NATIONAL UNIVERSITIES COMMISSION

BENCHMARK MINIMUM ACADEMIC STANDARDS FOR UNDERGRADUATE PROGRAMMES IN NIGERIAN UNIVERSITIES

BASIC MEDICAL AND HEALTH SCIENCES

APRIL, 2007
PREFACE

Decree (Act) No. 16 of 1985 as contained in the National Universities Commission amended Decree (Act) No. 48 of 1988 empowers the Commission to lay down minimum standards for all programmes taught in Nigerian universities. Consequently, the Commission in collaboration with the universities and their staff developed minimum academic standards for all the programmes taught in Nigerian universities in 1989. The Federal Government subsequently approved the documents in 1989.

After more than a decade of using the Minimum Academic Standard (MAS) documents as a major instrument of accreditation, the Commission in 2001 initiated a process to revise the documents. The curriculum review was necessitated by the fact that the frontier 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 competitiveness engendered by globalization were also compelling reason 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 of appropriate skills, competences and dispositions that will make them globally competitive and capable of contributing meaningfully to Nigeria’s socio-economic development.

Congniserant 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 practice. To actualize this, the Commission organized a stakeholders’ statements were developed for each programme in all the disciplines taught in Nigerian universities. Subsequent to this exercise, it was discovered that the benchmark-style statements were too sketchy to meaningfully guide the development of curricula and were also inadequate for the purpose of accreditation.

Given this scenario, the Commission therefore considered the merger of the Benchmark Style Statements and the revised Minimum Academic standards into new documents to be called Benchmark Minimum Academic Standards (BMAS) as an amalgam that crisply enunciates the learning outcomes and competences expected of graduates of each academic programme without being overly prescriptive while at the same time, providing the requisite flexibility and innovativeness consistent with a milieu of increased institutional autonomy.

Following this decision, the Commission initiated the process to produce the documents. The first, in the series, was the conduct of Needs Assessment Survey 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 need 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. Secondly, a workshop was held at which academic experts across Nigerian universities including vice-chancellors participated with the objective of effecting the merger. At the end of the workshop, draft BMAS documents were produced for the thirteen disciplines and the General Studies programme taught in Nigerian Universities. The documents were later sent to the Universities offering relevant disciplines for comments and input. Following the return of the inputs and comments from the universities to the Commission, a one-day workshop was held at which invited academic experts studied and incorporated the comments and inputs into the draft document.

To ensure that the documents were free from technical errors, the documents were sent to another set of academic experts for editing who also attended a one-day workshop to finally harmonize the BMAS documents.

Following the aforementioned processes, BMAS documents were produced for the underlisted 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;
v) Engineering and Technology;
vii) Environmental Sciences;
viii) Law;
ix) Pharmaceutical Sciences
x) Medicine and Dentistry;
xi) Science;
 xii) Social Sciences;
 xiii) Veterinary Medicine.

The process has been a rather long and tortuous one but it is gratifying to note that the BMAS documents will for long be an enduring academic covenant between the universities and the students that will be enrolled to study in their different programmes.

On behalf of the National Universities Commission, I wish to express my sincere gratitude to all Nigerian universities and their staff for their cooperation and immense contribution towards the development of the BMAS documents.

**PROFESSOR JULIUS OKOJIE**
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BASIC MEDICAL AND HEALTH SCIENCES

1.0 GENERAL

1.1 List of Programmes and Degree(s) in View

- HUMAN ANATOMY (B. Sc., Human Anatomy)
- HUMAN NUTRITION AND DIETETIES (B.Sc., Human Nutrition and Dietetics)
- MEDICAL LABORATORY SCIENCES (BMLS)
- NURSING SCIENCES (B.N.Sc)
- OPTOMETRY ( O.D. Doctor of Optometry)
- PHARMACOLOGY (B.Sc Pharmacology)
- PHYSIOLOGY (B.Sc Physiology)
- PHYSIOTHERAPY (B. Physiotherapy)
- PUBLIC HEALTH (B. Sc Public Health)
- RADIOGRAPHY AND RADIATION SCIENCES (B. Sc Radiography and Radiation)

1.2 Philosophy and Objectives of the Discipline

Philosophy

Life as a bio-psycho-socio cultural entity continues to experience rapid and tremendous changes. Consequently, a required body of knowledge necessary to cope with the advances, abilities expertise, changing needs of man, skills and responsibilities have similarly expanded. Degrees in Basic Medical Sciences/Health Sciences must just address these issues in frame work and be subject to continuous review.

Objectives of the Discipline
The discipline is designed to fulfill the following objectives:

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

1.3 Basic Admission Requirements and Expected Duration of the Programme(s)

Admission Requirements

Admission into these programmes would be by University Matriculation Examination (UME) and Direct Entry modes.

1.3.1 University Matriculation Examination (UME)

Candidates must possess credit passes at the Senior Secondary School Examination conducted by the West African Examination Council or National Examination Council, General Certificate Examination at the Ordinary Level or its equivalent in Mathematics, English Language, Physics, Chemistry and Biology at not more than two (2) sittings and an acceptable pass mark at the UME conducted by the Joint Admission and Matriculation Board (JAMB).

1.3.2 Direct Entry

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

i) accept passes in Physics, Chemistry and Biology or Zoology at the Higher School Certificates or Advanced Level of General Certificate Examination or its equivalent.

ii) First Degree in relevant Biological or Physical Sciences Discipline not Less than Second Class Lower Division Level.

Each University should conduct Aptitude test or interview of candidates before admission.

Duration of the Programmes

The duration of programmes under the discipline ranges from between 4 – 6 years based on the specification of each programme.

1.4 Graduation Requirements
Students must comply with each programme specification relation to core/compulsory courses, while required units under specified optional or elective courses must be duly complied with. Credit for graduation varies from one programme to the other based on the mode of entry (UME/DE) and the duration of each programme.

1.4.1 Degree Clarifications

Degrees are either classified using either the first class, second class upper, second class lower and third class or unclassified mode of degree of pass with distinction, pass credit and or pass which is equivalent of second class lower in which 50% is the pass mark.

1.4.2 Probation

Any candidate who earns less than 1.5 GPA in a semester is on probation.

1.4.3 Withdrawal

Any candidate who obtains less than 1.5 GPA for two consecutive semesters is deemed to be withdrawn.

1.4.4 Course Credit System

Course credit/Unit system must be employed in teaching all the programmes. Pre-requisite courses must be passed before students can register for higher level of a particular course while Non-requisite courses can be carried over. All compulsory courses for A Level must be passed before student can proceed to a higher level. ‘Make Up’ examination system should be allowed for students with slight deficiencies in order to proceed to the next level.

1.4.5 Grade Point Average and Cumulative Grade Point Average

**Classified:**
- First class division: 4.50 – 5.0
- Second class upper division: 3.50 – 4.49
- Second lower division: 2.40 – 3.49
- Third class division: 1.50 – 2.39

**Unclassified:**
- Pass (with distinction): 4.50 – 5.00
- Pass (with credit): 3.50 – 4.49
- Pass: 2.40 – 3.49
1.5 Evaluation

1.5.1 Techniques of student assessment

Techniques of student assessment adopted by NUC and all the other professional bodies should be maintained. Methods for course evaluation should be as follows: Continuous assessment, observational techniques, and summative evaluation in terms of final examination in all courses.

1.5.2 External Examiners’ System

External examiner must be part of the examination team and should be involved in all the professional examinations.

1.5.3 SIWES Rating and Assessment

SIWES rating should be complied with by the programmes and assessment of performance by the regulatory body should be strictly adhere to.

1.5.4 Students’ Evaluation of Course

Method of courses should relate to the knowledge, abilities and skills developed through the degree programmes which should include: problems solving exercises, assignments, other mode of continuous assessment, seminars, and formal examinations.

1.5.5 Maintenance and Curricular Relevance

* Professional accreditation by regulating body in addition to academic accreditation by NUC should be maintained.

* Interaction between producers of graduates and users is necessary to ensure continued relevance of curriculum.

* Curriculum review every five years is important to incorporate changes in practice and report of stakeholders/university initiative.

1.5.6 Performance Evaluation Criteria

Methods for assessing student should relate to the knowledge, abilities and skills developed through the degree programme which should include:
Assessment of Learning Methods

a) Written, Practical, Oral and Clinical Examinations along the course credit system.
b) Research Project reports/dissertation.
c) Oral defence of Research project.
d) Clinical posting records.
e) SIWES reports (Written and Oral presentations)
f) Continuous Assessment (class tests, end of posting assessments, assignments, etc)
g) Continuous assessment shall constitute 30% of total marks.
h) Failure in the clinical or practical examinations constitutes failure in the entire examination.
i) Courses will be examined by Unit Course System with pass mark of 50% in physiotherapy departmental/professional courses only.

1.6 Resource Requirements

1.6.1 Personnel – Academic Staff

The Teacher/Students ratios for the Basic courses would be 1:15 while the ratios for Clinical courses would be 1:10.

The staff mix is expected to be as follows:

| Professional/Readership | - | 30% |
| Senior Lectureship | - | 40% |
| Lectures 1 and Below | - | 30% |

To be appointable as Lecturer 1, the academic staff should possess Ph.D or Fellowship in the relevant professional discipline.

Non-Academic Staff

It is expected that Non-Academic staff to support the teaching of students will be as follows:

| Senior Non-Teaching Staff | - | 1:30 Students |
| Administrative Staff | - | 50% of Academic Staff |
1.6.2 Physical Facilities

Each University must provide adequate facilities for teaching the programmes.

These include:

a) Space

Adequate space must be provided for teaching and lecturing such as class rooms, lecture theatres, seminar rooms, laboratories, clinical/practical rooms according to NUC guidelines.

Adequate office accommodation must be provided for all academic and non-academic staff according to NUC guidelines.

b) 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 equipments and adequate consumables must be provided for the administrative staff while the right tools must be available for the technical staff.

1.6.3 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 staffing students.

1.7 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 graduates with broad knowledge of the Nigerian National 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).

GST 111: Communication in English (2 Units)
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)
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)
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 and Information Communication Technology (ICT) (2 Units)
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)
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)
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)
Introduction to Arabic alphabets and writing systems, Elementary conversational drills, Basic reading skills, Sentence construction in Arabic.

GST 211: History and Philosophy of Science (2 Units)
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)
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 Entrepreneurial Skills (2 Units)
Introduction to entrepreneurship and new venture creation; Entrepreneurship in theory and practice; The opportunity, Forms of business, Staffing, Marketing and
the new venture; Determining capital requirements, Raising capital; Financial planning and management; Starting a new business, Feasibility studies; Innovation; Legal Issues; Insurance and environmental considerations. Possible business opportunities in Nigeria.

ESP 311: **Introduction to Entrepreneurship Studies (2 Units)**

Some of the ventures to be focused upon include the following:

1. Soap/Detergent, Tooth brushes and Tooth paste making
2. Photography
3. Brick, nails, screws making
4. Dyeing/Textile blocks paste making
5. Rope making
6. Plumbing
7. Vulcanising
8. Brewing
9. Glassware production/Ceramic, production
10. Paper production
11. Water treatment/Conditioning/Packaging
12. Food processing/packaging/preservation
13. Metal working/Fabrication – Steel and aluminum door and windows
14. Training industry
15. Vegetable oil/and Salt extractions
16. Fisheries/Aquaculture
17. Refrigeration/Air conditioning
18. Plastic making
19. Farming (crop)
20. Domestic Electrical wiring
21. Radio/TV repairs
22. Carving
23. Weaving
24. Brick laying/making
25. Bakery
26. Tailoring
27. Iron welding
28. Building drawing
29. Carpentry
30. Leather tanning
31. Interior decoration
32. Printing
33. Animal husbandry (Poultry, Piggery, Goat etc)
34. Metal Craft – Blacksmith, Tinsmith etc
35. Sanitary wares
36. Vehicle maintenance
37. Bookkeeping
1.8 **Definition of Terms**

1.8.1 **Core/Compulsory Course:**

A course which every student must compulsorily take and pass in any particular programme at a particular level of study.

1.8.2 **Required Course**

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

1.8.3 **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.

1.8.4 **Optional Course**

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

1.8.5 **Pre-requisite Course**

A course which student must take and pass before taking a particular course at a higher level.

1.8.6 **Minimum Credit Load Per Semester**

The Minimum credit load per semester is 15.

1.8.7 **Course Credit Unit 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 difficulty or in levels of academic progress, e.g. Level or year 1 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 Credit Units.
1.8.8 **Grade Point Average (GPA)**

Performance in any semester is reported in Grade Point Average. This is the average of weighted grade points earned in the courses taken during the semester. The Grade Point Average is obtained by multiplying the Grade Point average in each course by the number of Credit Units assigned to that course, and then summing these up and dividing by the total number of Credit Units taken for the semester.

1.8.9 **Cumulative Grade Point Average (CGPA)**

This is the up-to-date mean of the Grade Points earned by the student in a programme of study. It is an indication of the student’s overall performance at any point in the training programme. To compute the Cumulative Grade Point Average, the total of Grade Points multiplied by the respective Credit Units for all the semesters are added and then divided by the total number of Credit Units for all courses registered by the student.
2.0 **DEGREE PROGRAMMES**  
**Discipline Common Courses**

### 1ST YEAR  
**1ST SEMESTER**

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### 2ND YEAR  
**1ST SEMESTER**

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<td>General Principles of Physiology I</td>
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<td>PSY</td>
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### 2\textsuperscript{ND} SEMESTER

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<td>BIC 202</td>
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2.1 HUMAN ANATOMY (B.Sc Human Anatomy)

2.1.1 Philosophy, Aims And Objectives of the programme

Philosophy

The general philosophy of the programme is to produce graduates of high academic standing with adequate practical exposure who can function adequately in the medical education process, complement ancillary laboratory medical services to the greater society 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) Teach Anatomy to Medical, Dental, 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 such as M. Sc. and Ph. D. degrees.

2.1.2 Admission Requirements

Candidates seeking admission to the Human Anatomy degree programme must possess the minimum requirement for entry into the medical programmes, as contained in the general admission requirements.

(a) Medical students who have successfully completed the Basic Medical Science programme with a score of “B” grade in Human Anatomy and an overall score of “B” grade or GPA of 4.0 in the 300 Level examinations can be admitted for intercalated degree.

2.1.3 Learning Outcome

(a) Regime of subject knowledge
Students should know the fundamentals, terminologies, nomenclature, basic concepts applied to human anatomy.

(b) **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.

* Ability to demonstrate knowledge and understanding of essential facts, concepts, principles and theories in basic and applied anatomy identified above that form the theoretical basis for knowledge and understanding of the Human mechanism.

* Abilities to apply such knowledge and understanding of body changes in the interpretation, planning and implementation of Human needs.

(c) **Behavioral Attitudes**

* Recognizes the essential worth of the individual through internal responses.

* Shows sense of responsibilities for self-direction and personal growth.

2.1.4 **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.

2.1.5 **Resource Requirement for Teaching and Learning**

The Universities shall ensure the provision of adequate human, physical, equipments 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 academics with higher degrees in anatomy and/or related disciplines are accepted as academic staff. However, qualified professionals can be employed on part-time basis as demonstrators. The non-academic staff/student ratio should be 50% of the academic staff and of the right mix according to NUC guidelines.

(b) **Academic and Non-Academic Spaces**

Each University must provide adequate facilities for teaching the programmes. These include:

Adequate space must be provided for teaching and lecturing such as class rooms, lecture theatres, seminar rooms, laboratories, practical rooms according to NUC guidelines.

Adequate office accommodation must be provided for all academic and non-academic staff according to NUC 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 equipments and adequate consumables must be provided for the administrative staff while the right tools must be available for the technical staff.

(b) **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.

2.1.6 **Course contents and Description**

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2ND SEMESTER

ANA 312 Radiological Anatomy and Techniques 2
ANA 322 Histochemistry 2
ANA 342 Cell and Molecular Biology 2
ANA 352 Research Methods and Research Ethics 2
VAN 312 Animal Handling & Comparative Veterinary Gross Anatomy 3
COM 312 Demography and Biostatics 2
EPN 302 Entrepreneurial Studies II 2

400 LEVEL

Course Code Subject Credit Unit

1ST SEMESTER

ANA 411 Surface and Living Anatomy 1
ANA 421 Anatomical and Museum Techniques 4
ANA 431 Introduction to Electron Microscopy 2
ANA 441 Skeletal Biology and Anthropology 2
ANA 450 Biometry and Human Growth 2
ANA 499 Final Year Project 4

2ND SEMESTER

ANA 412 Electron Microscopic Technique and Ultrastructure 4
ANA 499 Final Year Project 4
ANA 422 Seminar 2
ANA 432 Laboratory Work Experience 3
ARE 412 Introduction to Archaeology 3

200 LEVELS

1ST SEMESTER

ANA 211: Introductory Anatomy & Gross Anatomy of Upper & Lower Limbs 5 Units

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: Pectoral region and mammary gland; axilla and brachial plexus; Back deltoid and scapular regions, arm, forearm, hand, bones and joints.
**Lower Limb:** 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 Reagiological Anatomy of Upper and Lower Limbs.

**ANA 221  Histology of Basic Tissues 2 Units**
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 231  General Embryology 2 Units**
Gametogenesis, cyclic changes in the female genital tract, fertilization, cleavage, blastocyst, gastrulation and formation of germ layers, segmentation of mesoderm, folding of embryo fetal membranes, umbilical cord and placentation. Development of limbs and teratology. Developmental anomalies and clinical syndromes.

**2ND SEMESTER**

**ANA 212  Gross Anatomy of Thorax, Abdomen, Pelvis & Perineum 4 Units**
**Thorax:** Thoracic wall, pleura, lungs, Heart and Coronary Vessels mediastinum and diaphragm.
**Abdomen:** Anterior abdominal wall and herniae, external genitalia, peritoneum, stomach and intestines, blood supply. Gut, Liver, Pancreas, Spleen, Kidneys and Suprarenals. Pelvis and Perineum: Male and female perineum, pelvic wall and floor, pelvic peritoneum, viscera, nerves and vessels. Surface Anatomy, Radiological Anatomy.

**ANA 222  Systematic Histology (Organology) 2 Units**
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 232  Systematic Embryology (Organogenesis) 1 Unit**
Development of Cardiovascular system, Integumentary system, Respiratory system, Digestive system, Urogenital system. Developmental anomalies and clinical syndromes.

**300 LEVEL**

**1ST SEMESTER**

**ANA 311  Gross Anatomy of Head & Neck and Neuroanatomy 4 Units**
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.


ANA 321 Neurohistology and Histology of Organs of Special Senses 2 Units


ANA 331 Embryology of the Nervous System and Pharyngeal Apparatus 2 Units


ANA 341 Human Genetics 2 Units


ANA 351 Laboratory Techniques for Light Microscopy 3 Units

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.

EPS 311: Entrepreneurial Studies I 2 Units

2ND SEMESTER
### ANA 312 Radiological Anatomy and Techniques 2 Units
Basic principles of Radiological imaging of human tissue. Radiological identification of major body structures. Introduction to modern imaging techniques. Precautionary measures.

### ANA 322 Histochemistry 2 Units
Principles and techniques of Histochemistry including Immunocytochemistry.

### ANA 342 Cell and Molecular Biology 2 Units

### ANA 352 Research Methods and Research Ethics 2 Units

### VAN 312 Animal Handling & Comparative Mammalian Anatomy 3 Units
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.

### EPN 302: Entrepreneurial Studies II

#### 400 LEVEL

#### 1ST SEMESTER

### ANA 411 Surface and Living Anatomy 1 Unit
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 421 Anatomical and Museum Techniques 4 Units
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 431 Introduction to Electron Microscopy 2 Units
History of the electron microscope. Types of electron microscope. Basic principle of the structure and function of the of the electron microscope.

### ANA 441 Skeletal Biology and Anthropology 2 Units

**BHG 411 Biometry and Human Growth  2 Units**

**ANA 409 Final Year Project  3 Units**
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.

**2ND SEMESTER**

**ANA 412 Electron Microscopic Technique and Ultrastructure  4 Units**
Tissue sample acquisition techniques, tissue processing and examination, photographic recoding of ultrastructural images shall be taught. Where possible, the practical aspects shall be demonstrated.

**ANA 422 Seminar  2 Units**
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 432 Laboratory Work Experience  3 Units**
The student shall be attached to a relevant diagnostic laboratories and photographic laboratories to provide opportunity for acquisition of practical on-the-job experience in line with the objectives of the entrepreneurial studies.

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

**ANA 409 Final Year Project  3 Units**
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.

**Course Content in Biochemistry**

**200 LEVEL**
1ST SEMESTER

BCH 211 Chemistry of Carbohydrates, Protein and Lipids 2 Units
Introductory enzyme kinetics; enzymes co-enzyme and vitamins.

2ND SEMESTER

BCH 211 General Metabolism of Carbohydrates, Lipids and Proteins 2 Units
Carbohydrates, proteins and lipids and integration of metabolism; TCA cycle, electron transport and oxidative phosphorylation.

BCH 222 Medical Biochemistry Practical 1 Unit
Laboratory work covering essential components of the Biochemistry course shall be done.

Course Content in Physiology

200 LEVEL

1ST SEMESTER

PHS 211 General Physiology, Body Fluids, Blood & Cardiovascular System 1 Unit

PHS 221 Physiology of Respiration, Renal, GIT and Autonomic N S 2 Units

PHS 232 Physiology of Reproduction and Endocrine Organs 1 Unit
Male and Female reproductive apparatus, Nervous Coordination, Sexual Hormone, Pregnancy, Lactation and Contraption. Integrative function,
Hypothalamopituitary connection, Thyroid Physiology, Adrenal Hormones, Pancreatic Hormone, Parathyroid Hormones. Integrative functions and malfunction of Hypothalamopituitary connections, Thyroid, Adrenal, Pancreatic, Parathyroid and other hormones with clinical significance.

### 300 LEVEL

#### 1ST SEMESTER

**PHS 341  Physiology of Excitable Tissues, Nerve, Muscle, CNS, Special Senses  2 Units**

Central nervous systems. Organization and structure, Reflex Arc, the neuron, impulse synapses, neurotransmitters, Sensory System, Motor System, Posture, Locomotion, Speech, Sleep – Walking mechanism, the Hypothalamus, E.E.C. function of CNS. Special Senses – Structure of the eye, visual system, visual defects, auditory system, Structure of the ear Deafness, receptors, Physiology of olfaction.

#### Course Contents in Community Medicine

### 300 LEVEL

#### 2ND SEMESTER

**COM 312  Demography and Biostatistics  2 Units**

The principles of population, composition, distribution and growth and those factors that influence them, including the health. Effects of population characteristics and analysis in biostatistic, emphasis will be on students acquiring the necessary skills for the collection and presentation, analysis and interpretation of data.

#### Course In Philosophy

**200 Level**

1ST Semester

**SGS 211  Moral Philosophy 1 Unit**

#### Course in Geography

**200 Level**

2ND Semester

**GEO 211  Evolution of Man’s Relation with his Environment  1 Unit**

#### Course in Law

**200 Level**

2ND Semester
2.2 HUMAN NUTRITION AND DIETETICS
(B.Sc., Human Nutrition and Dietetics)

2.2.1 Philosophy, Aims and Objectives

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 subjects 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. The objectives of the programme in Nutrition and Dietetics are to ensure students:

1) Understand the interrelationships among agriculture, food and nutrition as well as how they relate to health.
2) Can 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 there 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.

2.2.2 Admission and Graduation Requirements:

UME: To be admitted into the 4 year B.Sc. Nutrition and Dietetics programme the candidate must meet the entry requirements as stated earlier (see section 1.3.1).

DE: To be admitted into the 3 year B.Sc. Nutrition and Dietetics programme, the candidates must possess entry requirements as stated earlier (see section 1.3.2.).

To graduate, a student shall have undergone 3 or 4 years of study depending on his entry point, including 6 months industry trainings. Course workload must
meet the graduation requirements of the University. However, in doing so, the student must earn a minimum of 134 credit units for the four year programme and 100 credit units for the three year (direct entry) programme.

The submission of an undergraduate project thesis based on supervised research is a graduation requirement, which must not be compromised. This requirement exposes the student to problem-solving techniques and provides him with an ability to organize ideas from literature and research findings. In short, it prepares the student for the work ahead and for further training at the postgraduate level. This area of academic preparation needs to be maintained and developed further.

In addition,

He/she must have passed all the University COMPULSORY courses.

He/she must have passed all Departmental/College CORE courses and required electives.

He/she must not have spent more than two additional years above prescribed minimum duration specified.

He/she must not have less than a CGPA of 1.50 at the end of the program.

2.2.3 Learning Outcome

a) Regime of Subject Knowledge

A broad based knowledge in Nutrition and Dietetics enables graduates function as professional Nutritionists/Dietitians. To achieve this, programme commences with a study of the relevant branches of the natural and management sciences, which form the basis of a coordinated sequence of applied courses offered in the penultimate and final year. An essential aspect of this course is the opportunity provided for students to gain direct practical experience during periods of industrial training (IT) in the food industries, hotels, hospitals, research centers, corporate organizations and agencies. To be registered as Professional Dietetic, students are required to also undergo a one-year internship programme after graduations in any recognized and approved Teaching Hospital in the country: In addition, students should be taken on excursion to relevant Nutrition enterprises:

b) Competencies and Skills

Graduates will have competence in conceptual, management and entrepreneurial skills;
Graduates will acquire practical and analytical competence to enable them manage sustainable Nutrition programames;

Graduates will be equipped with data processing skills and have ability to interpret data to provide solutions to Nutrition problems;

Graduates will be able to functions in advisory capacity to government and private agencies in areas related to Nutrition.

Graduates will be able to plan, implement, monitor and evaluate appropriate nutrition intervention programmes for benefits of population groups.

Graduates will be acquire leadership qualities that will enable them take on leadership roles in public and private establishments related to Nutrition.

Graduates will have competences in communication skills and be able to present research/field reports with convincing arguments clearly either in writing or orally;

Graduates will be equipped with information technology skills required for global communication; and

Graduates will have skills in participatory approach to conservation and utilization of renewable natural resource with a view to enhancing rural development.

Graduate will 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 that there is dignity in labour through competence in conception, planning, execution, monitoring and evaluation of various nutrition programmes and enterprises.

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

Maintain the ethical standards of the profession.

2.2.4 Attainment Levels

Graduates should be able to function effectively as Nutritionists/Dietitians. 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.

2.2.5 Resources Requirement for Teaching and Learning

a) Academic and Non-Academic Staff
   The requirements for academic and non-academic staff are as stated earlier (see 1.6.1)

b) Academic and Non-Academic Spaces
   This also as stated earlier (see 1.6.2 (a)

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 audiovisuals, photocopiers, microfilms CD ROMS etc.

2.2.6 Course Contents and Descriptions

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12. Introduction to Computers 3
13. Introduction to Clinical Nutrition 2
14. Food Preparation and Management 2
15. Food Biochemistry 2
16. Food Microbiology 3
17. Basic Anatomy and Physiology II 2

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### 300 LEVEL

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<td>5. Personnel and Institutional Management</td>
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#### SECOND SEMESTER

7. SIWES 15 Credits

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#### FIRST SEMESTER

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<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>1. Diet Therapy and Hospital Practice II</td>
<td>3</td>
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<tr>
<td>2. Recipe Development and Testing</td>
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<tr>
<td>3. Advanced Food Preparation</td>
<td>2</td>
</tr>
<tr>
<td>4. Consumer Education</td>
<td>2</td>
</tr>
<tr>
<td>5. Community Nutrition</td>
<td>3</td>
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<tr>
<td>6. International Nutrition</td>
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</table>
7. Nutrition Planning and Policy 2
8. Seminar in Human Nutrition and Dietetics 2

Sub-Total 18

SECOND SEMESTER

9. Project 6
10. Advances in Human Nutrition 2
11. Nutrition Education 2
12. Clinical Nutrition 3
13. Public Health Nutrition 2
14. Entrepreneurship II 2

Sub-Total 17

Course Description

100 LEVEL

Introduction to Home Science and Nutrition (2 Credits)

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 conception 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

Agricultural Food Products (2 Credits)

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.

Basic Human Anatomy and Physiology I (2 Credits)

Cell and its functions. An introduction to basic anatomy, physiology in various systems. Nerves and muscles as agents of communication in the body. Kidney as

**Human Biochemistry and Nutrition I (2 Credits)**


**Human Biochemistry and Nutrition II (2 Credits)**


**Introduction to Clinical Nutrition (2 Credits)**


**Food Biochemistry (2 Credits)**

Protein systems in foods; sugars in food technology; peptic substances; plant gums and their uses in foods; non-enzymic browning; role of lipids in food; lipid oxidation and lipid autodxidation in food systems; carotenoids in food systems; terpenses, essential oils and chemistry of food orders; phenolic compounds; respiration; chlorophyll and photosynthesis; biochemical activity of microorganisms in foods.

**Food Microbiology (4 Credits)**

Incidence and types of micro-organisms in food, meat, fish and other seafoods, fruits, vegetables and dairy product; spoilage of fresh and preserved foods;
principles underlying destruction of micro-organisms during food preservation by use of chemicals, low and high temperatures, drying and radiation; indices of food sanitary quality and micro-biological standards and criteria; food poisoning, food infections, food infestation and mycotoxin in foods.

300 LEVEL

Diet Therapy and Hospital Practical I (3 Credits)
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, diarrhea in infants; oral rehydration.

General and Applied Nutrition (2 Credits)
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.

Practice of Nutrition (2 Credits)
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 used 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.

Personal and Institutional Management (2 Credits)

Research Methods in Nutrition (2 Credits)
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.

**Industrial Training (15 Credits)**

Students will be posted to recognized and relevant placement areas of their choice during the 6-months industrial training. The first 3-months will be spent in standard food service institutions, while the remaining 3-months will be spent in hospitals or nutrition rehabilitation centers. 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**

**Diet Therapy and Hospital Practice II (3 Credits)**

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 counseling.

**Clinical Practice (3 Credits)**

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 counseling; 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.

**International Nutrition (2 Credits)**

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.
Conceptional approach to the global solutions of nutrition policy. Role of international relief agencies. Relationship of various United National Agency in averting world hunger.

**Community Nutrition (3 Credits)**

**Public Health Nutrition (2 Credits)**
Nutritional problems of Nigeria public importance. 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. Environmental and nutrition. Development of primary health care and nutrition of Nigeria. Improving social and economic services at all levels with special interest on the vulnerable groups.

**Nutrition Planning and Policy (2 Credits)**

**Advanced In Human Nutrition (2 Credits)**

**Nutrition Education (2 Credits)**
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.

Project in Nutrition and Dietetics (6 Credits)
The student is expected to study fairly critically under controlled supervision by an academic staff, a special problem in the area of nutrition and dietetics, present a dissertation and finally defend him/her findings before a panel comprising an international and external examiners.

Seminar in Nutrition and Dietetics (2 Credit)
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.

Consumer Education (2 Credits)
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.

Advanced Food Preparation (2 Credits)
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.

Recipe Development and Testing (2 Credits)
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.
2.3 MEDICAL LABORATORY SCIENCES (BMLS)

2.3.1 Philosophy, Aims and Objectives of the Degree Programme

Philosophy

The broad philosophy of training in medical laboratory sciences should be:

a) To provide sound academic and professional background for the production of Medical Laboratory Scientists who would be capable of working anywhere in Nigeria.

b) To produce Medical Laboratory Scientists who would satisfy internationally recognizable standards and who could undertake further training towards specialization.

c) To 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 Objective

The main aims of bachelors honours degree programmes in Medical laboratory sciences should be:

i) To instill 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 department e.g. water corporations; research institutions, etc).

ii) To involve the students in an intellectually stimulating and satisfying experience of learning, studying and research.

iii) To 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) To 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) To develop in students through an education in medical laboratory sciences, a range of transferable skills of value in medical and non-medical employment.

vi) To provide students with a knowledge and skills base from which they can proceed to further studies in specialized 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) To generate students with the ability to produce biological and diagnostic reagents as well as being able to fabricate and maintain laboratory equipments.

ix) To also empower graduates of Medical Laboratory Sciences with skills that will enable them engage in income yielding ventures i.e. a re-orientation from the ‘take-a-job’ mentality to the ‘make-a-job mentality’.

2.3.2 Admission and Graduation Requirements

Candidates seeking enrolment into the B.MLS programme should possess the following minimum entry qualifications as stated in general issues.

Duration of Course

The B.MLS degree programme shall run for 5 years for Joint Matriculation Examination entry candidates and 4 years for direct entry candidates. Non classification of degrees is recommended. Greater or equal to 4.5 GPA is pass with Distinction. (Pass mark is 50% or 3.0 GPA).

2.3.3 Learning Outcomes:

a) Regime of Subject Knowledge

Each institution providing bachelors honours degree in Medical Laboratory Sciences is free to decide on the content, nature and organisation of its courses or modules. Therefore, Medical Laboratory Sciences degree programmes offered by individual universities would have their own particular (peculiar) characteristics. While it is acknowledged that the depth in which individual aspects are treated may vary with the nature of specific Medical Laboratory Sciences programme, it is expected that all programmes will ensure that students become conversant with the following main aspects of medical laboratory sciences.
i) Major aspects of the basic science courses including Biology, Physics, Chemistry, Mathematics, Genetics and Molecular Biology, Biostatistics, Computer programming up to advanced levels.

ii) Major general study courses including use of English language to ensure that students are conversant with the English language structure and function, writing skills, lexis, letters and memorandum, speech writing and term papers, etc; other general studies including Social Sciences and Humanities.

iii) The Basic Medical Sciences including Gross Anatomy, Physiology and Biochemistry.

i) Core subjects of Medical Laboratory Sciences including: Clinical Chemistry; Medical Microbiology (Virology, Bacteriology, Mycology) etc;

ii) Laboratory postings are conducted at specified and regular intervals in all core medical laboratory sciences courses. Students are posted to specific hospital based laboratories for professional experience under the supervision of senior medical laboratory scientists/lecturers as part of the Students Industrial Work Experience Scheme (SIWES).

iii) Field trips are conducted and students are taken for further professional exposure/experience in utility departments (e.g. water treatment plants); industries (e.g. Breweries, Food and Beverage especially for quality assurance and control); community health centers for epidemiological studies; special clinics and bays e.g. leprosaria, tuberculosis/HIV units; sickle-cell anaemia clinics; renal units, etc. for further experience on monitoring and diagnosis. They will also be posted to related companies/factories to acquire some entrepreneur skills.

Scored log books are kept and signed for day-to-day laboratory/ posting experiences for each student.

iv) By the final year, students are expected to take up two options.

a) **Major Option:**

Where apart from normal taught courses/practical classes, the student also takes up a project research topic in the area as well as writing detailed papers to be presented as seminars.

b) **Minor Option:**

Where the student takes only course work and practical courses.
v) Students are also expected to take the following auxiliary courses before graduation:

(a) Laboratory instrumentation and techniques covering all the areas of medical laboratory sciences.

(b) Laboratory management and functions.

(c) Pharmacology and toxicology

(d) Research methodology

(e) Professional ethics in medical laboratory science practice.

(f) Biomedical engineering to expose them to fabrication and repairs of medical equipments, instruments and technology.

(g) Theory and practice of entrepreneurship.

(h) Information Technology

(i) A foreign Language (e.g French) as an elective

vi) Upon successful completion of the requirement for the award of a B.MLS degree, graduates are expected to do a one-year internship in a recognized hospital/research/health centre.

b) Competencies and Skills

At bachelors honours level, students are expected to develop a wide range of different 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.

ii) 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:
(a) **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 recognize 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.

(b) **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.

c) **Transferable Skills**

* Communication skills (both written and oral). It is suggested that the French language or a 2nd Language be offered as a 2 unit elective.

* 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 organisational 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**

On graduation, students would have been well equipped with sound professional ethics for the profession of Medical Laboratory Sciences – including good reputation and fulfillment 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.

2.3.4 **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 researches.

**Additional assessments may include:**

- Essay assignments
- Laboratory exercises undertaken
- Literature surveys and evaluations – presented as class seminars/tutorials
- Collaborative project work
- Preparation and illustrations on project work reports/display.
- Reports on external/field trips/laboratory postings

Indicators of different levels of attainments in these performances include the award of Distinction pass for GPAs of 4.5 and above pass mark of at least a GPA of 3.0.

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 experiment results 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 recognized. 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 done.

2.3.5 Resource Requirements for Teaching and Learning in the Programme

Minimum expectations of resource capacity to enable effective teaching and learning:

a) **Academic and Non-Academic Staff**

One academic staff per sixteen students (1:16) who should be equitably distributed amongst the core courses is recommended, and 1:10 in the clinical areas. Non-Academic Staff (50% of Academic staff)

Administrative Staff including:

Secretary, Typist, Clerical Staff, Library Assistants, Messengers and Cleaners

Laboratory Staff (1 per 30 Students)

Technical staff made up of Laboratory Scientists, Technologists, Technicians Laboratory Attendants, Store keeper etc.

b) **Academic and Non-Academic Spaces**

These would include:

- Office spaces for the Head of Department,
- Secretary
- General Administrative Office
- Office and Laboratory space for senior academic staff and other academic staff using NUC guidelines.
- A well equipped Departmental Teaching Laboratory with a store room, 2 preparatory rooms, 1 big office for the Chief Medical Laboratory Scientist,
and other offices preferably to be shared amongst junior laboratory scientists.

- At least 2 general class rooms for general courses and at least one big classroom for each discipline.
- Hospital facilities should conform to the requirements laid down by the Medical Laboratory Sciences Council of Nigeria i.e. good and well equipped hospital based laboratories for each discipline with appropriate facilities.

c) **Academic and Administrative Equipment**

Overhead projectors, multimedia Network and visual learning environment including power point etc must be provided. All necessary office equipment including computers, typewriters, Photostating machines and audio visual aids should be provided in the Secretary’s and HOD’s offices and also in the General Administrative office.

d) **Library and Information Resources**

* Each medical laboratory sciences department should have a well stocked library with up to date journals and books.

* There should be a computer based information service.

* Establishment of an audiovisual laboratory/Learning Resources with Phantoms, CD-ROMS, etc.

### 2.2.6 Course Contents and Descriptions

#### 1st YEAR

**1ST SEMESTER**

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<th>CODE</th>
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<td>Practical Physics</td>
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<td>B10</td>
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<td>MAT</td>
<td>Elementary Maths</td>
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<td>Use of English I</td>
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<td>GST</td>
<td>Social Sciences I</td>
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**Total Units** 20
### 2ND SEMESTER

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<td>PHY</td>
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<tr>
<td>B10</td>
<td>102  General Biology II</td>
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<td>CHM</td>
<td>103  General Biology III</td>
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<td>CHM</td>
<td>103  General Chemistry III</td>
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<td>GST</td>
<td>102  Use of English II</td>
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<td>GST</td>
<td>104  Social Sciences II</td>
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<tr>
<td>BIO</td>
<td>104  Biology practical</td>
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**Total Units 17**

### 2ND YEAR

#### 1ST SEMESTER

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<td>ANA</td>
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<tr>
<td>PSY</td>
<td>201  General Principles of Physiology I</td>
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<tr>
<td>PSY</td>
<td>202  General Principles of Physiology II</td>
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<tr>
<td>BIO</td>
<td>201  Biochemistry I</td>
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<tr>
<td>MLS</td>
<td>201  Introduction to Med. Lab. Sc.</td>
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<tr>
<td>CPS</td>
<td>101  Introduction to Computer Sciences</td>
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<tr>
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<td>201  Humanities I</td>
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**Total Units 17**

#### 2ND SEMESTER

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<td>ANA</td>
<td>203  Histology &amp; Histochemistry</td>
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<td>BIC</td>
<td>202  Bioenergetics and Metabolism</td>
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<td>BCM</td>
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<td>PSY</td>
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<tr>
<td>CPS</td>
<td>102  Basics of Information Technology &amp; Bioinformatics</td>
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**Total Units 18**
### 3rd Year

#### 1st Semester

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<tr>
<td>MLS</td>
<td>Basic Hematology</td>
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<tr>
<td>MLS</td>
<td>Basic Microbiology</td>
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<td>MLS</td>
<td>Basic Histopathology</td>
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<tr>
<td>MLS</td>
<td>Basic Immunology</td>
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<td>BIC</td>
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<tr>
<td>PSY</td>
<td>Endocrinology &amp; Reproductive Physiology</td>
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**Total Units** 20

#### 2nd Semester

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<tr>
<td>MLS</td>
<td>Laboratory Posting I</td>
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<td>MLS</td>
<td>Practical Exercise I</td>
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<tr>
<td>MLS</td>
<td>Fundamentals of blood group serology</td>
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<tr>
<td>MLS</td>
<td>Basic Medical Parasitology</td>
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<tr>
<td>STS</td>
<td>Biostatistics</td>
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<tr>
<td>PHM</td>
<td>Basic Pharmacology &amp; Toxicology</td>
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**Total Units** 19

### 4th Year

#### 1st Semester

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<tr>
<td>MLS</td>
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<td>MLS</td>
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<td>MLS</td>
<td>Microbiology I</td>
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<td>MLS</td>
<td>Lab Instrumentation &amp; Techniques</td>
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<tr>
<td>MLS</td>
<td>Professional Ethics in Med Lab Scs</td>
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<tr>
<td>MLS</td>
<td>Introduction to Theory &amp; Practice of Entrepreneurship</td>
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**Total Units** 23
### 2\textsuperscript{ND} SEMESTER

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<tr>
<td>MLS</td>
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<tr>
<td>MLS</td>
<td>Medical Entomology</td>
<td>2</td>
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<tr>
<td>MLS</td>
<td>Laboratory Posting II</td>
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<tr>
<td>MLS</td>
<td>Biomedical Engineering</td>
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</tr>
<tr>
<td>MLS</td>
<td>Clinical Chemistry I</td>
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<tr>
<td>MLS</td>
<td>Blood Group Serology</td>
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<tr>
<td>MLS</td>
<td>Immunology and Immunochemistry</td>
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Total Units 21

### 5\textsuperscript{TH} YEAR

#### 1\textsuperscript{ST} SEMESTER

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<tr>
<td>MLS</td>
<td>Laboratory Posting III</td>
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<td>MLS</td>
<td>Seminar</td>
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Total Units 14

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<tr>
<td>MLS</td>
<td>Project</td>
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<td>MLS</td>
<td>Specialty</td>
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Total Units 12
Description of Courses

FIRST YEAR

BIO 101 General Biology I 2 units

BIO 102 General Biology II 2 units

BIO 103 General Biology III 2 units

BIO 104 General Biology (Practical) 2 units
The description of parts of the (microscope) and its uses. The form and organization of micro-organism (Bacteria, fungi viruses and protozoa). The morphology of plants: lower plants (angiosperm), higher plants (herbaceous plants). The external morphology of invertebrates (mainly arthropods); Dissection techniques in lower forms (e.g. Earthworms and insects) Histological techniques, plants, Enzymes and nutrition. External morphology of vertebrates (fish, amphibian, reptiles, birds mammals) Dissection techniques: Toad, Mammals. Preparation of skeletons and study of vertebrate skeletal structures.

CHEM 101 General Chemistry I 2 units
CHEM 102  General Chemistry II  2 Units

CHEM 103  General Chemistry III

CHEM 104  Basic Practical Chemistry  2 Units
The theory and practise of simple volumetric and qualitative analysis. Simple organic preparations, reactions of functional groups and physical determinations.

MTH 101  Elementary Mathematics  3 Units
(Prerequisite: O’Level Mathematics or equivalent) 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, additions and factor formulae.

PHY 101  General Physics I  2 Units

PHY 102  General Physics II  2 Units
eye, reflection and rarefaction of light, plane and spherical mirrors, thin lenses; optical instruments. The eye, defects of vision and their corrections. Wave nature of light, interference, diffraction. Velocity of light.

**PHS 103 General Physics III**
2 Units
Electric charge, Coulomb’s law, Electric field, Electrostatic potential. Energy in electric field, capacitors. Dielectrics. Electric current, potential difference and electromotive forces, Ohm’s law, potentiometer, metre bridge, Wheatstone bridge, magnetic effects of currents; permanent magnetism, earth’s magnetic filed. Faraday’s law of induction, generators and electric motor. Alternation current; Maxwells equation, Structure of the atom, radioactivity, X-rays, applications in life sciences, Nuclear energy.

**PHY 191 Practical Physics I**
2 Units
Practical Exercises for all the Physics course above.

**ANA 201 Gross Anatomy I**
2 Units

**PHY 201 General Principles of Physiology I**
2 Units

**PHY 202 General Principles of Physiology II**
2 Units
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.

**BCM 201 Biochemistry I**
2 Units
An outline of basic chemistry to include Acid-base Chemistry, Elementary Thermodynamics, Chemical bonding isomerism, chemical kinetics and Orders of reactions, reactivity leading to a consideration of Organic Reactions:- reactions of the major reactive functional groups. Consideration of the structure, properties and biochemical/biological functions of carbohydrates. Lipids, aminoacids and proteins, Nucleic acids and genetic engineering (basic molecular biology). A survey of Biochemical Catalysis, Enzymes and coenzyme: their nature,
properties, characteristics including elementary enzyme kinetic. Illustrative laboratory exercises.

**MSL 201 Introduction to Medical Lab. Science**  
**3 Units**

**CPS 101 Introduction to Computer Science**  
**2 Units**
History of Computer, functional components of computer, characteristics of computer, problem solving, flow chart, Algorithms Computer Programming, statements, symbolic names, array, subscripts, expossion and control statement, Introduction to Basic or Fortran programming Languages, computer application. Practical postings to Computer Centres.

**GST 201 Humanities I**  
**2 Units**

**ANA 202 Gross Anatomy II**  
**2 Units**
(Lower Limb, Head and Neck, CNS) Lower limb, Gluteal region and femoral triangle, the thigh, leg and foot, hip, knee, ankle and midlaisal joints. Blood vessels, nerves and lymphatic drainage of the neck, parotid region, Nasal cavity, oral cavity, pharynx larynx, orbit eye, ear, mechanism of hearing, smell vision and taste. Osteology of bones of skull and cervical vertebrae. C.N.S.: Brain, cerebellum and cerebrum, cranial nerves.

**ANA 203 Histology & Histochemistry**  
**2 Units**
General histology, the cell, epithelia, connective tissue, - loose and special (cartilage, bone). Muscles – smooth, striated and cardiac. Cardiovascular system blood vessels and pleura, bronchial tree, Gastro intestinal system, oral cavity, oesophagus, stomach, intestines, liver and pancreas. Practical classes on the topics.

**BCM 202 Bioenergetics & Metabolism**  
**3 Units**
An outline of Biological oxidations leading to Intermediary metabolism of Carbohydrates, Lipids, proteins, amino acids, nucleic acids and nucleotides. Electron transport and Oxidative Phosphorylations, ATP and other High Energy Compounds and their importance. Inborn Errors of Metabolism to include Molecular basis of Metabolic diseases. Biochemical de-rrangement in G-6-PD
deficiency, sickle cell anaemia, glycogen storage diseases, etc. Illustrative laboratory exercises.

**BCM 203  Practical Biochemistry  3 Units**
Laboratory exercises on topics from BIC 201 and 202 above.

**PHS 203  General Principles of Physiology III  3 Units**
The heart; events of the cardiac cycle cardiac output and control of cardiac contractility. The vessels; Functional Anatomy; Hemodynamics; Arterial blood pressure and its regulation; Cardiovascular reflexes. Peripheral resistance and local control of the circulation; Regional blood flow; Cardiovascular hemostasis in stress situations.

**GST 202  Humanities II  2 Units**

**CPS 102  Basics of Information Technology and Bioinformatics  2 Units**
Details of Information Technology as related to Medicine, Programming, Practical appreciations and applications.

**THIRD YEAR**

**MLS 301  Basic Clinical Chemistry  2 Units**
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 Clarenace, Inulin clearance, Concentration and Dilution Tests; Urinary Acidification Tests, urine specific gravity/Osmolality 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; hyperglycemia diabetes mellitus – its causes and investigation; Hypoglycemia – types causes and investigation.

**MLS 302  Basic Haematology  2 Units**  

**MLS 303  Basic Microbiology  3 Units**  
Scope of microbiology; historical approach etc. Classification and nomenclature of microorganisms. Introduction to the microbial world; Introduction to Bacteriology, Mycology, Virology and Parasitology (the protozoans).  
**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**  
**MLS 305 Basic Immunology 3 Units**

**BCM 301 Special Topics In Biochemistry 3 Units**
A detailed treatment of Nutritional requirements (Macro & Micro-nutrients) of man, and Nutritional disorders. Biochemical functions of fat soluble and water soluble vitamins, major minerals and trace elements. Coenzyme structure, and functions.

**PHS 301 Endocrinology and Reproduction Physiology 2 Units**
General principles of endocrinology, functions and regulation of the pituitary, thyroid, parathyroid, pancreatic and adrenal secretions. Male and female reproductive physiology.

**MLS 307 Practical Exercise I 4 Units**
The student is expected to carry out practical exercises in all the disciplines:

**Clinical Chemistry**


**Histopathology:** Preparation of fixatives, removal of formalin pigments, testing of end point of decalcification using chemical methods. General tissue staining by Hematoxylin and counter-staining with eosin. Demonstration of elastic and collagen fibres. Prusian blue (Perls) reaction for iron in tissues. Gram and Ziehl Neelsen (Zn) 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 Neelsen 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 hemolysis. Sensitivity

**MLS 306 Laboratory Positing I**  
4 Units  
Laboratory posting 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 308 Fundamental Blood Group Serology**  
3 Units  

**MLS 309 Basic Medical Parasitology**  
3 Units  
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.

**STS 301 Biostatistics in Health Technology**  
3 Units  
sampling. Tests of statistical significance. Experimental designs and clinical trials. Other applications of biostatistics to clinical and preventive medicine.

**PHM 301 Basic Pharmacology & Toxicology** 3 Units

**FOURTH YEAR**

**MLS 401 Laboratory Management and Functions** 3 Units

**MLS 402 Medical Laboratory Haematology I** 4 Units

**MLS 403 Medical Laboratory Histopathology I** 4 Units
MLS 404  Medical Laboratory Microbiology I  4 Units
Epidemiology of communicable diseases and disease spectrum and control.

MLS 405  Laboratory Instrumentation and Techniques  4 Units
Instrument aspects of qualitative and quantitative analysis – theory and practise of some common analytical techniques: colorimetry, spectroflourimetry flame photometry, conductometry, polarography, coulometry etc. Osmometry, Rephelometry, Turbidimetry, PH Measurement by ion specific electrodes – Separation techniques include Electrophoresis, - paper, cellulose acetate, Agar gel, starch and polyacrylamide gel, Isoelectric focusing, Isotaphoresis, Chromatograhy – paper, Thin Layer Chormatography, gas Liquid Chromatography, Ion exchange, gel filtration, molecular sieves; Dialysis filtration, solvent extraction, Centrifugation – Ultracentrifugation. Immunoelectrophoretic 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 hematological Equipment, other applied techniques in the Medical Laboratory with emphasis on general Medical Laboratory Instrumentation. Practicals on the above topics.

MLS 406  Research Methodology  2 Units
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 fundings for research projects. Art of scholarly publications and Instructional design.

MLS 407  Medical Entomology  2 Units
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 4 Units
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

MLS 410 Clinical Chemistry 4 Units
Porphyrin, causes, symptoms and laboratory investigation of porphyriaemia, porphria and Porphyrinuria, Haemoglobin, synthesis, function. Glycosylated haemoglobins. Abnormal haemoglobins haemoglobinopathies, Sulp Hb, CoHb,Hb, 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, galactosemia 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
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 (quantitation) Compatibility procedures – different methos, advantages and disadvantages, Blood Transfusion reactions – causes and types; Investigation, Risks attendant in blood transfusion – Diseases, Anaphylactic, hemolytic 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
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 safeguard 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. Fulfillment of professional role with integrity, refraining from its misuse to the detriment of patients, employers and colleagues. Medico-legal aspects.

**MLS 414 Introduction to The Theory And Practice of Entrepreneurship**  
**2 Units**
Introduction to entrepreneurship and new venture creation; Entrepreneurship in theory and practice; the opportunity – sources, identification, etc. The entrepreneurial Team and Finance. Raising Financial Capital, Marketing and the new venture; innovation – management, determinants, process in new ventures, case studies as specific for Medical Laboratory Professionals and other areas; New venture workshops; Growth and Harvest.

**MLS 501 General Laboratory Practice**  
**4 Units**
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 Hematological clinical chemistry Equipment; other applied techniques in the Medical Laboratory with emphasis on general Medical Laboratory Instrumentation. Practicals 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**  
**4 Units**
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**  
**4 Units**
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.


**Haematology and Blood Group Serology**

**Histopathology**

**Medical Microbiology and Parasitology**

**MLS 511 Clinical Chemistry II**
4 Units

**MLS 512 Clinical Chemistry III**
4 Units
Causes and Laboratory investigation of disorders of Iodine metabolism. Plasma proteins in health and disease. Definition, causes and investigation of paraproteinemia; Bence-Jones proteinuria and significance. Diseases of muscle.

**MLS 521 Medical Laboratory Haematology III**  4 Units

**MLS 522 Medical Laboratory Haematology III**  4 Units

**MLS 531 Medical Laboratory Histopathology II**  4 Units

**MLS 532 Medical Laboratory Histopathology III**  4 Units
MLS 541 Medical Laboratory Microbiology II 4 Units

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, Chromoblastomycosis, etc. Cutaneous mycoses – Dermatophytoes. Superficial mycoses etc.

General properties, pathogenesis, diagnosis, epidemiology and control and recognition of fungi. The ermatropic and viscerotropic viruses. Smallpox, cowpox and vaccination; measles, rubella, chickenpox and Shingles, Herpesviruses. 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 542 Medical Laboratory Microbiology III 4 Units

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 enterobacteriaee, coliforms, gastroenteritis, salmonellosis, Shigellosis Cholera, Vibrios, Pseudomonas, Bacteriodes etc). the haemophlic bacilli (haemo-philus, brucellae, Yersinia, Bordetella etc. Anaerobic Spore formers, Aerobic Spore formers. (Bacillus anthracis. The Clostridia, The spirochetes, the Mycobacteria, the Fungus-like beacteria (actinomycetes) – Corynebacteria, Rickettsiae, Chlamydiae Mycoplasma, L-forms, Listeria, Erysipelothrix, Bartonella etc. General pathology, epidemiology, features, diagnosis, control and therapy.

MLS 505 Seminar 2 Units

MLS 560 Speciality 1 4 Units

MLS 507 Speciality 11 4 Units
2.4 NURSING SCIENCES (B.N.Sc)

2.4.1 Philosophy, Aims and Objectives of the degree programme

* Philosophy

The philosophy of the nursing degree programmes takes cognizance of the philosophy of health services and nursing education for Nigeria.

The Nursing profession believes that:

(i) Man is a bio-psycho-social being and his needs are the focus of all nursing activities. Man is a member of a family and families make up communities.

(ii) The health care system exists to meet the needs of the consumers of health care by providing primary, secondary and tertiary health care to ensure that individuals, families, groups and communities are assisted to maintain a high level of wellness.

The profession believes that Primary Health care is the key to the attainment of health for all. The belief is based on:

(i) The human environment is a major factor in man’s health status. It is therefore necessary to conceptualise the individual and the environment as open systems engaged in continuous dynamic interaction.

(ii) University education is the key to the growth of the profession. Optimal Professional nursing education can be achieved in an institution of higher learning that provides a foundation for general education in the various sciences and arts.

(iii) Nursing is a science that is based on the knowledge of behaviour that enable changes in the client system to be monitored by utilizing the scientific method of inquiry whilst providing nursing intervention to individuals, families, groups and communities at the primary, secondary and tertiary level of health care.

(iv) Professional nursing education is built upon a theoretical base that seeks to develop continuous self-directed practitioners who will advance and test knowledge on which practice is based. Current health care demands require an innovative approach in professional preparation, and a curriculum that is responsive to the changing health needs of the society.
* **Aims and Objectives**

i) The programme offers liberal or general and professional education for nurses who will be able to utilize psycho-social and physical factors in health promotion, health maintenance and health restoration.

ii) The programme prepares the graduate nurse to think effectively, to communicate thought and to discriminate among values.

iii) The programme prepares Polyvalent Nurse Practitioner who are capable of performing nursing skills in a variety of settings, therapeutically assisting individuals, family and community with diverse backgrounds 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.

2.4.2 **Admission and Graduation Requirements**

**UME**
Candidates seeking admission into B.N.Sc. programme should possess the minimum entry qualifications as contained under general issues on Basic Medical Sciences.

**Direct Entry**
Candidates possessing Registered Nursing Certificate (RN) and the required five subjects at ‘O’ level may be admitted by direct entry.

**Duration of Programme**

The duration of the B.N.Sc. Degree Course is 5 years for Joint Matriculation Examination Entry candidates and 4 years for Direct Entry Candidates. As a professional degree, the BNSc shall not be classified. However, it shall be awarded as follows:

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<tr>
<td>Pass (with credit)</td>
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<tr>
<td>Pass</td>
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2.4.3 **Learning Outcome**

By the end of the academic programme, the graduate of the B.N.Sc. programme should demonstrate:
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**

vi) Identifying health needs, planning and giving comprehensive nursing care to individuals of all ages in a variety of settings;

vii) Applying Basic Scientific and Nursing Theories, Principles and concepts in the practice of Nursing and Midwifery;

viii) Selecting appropriate nursing intervention and performing technical skills with maximal dexterity.

ix) Effective communication by organizing thought and expressing it in the manner in which it could be easily comprehended;

x) Planning and effecting health promotion activities;

xi) Working co-operatively as a member of the health team in primary health care by:

1) Sharing information
2) Accepting Responsibility and limitation willingly
3) Participating in group activities

vii) 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 nurse and to the nursing profession.

iv) Shows sense of responsibility for self-direction and personal growth.

2.4.4 **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.

**Evaluation**

a) The evaluation system adopted by NUC and N&MCN for accreditation should be maintained.

b) Methods for course evaluation should be as follows:

i) Course Unit System

ii) Continuous Assessment

iii) Observational Techniques

iv) Anecdotal an 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 should from 30% of the overall final grade.

**Examination Regulations**

Besides individual university examination regulation, the following regulations shall apply to the BNSc programme:

1. Before a student graduates, she/he should have taken and passed all the courses and fulfilled all other requirements for graduation by the university.

2. For all Nursing courses, the pass mark shall be 50%.

3. For all other courses, the pass mark shall be according to the regulations governing the courses.

4. 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.

**2.4.5 Resource Requirements Teaching and Learning**

a) **Academic and Non-Academic Staff**

Lecturers in B.NSc. course will be drawn from the various disciplines in the B.N.Sc. curriculum. Where the relevant courses already exist in the particular University, the B.N.Sc students will receive lectures with their counterparts in that disciplines.

Lecturers in the Department/Faculty of Nursing must posses academic qualification in a nursing specialty area and satisfy the minimum requirement for teaching in the specific University of choice.

The academic staff/student ratio should be 1:10 in each subject areas.

This should compose of clinical Instructors, Laboratory Technicians and administrative staff. A clinical supervisor 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. Administrative staff shall be 50% of Academic staff.
b) **Academic and Non-Academic Spaces**

i) The Nursing Degree programme should be located in a Department/Faculty of Nursing in the University.

**Student Accommodation:**

i) All universities should provide residential accommodation for nursing students.

ii) Clinical students must be within or near the Teaching Hospital.

**Lecture Space**

Lecture rooms should be able to accommodate a minimum of 50 students. Nursing Department should have a seminar room for tutorials (for 15 students). There should be a laboratory space for nursing and midwifery demonstration and practice.

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 the Hospital. Each room should be adequately furnish and provided with PC and Audio Visual materials. Equipment for demonstrating basic nursing procedure should be available in the nursing laboratory. In addition, audiovisual aids and computer/information technology facilities should be available in the Department of Nursing. Equipment and other facilities in the clinical areas should conform with the Nursing and Midwifery Council standard.

d) **Library and Information Resources**

Each 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.
### Course Contents and Description

#### 100 LEVEL COURSES

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<td>CMP 200</td>
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#### 200 LEVEL

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<td>NSC 203</td>
<td>Human Anatomy</td>
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<tr>
<td>NSC 204</td>
<td>Human Physiology</td>
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<tr>
<td>NSC 206</td>
<td>Biochemistry – General and Medical</td>
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<tr>
<td>NSC 207</td>
<td>Medical Microbiology and Parasitology</td>
<td>3</td>
</tr>
<tr>
<td>NSC 208</td>
<td>General and Cellular Pathology</td>
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<td>NSC 205</td>
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<td>POL 201</td>
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#### 300 LEVEL

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<td>NSC 302</td>
<td>Environmental Health</td>
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<tr>
<td>NSC 303</td>
<td>Basic Community Health Nursing including Primary</td>
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<td></td>
<td>Health Care</td>
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<td>NSC 306</td>
<td>Basic Medical Surgical Nursing</td>
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<tr>
<td>NSC 305</td>
<td>Human behaviour in health and illness</td>
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</table>
### Descriptions of Courses

**NSC 201  Foundations of Nursing 3 Units**
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 202 Biostatistics – 2 units
The course introduces the student to the statistical process and various statistical methods in common use. It deals with the collection, compilation, analysis, presentation of data, and the drawing of conclusions from statistical analysis.

Collection of data. Analysis and presentation of data: Graphs, Diagrams. Cumulative distributions measures of location and dispersion correlation and regression. Simple concepts of probability, distribution and density. Basic inference about population, mean estimation and test based on large and small samples.

NSC 203 Human Anatomy – 5 Units

NSC 204 Human Physiology – 5 Units
The course examines the functions of the human body in relation to cells, tissues, membrane glands and organs.

Introduction to Physiology, Physiology of Excitable tissues, Autonomic nervous system. Physiology of Blood and cardiovascular system, Respiratory system, Metabolism, Skin and Temperature regulation. Physiology of digestive system, Kidney, Endocrinology and Reproduction. Central and Peripheral nervous system and Special senses.

NSC 205 Development Psychology – 2 Units
Emphasis in this course is on development from conception through childhood 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 – 3 Units
The course deals with the chemistry of important biological compounds stressing their biogenesis and reaction mechanism.
NSC 207    Medical Microbiology and Parasitology – 3 Units
The course covers the study of the characteristics and classification of microorganisms. It enables the student identify ineffective agents that cause disease in man and to apply the knowledge of disease processes in terms of personal and communal health.
Control of microorganisms, sterilization, disinfection. Chemotherapeutic agents and Antibiotics.

GST 201    African History and Culture – 2 Units
The course deals with the values, norms and culture of Africa and the Nigerian Society in particular. It emphasizes role of culture in the behaviour of Africans. The African Society; development, migration, large and small rural movements and its effect on man and disease control of population and population dynamics. The Nigerian Society and disease: rural and urban society; changing patterns of disease in rural and urban societies. The role of affluence social habits and educational status

NSC 208    General and Cellular Pathology – 3 Units
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 an organs and distant parts of the body are discussed.

POL 201    Political Science – 2 Units
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.
NSC 301  **Epidemiology – 2 Units**
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**
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**
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.

PHA 301  **Pharmacodynamics and Chemotheraphy – 3 Units**
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.
NSC 304 Nursing Ethics and Jurisprudence – 3 Units
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
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 counseling. 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 dynamic: Leadership, group norms, interpersonal relations, communication. Principles and technique of guidance and counseling.

NSC 306 Basic Medical (3 Units) and Surgical (3 Units) Nursing = 6 Units
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 psychophysioligic 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
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.
Nutrient requirements and recommended daily calory requirements. Food in relation to the life cycle. Dietetics and diet in illness.
NSC 401  Basic Mental Health and Psychiatric Nursing - 5 Units
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 (4 Units) and Child Health (4 Units) Nursing 8 Units
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 (4 Units) and Surgical (4 Units) Nursing = 8 Units
The course is designed to build upon the content covered in Basic Medical-Surgical Nursing and to 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
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**
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.
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 Care Services – 2 Units**
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.

**NSC 407  Practicum in Teaching and Management – 2 Units**
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.

**NSC 503  Advanced Community Health Nursing - 5 Units**
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 health 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 501  Advanced Mental/Psychiatric Nursing – 5 Units**
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 (3 Units) and Child Health (2 Units) Nursing = 5 Units**
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 508  NURSING ENTERPRENURSHIP - 4 Units**
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 504  Nursing Seminar – 2 Units**
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 505  Research Project – 5 Units
Students are guided in the development, execution and writing of their research project.

NSC 506  Electives – 6 Units
Each student decides on a clinical area of special interest for in-depth study and practice. Application of theoretical knowledge is emphasized.

NSC 507  Health Economics
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.
2.5  OPTOMETRY (O.D. Doctor of Optometry)

2.5.1 Philosophy, Aims and objectives of the Degree programme

Philosophy

Optometry has experienced rapid and tremendous changes in the recent past due to technological advances in medical sciences and associated role development. Consequently, the body of knowledge necessary to cope with these advances and the abilities, expertise skill and responsibilities have similarly expanded, optometry education must thus address these issues in its framework and be poised for a continuous review as the need arises.

The main aim and objectives of the O.D. degree programme should be:

* To instill 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.

* To provide students with a broad and balanced foundation of knowledge in optometry as well as practical and clinical skills.

* To develop in students the ability to apply their knowledge in optometry and skills to the solution of theoretical and practical problems in Optometry.

* To develop in students through an education in optometry, a range of transferable skills of value in optometry and non-optometry related employment.

* To provide students with knowledge and skills base from which they can proceed to further studies in specialized areas of Optometry.

* To generate in students an appreciation of importance of Optometry in an Industrial, Clinical, Economic, Environmental and Social context.

2.5.2 Admission and Graduation Requirements

The admission requirements are as contained in the general issues

2.5.3 Learning Outcome

a) **Regime of Subject Knowledge:** it is expected as well, that at the end of an O.D programme that student must be proficient in:
(i) Handling of both diagnostic and major therapeutic ophthalmic drugs.

(ii) Effective use of the Ophthalmoscope, Slit Lamp Biomicroscope Retinoscope Thermometer, 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 O.D level, students are expected to develop a wide range of different abilities and skills. Some of the main abilities and skill expected of students at the end of their O. D. programme 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.

vi) It is felt that each University could without detracting from the minimum standards development programmes for specialized interests in the disciplines.

c) Behavioral Attributes

An O.D degree holder should have the following attributes:

* Integrity and commitment to sanctity of facts.

* Demonstrate tolerance and accommodation to others, irrespective of differences as a reflection of bias free attitudes acquired through training.
* Conversant with and subscribe to acceptable professional ethics in handling clerical patient information.

* Subscribe to acceptable professional ethics on the handling of dangerous microorganisms in relation to storage transportation and use in research.

2.5.4 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:

- Formal examinations
- Laboratory reports/records
- Problem-solving exercises
- Oral presentations
- Planning, conduct and reporting of project work and researches.

2.5.5 Resources Requirements for Teaching and Learning

a) Academic and Non Academic Staff

The academic staff- student ratio should not exceed 1: 10 in the department. Professionally qualified optometrist with fellowship in relevant disciplines are accepted as academic staff. However, qualified professionals can be employed on part-time basis. In addition M.Sc/ PhD in relevant disciplines can be employed as a lecturer. Academic staff should be in the right mix according to NUC guidelines. Technical staff – student ratio should be 1:30 while the administrative non-academic staff/student ratio should be 50% of academic staff strength.

b) Academic and Non Academic Spaces

The head of department and other staff up to Senior Lecturer should have their offices, with the HOD’s office having a complementary office with serving secretarial staff. Other lecturers should not be more than two in an office. Adequate classrooms for lectures, Adequate laboratories/demonstration and Clinical Rooms.

d) 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.
### 2.5.6 Course Contents and Descriptions

#### 100 Level Courses

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<tr>
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**Core Courses**

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<td>OPT 207</td>
<td>Human Anatomy</td>
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<td>OPT 208</td>
<td>Ocular Anatomy Laboratory</td>
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<tr>
<td>OPT 209</td>
<td>Human Physiology</td>
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<tr>
<td>OPT 210</td>
<td>Geometrical Optics</td>
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<td>OPT 217</td>
<td>Ocular Anatomy I</td>
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<tr>
<td>OPT 220</td>
<td>Physical Optics</td>
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<tr>
<td>OPT 227</td>
<td>Ocular Anatomy II</td>
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**ELECTIVES**

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Total Credits: 22

Total Electives Credits: 20

Total Credits: 18
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<td>General Optometry I</td>
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<td>ENP 301</td>
<td>Introduction to Theory and Practice of Entrepreneurship</td>
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### 400 LEVEL

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<td>OPT 427</td>
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#### MANDATORY

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<td>OPT 433</td>
<td>Epidemiology</td>
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<td>OPT 435</td>
<td>Functional Optometry</td>
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<td>OPT 437</td>
<td>Health Science for Optometry</td>
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500 LEVEL

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<td>Strabismus and Amblyopia</td>
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<tr>
<td>OPT 525</td>
<td>Orthoptics</td>
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MANDATORY

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<td>Applied Psychology for Optometrists</td>
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<td>Endocrinology and Nutrition</td>
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600 LEVEL

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<td>OPT 609</td>
<td>Advanced Practice Management</td>
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Electives

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<td>OPT 632</td>
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Course Description

100 Level Courses

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<tr>
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<td>General Biology/Practicals</td>
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<tr>
<td>PHY</td>
<td>Mechanics and Properties of matter</td>
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<td>PHY</td>
<td>Thermal Physics, sound and optics</td>
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<td>Mathematics II</td>
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200 LEVEL

OPT 200 Optics Laboratory-(2 Units)

OPT 207 Human Anatomy (4 Units)
General Anatomy with emphasis on the Head, neck and thorax. An introduction to histology and embryology. Co-requisite -OPT 218, 228

OPT 208: Ocular Anatomy Laboratory (2 Units)
Prepared slides of various section of the eye. Identification of bones and sutures, fossa of the orbits 2 and Cranium. Dissection of Bovine eye.
OPT 209  Human Physiology (4 Units)
Basic human Physiology; Haemostasis, circulation of fluids, respiration, with an emphasis on chemical principles, properties of excitable cells, renal Physiology, endocrine control, gastro-intestinal Physiology and the physiology of the nervous systems. Co-requisite - OPT 207

OPT 210  Geometrical Optics (2 Units)
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 ophtalmic lenses. Laboratory work is included.

OPT 217  Ocular Anatomy (2 Units)
An overview of the anatomy of the eye and orbit. Structure of the orbit, eye lids, lacrimal apparatus, conjunctiva, sclera, cornea, anterior chamber iris, posterior chamber, lens, ciliary body and extra ocular muscles.

OPT 220  Physical Optics (2 Units)
Principles of wave optics, interferences, diffraction, polarization, radiometry, holography, quantum nature of light, spectroscopy, lassers. Relativistic optics. Laboratory work is included. Pre-requisite: OPT 210.

OPT 227  Ocular Anatomy (2 Units)
A continuation of OPT 217. The structure of the vitreous, choroid and retina. Nerve and blood supplies to the eye and orbit. Embryology and development of the eye. Laboratory work is included.

MTH 210  Ancillary Mathematics I (3 Units)

Differentiation and integration. Areas and volumes of revolutions of solids. Descriptive statistics: Mean, median, mode and standard deviation; frequency distribution and related graphs.

300 LEVEL
OPT 300  Physiological Laboratory (2 Units)
Schematic eye, Visional acrities; Vernier acrity, Stereocercity, Optometes, Contrast Scravity. “AC/A Ratio” “Co-requisite OPT 310”

OPT 301  Ophthalmic Optics Lab. (2 Units)
Ophthalmic Lens, Manupedire, Suryaeng and edging Insection of Lenses into frames and frame repairs. Co-requisites: OPT 311.
OPT 310  Physiological Optics I (2 Units)
The eye as an optical instrument; Reduced and schematic eyes; Anomalies of refraction and optical aberrations of the eye. The bedel optometer; Resolution and visual acuity. Laboratory work is included. Co-requisite: 312.

OPT 311  Ophthalmic Optics I (2 Units)
The history and development of ophthalmic lenses and lens materials; Spherical, cylindrical and sherocylindrical lenses. Transposition, toric surfaces, centration and decentration, ophthalmoprisms and prismatic effects. Special lenses.

OPT 312  General Optometry I (2 Units)
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 organisations. An introduction to optometric terms and instrumentation. The types and incidence of refractive errors. Co-requisite: OPT 310. adaptation 1.1

OPT 317  Neuro Physiology (3 Units)
Anatomy, Physiology and functions of the Supraretinal System; Ganglian Cells. Optic nerve, Lateral geniculate body, Visual cortex, forebrain, superior colliculus, pre-tectal and tectal regions, Cerebellum, Vastibular 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)

OPT 320  Physiological Optics II (3 Units)
The extraocular muscles, their electrophysiology, actions, and innervational systems. 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)
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)
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)**
The physiology of the eye. Functions of the eyelids, lacrimal 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)**
General principles of pharmacology; principles and classification of autonomic drugs. Pre-requisite: BCH 220

**ENP 301 Introduction To The Theory and Practice of Entrepreneurship (2 Units)**
Introduction to entrepreneurship and new venture creation; Entrepreneurship Theory and Practice; the opportunity – sources and identification, etc. The entrepreneurial. Team and Finance Capital, Marking and the other new venture, case studies as specific for optometric professionals and other new Venture workshops; growth and harvest.

**400 LEVEL**

**OPT 400 Physiological Optics Lab (2 Units)**

**OPT 403 General Optometry Lab. (3 Units)**
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)**

**OPT 410 Physiological Optics III (3 Units)**
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)
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, fandial, 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)
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)
Mechanism in ocular pathology; Pathophysiology, detection and management of
anterior segment disorders. Pre-requisite: OPT 317, 318 Co-requisite: Co-
requisite: OPT 418

OPT 418  Ocular Pharmacology (2 Units)
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)
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)
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, ophtalmoscopy, lensometry, biomicroscopy, stereacuity
testing, gonioscopy perimetry, colour vision testing and sphygnomanometry.
Pre-requisite: OPT 412  Co-requisite: OPT 403

OPT 424  Contact Lenses II (2 Units)
A continuation of OPT 414. Advanced fitting techniques; toric and bitoric lenses,
keratoconic patients. Monitoring contact lens wearers and fitting presbyopic
patients. Pre-requisite: OPT 414.
OPT 427   Ocular Pathology II (2 Units)

OPT 432   Optometric Instrumentation (2 Units)
Principles of Operation, basic maintenance and repairs of common Optometric Instruments.

OPT 433   Epidemiology - (2 Units)
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)
Analytical methods in evaluating Optometric data. Optometry extension programme methods. Case analaysis the DEP techniques.

OPT 437   Health Sciences for Optometry (2 Units)
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)
Ophthalmic lens manufacture, surfacing and edging insertion of lenses into frames and frame repair. Pre-requisite: OPT 321.

OPT 501   Clinical Optics (2 Units)

OPT 503   Primary Optometry Clinic (4 Units)
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)
Advanced fitting techniques; toric and bitoric lenses, Keratoconic patients Monitory Contact lens. Wearers and fitting prebyopic patients. Pre-requisite: OPT 404,414.

OPT 505   Speciality Optometry Laboratory (4 Units)
Laboratory exercises in Orthoptics, Geriatric, Pediatric Clinics. Use of instrument and techniques in these fields. Co-requisite: OPT 515, 525
OPT 512 Pediatric Optometry (3 Units)
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)

OPT 519 Practice Management (2 Units)
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 592 Geriatric Optometry (2 Units)
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)

OPT 525 Orthoptics (2 Units)
An introduction to the binocular vision anomalies of both the strabismic and non-strabismic patient. The treatment of problem of convergence and divergence, accommodation, fusional reserves. The detection, measurement and treatment of strabismus, eccentric, fixation, microstrabismus, etc. The prognosis for a functional or cosmetic cure of binocular vision anomalies.
OPT 531  **Scientific Research Methods (2 Units)**
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  **Neuro Pathology (2 Units)**

OPT 537  **Applied Psychology for Optometrists (2 Units)**

OPT 538  **Endocrinology and Nutrition (2 Units)**
Basic human endocrine systems, their general functions, modes of action, oegulation and transport. Metabolic disturbances related to dietary deficiencies and excesses. Pre-requisite: OPT 209

OPT 539  **Community Optometry (2,2 Units)**

600 LEVEL

OPT 600  **Research Project (6 Units)**
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)**
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)**
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 Pediatric Clinic (2 Units)**
Examination, diagnosis, treatment and management of infants to adolescents. Orthoptics practice. Pre-requisite: OPT 505, 512, 525.

**OPT 605 Rehabilitative Clinic (2 Units)**
Examination, diagnosis, treatment and management of Geriatric and low vision patients. Pre-requisite: OPT 505, 522, 524.

**OPT 606 Environmental Vision (3 Units)**
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)**
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)**

**OPT 632 Hospital Practice (2 Units)**
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.
2.6 PHARMACOLOGY (B.Sc Pharmacology)

2.6.1 Philosophy, Aims and Objectives of the Degree Programme

Philosophy

To train middle 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:
- Scientists and researchers in health-related industries
- Skilled health care workers in pharmaceutical industries in the area of drug development
- Broad knowledge of pharmacologists who will be able to specialize in different areas of the field.
- Future pharmacology teachers in the University most especially in the School of Medicine, and allied health sciences.

2.6.2 Admission and Graduation Requirements

Before admission to the Degree Programme of Bachelor of Science (Hons.) Pharmacology, a candidate must:

Obtain the West African School Certificate with credits in the following subjects:
- English Language
- Chemistry
- Physics
- Biology or Biological Sciences
- Mathematics

OR Its equivalents at the ordinary level in the General certificate of Education

A candidate with a pass at Advanced Level in

(1) The General Certificate of Education or the Higher School Certificate in 3 of the following subjects:
- Physics or Mathematics
- Chemistry
- Biology/Zoology/Botany

Candidates with a good pass in two papers may be considered.

OR

Pass equivalent subjects, in the level 1 courses of the University in
- Physics or Mathematics
- Chemistry
- Biology

The programme duration shall be for a period of 4 years of 8 semesters.

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, inclusive of the university course requirements.

2.6.3 **LEARNING OUTCOMES**

a) **Regime of Subject Knowledge**

The graduate of the programme are expected to have acquired:

(a) Working knowledge of sources of drugs and drug information
(b) Knowledge and skills in understanding mechanisms of action of drug, how drug works in the body
(c) Understanding of careful selection and testing of drugs and natural products before application in medicine
(d) Understanding of basic techniques in the pharmacological investigations of drugs and natural products.
(e) 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:

(a) Render community service in the proper use of drugs
(b) Render service on proper evaluation of our natural products that may be use in treatment of different diseases
(c) Perform simple laboratory investigations on the action or in action of any medical products and be able to carry out basic pharmacological screening.
(d) Use evidence – based pharmacological investigations to certify of drugs and natural products
(e) Interpret medical inserts and marketing and post marketing surveillance
c) **Behavioral Attributes**

The graduate of the programme shall be junior pharmacologists who 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.

2.6.4 **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 as well as demonstrate competence and proficiency.

2.6.5 **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**

Assistant Lecture/Lecturer II/Lecturer I
- Qualification in accordance with University guideline

Senior Lecturer/Ass. Prof./Prof
- University guideline

Total academic staff requirement shall be a minimum of six.

**Academic Staff/Student Ratio**

The minimum ratio of academic staff to students in the Basic Medical Sciences shall be 1:15. The mix of academic staff shall be according to guidelines.

i) Senior Administrative Staff: not to exceed 3.4% of total student population

iii) Senior Technical Staff
To be determined according to guideline – shall enhanced. This should include Laboratory Technologist, Laboratory Technician

iv) Junior Staff: The number shall not exceed 10% of total number of students.

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 such as:
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

Research Laboratories
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 an adequate offices headed by a confidential secretaries

Office Spaces shall be provided for all academic and non-academic staff as stated in NUC guidelines

v) Academic and Administrative Equipment
- There must be adequate research facilities
- Research funding to be sourced both internally and externally
- Collaborative research to be encouraged
  The learning methods shall be multi disciplinary and integrated tutor guided

  i) Audio - Visuals
  ii) Tutorials and Seminars
  iii) Laboratory investigation/practices
  iv) Project writing and presentation /defense
  v) Research methods and instrumentation

vi) 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
2.6.6 **Course Contents and Descriptions**

**200 LEVEL**

**COMPULSORY COURSES FOR PHARMACOLOGY**

<table>
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<th>COURSE CODE</th>
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**ELECTIVE COURSES**

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### 300 LEVEL

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### 400 LEVEL

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<td>PHA 402</td>
<td>Chemotherapy of neoplastic Diseases, Anti-neoplastics</td>
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<td>PHA 403</td>
<td>Immuno-Pharmacology: Pain, Inflammation, Anti-inflammatory agents</td>
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</table>
Course Description

**PHA 301 General Principles of Pharmacology 2 Units**

**PHA 302 Pharmacogenetic and Pharmacokinetics 2 Units**

**PHA 303 Autonomic Pharmacology 2 Units**
Cholinergic (Parasympathetic) Mechanisms

**PHA 304 Adrenergic (Sympathetic) Mechanisms 2 Units**
Adrenergic receptors – Types of Adrenoceptors. Concept of agonists and antagonists.

**PHA 305 Neuro Pharmacology CNS Depressants and Stimulants 3 Units**

**PHA 306 Pharmacology of the Organ Systems 4 Units**

**PHA 307P Practicals on 301-306 2 Units**
Selected practicals to illustrate the theoretical principles.

**PHA 308 Endocrine & Reproductive System Pharmacology 2 Units**

**PHA 309 Vitamins and Nutritional Haemopoietic Agents 2 Units**

**PHA 310 Toxicology 2 Units**
Poisoning. Environmental Pollution. Industrial Toxicology including Food Additives. Forensic Toxicology.

**PHA 311P Methods of in Toxicology 1 Units**
Practical 1: ED$_{50}$ LD$_{50}$ Determination
Practical 2: ED$_{50}$ LD$_{50}$ Determination
Practical 3: Acute and Chronic Poisoning in Rabbits
Practical 4: Antidotes
Practical 5: Cosmetics Testing
Practical 6: Identification of drugs by Thin Layer Chromatography
Practical 7: 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**
A. Life Cycle of Malarial Parasite
   Life Cycle of E histolytica
   Drugs used in the treatment of malaria, Amoebiasis, Trypanosomiasis, Leishmaniasis, Helminthiasis

A. Disinfectants and Antiseptics

**PHA 401 Chemotherapy of Microbial Diseases, Vaccines and Sera 2 Units**
I. Antibacterials/Antibiotics
   The sulphonamides and Trimethoprim. The penicilins and cephalosporins.
   Tetracyclines and Chloramphenical. The Aminoglycosides. The Macrolides etc.
   Miscellaneous Antimicrobials, Polypeptidcs. Antifungal and antiviral agents.
   Drugs used in the treatment of Tuberculosis and Leprosy Vaccines and Sera.

**PHA 402 Chemotherapy of Neoplastic Diseases Anti-Neoplastics 1 Units**
Alkylating Agents, Antimetabolites, Hormones. Other anti-neoplastic agents (Antibiotics, Plant alkaloids and Miscellaneous).

**PHA 403 Inflammation, Allergy and Anaphylaxis (Immunopharmacology) 2 Units**
Introduction: Definition, Types, Characteristics and patho-physiology 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

i) Kinins, substance compound 4840 etc.
ii) Angiotensin
iii) Prostaglandins
Pathophysiology of allergic and immune reactions.

**PHA 404P  Practicals on 400 Level Courses  4 Units**

**PHA 405  Psychopharmacology  1 Units**

**PHA 406  Ethnopharmacology  1 Units**
1. 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.
4. Important plant and animal sources of modern medicine from Belladona to digitals, from cinchona bark to opium poppy.
5. Scientific methods of evaluation of herbal preparations
6. Desirability or not of merging orthodox and traditional medical practices

**PHA 407  Seminars in Pharmacology  4 Units**
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  4 Units**
Experimental research project on a topic of interest to be supervised by Academic Staff.
PHG 201 General physiology, Body fluids and Blood, Cardiovascular physiology 3
PHG 202 Respiratory physiology, Renal Physiology, Autonomic nervous System, Castro-intestinal physiology Nutrition and Metabolism 3
PHG 213 Nerve/Muscle Physiology, Central Nervous System, Special Senses 2
PHG 214 Endocrinology, Reproduction 2
PAN 201 Anatomical basis for drug actions 2
PAN 202 Neuro-anatomy course for pharmacy students 1

DETAILED COURSE OUTLINE AND DESCRIPTION FOR B.Sc (HONS) PHARMACOLOGY COURSE OUTLINE PART 1/200 LEVEL

COMPULSORY COURSES FOR PHARMACOLOGY

COURSE CODE COURSE TITLE COURSE UNITS
PHG 201 General physiology, Body fluids and Blood, Cardiovascular physiology 3
PHG 202 Respiratory physiology, Renal Physiology, Autonomic nervous System, Castro-intestinal physiology Nutrition and Metabolism 3
PHG 213 Nerve/Muscle Physiology, Central Nervous System, Special Senses 2
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### PART II/300 LEVEL

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400 LEVEL

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<td>PHA 412</td>
<td>Quantitative Pharmacology</td>
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PHARMACOLOGY SYLLABUS

PART II

PHA 301 General Principles of Pharmacology 2 Units
PHA 302  Pharmacogenetic and Pharmacokinetics  2 Units

PHA 303  Autonomic Pharmacology  2 Units
Cholinergic (Parasympathetic) Mechanisms

PHA 304  Adrenergoc (Sympathetic) Mechanisms  2 Units

PHA 305  Neuro Pharmacology Cns Depressants and Stimulants  3 Units

PHA 306  Pharmacology of the Organ Systems  4 Units

**PHA 307P  Practicals on 301-306  2 Units**
Selected practicals to illustrate the theoretical principles.

**PHA 308  Endocrine & Reproductive System Pharmacology  2 Units**

**PHA 309  Vitamins And Nutritional Haemopoietic Agents  2 Units**

**PHA 310  Toxicology  2 Units**

**PHA 311P  Methods of in Toxicology  1 Units**
Practical 1: ED$_{50}$ LD$_{50}$ Determination
Practical 2: ED$_{50}$ LD$_{50}$ Determination
Practical 3: Acute and Chronic Poisoning in Rabbits
Practical 4: Antidotes
Practical 5: Cosmetics Testing
Practical 6: Identification of drugs by Thin Layer Chromatography
Practical 7: 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**
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 401  Chemotherapy of Microbial Diseases, Vaccines and Sera  
2 Units
2. **Antibacterials/Antibiotics**
   The sulphonamides and Trimethoprim.
   The penicilins and cephalosporins
   Tetracyclines and Chloramphenical
   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-Neoplastics  
1 Units
Alkylating Agents, Antimetabolites, Hormones. Other anti-neoplastic agents
(Antibiotics, Plant alkaloids and Miscellaneous).

PHA 403  Inflammation, Allergy and Anaphylaxis  
Immunopharmacology  
2 Units
Introduction: Definition, Types, Characteristics and patho-physiology 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.
Kinnis, substance compound 4840 etc.
Angiotensin
Prostaglandins
Pathophysiology of allergic and immune reactions.

PHA 404P  Practicals on 400 Level Courses  
4 Units
Methodology in evaluation of chemotherapeutic agents. Determination of
therapeutic indices. Isolated Tissue and Whole Animal Experiments as in
Laboratory Manual.

PHA 405  Psychopharmacology  
1 Units
History of Psychopharmacology. Developmental. Psychopharmacology. Blood-
Brain Barrier and other membrane phenomenal in Psychopharmacology.
Drug abuse and drug Addition Clinical uses of Psychotherapeutic Agents.
Toxicology of Psychotherapeutic Agents.

PHA 406  Ethnopharmacology  
1 Units
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

**PHA 407  Seminars in Pharmacology  4 Units**
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  4 Units**
Experimental research project on a topic of interest to be supervised by Academic Staff.

**PHA 409  Breeding and Care of Laboratory Animals and Laboratory Management 2 Units**
Care of laboratory animals. Breeding of Different laboratory animals.

**PHA 412  Quantitative Pharmacology  3 Units**
(iii) Occupancy theory
(iv) Rate Theory
2.7 PHYSIOLOGY (B.Sc Physiology)

2.7.1 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 entrepreneur 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, medical and 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 related fields of specialization.

(vi) To train students who can adapt themselves after schooling, to various life situations including entrepreneurship.

2.7.2 Admission and Graduation Requirements

Candidate seeking admission into the programme should possess the minimum entry requirements as contained under general issues for Basic Medical Sciences

Medical Students who have successfully completed 300 Level may be admitted for 1 year intercalated programme.

2.7.3 Learning Out come

The purpose of this benchmark minimum standard is to stipulate a minimum standard, which must be applied by all Nigerian universities teaching physiology to students of various undergraduate degree programmes.
a) **Regime of Subject Knowledge**

The courses should include the following: Biology, Physics and Chemistry

**English Language** – students to be taught enough English to communicate fluently (both written and oral). Students must demonstrate ability to communicate in good English, sufficient to prove that they are university graduates who studied their subject in English.

**Genetics and Molecular Biology** – the students must be taught basic genetics, medical genetics and sufficient knowledge of modern molecular biology. Molecular biology is an important component of modern medical and health knowledge. This should also include Genomics

**Sociology and Anthropology** – this should be taught by staff of Faculty of Social Sciences.

**General Studies** – this should encompass broad-based knowledge in many subjects including: History of Science, Philosophy and Logic, General Principle of Law, Educational Psychology, Mathematics, Introductory Statistics and Entrepreneurial Studies

Students should also have the knowledge of the following as minimum benchmark:

Introduction and general principles in physiology such as homeostasis, body compartments systems, etc. Blood and other body fluids Immunological and other functions of blood, Excitable tissues – skeletal muscles, smooth muscles, cardiac muscle, nerves. Cardiovascular system physiology, Respiratory system physiology, Gastrointestinal physiology, Renal physiology, Endocrinology, Reproduction, Autonomic nervous system, Peripheral nervous system, Central nervous system, Special senses, Practical physiology including computer aided practical, Research methods in physiology, Biochemistry of carbohydrates, fats and proteins; Biochemistry of nucleotides and nucleic acids, Biochemical pathways, Enzymology and chemical regulations, Neuroendocrinology, Biostatistics, Molecular biology including Genetics, Gross anatomy of the human body including dissection (prosection) of human cadavers. General histology, Embryology, Research project in final year only, Any other related knowledge expected of a physiologist.

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.
1) 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.

2) The students should attain practical proficiency and skills such as all basic practical topics in each of the physiology benchmark outlines stated above.

3) 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.

4) Students should have skills and ability to tackle new innovative cases and problem solving, or development of new ideas.

5) 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).

6) 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.

7) 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

Students should be trained on medical ethics, 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.

2.7.4 Attainment Levels

For the students studying Physiology for degrees such as Medicine, Nursing, Nutrition, Science Laboratory, Physiotherapy, etc. student must attain sufficient level of cognitive knowledge and practical skills to be able to pass the relevant part of the professional examination in Medicine.

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.

2.7.5 **Resources Requirement for Teaching and Learning**

a) **Academic and Non-Academic Staff**

   Academic Staff: Student ratio should be 1:10

   Administrative Staff – 50% of Academic staff

   Technical Staff ratio – 1:30

b) **Academic and Non-Academic Spaces**

   Lecture Rooms should be adequate, in addition:

   i) Each department should have a seminar room for tutorials

   ii) There should be adequate laboratory spaces in all Universities.

c) **Academic and Non-Academic Equipment**

   There should be a computer based information services with PC audiovisual aids e.g. CDROM, Video CD.

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, Video CD.
### Year 1

#### Semester I

<table>
<thead>
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<th>Course No</th>
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<td>Introductory Physics I</td>
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<td>Introduction to Cytology and Genetics</td>
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<td>Introduction Physiology and the Automatic Nervous System</td>
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<td>PHS 202</td>
<td>Haematology</td>
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<td>PHS 203</td>
<td>The Cardiovascular System</td>
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**Semester II**

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<td>Histology</td>
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<td>ANA 203</td>
<td>Systemic Embryology of Structure of Head and Neck and Urogenital Systems</td>
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<td>PHS 204</td>
<td>Renal Physiology, Body Fluids and temperature Regulation.</td>
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<td>PHS 205</td>
<td>Respiratory System</td>
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<td>BCH 203</td>
<td>Carbohydrates: Chemistry and Metabolism</td>
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**YEAR 3**

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<td>Gastrointestinal Physiology</td>
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<td>Endocrinology and Reproduction</td>
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<td>Blood, Regulation of Body Electrolytes and fluids</td>
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<td>PHS 305</td>
<td>Enzymology and Chemical Regulation</td>
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**YEAR 4**

**Semester 1**

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<td>PHS 402</td>
<td>Cardiopulmonary Physiology</td>
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<td>PHS 403</td>
<td>Environmental Physiology and Metabolism</td>
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<td>PHS 404</td>
<td>Laboratory Teaching and Instrumentation</td>
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<td>PHS 405</td>
<td>Literature Review</td>
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<td>PHS 406</td>
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**Description And Content Of Courses In Physiology**

**PHS 201 Introductory Physiology and the Autonomic Nervous System**

**PHS 202 Haematology**
General characteristics and functions of blood. Properties and functions of plasma. red blood cells; factors involved in erythropoiesis, blood groups. White
blood cells; origin, type, properties functions, antigenicity and immunities. Platelets and hemostatic mechanisms. Reticulo-endothelial system. Cloting and fibrinolytic systems. Imunity and Immodeficiency disease and HIV.

PHS 203 The Cardiovascular System
Overall plan and functions of the C.V.S. Physiologic anatomy of the heart, mechanical events of cardiac cycle, cardiac output and its estimation, E.C.G. The Vascular system; Cross sectional area of different vascular groups, systolic, diastolic, pulse and mean pressures, exchange of fluids across the capillaries, venous and central venous pressures. Integration of C.V.S functions; central control centers, regulation of systemic blood pressure. Cardio-vascular adaptations in health and disease. Circulation through special areas. Vascular endotudium in cardiovascular control.

PHS 204 Renal Physiology, Body Fluids and Temperature Regulation

PHS 205 Respiratory System

NES 202 Neuroscience I
Development and general plan of the central nervous system. Nerve: morphology, generation and conduction of action potential. Sensory division of the nervous system; morphology receptors, sensory pathways, reticular formation, thalamus and sensory cortex.

PHS 301 Gastrointestinal Physiology
PHS 302  Endocrinology And Reproduction
Endocrine system: Introduction and neuroendocrine relationship. Hypothalamo-
Pituitary axis, Endocrine glands; normal, hypo – and hyper-functions. Other
hormones of some clinical importance. Physiologic anatomy of male and female
reproductive system. Male and female sex hormones. Cyclicity of hormone

NES 301  Neuroscience II
Synapse; morphology, synaptic transmission, procession of data, neurotransmitter
in the CNS. Motor division of the CNS; morphology, motor cortex, basal ganglia,
pyramidal and extrapyramidal system. Cerebellum, Locomotion and maintenance
of posture; spinal and body-orienting reflexes, brainstem control, muscle spindle,
muscle tone. Hypothalamus and limbic system. Higher functions of the nervous
system. Special senses.

PHS 304  Blood Regulation of Body Electrolytes and Fluids
A review of the general properties and functions of blood. Functions and life
cycle of various blood cells. Abnormalities of blood. Brief recapititulation of the
functionality of the kidneys. Renal handling of electrolytes. Current concepts of
concentration and dilution of urine. The rennin-angiotensin system. Renal
disorders.

PHS 303  Selected Topics in Neurophysiology
Pathophysiology of pain. The association areas of the cortex Physiological basis
of motivated behaviours. Muscle spindle function in motor control. Maintenance
of posture. Mechanism of locomotion.

PHS 306  Laboratory Teaching and Instrumentation
Opportunity for students to review the Physiological concept of systems taught
and understand them so thoroughly as to enable them demonstrate the concept
using available equipment to Medical or more junior Physiology Students.

PHS 401  Neuroendocrinology
Historical origins of a Neuro-endocrine connection. A review of the physiologic
anatomy of hypothalamo-pituitary link. Current concepts of channels of
communication between the hypothalamus and the pituitary. Hypothalamic
neurosecretions. The “master gland” of the endocrine system. Pituitary
secretions and their current concepts of the servomechanisms between the
hypothalamus, the pituitary and other endocrine organs.

PHS 403  Environmental Physiology and Metabolism
Current concepts on the control of energy balance. Brief review of intermediary
Metabolism of specific organs: brain, renal, pulmonary and cardiac metabolism.
Abnormal metabolism: Diabetes mellitus, specific in-born errors of metabolism.
Physiological basis of topical environmental problems, Family Planning, malnutrition.

**PHS 404 Laboratory Teaching and Instrumentation**
Opportunity for students to review the Physiological concept of systems taught and understand them so thoroughly as to enable them demonstrate the concept using available equipment to Medical or more junior Physiology students.

**PHS 406 Biostatistics**

**PHS 405 Literature Review - 1 Unit**

**PHS 407 PROJECT - To be supervised**
2.8 PHYSIOTHERAPY (B. Physiotherapy)

2.8.1 Philosophy, Aims and Objectives

Philosophy

The Philosophy is to train and produce highly knowledgeable and skilled Physiotherapist 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.

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 objectives are:

a) To produce Physiotherapists who will be able to work in:- Hospitals, Rehabilitation facilities and other Health Establishments as members of the Health Team.

   ii) Physiotherapy Training Institutions, Research Centres and other Academic environments after undergoing relevant postgraduate training.

   iii) Sports, Physical Fitness and Health promotion Facilities.

   iv) Industrial workplace and other occupational environments.

b) To evaluate physical ailments and disabilities, plan and carry out a programme of treatment according to the patient’s clinical state.

c) To recognize the role of the Physiotherapist in Health Care delivery in the community and in the Health Team.

d) To participate in clinical research with others as a means of further study and professional enhancement.

e) To acquire, develop and maintain rapport with professional colleagues, patients, their relatives and members of the Health Care Team.

f) To acquire, a sense of commitment to patients and the profession at all times.
g) To acquire knowledge in health policies, health management, global health issues and socio-cultural health issues.

2.8.2 Admission and Graduation Requirements

The admission requirement into the programme are as contained under general issues for Basic Medical Sciences.

The Physiotherapy degree programme shall normally extend over 5 years for candidates admitted to 100 level of study; and 4 years for Candidates admitted to the 200 level of study. Candidates shall graduate with unclassified degree as pass or pass with distinction. All candidates must register as full-time students, no part-time registration is allowed.

2.8.3 Learning Outcome

a) Regime of Subject knowledge

i) Anatomy. Physiology, Biology/Zoology, Physics, Biochemistry, the basics and application of; Psychology, Medical Sociology, Computer Science and Mathematics / Statistics.

The above listed regime of subjects will enable the student to have 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) Application of the knowledge of the subjects in the pre-clinical sciences, (Anatomy, Physiology, Physics and Biochemistry) help students to understand the physiological and therapeutic effects of the basic Physiotherapy modalities.

iii) 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. These prepare students for patient care.

iv) Basic Requirements of clinical practice Assessments of patients (subjective and objective evaluation including joint assessment, muscle assessments, functional assessments, outcome measures of treatment, etc)

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.

vi) Acquisition of 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.

Physiotherapy training shall be a combination of teacher-directed, tutor-guided, student-directed and problem-based methods. The following shall be employed for effective teaching and learning: -

b) **Competencies and Skills**

At the end of the Physiotherapy training programme, graduates shall have acquired skills in:

Comprehensive physical examination and clinical assessment of patient’s health to arrive at a physiotherapy diagnosis from the medical diagnosis.

Planning patient’s treatment based on; the outcome of patient’s assessment, available physiotherapy facilities and precautions to avoid contra-indications to the treatment.

Giving treatment to patient employing evidence-based practice as well as being mindful of the safety of patient, self, equipment and treatment environment.

Evaluation of outcome of treatment using standard outcome measures or specifically designed outcome measure based on clinical and socio-cultural considerations.

Modifying treatment appropriately based on the outcome of evaluation of treatment.

Effective and appropriate Communication Skills (Including counselling and psychotherapy).

Skills for conduction of research including proposal writing, data collection and analysis, interpretation of findings and report writing for dissertation or publications in learned journals.
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.

Ability to apply the outcome of clinical researches in patient care.

Practical/Clinical Skills

Patients assessment skills

Skills to carry out fundamental procedures in physiotherapy. General skills relating to non-professional subjects such as computer literacy, general communication, administrative, entrepreneurial and organizational skills.

Skills for psychotherapy and health education for the preventive and health promotion aspects of physiotherapy.

Basic skills of equipment handling and maintenance.

c) **Behavioural Attributes**

The products of the physiotherapy programme shall be physiotherapists who have acquired high level of theoretical knowledge, clinical skill and sense of purpose. They should have a good mastery of the basic physiotherapy procedures, shall exhibit understanding of the concept of health care system and health care. They shall 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.

2.8.4 **Attainment Levels**

The degree shall be unclassified. Excellence shall be recognised through the awards of distinction and prizes.

2.8.5 **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 Sciences shall be 1:15 while the minimum for Clinical Physiotherapy shall be 1:10. Only Physiotherapists currently registered with the Medical
Rehabilitation Therapist Board (MRTB) of Nigeria and with acceptable postgraduate qualifications shall qualify to teach Physiotherapy at the University level. No Physiotherapy teacher shall aspire to Senior Lectureship without a PhD degree in physiotherapy.

Non-Academic Staff
(a) 50% of Academic Staff
(b) Technical Staff – 1:30 ratio

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.

The deployment of these resources, including teaching units, should be organised in a Department of Physiotherapy.

### 2.8.6 Course Contents and Descriptions

<table>
<thead>
<tr>
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<th>Courses Title</th>
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<td>PHY 111</td>
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**Total Credit Units**  
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<td>CHE 195</td>
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<tr>
<td>PHY 113</td>
<td>Basic Principles of Physics III</td>
<td>3</td>
<td>Required</td>
<td>2</td>
</tr>
<tr>
<td>PHY 118</td>
<td>Experimental Physics</td>
<td>3</td>
<td>Required</td>
<td>2</td>
</tr>
<tr>
<td>ZOO 112</td>
<td>The Mammalian Body</td>
<td>3</td>
<td>Required</td>
<td>2</td>
</tr>
<tr>
<td>ZOO 113</td>
<td>Diversity of the Animal Life</td>
<td>3</td>
<td>Required</td>
<td>2</td>
</tr>
</tbody>
</table>

**Total Credit Units**  
25

### 200 LEVEL (2ND YEAR) COURSES

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit Unit</th>
<th>Type</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHS 290</td>
<td>Basic Principles in Physiology I</td>
<td>3</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>BIC 340</td>
<td>Chemistry and Biochemistry of Macro-Molecules</td>
<td>3</td>
<td>Required</td>
<td>1</td>
</tr>
<tr>
<td>ANA 210</td>
<td>Anatomy I</td>
<td>3</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>ANA 211</td>
<td>Anatomy II</td>
<td>3</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PHY 271</td>
<td>Physics for Biology I</td>
<td>3</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>STAT 141</td>
<td>Basic Statistics</td>
<td>2</td>
<td>Required</td>
<td>1</td>
</tr>
<tr>
<td>*GES 105</td>
<td>Land Use Agriculture and animal Husbandry</td>
<td>2</td>
<td>Compulsory</td>
<td>1</td>
</tr>
</tbody>
</table>

**Total Credit Units**  
19

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit Unit</th>
<th>Type</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHS 291</td>
<td>Basic Principles in Physiology II</td>
<td>3</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>BIC 341</td>
<td>Enzymes and Intermediary Metabolism</td>
<td>3</td>
<td>Required</td>
<td>2</td>
</tr>
<tr>
<td>ANA 220</td>
<td>Anatomy III</td>
<td>3</td>
<td>Compulsory</td>
<td>2</td>
</tr>
</tbody>
</table>
PSY 202 Abnormal Psychology 3 Required 2
ANA 221 Anatomy IV 3 Compulsory 2
STA 240 General Applied
Statistics 2 Required 2

Total Credit Units 18

* University compulsory courses which vary in course code, course title, course objectives and course content from university to university.

300 LEVEL (3RD YEAR) COURSES

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit Unit</th>
<th>Type</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY 251</td>
<td>Electro- Physics for Physiotherapy Students</td>
<td>3</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>ANA 310</td>
<td>Anatomy V</td>
<td>3</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 310</td>
<td>Introduction to Physiotherapy Profession</td>
<td>3</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 311</td>
<td>Introduction to Kinesiology</td>
<td>3</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 312</td>
<td>Exercise Physiology</td>
<td>3</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>SOC 202</td>
<td>Introduction to Social Institutions</td>
<td>3</td>
<td>Required</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Credit units 18

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit Unit</th>
<th>Type</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>PST 320</td>
<td>Thermotherapy</td>
<td>2</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>PST 321</td>
<td>Cryotherapy</td>
<td>2</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>PST 322</td>
<td>**Practical Electro-Therapy I</td>
<td>3</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>PST 323</td>
<td>Introduction to Movement</td>
<td>2</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>PST 324</td>
<td>Manual Therapy</td>
<td>2</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>PST 325</td>
<td>Pathokinesiology</td>
<td>2</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>PST 326</td>
<td>***Practical Exercise and Manual Therapy I</td>
<td>3</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>PST 327</td>
<td>Prosthetics &amp; Orthotics</td>
<td>2</td>
<td>Compulsory</td>
<td>2</td>
</tr>
</tbody>
</table>
PST 328  Introduction to Clinical Physiotherapy & General Nursing  2  Compulsory  2
PST 329  Introductory Pathology  2  Compulsory  2
PST 330  Vacation Clinical Posting  4  Compulsory  Vacation (end of 300 Level vacation)

Total Credit Units  26

**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.

400 LEVEL (4TH YEAR) COURSES

<table>
<thead>
<tr>
<th>Course No</th>
<th>Course Title</th>
<th>Credit Unit</th>
<th>Type</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>PST 410</td>
<td>Low Frequency Electrical Stimulating Currents</td>
<td>2</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 411</td>
<td>Actino therapy and Ultrasonic Therapy</td>
<td>2</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 412</td>
<td>*Practical Electrotherapy II</td>
<td>3</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 413</td>
<td>Muscle Strengthening and Joint Mobilization</td>
<td>2</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 414</td>
<td>Therapeutic Exercises</td>
<td>2</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 415</td>
<td>Hydrotherapy</td>
<td>2</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>**PST 416</td>
<td>Practical Exercise Therapy &amp; Manual Therapy II</td>
<td>3</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 417</td>
<td>Clinical Measurements &amp; Instrumentation</td>
<td>2</td>
<td>Compulsory</td>
<td>1</td>
</tr>
</tbody>
</table>
PST 418  Physical Diagnosis & Clinical Practice I  4  Compulsory  1 & 2
PST 419  Pharmacological Considerations in Physiotherapy 2  Required  1

Total Credit Units  24

*Practical aspects of PST 410 and PST 411 shall be examined under PST 412.
**Practical aspects of PST 412, PST 414 and PST 415 shall be examined under PST 416.
Practical examinations shall be externally moderated and conducted at the end of 2nd semester of 400 level.

<table>
<thead>
<tr>
<th>Course No</th>
<th>Course Title</th>
<th>Credit Unit</th>
<th>Type</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>PST 420</td>
<td>Skeletal Disorders &amp; Rehabilitation</td>
<td>3</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>PST 421</td>
<td>Cardio- respiratory Disorders &amp; Rehabilitation</td>
<td>3</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>PST 422</td>
<td>Neurological Disorders &amp; Rehabilitation. I</td>
<td>2</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>PST 423</td>
<td>Soft Tissues Disorders &amp; Rehabilitation.</td>
<td>2</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>PST 424</td>
<td>Community Physiotherapy &amp; Ergonomics</td>
<td>2</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>PST 425</td>
<td>Physiotherapy in women’s Health and Nutritional Disorders</td>
<td>2</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>PST 426</td>
<td>Research Methodology and Biostatistics</td>
<td>2</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>PST 427</td>
<td>Joint disorders &amp; Rehabilitation</td>
<td>2</td>
<td>Compulsory</td>
<td>2</td>
</tr>
<tr>
<td>PST 428</td>
<td>Clinical Practice II</td>
<td>4</td>
<td>Compulsory</td>
<td>2</td>
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</table>

Compulsory  ***Vacation

Total Credit Units  24

*** Vacation is the period between 400 & 500 levels (i.e. 400 level end of session vacation)
<table>
<thead>
<tr>
<th>Course No</th>
<th>Course Title</th>
<th>Credit Unit</th>
<th>Type</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>PST 510</td>
<td>Manipulative Therapy</td>
<td>3</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 511</td>
<td>Neurological Disorders and Rehabilitation II</td>
<td>2</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 512</td>
<td>Specialty Lectures (Anesthesia, Radiology, Psychiatry, Pathology, Occupational Therapy, Medical Social Work, Primary Health Care)</td>
<td>3</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 513</td>
<td>Gerontology</td>
<td>2</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 514</td>
<td>Introduction to Physiotherapy Administration</td>
<td>2</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 515</td>
<td>Physiotherapy in Disorders of Blood &amp; Lymph Vessels</td>
<td>2</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 516</td>
<td>Research Project Seminar</td>
<td>2</td>
<td>Compulsory</td>
<td>1</td>
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<tr>
<td>PST 517</td>
<td>Intensive Care Physiotherapy</td>
<td>3</td>
<td>Compulsory</td>
<td>1</td>
</tr>
<tr>
<td>PST 518</td>
<td>*Clinical Practice III</td>
<td>4</td>
<td>Compulsory</td>
<td>1 &amp; 2</td>
</tr>
</tbody>
</table>

**Total Credit Units** 23

*PST 518 shall be examined by external moderation at the end of 2\textsuperscript{nd} Semester of 500 Level*
Course Description

PSY 101  Introduction to Psychological Basis of Behavior
An elementary introduction to psycho-biological basis of behaviour. Topics to be covered include; basic units of the nervous system, hierarchical structure of the brain, sensory process, consciousness and visual sensation, auditory and chemical fundamental of motivation.

MAT 101  Supplementary Mathematics.

CHE 127  Inorganic Chemistry
Electronic Configuration, Periodicity And Building Up Of The Periodic Table. Hybridization and shapes of simple molecules. Extraction of the metals. Comparative chemistry of groups 1A (alkali metals); 11A (alkaline earth metals); and 1vA (carbon group) elements. Introduction to transition metal chemistry and nuclear chemistry.

CHE 177  Organic Chemistry
Tetravalency of carbon, structure, molecular composition and variety of carbon compounds. Functional groups, classes of carbon compounds. Reaction mechanism and kinetics. Skeletal classification of carbon compounds. The chemistry of alkenes and petroleum, alkenes including ozonolysis, alkynes, benzene, alcohols including phenols, others, aldehydes, ketones; carboxylic acids and derivatives, and amines, structure of simple sugars, starch and cellulose, peptides and proteins. Synthetic polymers from various classes of compounds. Mechanisms of reactions discussed all cases and uses of compound.

CHE 195  Practical Chemistry
The practical aspects of all the theoretical courses taken in Chemistry for the session.

PHY 112  Basic Principles of Physics II
Ion to measuring instruments. Concepts of Electromagnetic-induceduction and application, motors, dynamos, generators etc. A.C. voltages applied to inductors, capacitors and resistance singly and combined. The transformer.

**PHY 113  Basics Principles of Physics III**

**PHY 118  Experimental Physics**
Experiments arising from the theory courses of PHY III and PHY 112 and illustrative of basic physical techniques for observations and measurements. Data collection, analysis and deduction.

**ZOO 112  The Mammalian Body**
The anatomy and physiology of the rat, the adaptation to the environment. External features. Skin, skeletal and muscular systems. Digestion and absorption of food; nutrition, gas exchange systems and transports. The blood and the circulatory system. The kidney and homeostasis. Nervous and chemical coordination.

**ZOO 113  Diversity of the Animal Life**
General classification of animals. The concept of evaluation characteristics and life history of representative types from each phylum. Animals of medical veterinary and agricultural importance

**200 Level Course**

**PIO 290  Basic Principles In Physiology.**

**PIO 340  Chemistry and Biochemistry of Micromolecules**
ANA 210  Anatomy I: Gross Anatomy of the Lower Limb
Introduction to the philosophy, methodology, language and general descriptive terms of Anatomy. Introduction to skin, muscles, bones, joints, blood vessels, nerves, lymphatic vessels etc.
Gross Anatomy of the lower limb; Front of the thigh, medial side of the thigh, the gluteal region, the back of thigh, the popliteal fossa, the front of the leg, the dorsum of the foot, the lateral side of the leg, the back of the leg, the sole of the foot including the arches of the foot, the hip and knee joints, tibio-fibular joints, the ankle joint and the joints of the foot.

ANA 211  Anatomy II; Gross Anatomy Of The Abdomen, Pelvis And Perineum
Abdomen and peritoneum; spermatic cord, inguinal canal and hernia; Arteries, veins and lymphatics of the GIT. Abdominal alimentary tract. Liver, spleen, pancreas and kidney; Pelvis, perineum, including the genital organs.

PHY 271  Physics for Biology I
Elementary kinematics and vector algebra. Newton’s laws of motion. Static forces acting on a human body. Elasticity and strength of materials. Momentum conservation; application to contusion and fracture during impacts, and to similar medical situations; conservation of energy; the first law of the thermodynamics; applications to metabolism and work done by various organs of the body. Angular momentum and torque. Harmonic motion and diffusion. Applications to osmotic pressure and passage of substances through capillary walls. Molecular motion in gases; distribution, functions and the Boltzmann principles. Intermolecular collisions and transport processes. Equilibrium in external fields; the centrifuge and measurement of molecular weight.

STAT 141  Basic Statistics
Presentations of data as graphs, diagrams frequency and cumulative distributions. Measures of location and dispersion. Correlation and regression. Simple concept of probability. Distribution and density functions. Some basic distributions e.g. Binomial. Simple random sampling. Basic inferences about the population. Mean estimation and test based on large and small sample (one sample and two sample cases). Estimation and tests of population variance.

PIO 291  Basic Principles in Physiology II

BIC 341  Enzymes and Intermediary Metabolism

ANA 220  Anatomy III
Upper limbs & pectoral region. Thorax and body wall. Heart, lungs & mediastinum. Anthology, mycology, vascular system:

PSY 202  Abnormal Psychology
Emphasis will be on the common types, causes, diagnostic characteristics and treatment of mental disorders observable in the Nigerian and other cultures. Minor and serious types.

ANA 221  Anatomy IV  General Histology
Cell structure and division. Epithelial tissues, connective tissues II. Cardiovascular system. Lymphoid organs, skin, male and female reproductive systems. Endocrine systems I & II

STAT 240  General Applied Statistics

300 Level Courses

PHY 251  Electrophysics for Physiotherapy Students

ANA 310  Anatomy V: Head and Neck
Head and Neck. Neuroanatomy. General overview of Anatomy

PST 310  Introduction to Physiotherapy Profession
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
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

SOC 202   Introduction to Social Institutions
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.

PST 320   Thermotherapy
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
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 Electgrotherapy 1
This is to test practical aspect of PST 320 and PST 321.

PST 232   Introduction to Movement

PST 324   Manual Therapy
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
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
This is to test the practical aspect of PST 323, PST 324 and PST 325

PST 327  Orthotics and Prosthetics
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 Clinicals Including General Nursing

PST 329  Introductory Pathology

PST 330  Vacation Clinical Posting
Patient’s assessment, treatment plan and programme. Relating theory to practice in patient handling, effective communication, professional attitude and responsibility.
400 Level Courses

PST 410  Low Frequency Electrical Stimulating Currents

PST 411  Actinotherapy and Ultrasonic Therapy

PST 412  Practical Electrotherapy II
This is to test the practical aspect of PST 410 and PST 411.

PST 413  Muscle Strengthening and Joint Mobilization

PST 414  Therapeutic Exercises
Exercise for the treatment of specific types of disease conditions. Group therapy, suspension therapy, traction, breathing exercises, relaxation techniques, facilitated movement, and neuro-muscular coordination exercises, health promotion, principles of exercise prescription. Lower motor neuron lesions, amputees, arthritis, back pain, pulmonary diseases, hemiplegia and paraplegia.

PST 415  Hydrotherapy
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

PST 416       Practical Exercise Therapy
This is to test the practical aspect of PST 413, PST 414 and PST 415

PST 417       Clinical Measurements and Instrumentation

PST 418       Physical Diagnosis And Clinical Practice I
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

PST 420       Skeletal Injuries and Disorders and Rehabilitation

PST 421       Cardio-Respiratory Disorder and Rehabilitation
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
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, meningocele etc. Medical, surgical and physiotherapy management of conditions.

**PST 423 Soft Tissue Disorders and Rehabilitation**
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: Amyotimia and myotonia congenital; abnormalities of the foot and hand. Myasthenia gravis. Management of chronic and acute soft tissue injuries (muscular, tendinous and ligamentous injuries, tendinities etc,) Acquired and congenital abnormalities of the foot and hand.

**PST 424 Community Physiotherapy and Ergonomics**
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 Nutritional Disorders**

**PST 426 Research Methodology and Biostatistics**
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**

**PST 428 Clinical Practice II**
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 429 Students Industrial Work Experience Scheme (SIWES)**
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 Courses**

**PST 510 Manipulative Therapy**
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**
Pre-requisite:- PST 412 Neurological disorders and rehabilitation I

**PST 512 Specialty Lectures (Anaesthesia, Radiology, Psychiatry, Pathology, Occupational Therapy, Medical Social Work and Primary Health Care).**
Surgery – Observation of operating theatre procedures in the general, neuro 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 514  Gerontology

PST 514  Introduction Physiotherapy Administration and Management
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 Vessels
Atherosclerosis, arteriosclerosis, aneurism, Buerger’s-Raynaud’s disease, phlebitis, thrombosis, embolism, varicose veins, sickle cell diseases.

PST 516  Research Project Seminar.
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
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
Same as CLINICAL PRACTICE II but with greater responsibilities in patient care.
PST 520  Skin Disorders And Rehabilitation
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  Ports Physiotherapy
The role of physiotherapy in sports. Relationship with sportmen, coaches, trainers, sports psychologists, sports medical team etc. Prevention and treatment of sports injuries. Health promotion for sportmen through the attainment and maintenance of adequate physical fitness levels. Assessment of physical fitness status of sportmen 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
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.

PST 524  Policy Issues in Health Care (Seminars).
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
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.
2.9 PUBLIC HEALTH (B. Sc Public Health)

2.9.1 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 systems 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.

2.9.2 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 or candidates with NCE (Physical/Health Education, Science Education, Nutrition, Home Economics) Health Superintendent, may be considered for admission.

To graduate and for the award of the B.Sc (Hons) degree in Public Health, the student must have completed and passed the prescribed courses and electives totaling 120 Credit Units.

1.7 Repeating Failed Courses

Students have opportunities to repeat the courses failed as well as improve on courses where the grades are lower.

1.8 Withdrawal

Withdrawals are based on the following basis:
A student whose cumulative grade point average (CGPA) drops below 1.5.0 on the 5 point scale for two consecutive semesters shall withdrawal from the University. A student whose performance level does measure up to stringent demands of a particular programme may be authorized, on request, to change to another programme of study whose requirements he may meet, so long as the cumulative GPA does not drop below the average of 1.5.0 on the 5-point scale minimum.

2.9.3 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.

iv) Understanding of the organization and management of the health services and lastly

v) 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:

1. 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;

2. perform full community diagnosis using the indicators of health prior to community intervention;

3. participate actively in community mobilization processes prior to implementation of community health programs;

4. produce Information Education Communication (IEC) materials for health communication;

5. plan and implement patient education and counseling on health consumer issues in the health facilities/clinics/hospital and community settings;

6. participate in immunization exercises and perform nutrition assessment of infants, children of school age, adolescents and adults in the community;
7. monitor the environment for pollutants and ensure safety at work sites;
8. plan and implement school health education programmes for substance abuse reduction, sexuality and nutrition education;
9. plan and describe the details of epidemiology of communicable diseases;
10. design methods of investigation and control of disease outbreaks in the community;

Practical Skills

The graduates of the programme shall be able to carry out:

1. organize a communicable disease campaign and surveillance;
2. interview, counsel and work with clients in the clinics and homes;
3. assess the health status of pregnant women and children and undertake systematic observations;
4. perform anthropometric measurements of children 0-5 years and school children 6-18 years and have the indices recorded, analyzed and graphed;
5. manage the resources (material and human and keep appropriate and accurate records;
6. record and calculate simple and reliable indices of the outcome of maternal and child health services;
7. perform Laboratory procedures appropriately as directed for water, soil and specimen analysis;
8. identify environmental health hazards in the community and take appropriate action access the nutrition states or individual, community and establish appropriate actions;
9. recognize emergency conditions and initiate immediate actions through the appropriate referral system;
10. recognize community mental health problems and take appropriate action;
11. identify the main occupational hazards in the work place and in the community and initiate appropriate actions;
12. identify problems relating to the aged and the handicapped and refer as appropriate;
13. 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 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.

1. assess maternal and child health needs and resources in the community and assist in planning, implementing, maintaining and evaluating services;
2. initiate and implement research findings to strengthen all areas of public health;
3. maintain good information and working relationship with community leaders, representatives of other agencies and other health personnel;
4. participate in community development activities in cooperation with community leader and representatives of other agencies;
5. use existing guidelines to manage common ailments and refer the more serious conditions as appropriate;
6. participate in reproductive health activities and advise on child spacing; and
7. observe and practice under supervision, circumcision, incision and drainage.

2.9.4 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.

2.9.5 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.

Promotion of staff shall be on regular basis as much as possible, with a view of fairness and academic excellence.
The following categories of academic staff with the minimum qualifications are earmarked for Department of Health Sciences.

**Graduate Assistant**
A Good Bachelor’s Degree

**Assistant lecturer**
A Master’s Degree in Public Health

**Lecturer II**
A Doctoral Degree in Public Health ( *With specialization in any field of Public Health*)
Promotional prospects for Assistant lecturers with at least three years experiences.

**Lecturer Grade I**
A Doctoral Degree in Public Health and related Specialization  
Epidemiology with at least three (3) years experience on the job. The three-year period is for eligibility for consideration i.e apart from the stated periods, the candidate will be assessed for quality of teaching, publications, contribution to the University and community. 
As in 3 (ii) plus 4 years of experience and adequate number of publications in referred journals.

**Senior lecturer**
At least three (3) years as lecturer Grade I. Adequate publications, teaching and services to the University and the community.

**Reader/Associate Professor**
The position can be filled either by promotion or appointment. At least three years on Senior Lectureship with considerable publications. Outstanding research and teaching coupled with Services to the University and the Community Plus positive external assessment.

**Professor**
At least three (3) years as Reader/Associate professor. Outstanding research, teaching and service to the University and community, plus positive external assessment. Position can be filled either by promotion or appointment.

Staff (Academic) Rank mixes and ratios in the department of Health Sciences shall be such that admits 20% in the professorial grade, 25% in the senior Lecturer grade and 55% in the lectureship grade I, II and III.

The Department shall have at least the following.
(a) One Secretary
(b) One Clerical Officer
(c) Two office Attendants/Cleaner
(d) Two Typists
(e) One duplicating machine operator/maintenance officer
(f) One Programmer/system analyst.

b) Academic and Non-Academic Spaces

Academic Physical Spaces - Shall be Available
Administrative Facilities - Shall be Available
Staff Office - Shall be Available
Other Space/Facilities - Shall be Available
Student Accommodation - As applicable

c) Academic and Administrative Equipment

The following Equipment shall be available in the stated minimum quantity:

1. At least 1 Computer 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.
### 1st Year (100 Level) Courses

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>SEMESTER</th>
<th>PREREQUISITE</th>
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<tbody>
<tr>
<td>PHSC 101</td>
<td>Introduction to Public and Health Primary Care</td>
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<tr>
<td>PHSC 103</td>
<td>Anatomy I</td>
<td>-</td>
<td>3 BIOL 101</td>
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<tr>
<td>PHSC 104</td>
<td>Physiology I</td>
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<td>3 BIOL 101</td>
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<tr>
<td>PHSC 105</td>
<td>Introduction to Sociology and Anthropology</td>
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### COGNATE REQUIREMENTS

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<td>General Chemistry</td>
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<td>General Physics</td>
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<td>MATHS 101</td>
<td>General Mathematics</td>
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### GENERAL EDUCATION REQUIREMENTS

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<td>GEDS 101</td>
<td>Philosophy of Christian Education</td>
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<tr>
<td>GEDS 102</td>
<td>Use of Library</td>
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<tr>
<td>GEDS 111</td>
<td>God in Modern Society</td>
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<tr>
<td>GEDS 121</td>
<td>Computers in modern Society and Keyboarding</td>
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<td>GEDS 122</td>
<td>Life and Teachings of Christ</td>
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<tr>
<td>GEDS 124</td>
<td>Citizenship and Elements of Govt.</td>
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<td>GEDS 131</td>
<td>Communication in English I</td>
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<td>GEDS 132</td>
<td>Nigerian Peoples in Global Culture</td>
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### 2nd Year (200 Level) Courses

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<tr>
<td>PHSC 201</td>
<td>Biostatistics</td>
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<tr>
<td>PHSC 202</td>
<td>Principles of Epidemiology and disease Surveillance</td>
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<td>2 PHSC 212</td>
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<tr>
<td>PHSC 203</td>
<td>International Health</td>
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<tr>
<td>PHSC 204</td>
<td>Health Anthropology</td>
<td>-</td>
<td>2 PHSC 105</td>
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<tr>
<td>PHSC 205</td>
<td>Psychological Foundations of Health Behaviour, and Change process</td>
<td>- 2 PHSC 102</td>
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<tr>
<td>PHSC 206</td>
<td>Fieldwork I (Community Health Care Practice)</td>
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<td><strong>CORE COURSES</strong></td>
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<tr>
<td>PHSC 301</td>
<td>Applied Epidemiology (infectious disease epidemiology and Immunization techniques)</td>
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<tr>
<td>PHSC 302</td>
<td>Principles of Health Information, Education and Communication (IEC)</td>
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<tr>
<td>PHSC 303</td>
<td>Health Programme Planning and Evaluation.</td>
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<tr>
<td>PHSC 304</td>
<td>Population/Demographic Dynamics</td>
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<tr>
<td>PHSC 305</td>
<td>Environmental Health and Public Health Laws</td>
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<td>PHSC 306</td>
<td>Family Health and Human Reproductive Health (MCH)</td>
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<tr>
<td>PHSC 307, 308</td>
<td>Community Health Practicum II, III</td>
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<tr>
<td>PHSC 309, 210</td>
<td>Seminars in Public Health II, III</td>
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<td>PHSC 311</td>
<td>Health Problems of the Adolescents, Adults and The Handicapped</td>
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<td>PHSC 312</td>
<td>Public Health Nutrition</td>
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<td>PHSC 313</td>
<td>School Health Education</td>
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<tr>
<td>PHSC 314</td>
<td>Occupational Health</td>
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<td>PHSC 315</td>
<td>Community Mental Health</td>
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<tr>
<td>PHSC 316</td>
<td>Research Methods and Proposal writing in Public Health Education</td>
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<tr>
<td>PHSC 317</td>
<td>Public Health Microbiology and Parasitology (Food/Water Sanitation and Environmental Microbiology)</td>
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3rd Year (300 Level) Courses
COGNATE REQUIREMENTS

GENERAL REQUIREMENTS

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<tr>
<td>PHSC 401</td>
<td>Health Systems Management</td>
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<tr>
<td>PHSC 402</td>
<td>Training Methods</td>
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<td>PHSC 403</td>
<td>Health Sociology</td>
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<td>PHSC 404</td>
<td>Communication for Health and Media Technology</td>
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<td>PHSC 405</td>
<td>Seminars on Contemporary Issues in Public Health</td>
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<td>PHSC 406</td>
<td>Principles of Pharmacology, Therapeutics, and Substance Abuse</td>
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<td>PHSC 407</td>
<td>Community Health Care Practicum (Field Work IV)</td>
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<tr>
<td>PHSC 408/409/410/411/412/413</td>
<td>Special Topics in Core Areas of Public Health</td>
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<tr>
<td>PHSC 414</td>
<td>Internship*</td>
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<tr>
<td>PHSC 499</td>
<td>Research Project</td>
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Note: * See Internship PHSC 490

- The Core Areas of Public Health
  - **PHSC 408** Public Health Information, Education & Communication;
  - **409** Epidemiology, Disease Control & Surveillance;
  - **410** Environmental Health/Occupational Health;
  - **411** Human Nutrition;
  - **412** Health Systems Management & Administration;
  - **413** Community/Family and Reproductive Health
Course Descriptions

PHSC 101  Introduction to Public Health & Primary Health Care (2 Credits)
The course highlights issues of health in broad perspectives; ranging from various periods of recorded history, that is, from the antiquity to present times. The development and growth of public health from its inception are addressed. The various actors in the course of its development and the various roles played by each of them are highlighted. Also, the course traces the development of modern public health in Nigeria, that is, the development of health services and the basic health services to the development of the national primary health care system are highlighted.

PHSC 102  Anatomy I (3 Credits)
A survey of the structure of the cell and organization of the human system. The heart and blood vessels (the circulatory system), the muscles and skeletal system will be studied in details. The gastrointestinal system will be reviewed. Identifying relevant structures within the system. Some emphasis will be made on embryologic characteristics of the organ system discussed.

PHSC 103  Physiology I (3 Credits)
This course provides the student with an introduction to the functions of the typical mammalian cell with an initial review of the definition of physiology and a survey of the structural and functional organization of the human body. The course also focuses on the physiological functions of the cardiovascular system, the circulatory system, the digestive system, the endocrine system, the respiratory system, and reproductive system.

PHSC 104  Introduction To Sociology And Anthropology (2 Credits)
These courses examine describe and analysis the social structure and dynamics of human society. It explains the important roles of sociology, anthropology and other social sciences across the spectrum of disciplines. Areas of emphasis include social structure and institutions, problems of social organization, population, societal as well as collective behavior, social movement and ideology. The uses of sociology and anthropology are explained.

BIOL 101  General Biology I (3 Credits)
This course in basics of biology designed for Health Science students is intended to help students harmonize concepts previously learnt from secondary school. It should provide general introduction to the diversity of organisms and their characteristics.

CHEM 101/102  General Chemistry I, (3 Credits), II (3 Credits)
These Courses are as presented in the university Bulletin and taught in the department of Basic and Applied Sciences.
PHSY 101       General Physics I       (3 Credits)
These Courses are as presented in the university Bulletin and taught in the department of Basic and Applied Sciences. (3 units per semester)

PHSC 201       Biostatistics       (2 Credits)
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.

PHSC 204       Introduction to The Principles of Epidemiology and Disease Surveillance       (3 Credits)
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.

PHSC 205       International Health       (1 Credit)
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.

PHSC 206       Health Anthropology       (2 Credits)
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 behavioral models to clarify topical anthropological issues and situations.

PHSC 207 Psychological Foundations of Health Behavior, Health Education And Change Process (3 Credits)
The course focuses on the theories of individual behavior 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 behavior models are presented to illustrate issues and situations and to clarify specific psychological behavioral actions. Specific examples are cited so that the student’s will acquired a good understanding of behavior dynamics. Such specific examples motivate the student to design behavioral model-based intervention strategies. In addition the course highlights concepts relevant to group behavior (small & large) at difference stages of their developments and outcomes. Laboratory sessions are utilized to mimic roles of individuals or groups. Behavioral science theories are cited to explain the dynamics of these processes.

PHSC 208 Field Work I (3 Credits)
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.

PHSC 209 Anatomy II (3 Credits)
This course continues to build on NRSG112 by briefly reviewing the structure of the kidneys including the microstructures enabling an understanding of the functions of the kidneys to be studied. 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.

PHSC 210 Physiology II (3 Credits)
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.

**PHSC 211  Introduction to Cell Biochemistry  (3 Credits)**
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.

**PHSC 214  Seminars in Public Health I  (1 Credit)**
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.

**PHSC 213  Developmental Psychology  (2 Credits)**
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.

**PHSC 301  Applied Epidemiology  (2 Credits)**
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.

**PHSC 302  Principles of Health Education, Information, Communication (IEC) & Counseling (2 Credits)**

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 counseling 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 counseling strategies in planning and evaluating communication aspect of health programs.

**PHSC 303  Health Programme Planning and Evaluation (2 Credits)**

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.

**PHSC 304  Demography and Social Statistics in Public Health (2 Credits)**

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 present the descriptive statistics and graphics with reports writing and submitted on assigned projects.

**PHSC 305  Environmental Health (2 Credits)**

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.
PHSC 306  Family Health and Human Reproductive Health (2 Credits)
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.

PHSC 307/308 Field Work II, III (Community Health Practicum) (3 Credits)
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.

PHSC 309/310 Seminars In Public Health II (1 Credit) III (1 Credit)
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)

Health Problems of Special Groups (Adolescents, Aged and Adults) (2 Credits)
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

PHSC 312 Public Health Nutrition (2 Credits)
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.

**PHSC 313  School Health Education  (3 Credits)**
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.

**PHSC 314  Occupational Health  (2 Credits)**
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.

**PHSC 315  Community Mental Health  (2 Credits)**
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.

**PHSC 316  Research Methodology  (2 Credits)**
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.

**PHSC 317 Public Health Microbiology and Parasitology (3 Credits)**

The Course covers the study of the characteristics and identification of microorganism’s 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 favoring 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.

**PHSC 401 Health Systems Management (2 Credits)**

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.

**PHSC 402 Training Methods (2 Credits)**

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 ahead 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.

PHSC 403 Health Sociology/Anthropology (2 Credits)
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.

PHSC 404 Communication For Health And Media Technology (2 Credits)
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.

PHSC 405 Seminars in Public Health IV (1 Credit)
The students would have the opportunity to prepare and present reports of fieldwork at seminars organized 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.

PHSC 406 Principle of Pharmacology, Therapeutics and Substance Abuse (2 Units)
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.
PHSC 407  Contemporary Issues in Public Health  (3 Credits)
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.

PHSC 408  Field Work Iv (Community Health Practicum)  (3Credits)
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 lecturers 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.

PHSC 490  Internship  (8 Credits)
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 an 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, students 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.
PHSC 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.

SPECIAL TOPICS

PHSC 408 Public Health Information, Education and Communication (1 Credit)

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) Behavioral 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.

PHSC 409   Epidemiology, Disease Control and Surveillance (1 Credit)

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.

PHSC 410   Environmental Health/Occupational Health (1 Credit)

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.
PHSC 411  Human Nutrition (1 Credit)

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.

PHSC 412  Health Systems, Planning, Management & Administration (1 Credit)

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.

PHSC 413  Community/Family and Reproductive Health (1 Credit)

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.

PHSC 407 Field Work Iv (Community Health Practicum) (3 Units)

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 facilities levels. The students are to produce reports on health systems research based on their experiences at different levels of activities more
community development involving students in specialized areas of community needs. (3 units per semester
2.10  RADIOGRAPHY AND RADIATION SCIENCES (B. Sc Radiography and Radiation)

2.10.1 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 fulfill the following objectives:

To prepare students with sufficient theoretical scientific knowledge base and practical skills that enable them assume professional positions as radiographers/medical imaging scientist who can use the most complex medical imaging equipment and procedures.

To develop in students the relevant practical and technological competence in radiography practice at primary, secondary and tertiary levels of healthcare.

To assist students in the development of interpersonal skills necessary to function as members of the health team.

To develop in students a high level of proficiency in conventional radiography and a good working knowledge of other imaging modalities (viz medical ultrasound, C.T., MRI) and radiotherapeutic procedures.

To prepare students with sufficient knowledge and analytical skills that equip them for further studies, research development/modification of medical imaging techniques for the diagnosis and treatment of diseases.

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.

To develop in students the spirit of entrepreneurship so that on graduation, they can cope with self employment
2.10.2 Admission and Graduation Requirements

UME: In addition to the general admission requirements, candidates with Diploma Certificate in Radiography with five credits at “O” Level or Senior Secondary School Certificate (SSCE) can be considered for direct entry. The programme will be a five-year course leading to the award of a Bachelor of Science (B.Sc.) Radiography and Radiation. The Radiography and Radiation Science programme will be located with the Faculty of Medicine or Health Science.

Direct Entry
As in General Entry requirements.

2.10.3 Learning Outcome

a) Regime of Subject Knowledge

It is expected that all programme will ensure that students become conversant with the following main aspect of medical radiography and other imaging modalities:
Fundamentals, terminologies, nomenclature, basic concepts and units in physics up to first year level in the university (A’ level equivalent) including elements of modern physics and practicals viz: General Biology and principles of chemistry up to first year level including relevant practicals.
Good acquisition of both written and oral communication skills in English Language sufficient so ensure effective and functional communication required.
Mathematical methods – up to 100 level mathematics course
Elements of humanities that ensure well rounded education
Basic medical sciences including Gross Anatomy, Physiology, Biochemistry and relevant practical courses.
Simple nursing procedures and patient observation.
Hospital practice principles and care of patients. Medicolegal issues
Psychology in ill-health and applications in patient care
Radiation Physics, Bioeffects, Protection and its management
Good knowledge of principles and instrumentation of varieties of an X-ray imaging equipment.
Knowledge, appreciation and operation of other imaging equipment, including U/S, C.T., MRI, DF and Thermography.
Image formation theories, processing, storage and retrieval.
Image receptor, accessories, characteristics, management and quality control.
Basic pathology, corresponding radiographic/imaging appearances and their recognition.
General Radiographic Techniques, special/contrast techniques.
Simple procedures in ultrasound scan i.e. general abdominal and pelvic
scans. Pharmacology of contrast agents, principles of administration and possible reaction.
Community Health and Biostatistics
Principles of research and application to medical imaging
Oncology and principles of radiotherapy.

b) Competencies and Skills

At bachelor degree level Radiography (medical imaging science) students are expected to develop the following cognitive and practical skills and abilities in Radiography.

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 medical imaging sciences.

Abilities to apply such knowledge and understanding in the interpretation, planning, implementation and evaluation of medical imaging investigation.

Abilities to recognize medical imaging problems and plan strategies for their solution including modifications and development of technique.

Computation and data processing skills relating to medical imaging (C.T.; U/S/, MRI and DF) and information management.

Skill in presentation of scientific materials and arguments clearly, currently in writing and orally to a range of audiences.

c) Behavioural Skills

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

2.10.4 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.

2.10.5 Resources Requirements for Teaching and Learning

The Universities shall ensure the provision of adequate human, physical, equipments 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 1:10 in the programme. Professionally qualified radiographers with higher degrees in radiography and/or related disciplines are accepted as academic staff. However, qualified professionals can be employed on part-time basis as Radiographic Instructor.

The non-academic staff/student ratio should be 50% of the academic staff and of the right mix according to NUC guidelines.

b) Academic and Non-Academic Spaces

Universities should provide accommodation for Radiography students. Accommodation should be provided for student Radiographers during clinical posting, within the hospital premises.

Lecture rooms: In addition to lecture rooms shared with other Departments in Medical Schools e.g. anatomy, Biochemistry, etc. there should be at least one lecture room within the Department.

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:
* Lead rubber shields, lead gloves, gonadal shields
* Lead Aprons, wedged lead.
* Dosimetry equipment

(viii) Equipment for care of patient
(ix) An ultrasound unit with a linear/sector transducers

Physics/Equipment Laboratory: This should have image intensifiers, X-ray tubes, cathode ray tubes, moving coil meters, ammeters, 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 Radiographers Registration Board.

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.

2.10.6 **Course Contents and Descriptions**

**ANATOMY**

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<th>SUBJECT DESCRIPTION</th>
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## YEAR 2

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<td>PHYS 201</td>
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<td>RAD 202</td>
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### SEMESTER II

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## YEAR 3

### 1ST SEMESTER

<table>
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<tr>
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<tbody>
<tr>
<td>ANA 301</td>
<td>Gross Anatomy II Head and Neck</td>
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<tr>
<td>ANA 302</td>
<td>Embryology – General</td>
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<tr>
<td>PHS 301</td>
<td>Endocrinology/Reproduction</td>
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<tr>
<td>PHS 302</td>
<td>Nerves, Muscles, CNS</td>
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<tr>
<td>RAD 301</td>
<td>Radiographic Anatomy 1</td>
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<tr>
<td>RAD 303</td>
<td>Radiobiology/Radiation Protection</td>
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RAD 311  Radiographic Technique 1  3

2ND SEMESTER

RAD 312  Radiographic Technique 11  3
RAD 321  Radiographic Imaging 1  3
RAD 331  Radiographic Equipment 1  3
PAT 301  General Pathology  3
RAD 341  Clinical Posting 1  4
RAD 302  Radiographic Anatomy 11  2

YEAR 4
1ST SEMESTER

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<tr>
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<tr>
<td>RAD 401</td>
<td>Radiological Health Management</td>
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<tr>
<td>RAD 402</td>
<td>Biostatistics</td>
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<td>RAD 411</td>
<td>Radiographic Technique 111</td>
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<tr>
<td>RAD 421</td>
<td>Radiographic Imaging 11</td>
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<td>RAD 431</td>
<td>Radiographic Equipment 11</td>
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<td>RAD 441</td>
<td>Clinical Posting 11</td>
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<tr>
<td>RAD 407</td>
<td>Pharmacology</td>
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<td>RAD 451</td>
<td>Other Imaging Modalities 1</td>
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2ND SEMESTER

RAD 403  Community Health  2
RAD 412  Radiographic Technique 1V  3
RAD 422  Radiographic imaging 111  2
RAD 432  Radiographic Equipment 111  2
RAD 442  Clinical Posting 111  5
RAD 452  Other Imaging Modalities 11  2
RAD 409  Research Methods  2

YEAR 5
1ST SEMESTER

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<td>RAD 561</td>
<td>Imaging Critique/pattern recognition</td>
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<td>RAD 511</td>
<td>Radiographic Technique V</td>
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RAD 521 Radiographic Imaging 1V 2
RAD 531 Radiographic Equipment 1V 2
RAD 541 Clinical Posting 1V 6
RAD 551 Radiotherapy/Oncology 2
RAD 502 Seminar 2

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2ND SEMESTER

RAD 512 Radiographic Technique 1V 3
RAD 522 Radiographic Imaging V 2
RAD 532 Radiographic Equipment V 2
RAD 542 Clinical Posting V 6
RAD 552 Radiotherapy/Oncology 11 2
RAD 562 Quality Assurance 2
RAD 503 Project 4

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DESCRIPTION OF THE COURSES

ANA 201 Gross Anatomy I (4 Units)
Upper limb; pectoral regions and mammary gland; axial
and brachial plexuses, Back: deltoid and scapular regions, upper arms, forearm,
hand-bones and joints

Lower Limb; front and medial side thigh, gluteal region, back of the thigh and
popluteal fossa, leg, sole of foot, bones and joints, Regional anatomy, surface
Anatomy, Applied and Radiological anatomy of Upper Limb and Lower Limb.

ANA 202 Gross Anatomy II (4 Units)
Thorax and Abdomen, Thoracic wall, pleura, lungs, mediastinum and
diaphragm. Abdomen, anterior abdominal wall and herniae-external genitalia-
peritoneum, stomach and intestines, blood supply, Gut, Liver, Pancreas, Spleen,
Kidneys and suprarenals

Pelvis-male: and female perineum-pelvic walls and floor, pelvic peritoneum,
viscera, nerves and vessels. Regional anatomy, Surface Anatomy, Radiological
Anatomy.

ANA 301 Gross Anatomy III (2 Units)
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,
prevertebral region and joints of neck, mouth and tongue, pharynx and palatonasal cavity and sinuses, larynx ear and eye.


**ANA 205 Genetics:** (1 Unit)

**ANA 203 Embryology I:** (1 Unit)
General Embryology, gametogenesis, cyclic changes in the female genital tract, fertilization, cleavage, blastocyst, gastrulation and formation of germ layers, segmentation of mesoderms, folding of Embryofetal membranes, umbilical cord and placentation and development of limbs, and teratology.

Development anomalies, clinical syndromes.

**ANA 204 Embryology II:** (2 Units)
Development aspects of cardiovascular system. Integumentary system, Respiratory system, Digestive system and Urogenital system, development anomalies, clinical syndromes.

**ANA 302 Embryology III:** (1 Unit)
Development of the face and pharyngeal derivatives and teratology and development of nervous systems, sense organs, development anomalies and clinical syndromes.

**PHYSIOLOGY**

**PHS 201 General Principles of physiology, Blood and Body Fluids (1 Unit)**
Introductory and general principles of physiology, Homeostasis, physiological variations, Cell Physiology Membrane potentials, and body Fluids, Excitable tissues and the Autonomic System, Blood composition, Properties, Function; Production and Fate. Clinical applications.
PHS 202  
**Cardiovascular and Respiratory Physiology** (2 Units)
Cardio Vascular system – The heart, vascular system, function in health and disease; Respiratory Physiology – Physiological Anatomy, Lung Volumes, Breathing gas exchange, and base balance Adaptation to abnormal environments, Metabolic rate and temperature regulations.

PHS 203  
**Gastroenterology and Renal Physiology** (2 Units)

PHS 301  
**Endocrinology and Reproductive Physiology** (2 Units)
Integrative functions, function and malfunction of Hypothalamo-pituitary connections, Thyroid, Adrenal, Pancreatic, Parathyroid, and other hormones with clinical significance; Reproduction – Male and Female reproductive organs, Nervous Coordination, Sexual Hormone, Pregnancy, Lactation and Contraception.

PHS 302  
**Nerve, Muscle, Central Nervous System and Special Senses** (2 Units)

BCM 202  
**Biochemistry** (2 Units)
PHY 201  Basic Physics In Radiology/Radiation Physics (3 Units)
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, Electromagnetron; Electromagnetic induction, Mutual and Self induction; principles and construction of the transformer; 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; Botir’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 202  Hospital Practice and Basic Patient Care (1 Unit)

RAD 203  Psychology for Radiography (1 Unit)
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 303  Radiobiology/Radiation Protection and Dosimetry (3 Units)
PAT 301  General Pathology (3 Units)

RAD 311  Radiography Techniques I (3 Units)
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:

a) Fingers, thumb, hand, etc.
b) Shoulder girdle and thorax

RAD 341  Clinical Posting I (4 Units)
Students should attend clinical posting at designated hospitals 12 hours per week 2 days release.

RAD 312  Radiographic Technique II (3 Units)
Radiographic technique for lower limb, pelvic girdle and Hip. Vertebral column, including cervical, cervicothoracic, thoracic thoracolumbar etc.

RAD 321  Radiographic Imaging I (3 Units)

RAD 331  Radiographic Equipment I (3 Units)
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 301  Radiographic Anatomy I (2 Units)
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)
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 411 Radiographic Techniques III (3 Units)
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)
The contrast examination of the gastrointestinal system, excretory system, obstetrics and gynecological examinations. Also, sialography, Dacryocystography, arthography. Nyelography, Mammography, operating theatre techniques.

RAD 403 Community Health (2 Units)

RAD 431 Radiographic Equipment II (2 Units)

RAD 432 Radiographic Equipment III (2 Units)

RAD 421 Radiographic Imaging II (2 Units)

RAD 422 Radiographic Imaging III (2 Units)

RAD 442 Clinical Posting II and III (5 Units)
Students should attend clinical posting at designated Radiology Department or Imaging Department 15 hours per week.
RAD 451 Other Imaging Modalities I (2 Units)
Computerized Tomography, Ultrasound, instrumentation. Basic Scanning techniques, Patient care, safety Precautions Hazards and protection.

RAD 452 Other Imaging Modalities I (2 Units)

RAD 407 Pharmacology (1 Unit)
Origin and sources of Drugs; Routes of Administration of Drugs; Pharmacokinetics; Absorption of Drugs; Excretion of Drug; Drug Toxicity. Adverse drug Reactions; Drug Interactions; Chlinergic 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 401 Radiological Health Management (2 Units)

RAD 402 Biostatistics (2 Units)

RAD 409 Research Methodology (2 Units)
RAD 511  Radiographic Technique V (3 Units)
Other contrast examinations, arterography venography, Bronchography ventriculography, Encephalography, Sinography. Fistulography Ward radiography.

RAD 512  Radiographic Technique VI (3 Units)
Geriatric/Paediatric Radiography, Principles of Tomography, Macro radiography Xeroradiography, Digital Imaging.

RAD 532  Radiographic Equipment V (2 Units)
Practical and “Trouble shooting” knowledge based on all the courses in Radiographic Equipment.

RAD 521  Radiographic Imaging IV (2 Units)
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. Substraction techniques.

RAD 522  Radiographic Imaging V (2 Units)
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 541  Clinical Posting IV (6 Units)
Students attend posting in accredited and designated Hospitals with adequately equipped imaging department 19 hours per week.

RAD 542  Clinical Posting V (6 Units)
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)

RAD 552  Radiotherapy/Oncology II (2 Units)
RAD 561 Image Critique/Pattern Recognition (1 Unit)
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 502 Seminar (2 Units)
Presentation of a paper by each student on an approved topic to a Departmental colloquium.

RAD 503 Project (4 Units)
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 and approved supervisor.

RAD 562 Quality Assurance (2 Units)
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.
APPENDICES

PHYSICAL FACILITIES: MINIMUM PHYSICAL FACILITIES FOR AND EQUIPMENT REQUIRED

3.1 Gross Anatomy

1 Embalmed Bodies – 1 Cadaver per 8 Students
2 Equipment Trolleys (3)
3 Electric Embalming Machine (1)
4 Bone Equipment – Electric Saw/Drill (1)
5 Articulated and Unarticulated Skeletons
6 X-Ray Viewing Machine (10)

3.2 Histology

1 Microscope (2) – Rotary/Sledge
2 Microtome Knives (3)
3 Microtome knife sharpener (1)
4 Binocular Light Microscopes – 1 per 2 students
5 Vacuum Pump (1)
6 Cryostat with Microtome (1)
7 Automatic Tissue Processor (1)
8 Microscope Slide Projector (1)
9 Overhead Projector (1)

3.3 Embryology

1 Models and Charts
2 Slides of Sections
3 Slide Projector

3.4 Biochemistry

1 Centrifuge – Clural - 6
2 Ultracentrifuge - 2
3 Electronic Balances - 2
4 Heating Block - 8
5 Vacuum Pumps - 2
6 Spectrophotometer - 1 per 20
7 Ph. Meters - 1 per 20
8 Thermostatic Water Bath
9 Oven - 1
10 Gas Chromatography - 1
11 Liquid Chromatograph - 1
12 Electrophoresis - Disc - 2
13 Flame Photometer
14 Water Distiller

3.5 **Physiology**

1. Spirometers - 1 per 20 students
2. Vitalograph - 1 per 20 students
3. Peak Flowmeter - 1 per 20 students
4. Gas Meter - 2
5. ECG Machines - 4
6. Spectrophotometers - 1 per 20 students
7. Physiograph Recorders Traunducers - 1 per 20 students
8. Oscilloscopes - 4
9. Centrifuges - 6
11. Audiometer - 2
12. Geiger Counter

3.6 **Haematology/Blood Transfusion Sciences**

Autoanalyzers - 2
Microscopes - 1 per 2 students
Waterbath - 1 per 10 students
Haematocrit centrifuge - 1 per 4 students
Electrophoresis tank and power pack - 1 per 4 students
Colorimeters - 1 per 4 students
Bench centrifuges - 1 per 10 students
Balance - 1 per 10 students
Neubur counting chamber - 1 per 4 students
PH meter - 1 per 4 students

3.7 **Microbiology**

Student microscopes - 1 per 2 students
Fluorescent microscope - 1 per 10 students
Magnifying lens - 1 per student
Centrifuges - 1 per 10 students
Incubators - (3)
Anaerobic culture jars - (4)
Membrane/sietz filters - (4)
Metter balance - (4)
Autoclaves - (2)
Deioniser - (2)
3.8 Clinical Chemistry

Electronic balance - (2)
Spectrophotometer - 1 per 20 students
PH. Meters - 1 per 20 students
Atomic absorption spectrophotometer - (2)
Autoanalyzers - (2)
Colorimeters - (6)
Flame Photometer - (2)
Water distiller - (2)
Gas, liquid, TLC chromatographs - (3 each)
Vacuum pumps - (2)
Rotary evaporator - (2)
Centrifuge - (2)

3.9 Histopathology

Microtome - 2 Rotary/sledge
Microtome knives - (3)
Light microscopes - 1 per 2 students
Dissecting microscopes - (3)
Slides of sections/slide projector - (1)
Cryostat with microtome - (1)

3.10 Laboratory Equipment

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

3.11 **Low Vision Rehabilitative Lab.**

1. Law 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

3.12 **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 Scree - 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

3.13 **Contact Lens Laboratories**

1. Hard Contact Lens Set - 1
2. Hard Contact Lens Solutions Pack - 30
3. Soft Contact Lens Solutions Pack - 30
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

### 3.14 Ocular Anatomy Lab.

1. Dissection kits - 5
2. Plastic Human Skulls - 5
3. Microscopes - 4
4. Prepared assorted Slides for Histologic Studies - 10
5. Bovine Eyes (consumable) - 20
6. Refrigerator - 1

### 3.15 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 Equipments: Central - 2
   Peripheral - 2
8. Tomometers Indentation - 2
   Applanation - 2
9. Acuity Charts Near - 4
   Distance - 4
10. Archer – Elliot Distance VA Cabinet - 4

### 3.16 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
   Applanation - 5
   Non-contact - 2
9. Acuity Charts - 4
   (Near and Distance) – Illiterate (Snellen) - 3
   Non Illiterate (Snellen) - 3
<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>Children - Low Vision</td>
<td>3</td>
</tr>
<tr>
<td>10. Archer Elliot Distance V.A. Cabinet</td>
<td>10</td>
</tr>
<tr>
<td>11. Low Vision Diagnostic Kit</td>
<td>3</td>
</tr>
<tr>
<td>12. Contact Lens Trial Sets (Hard) Soft</td>
<td>4</td>
</tr>
<tr>
<td>13. Hand Held Maddox Rod</td>
<td>6</td>
</tr>
<tr>
<td>14. IPD Rule</td>
<td>10</td>
</tr>
<tr>
<td>15. Hydraulic Chairs for Phoropters</td>
<td>10</td>
</tr>
<tr>
<td>16. Synoptophores</td>
<td>2</td>
</tr>
<tr>
<td>17. Grades I,II,III Targets each</td>
<td>2 Sets</td>
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<tr>
<td>18. Lenses (consumables)</td>
<td>250</td>
</tr>
<tr>
<td>19. Frames (consumables)</td>
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</tr>
<tr>
<td>20. Diagnostic Drugs (consumables)</td>
<td>50</td>
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<tr>
<td>21. Binocular Indirect ophtalmoscope</td>
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3.17 Ophthalmic Laboratory

<table>
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<th>Item</th>
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<tbody>
<tr>
<td>1. Edgers</td>
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<tr>
<td>2. Bead Heaters</td>
<td>2</td>
</tr>
<tr>
<td>3. Formers</td>
<td>100</td>
</tr>
<tr>
<td>4. Lensometer</td>
<td>2</td>
</tr>
<tr>
<td>5. Pattern Markers</td>
<td>5</td>
</tr>
<tr>
<td>6. Surfacing Machines</td>
<td>5</td>
</tr>
<tr>
<td>7. Frames (consumables)</td>
<td>200</td>
</tr>
<tr>
<td>8. Lenses (consumables) pairs</td>
<td>200</td>
</tr>
<tr>
<td>9. IPD Rule</td>
<td>10</td>
</tr>
<tr>
<td>10. Layout Card</td>
<td>10</td>
</tr>
<tr>
<td>11. Indian Ink (bottles) (consumables)</td>
<td>10</td>
</tr>
</tbody>
</table>

3.18 Physiology

a) Polygraphs
b) Physiographs
c) Jackerted Organ baths
d) 2 Channel recorder
e) Sarturiom balance
f) Balances weighing
g) Assorted Glasswaves/Pippef
h) Spectronic 20
i) Spectro photometer
j) Soxhlet Extractors
k) Animal cages
l) Deep Freezer  
m) Refrigerators  
n) Microscopes  
o) PH Meters  
p) Colorimeter  
q) Bench Centrifuges  
r) Waterbath  
s) Audio Visual equipment  
t) Overhead Projector  
u) Water Distillers  
v) Transducers  
w) Flame Photometer  
x) High Performance liquid chromatograph (optional)  
y) Gas chromatographic (optional)  
z) Oven  
aa) Deionizer

3.19 **Equipment**

1. Student stimulators 1 per 20 students  
2. Student kymograph 1 per 20 students  
3. Transducers 1 per 20 students  
4. Spirometers 1 per 20 students  
5. Vitalograph 1 per 20 students  
6. Peak flow meters 1 per 20 students  
7. ECG machines 4 per lab.  
8. Spectrophotometers 1 per 20 students  
9. Oscilloscopes 4 per lab.  
10. Centrifuges 6 per lab.  
11. Haematocrit Centrifuges 5 per lab.  
12. Haemotocrit readers 20 per lab.  
13. Audiometers 2 per lab.  
14. Water bath (with shaker) 2 per lab.  
15. Flame photometer 1 per lab.  
16. Water distiller 1 per lab.  
17. Geiger counter 1 per lab.  
18. Blood gas analysers 1 per lab.  
19. An array of test tubes, racks, etc.  
20. Consumable chemical reagents  
21. Antisera for blood typing, etc.
3.20 Physiotherapy

A. Electrotherapy Equipment

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Minimum Quantity</th>
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<tbody>
<tr>
<td>Short Wave Diathermy machine and appropriate Electrodes.</td>
<td>1</td>
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<tr>
<td>Infra-Red Lamps</td>
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</tr>
<tr>
<td>Luminous</td>
<td>3</td>
</tr>
<tr>
<td>Non-luminous,</td>
<td>3</td>
</tr>
<tr>
<td>Tunnel Baths.</td>
<td>3</td>
</tr>
<tr>
<td>Microwave Therapy machines and appropriate treatment units.</td>
<td>1</td>
</tr>
<tr>
<td>Therapeutic Ultrasound machines with appropriate Treatments heads.</td>
<td>2</td>
</tr>
<tr>
<td>Wax Baths (Hand and Foot) with extra unused Wax.</td>
<td>2</td>
</tr>
<tr>
<td>Electrical Stimulators for Nerves and Muscles and appropriate electrodes.</td>
<td>2</td>
</tr>
<tr>
<td>Laser Therapy Units</td>
<td>1</td>
</tr>
<tr>
<td>Interferential Therapists Units with appropriate electrodes.</td>
<td>1</td>
</tr>
<tr>
<td>Transcutaneous Electrical Nerve Stimulators (TENS) (Single and Dual Channels)</td>
<td>2</td>
</tr>
<tr>
<td>Ultraviolet Lamps (Water and Air cooled)</td>
<td>1</td>
</tr>
<tr>
<td>Hydropack Therapy Units with various sizes of packs.</td>
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</table>

B. Hydrotherapy and Cryotherapy

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Minimum Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrotherapy Pool</td>
<td>1</td>
</tr>
<tr>
<td>Cold and Hot pack units</td>
<td>4</td>
</tr>
<tr>
<td>Deep Freezer/ Ice making machines</td>
<td>1</td>
</tr>
<tr>
<td>Hydrotherapy treatments baths of various sizes</td>
<td>1 EACH</td>
</tr>
<tr>
<td>Hydrotherapy treatments tanks of various sizes</td>
<td>1 EACH</td>
</tr>
<tr>
<td>Vapo coolant spray and gels.</td>
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</tr>
</tbody>
</table>

C. Exercise Therapy

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Minimum Quantity</th>
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<tr>
<td>Functional R e-Education</td>
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<tr>
<td>Assisted Exercises</td>
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<tr>
<td>Resisted Exercises</td>
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<tr>
<td>Mobilization Exercises</td>
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<tr>
<td>Co-ordination and Balance training</td>
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<tr>
<td>Bicycle Ergometers</td>
<td>2</td>
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<tr>
<td>Treadmills</td>
<td>2</td>
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<tr>
<td>Multigym</td>
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</table>
D. **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

E. **Prosthetics and Orthotics**

Facilities for fabricating of 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 exist in a Teaching Hospital:

i) Department or 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.
<table>
<thead>
<tr>
<th>Item</th>
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<tr>
<td>Pillows</td>
<td>12</td>
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<tr>
<td>Unisex Adult Dummy</td>
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<td>Dolls</td>
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<td>Bedside Lockers</td>
<td>4</td>
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<tr>
<td>Bed Tables</td>
<td>4</td>
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<tr>
<td>Sandbags</td>
<td>4</td>
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<td>Back Rest</td>
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<td>Bed Blocks</td>
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<tr>
<td>Drip Stand</td>
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<tr>
<td>Air Rings</td>
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<td>Oxygen Cylinder and Accessories with Carrier</td>
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<td>Pedal Bin</td>
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<td>Bed Screens</td>
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<td>Bed Pans</td>
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<td>Urinals</td>
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<td>Small Sterilizing Drums</td>
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<tr>
<td>Trolleys: Medicine Trolley</td>
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<tr>
<td>Dressing Trolley</td>
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<tr>
<td>Long Multipurpose Trolley</td>
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<td>Bowls: Small with Cover (Stainless)</td>
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<tr>
<td>Medium with Cover</td>
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<td>Medium without Cover</td>
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<tr>
<td>Large with Cover</td>
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<td>Plastic Bowls: Various Sizes</td>
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<td>Kidney Dishes: Small with Cover (Stainless Steel)</td>
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<td>Item</td>
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<td>Depezzer Catheter</td>
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<td>Nasal Catheter</td>
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<tr>
<td>Ryle’s Tube</td>
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<tr>
<td>Cannula (Various Sizes)</td>
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<td>Ceramic Mortal and Piston</td>
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<tr>
<td>Wash Hand Basin with Stand</td>
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<tr>
<td>Angle Poise Lamp</td>
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<td>Undine Lamp</td>
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<td>Patella Hammer</td>
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<tr>
<td>Tuning Fork</td>
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**FURNITURE:**

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<td>Stackable Chairs</td>
<td>25</td>
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<td>Linen Cupboard</td>
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<tr>
<td>Medicine Cupboard</td>
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<tr>
<td>D D A Cupboard</td>
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<tr>
<td>Lotion Cupboard</td>
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<tr>
<td>Instrument Cupboard</td>
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<td>Equipment Cupboard</td>
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**LINEN:**

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<td>Draw Sheets</td>
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<td>Counterpanes</td>
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<td>Blankets</td>
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<td>Item</td>
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<td>Pillow Cover</td>
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<td>Long Machintosh</td>
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<td>Treatment Machintosh</td>
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<tr>
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<tr>
<td>Patients Gowns - Male</td>
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<td>Patients Gowns - Female</td>
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<tr>
<td>Pyjamas</td>
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<td>Theatre Gowns</td>
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<td>Face Flannels</td>
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<td>Bath Towels</td>
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<td>Hand Towels</td>
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<td>Medicine Towels</td>
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**CONSUMABLES:**

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<tr>
<td>Surgical Blades (Different Sizes)</td>
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<tr>
<td>Spigots (Different Sizes)</td>
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<td>Plain Bandage</td>
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<td>Crepe Bandage</td>
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<td>Abdominal Bandages</td>
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<tr>
<td>Triangular Bandages</td>
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<tr>
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<tr>
<td>Gauze</td>
<td>2 Rolls at a time</td>
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<tr>
<td>Cotton Wool</td>
<td>1 Roll at a time</td>
</tr>
<tr>
<td>Plaster</td>
<td>1 Roll at a time</td>
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<tr>
<td>Stockinet</td>
<td>2 Dozens</td>
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<tr>
<td>Plaster of Paris</td>
<td>1 tin at a time</td>
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<tr>
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<td>2 Packets</td>
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<tr>
<td>Surgical Gloves</td>
<td>2 Packets</td>
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<tr>
<td>Finger Stalls (Different Sizes)</td>
<td>2 Dozens</td>
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<td>Face Mark</td>
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<td>Oxygen Mark</td>
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<tr>
<td>Infusion Set</td>
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<tr>
<td>Transfusion Set</td>
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<tr>
<td>Injection Syringes and Needles (All Sizes)</td>
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<tr>
<td>Scalp Vein Needles</td>
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Antiseptics and Disinfectants e.g.  
- Savlon  
- Izal  
- Dettol  
- Aciflavin  
- Methylated Spirit  
- Hibitane  
- Eusol  
- Hydrogen Peroxide  
- Magnesium Sulphate  
- Gentian Violet  
- Benedicts Solution  
1 Bottle each

Mouth Wash 1 Bottle
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
Acetest Tablets 2 Bottles
Clinistix Strips 1 Pack
Albustix Strips 1 Pack
Urine Bags 6
Colostomy Bags 4

**TREATMENT SHEETS;**

- Medication Sheets
- Post Operative Observation Sheets
- Fluid Intake and Output Sheets
- Vital Signs Sheets
- Kardex
- Nursing Care Plan Sheets
- Anaesthetic Chart
- Consent Forms Stock As Required
- Outpatient Folders
- Diabetic Chart
- Neurological Observations
- Admission Forms
- Laboratory Forms
- X-Ray Forms
- Nursing Care Plan Formats
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

FOOD STUFF:
Rice
Beans )
Milk ) Stock As Required
Etc. )

DRUGS:
Vitamins )
Analgesics )
Antibiotics )
Sedatives ) Stock As Required
Laxative )
Intravenous Infusion )
e.g. Dextrose in various Percentages )
Normal Saline )

AUDIO-VISUAL AIDS:
Chalkboard/White Board 1
Chal
Flip Chart and Accessories 1
Models
Overhead Projector and Accessories 1
Slides/Slide Projector & Accessories 1
VCD Cassette Player & Accessories 1
Educational Videos 1
Television 2
Computer & Accessories 1
Film Projector 1
Camera 1
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<td>Delivery Bag</td>
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<td>Vacuum Extractor</td>
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<td>Measuring Tape</td>
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<td>Ruler</td>
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<tr>
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<td>Episotomy Scissors</td>
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<td>Disposable Aprons</td>
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<tr>
<td>Plastic Baby Bath Sets</td>
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<td>Baby Powder</td>
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<td>Towels</td>
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<td>Baby Napkins</td>
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<td>Dresses</td>
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<td>Perineal Models</td>
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<tr>
<td>Anatomical Charts</td>
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<td>Midwefery Models e.g. Perineum</td>
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<tr>
<td>Reproductive System</td>
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<td>Pelvis</td>
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<td>Foetal Skull</td>
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<td>Placenta</td>
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<td>Foetal Stethoscope</td>
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<td>Vulsceallum Forceps</td>
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<tr>
<td>Pelvimeter</td>
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<tr>
<td>Vagina Wall/Cervix Retractors</td>
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</tr>
<tr>
<td>Baby Scale</td>
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<tr>
<td>Height Scale</td>
<td>1</td>
</tr>
<tr>
<td>Uterine Sound</td>
<td>1</td>
</tr>
<tr>
<td>Balley’s Vagina Speculum</td>
<td>2</td>
</tr>
<tr>
<td>Cusus Vaginal Speculum</td>
<td>5</td>
</tr>
</tbody>
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3.22 Laboratory Sciences

1. Spectrophotometers
2. Audiometer
3. Centrifuge
4. Audiometer
5. Geiger Counter
6. Water Baths
7. Electronic Weighting Balance
8. Micro Centrifuge
9. Water Distiller
10. Student Microscopes
11. Research Microscope
12. Teaching Microscope and Camera
13. Magnifying lens
14. Centrifuges
15. Deep Freezer
16. Water baths
17. Incubators
18. Proteinmeter Standards
19. Various types of laboratory agents and culture media
20. Heamatocrit centrifuge
21. Electrophorsonresis tank and power pack
22. Bench Centrifuge
23. Balance
24. Neuber Counting Chambers