internet connections, audio-visual presentations and telemedicine.

1. Baby cadavers
2. Soft tissue specimens

3. Models and Charts
4. Slides of Sections
5. Multimedia Projector

4.4 Human Nutrition

1. Adiabatic Bomb Calorimeter
2. Kjehdal Apparatus
3. Markham Distillation Apparatus
4. Soxhlet Apparatus
5. Vacuum Oven
6. UV-Visible Spectrophotometer
7. Balances
8. Flame Photometer
9. Freeze Dryer
10. Air Ovens
11. Centrifuges
12. Electronic Weighing Scales for Adults
13. Electronic Weighing Scales for Children
14. Electronic Weighing Scales for Babies
15. Hanging Scales for Babies
16. Length Boards for Babies
17. Skinfold Callipers
18. Mid-Upper Arm Circumference Tape for Wasting
19. Glass Wares
20. Water Baths

4.5 Medical Laboratory Sciences

4.5.1 Biochemistry

1. Centrifuge
2. Ultracentrifuge
3. Electronic Balances
4. Heating Blocks
5. Vacuum Pumps
6. Spectrophotometers
7. pH Meters
8. Thermostatic Water Baths
9. Ovens
10. Gas Chromatograph
11. HPLC
12. Electrophoresis Equipment
13. Flame Photometer
14. Water Distiller

4.5.2 **Physiology**

1. Spirometers
2. Vitalographs
3. Peak Flowmeters
4. Gas Meters
5. ECG Machines
6. Spectrophometers
7. Physiograph Recorders Transducers
8. Oscilloscopes
9. Centrifuges
10. Blood Gas Malipers
11. Audiometers
12. Geiger Counters

4.5.3 **Haematology/Blood Transfusion Sciences**

1. Autoanalyser
2. Microscopes
3. Waterbaths
4. Haematocrit Centrifuges
5. Electrophoresis tanks and power packs
6. Colorimeters
7. Bench centrifuges
8. Balances
9. Nebeur counting chambers
10. pH meters

4.5.4 **Microbiology**

1. Student microscopes
2. Fluorescent microscopes
3. Magnifying lens
4. Centrifuges
5. Incubators
6. Anaerobic culture jars
7. Membrane/sietz filters
8. Mettler balances
9. Autoclaves
10. Deionisers
11. Water baths
12. Hot air ovens
13. Bunsen burners
14. Refrigerators
15. Freezers
16. Ultra centrifuge

4.5.5 **Clinical Chemistry**

Electronic balances
Spectrophotometers
pH Meters
Atomic absorption spectrophotometer
Autoanalyzers
Colorimeters
Flame Photometer
Water distillers
Gas Chromatograph
HPLC
TLC equipment
Vacuum pumps
Rotary evaporators
Centrifuges

4.5.6 **Histopathology**

Microtome-2 Rotary/sledge
Microtome knives
Light microscopes
Dissecting microscopes
Slides of sections/slide projector
Cryostat with microtome

4.5.7 **Laboratory Sciences**

Spectrophotometers
Audiometer
Centrifuges
Geiger Counter
Water Baths
Electronic Weighing Balances
Micro-Centrifuge
Water Distiller
Student Microscopes
Research Microscope
Teaching Microscope with Camera
Magnifying lens
Deep Freezer
Incubators
Proteinmeter Standards
Various types of laboratory reagents and culture media
Heamatocrit centrifuge
Electrophoresis tank and power pack
Bench Centrifuges
Neuber Counting Chambers

4.6 Nursing Sciences
Item (Minimum Quantity Indicated)

4.6.1 Beds and bedside items

Adult Beds and Mattresses - 4
Baby Cots - 2
Pillows - 12
Unisex Adult Dummy- 2
Dolls - 2
Bedside Lockers - 4
Bed Tables - 4
Sandbags - 4
Back Rest - 4
Bed Blocks - 4
Drip Stand - 4
Air Rings- 4
Oxygen Cylinder and Accessories with Carrier - 2
Suction Machine - 1
Hot Water Bottles - 2
Linen Bin- 2
Pedal Bin- 4
Bed Screens -6
Bed Pans - 4
Urinals- 4
Small Sterilizing Drums - 2
Large Sterilizing Drums - 2
Small Boiler Sterilizer - 2
Stainless Steel Sputum Mugs - 4
Disposal Containers - 2
Trays: Stainless Steel with Cover- 2
Trays: Stainless Steel without Cover - 2
Trolleys:Medicine Trolley - 2
Dressing Trolley- 2
Long Multipurpose Trolley - 2
Small Trolley - 2
Bowls:Small with Cover (Stainless) - 4, Small without Cover - 4, Medium with Cover - 4
Medium without Cover - 4, Large with Cover - 4, Large without Cover - 4
Plastic Bowls:Various Sizes - 6
Kidney Dishes: Small with Cover (Stainless Steel) - 4, Small without Cover - 4
Medium with Cover - 6, Medium without Cover - 4, Large with Cover - 4
Large without Cover - 4
Gallipots:Small with Cover (Stainless Steel) - 6, Small without Cover - 6, Medium with Cover - 6
Medium without Cover - 6, Large with Cover - 6, Large without Cover - 6

Toothed Dissecting Forceps - 6
Plain Dissecting Forceps - 6
Mosquito Artery Forceps - 4
Large Artery Forceps - 4
Spencer Wells Artery Forceps - 4
Dressing Forceps - 4
Sponge Holding Forceps - 2
Cheatle Forceps - 2
Bowl Lifting Forceps - 2
Vulsellum Forceps - 2
Needle Holding Forceps - 2
Clip Removing Forceps - 2
Tongue Holding Forceps - 2
Mouth Gag - 3
Stainless Spatula - 4
Wooden Spatula - 12
Tracheotomy Set - 1
Tracheotomy Tubes - 2
Rubber Airway - 4
Metallic Airway - 4
Double Sharp Scissors - 2
Double Blunt Scissors - 2
Sharp Blunt Scissors - 2
Stitch Scissors - 2
Bard Parker Handles - 2
Plastic Jugs with Cover - 4
Drinking Mugs - 4
Glass Measuring Jar - 3
Plastic Measuring Jar - 3
Stainless Measuring Jar - 3
Urinometer - 10
Test Tubes - 12
Test Tube Rack - 2
Test Tube Holder - 4
Pipettes - 4
Bunsen Burners - 4
Clinical Thermometers - 15
Rectal Thermometers - 15
Bath Thermometers - 2
Sphygmomanometer - 15
Stethoscope - 10
Diagnostic Set - 10
Endoscopy Set - 5
Adult Weighing Scale - 2
Baby Weighing Scale - 2

Height Ruler - 2
Foleys Catheter - 2
Malcot's Catheter - 6
Depezzer Catheter - 6
Nasal Catheter - 6
Ryle's Tube - 6
Flatus Tube - 6
Enema Tube - 4
Tourniquet - 10
Bladder Syringe - 10
Ear Syringe - 10
Trochars (Various Sizes) - 4
Cannula (Various Sizes) - 4
Ceramic Mortal and Piston - 2
Wash Hand Basin with Stand - 4
Angle Poise Lamp - 2
Undine Lamp - 4
Patella Hammer - 2
Tuning Fork - 4
Spirit Lamp - 2

4.6.2 **Furniture:**

Nurse's Table - 1
Stackable Chairs - 25
Linen Cupboard - 25
Medicine Cupboard - 2
DDA Cupboard - 1
Lotion Cupboard - 1
Instrument Cupboard - 1
Equipment Cupboard - 1

4.6.3 **Linen:**

Long Bed sheets - 16
Cot Sheets - 4
Draw Sheets - 12
Counterpanes - 12
Blankets - 12
Pillow Covers - 12
Long Macintosh - 8
Draw Macintosh - 6
Treatment Macintosh - 6
Plastic Aprons - 12
Patients Gowns-Male - 6, Female - 6
Pyjamas - 4
Theatre Gowns - 4

Theatre Caps - 4
Face Flannels - 15
Bath Towels - 15
Hand Towels - 15
Medicine Towels - 15
Large Bath Sheets - 15

4.6.4 **Consumables:**

Wooden Spatula - 12
Surgical Blades (Different Sizes) - 12
Spigots (Different Sizes) - 12
Plain Bandage - 24
Crepe Bandage - 24
Abdominal Bandages - 8
Triangular Bandages - 15
Many Tailed Bandages - 15
Gauze - 2 Rolls at a time
Cotton Wool - 1 Roll at a time
Plaster - 1 Roll at a time
Stockinet - 2 Dozens
Plaster of Paris - 1 tin at a time
Disposable Gloves - 2 Packets
Disposable Apron - 2 Packets
Surgical Gloves - 2 Packets
Finger Stalls (Different Sizes) - 2 Dozens
Face Mask - 4
Oxygen Mask - 2
Infusion Set - 15
Transfusion Set - 15
Injection Syringes and Needles (All Sizes) as Required
Scalp Vein Needles - 6
Antiseptics and Disinfectants
Acetic Acid - 1 Bottle
Sodium Bicarbonate - 1 Bottle
Ammonium Nitrate - 1 Bottle
Silver Nitrate - 1 Bottle
Red Litmus Paper - 1 Pack
Blue Litmus Paper - 1 Pack
Clinitest Tablets - 2 Bottles
Acidtest Tablets - 2 Bottles
Clinistix Strips - 1 Pack
Albustix Strips - 1 Pack
Urine Bags - 6
Colostomy Bags - 4

4.6.5 **Treatment Sheets;**

Medication Sheets
Post Operative Observation Sheets
Fluid Intake and Output Sheets
Vital Signs Sheets
Nursing Care Plan Sheets
Anaesthetic Chart
Consent Forms (Stock As Required)
Outpatient Folders
Diabetic Charts
Admission Forms
Laboratory Forms
X-Ray Forms
Nursing Care Plan Formats

4.6.6 **Kitchen Utensils:**

Drinking Cups - 24
Spoons - 24
Plates - 24
Serving Trays - 12
Food Cover - 12
Bibs - 24
Serviettes - 2 Dozens
Milk Jugs - 6
Sugar Jar - 6
Tea Pot - 6

4.6.7 **Drugs**

Vitamins)
Analgesics)
Antibiotics)
Sedatives)Stock As Required
Laxative)
Intravenous Infusion)
e.g. Dextrose in various Percentages)
Normal Saline)

4.6.8 **Audio-Visual Aids**

Magnetic Board - 1
Flip Chart and Accessories - 1
Multimedia Projector and Accessories - 1
Slides/Slide Projector & Accessories - 1
DVD Player & Accessories - 1
Television Sets - 2
Computer & Accessories - 1

Film Projector - 1
Camera - 1
Radio - 1
Public Address System - 1

4.6.9 Obstetrics and Paediatrics Nursing Equipment

Paediatric Sphygmomanometer with Stethoscope - 3
Delivery Couch - 2
Delivery Bag - 2
Incubator - 1
Vacuum Extractor - 1
Bed Screens - 2
Measuring Tape - 3
Ruler - 3
Oral Rehydration Therapy Kit - 2 Sets
Episiotomy Scissors - 2
Disposable Aprons - 2
Plastic Baby Bath Sets - 1
Baby Powder - 1
Vaseline - 2
Towels - 4
Baby Napkins - 4
Safety Pins - 2
Rubber Pants - 2
Sample Bra with Broad Straps - 6 each
Cord Clamp - 3
Cord Scissors - 3
Suction Machine - 1
Foetal Stethoscope - 10
Vulscellum Forceps - 6
Pelvimeter - 2
Vagina Wall/Cervix Retractors - 5
Baby Scale - 2
Height Scale - 1
Uterine Sound - 1
Balley's Vagina Speculum - 2
Cusus Vagina Speculum - 5
Sims Vagina Speculum - 6
Breast Pump - 5
5 each of models of Perineum, Reproductive System, Pelvis, Foetal Skull, Placenta, Foetal Circulation,

4.7 Optometry

4.7.1 Physiological Optics and Geometrical Optics

1. Nagel Anomaloscope-1
2. 100 Hue Test Instrument or Ishihara Plates-2
3. Monochrometer-2
4. Red and Green Filters-4
5. Lenses and Lens Holders-5
6. Optical Benches-4
7. Wratten Colour Filters (Nos. 22,473,74,290-3 Sets
8. Neutral Density Filters (0.1,0.2---1.0,2.0,3.0)-3 Sets
9. Artificial Pupils (1mm,2mm,2.5mm)-3 Sets
10. Dark Adaptometer-1
11. Schematic Eyes-6
12. Trial Frames and Lenses (A.O.)-3
13. Lens Measures-6
14. IPD Rule-20
15. Mirrors-10

4.7.2 Low Vision Rehabilitative Laboratory

1. Low Vision Kits-3
2. Stand Magnifiers-2
3. Pinholes-6
4. Artificial Eyes-2
5. Trial Lens Case-2
6. Artificial Pupils-4
7. Telescopes-3

4.7.3 Binocular Vision Laboratories

1. Haploscopes and Grades I,II,III Targets-5
2. Trial Lens Set-5
3. Pharopter-2
4. Vectograms-5
5. Prism Bars-5
6. Stereogram and Stereogram Mounts-5
7. Affer – Image Equipment-1
8. Hess – Lancaster Screen-2
9. Haidinger Brush Apparatus-1
10. Warth – 4 dot test apparatus-2
11. Haridional Magnifiers-2 Sets
12. Space Eikonometer-1
13. Polaroid Lens and Spectacles-2
14. Disparometers-2

4.7.4 **Contact Lens Laboratories**

1. Hard Contact Lens Set-1
2. Hard Contact Lens Solutions-30 Pack
3. Soft Contact Lens Solutions-30 Pack
4. Soft Contact Lens Trial Sets-10
5. Radio scope-1
6. Diameter Gauge-2
7. Keratometer-1
8. Slit Lamp-1
9. Suction Cups for Holding Lenses-5
10. Purging Machine-1
11. Saline Solution (bottles)-10
12. Schumer Tear Test Strip Boxes-5

4.7.5 **Ocular Anatomy Lab.**

1. Dissection kits-5
2. Plastic Human Skulls-5
3. Microscopes-4
4. Prepared assorted Slides for Histological Studies-10
5. Bovine Eyes (consumable)-20
6. Refrigerator-1

4.7.6 **Pre-Clinical Laboratories**

1. Pharopters and Pharopter Stands-40
2. Diagnostic Kit-4
3. Trial Lens Cases-8
4. Lensometer-4
5. Slit Lamp-2
6. Keratometer-2
7. Visual Field Equipment: Central -2, Peripheral-2
8. Tomometers Indentation-2, Applanation-2
9. Acuity Charts Near-4, Distance-4
10. Archer – Elliot Distance VA Cabinet-4

4.7.7 **Optometric Clinic**

1. Diagnostic Kits-8
2. Pharopters and Pharopter Stands-10
3. Keratometers-4
4. Slit Lamps-4
5. Trial Lens Cases-10
6. Lensometers-10
7. Visual Field Equipment: Central-4, Peripheral-4
8. Thermometers – Indentation-5, Applenation-5, Non-contact-2
9. Acuity Charts-4, (Near and Distance) – Illiterate (Snellen)-3, Non Illiterate (Snellen)-3 Children-3, Low Vision-3

10. Archer Elliot Distance V.A. Cabinet-10
11. Low Vision Diagnostic Kit-3
12. Contact Lens Trial Sets (Hard)-4, (Soft)-4
13. Hand Held Maddox Rod-6
14. IPD Rule-10
15. Hydraulic Chairs for Phoropters-10
16. Synoptophores-2
17. Grades I,II,III Targets-2 Sets each
18. Lenses (consumables)-250
19. Frames (consumables)-250
20. Diagnostic Drugs (consumables)-50
21. Binocular Indirect ophthalmoscope-2

4.7.8 Ophthalmic Laboratory

1. Edgers-4
2. Bead Heaters-2
3. Formers-100
4. Lensometers-2
5. Pattern Markers-5
6. Surfacing Machines-5
7. Frames (consumables)-200
8. Lenses (consumables)-200 pairs
9. IPD Rule-10
10. Layout Card-10
11. Indian Ink (bottles) (consumables)-10 bottles

4.8 Pharmacology

1. Single Chamber Isolated Organ Baths
2. Digital Hot Plates
3. Isometric Transducers
4. Distillers
5. Activity Cages
6. pH Meters
7. Centrifuges
8. UV-Visible Spectrophotometers
9. Rota-rod Tread Mills for Mice
10. Polygraphs
11. Microscopes
12. Plethysmometers
13. Water Baths
14. Stethoscopes
15. Sphygmomanometer
16. Observation Chambers
17. Chemical Balances
18. Dissecting Lamps

19. Ovens
20. Dissecting Sets
21. Isolated Perfused Heart Systems
22. Incubators
23. Automatic Multi-channel Pipettes
24. HPLC Equipment
25. Cold Centrifuge
26. Deep Freezers
27. Ultra-low Freezer

4.9 **Physiology**

1. Polygraphs
2. Physiographs
3. Jacketed Organ baths
4. 2 Channel recorder
5. Electronic Balances
6. Assorted Glasswares
7. Spectrophotometer
8. Soxhlet Extractors
9. Animal cages
10. Deep Freezer
11. Refrigerators
12. Microscopes
13. pH Meters
14. Colorimeter
15. Bench Centrifuges
16. Water Baths
17. Audio Visual equipment
18. Overhead Projector
19. Water Distillers
20. Flame Photometer
21. Oven
22. Deionizer
23. Student stimulators1 per 20 students
24. Student kymograph1 per 20 students
25. Transducers1 per 20 students
26. Spirometers1 per 20 students
27. Vitalograph1 per 20 students
28. Peak flow meters1 per 20 students
29. ECG machines 4 per lab.
30. Oscilloscopes 4 per lab.
31. Centrifuges 6 per lab.
32. Haematocrit Centrifuges5 per lab.
33. Haemotocrit readers 20 per lab.
34. Audiometers2 per lab.

35. Water bath (with shaker)2 per lab.
36. Geiger counter1 per lab.
37. Blood gas analysers1 per lab.
38. An array of test tubes, racks, etc.
39. Consumable chemical reagents
40. Antisera for blood typing, etc.

4.10 Physiotherapy

4.10.1 Electrotherapy Equipment (with indicated minimum quantity)

Short Wave Diathermy machine and appropriate electrodes - 1
Infra-Red Lamps - Luminous - 3, Non-luminous – 3, Tunnel Baths -3
Microwave Therapy machines and appropriate treatment units - 1
Therapeutic Ultrasound machines with appropriate treatment heads - 2
Wax Baths (Hand and Foot) with extra unused wax - 2
Electrical Stimulators for Nerves and Muscles with appropriate electrodes - 2
Laser Therapy Units - 1
Interferential Therapists Units with appropriateelectrodes - 2
Transcutaneous Electrical Nerve Stimulators - 2
Ultraviolet Lamps (Water and Air cooled) - 1
Hydropack Therapy Units with various sizesof packs - 2

4.10.2 Hydrotherapy and Cryotherapy

Hydrotherapy Pool - 1
Cold and Hot pack units - 4
Deep Freezer/ Ice making machines - 1
Hydrotherapy treatment baths of various sizes - 1 each
Hydrotherapy treatment tanks of various sizes - 1 each
Vapo-coolant spray and gels - 4

4.10.3 Exercise Therapy

Functional Re-Education
Assisted Exercises
Resisted Exercises
Mobilization Exercises
Co-ordination and Balance training
Bicycle Ergometers - 2
Treadmills - 2
Multigym - 1

4.10.4 Treatment Surfaces

Mackintosh - 12
Towels - 12
Examination Beds and Plinths - 12
Exercise Mats - 6
Wooden Chairs - 12
Wooden Stools - 12
Wooden Tables - 6
Pillows - 12
Beds Sheets - 12
Blankets - 12

4.10.5**Prosthetics and Orthotics**

Facilities for fabricating various walking and supportive aids (including artificial limbs, crutches, walking sticks, mirrors, parallel bars, walking frames)
Various types of bandages i.e. Crepe: 4 inches - 6, 6 inches - 6; Elastic: 4 inches - 6, 6 inches - 6
Gypsona: 4 inches - 6, 6 inches - 6
Felt - 12
Lint - 12
Rehabilitation Staircase - 2

NB:
In addition to the above, the B. Physiotherapy programme should take place where the following facilities are available for clinical practice in a Teaching Hospital ;

i) Department of Medicine with a Neurology Unit in addition to other units.

ii) Department of Surgery with an Orthopaedic Unit in addition to other units.

iii) Department of Paediatrics with a Paediatric Neurology Unit in addition to other units

iv) Department of Physiotherapy with complementary facilities for effective training.

4.11 Prosthetics And Orthotics (BSc) Programme

(1) Plaster of Paris – Powdery Cao4+ H_2o
(2) Steel – hard vest, tough
(3) Wood – wood in prosthetics e.g. Artificial limb, SACH foot, Knee piece
(4) Aluminium, etc make able
(5) Adhesives and Elastic
(6) Leather - leather in prosthetics and orthotics, e.g. ring padding, knee pad, cuff suspension, orthopaedic shoes, etc.
(7) Plastic – plastics in prosthetics and orthotics; e.g. KAFO, AFO, SPLINTS Etc.
(8) Vice to hold materials,
(9) Hard saw to cut,
(10) Guillotine machine to cut,
(11) Sheer machine to cut,
(12) Grinding stones/machine,
(13) Welding machine,
(14) Vacuum machine,
(15) Suction machine,
(16) Oven,
(17) Drill press m/c,
(18) Lathe machine,
(19) Craftsman carver,

(20) Skiving machine.