

**DEPARTMENT OF MEDICAL  
LABORATORY SCIENCE**

**BACHELOR OF MEDICAL LABORATORY SCIENCE  
(BMLS) PROGRAMME**

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## **WELCOME NOTE FROM THE HEAD OF DEPARTMENT**

I sincerely wish to welcome all of you to the Department of Medical Laboratory Science. We are highly excited to be partner with you as you participate in an exciting educational journey of discovery. I would like to extend a warm welcome as you begin what promises to be an exciting journey to a noble profession.

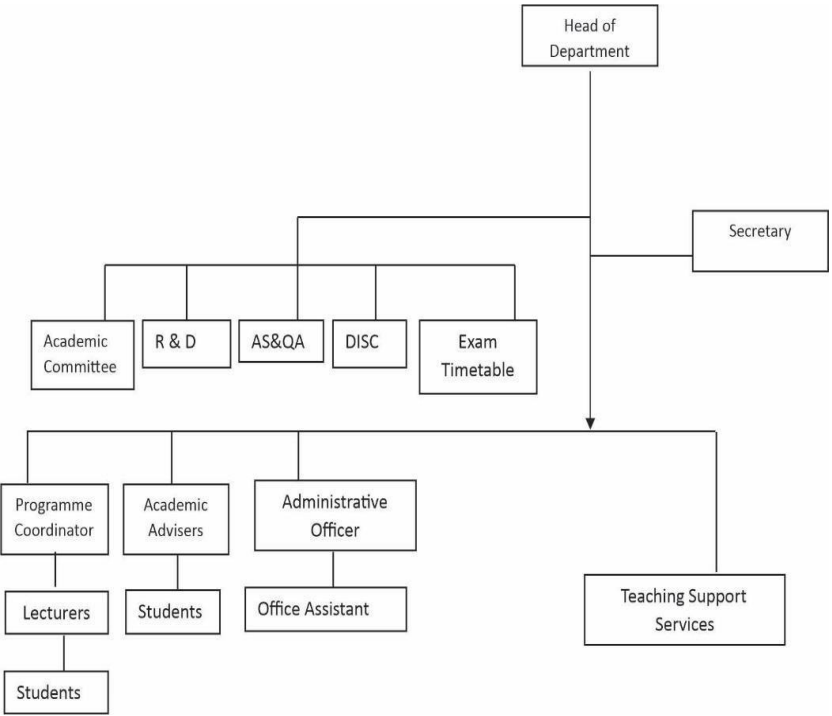
You have made the right choice of University in Trinity University and Department of Medical Laboratory Science. You will be working with a world-class departmental staff dedicated to helping you get the best of university education. You have entered the gateway to a global education that will prepare you to succeed in an increasingly competitive international marketplace. Indeed, you are among a generation studying to acquire world class knowledge. In this department and in the University, you will meet the people who will become your life vision assistants and mentors. Take advantage of the many services available to help you achieve your full potential both on site or online.

All of us at the Department of Medical Laboratory Science and Trinity University at large are strongly committed to supporting your success. In return, we know you will study hard, seek out and respect the opinions of others, enjoy the rich variety of activities that the university has to offer and find the opportunities to give back to your communities. Much of your success in your journey through life will depend on the efforts and the choices you make now. We aim to nurture excellence and provide you with an exceptional learning experience that will enable you to become an independent thinker.

I am confident that your time in Trinity University and Medical Laboratory Science Department will be full of rewarding experiences. Thank you for being a special member of the Department of Medical Laboratory Science.

***Dr. (Mrs.) R. M. Kolawole***

# ADMINISTRATIVE STRUCTURE OF THE DEPARTMENT



## LIST OF ACADEMIC STAFF

S/N	NAME OF STAFF	RANK DESIGNATION SALARY SCALE, DATE OF FIRST APPOINTMENT	F/T	QUALIFICATION, DATES OBTAINED, SPECIALISATION, MEMBERSHIP OF PROFESSIONAL ASSOCIATION AND NUMBER OF PUBLICATIONS	POST QUALIFICATION, WORK/TEACHING EXPERIENCE AND DATE, POST HELD AND THE ORGANISATION	COURSE/SUBJECT TAUGHT	GENDER	OTHER RESPONSIBILITIES/INTERE ST IN CURRICULAR AND EXTRA-CURRICULAR ACTIVITIES.
1	Dr. Kolawole R. M.	Ag. HOD/ Senior Lecturer/05 Step 1	FT (Sab batic al)	Ph.D, M.Sc., AMLS, MLSCN/AMLSN, Medical Microbiology	3 years	Medical Microbiology , Mycology and Parasitology	F	Ag.HOD/ 300 Level Course Adviser
2	Dr. Bartholomew Ifionu	Senior Lecturer/05 step 1	FT	Ph.D, M.Sc., FIMLT, AIMLT, MLSCN/AMLSN, Chemical Pathology	6 years	Chemical pathology, Introduction to Medical Laboratory Science and Posting	M	200 Level Adviser
3	Osiagwu Daniel	Lecturer 11/02 step 11	FT	M.Sc. AIMLT	3 years	Histopatholog y/Cytopatholog y	M	400 Level Adviser
4	Mrs. Obiageri Okeoma	LII/02 Step 1	FT	M.Sc., BMS, AMLSN, PGD	1 yr	Haematology/ Chemical pathology	F	100 Level Adviser
5	Prof. M. A. Muhibi	Professor/ 50% of 07 step 1	Visit ing	Ph.D, FWAPCMLS, FMLSCN, M.Sc., PGD, AIMLT	9 years	Haematology and Blood Transfusion Science	M	-
6	Prof. M. F. Olaniyan	Professor/ 50% of 07 step 4	Visit ing	Ph.D, FWAPCMLS, FMLSCN, M.Sc., PGDE, AIMLT, Cert. Imm	14 years	Chemical Pathology and Immunology	M	Consultant
7	Dr. T. Y. Raheem	Reader/50% of 06 step 1	Visit ing	Ph.D, FWAPCMLS, FMLSCN M.Sc., PGD, AIMLT, Cert. Imm	9 years	Medical Microbiology and Immunology	M	

8	Dr. Adesina, Opeyemi	Senior Lecturer1/ 05 step 1	Visit ing	Ph.D (2016), M.Sc. (2009), B.Sc., AIMLT, FMLSCN.	3 years	Haematology and Blood Transfusion Science	F	
9	Dr. Christian Enwuru	Lecturer1/ 04 step 1	FT	Ph.D 2019 M.Sc 2006  AMLS 1999	3 years	Medical Microbiology & Molecular Biology	M	

**LIST OF LABORATORY STAFF**

SN	NAME	QUALIFICATION	AREA OF SPECIALIZATION	RANK	GENDER	EMPLOYMENT STATUS
1	Mr. Emmanuel Fasela	M.Sc. Molecular Diagnostic, FIMLS Haematology, AIMLS Chemical Pathology	Haematology and Chemical Pathology	Chief Medical Laboratory Scientist	M	Full Time.
2	Mr. Samuel Akindele	M.Sc. Medical Microbiology, FMLS Parasitology	Medical Microbiology	Assit. Chief Medical Laboratory Scientist	M	Full Time
3	Mrs. Blessing Adakole	BMLS Histopathology	Histhopatology	Principal Medical Laboratory Scientist	F	Full Time
4	Mr. Christian Isaac Ubi	BMLS Haematology	Haematology	Medical Laboratory Scientist 1	M	Full Time
6	Olaniyan Tolulope Busayo	MLT	NA	Senior Medical Laboratory Technician	F	Full Time
6	Olayode Christopher Olasunkanmi	MLT	NA	Medical Laboratory Technician I	M	Full Time
7	Kareem Titilayo	MLT	NA	Medical Laboratory Technoiaan I	F	Full Time
8	Taiwo Oluwadamilola	MLT	NA	Medical Laboratory Technician I	M	Full Time



## LIST OF ADMINISTRATIVE STAFF

S/N	NAME	RANK	QUALIFICATION	GENDER	EMPLOYMENT STATUS
1	Mr. Sunday Abiola	Assistant Registrar (Faculty Office)	B.Sc. Administration	M	Full Time
2	Miss Alende Lynda	Administrative Officer (Faculty office)	HND, Hospitality and Tourism	F	Full Time
3	Mr. Fatimeyin Ayotunde	Administrative Officer (Departmental Office)	HND, Business Administration	M	Full Time
4	Mrs. Helen Odion	Administrative Assistant (Departmental Office)	ND, Business Administration	F	Full Time

## **INTRODUCTION**

The Medical Laboratory Science Council of Nigeria, which was established by Act. 2003 Cap 114 Laws of the Federation of Nigeria, regulates the practice of Medical Laboratory Science in Nigeria. The science entails the theory and practice involving the analysis of human or animal tissues, body fluids, excretions, production of biologicals, design and fabrication of equipment for the purpose of medical laboratory diagnosis and research. The subject areas include medical microbiology, chemical pathology, haematology, blood transfusion science, virology, histopathology, histochemistry, immunology, cytogenetics, exfoliative cytology, parasitology, forensic science, molecular biology, laboratory management, or any other related subject as may be approved by the Medical Laboratory Science Council of Nigeria and the University Senate. The profession combines the use of scientific instruments and techniques with the application of scientific knowledge in the performance of complex analytical procedures on tissue specimens, blood samples and other body fluids. These diagnostic tests and procedures are carried out by trained health professionals called Medical Laboratory Scientists. The roles of Medical Laboratory Scientists entail, and are not limited to the, diagnosis, prevention of diseases, disease surveillance and health promotion. As a highly skilled and disciplined member of the healthcare team, the Medical Laboratory Scientist is expected to ensure a robust inter-professional relationship and collaborate with other members of the health team. Good professional practice and teamwork should remain the guiding principles of the profession.

The programme of the Department is Bachelor of Medical Laboratory Science (BMLS) being regulated by National Universities Commission (NUC) and by the Medical Laboratory Science Council of Nigeria (MLSCN). The Department operates in the Faculty of Basic Medical Sciences. Students at their first year (100 level ) are trained under the

Faculty of Science in Basic Sciences and Faculty of Arts, Management and Social science in General studies. At the 200 level, students are introduced to Medical Laboratory Science. The third year of the programme marks the beginning of the professional training as students are engaged in the classroom for lectures as well as in the Hospital laboratory for the professional or practical training. At the fourth-year students are taught the basics in all the special areas of Medical Laboratory Science. At the end of 400 level programme, successful students are presented for the First professional examination, where the Medical Laboratory Science Council of Nigeria is expected to be represented by an Assessor or Observer. At the fifth year, students break into 4 core or specialised areas of Medical Laboratory Science, namely: Medical Microbiology, Clinical Pathology, Haematology/Blood Transfusion Science and Histopathology/Histochemistry. At the end of the fifth year, suitable students are presented for Final professional examination, where the Medical Laboratory Science Council of Nigeria is expected to be represented by an Assessor or Observer. Upon the successful completion of the 5-year training, graduates of the programme are inducted and issued a provisional license by the regulatory body. Following a successful induction into the profession, graduate of Medical Laboratory Scientists must also undergo a compulsory internship in any accredited laboratory before they are mobilised for National Youth Corps Scheme.

## **PHILOSOPHY**

The broad philosophy of the Bachelor of Medical Laboratory Science degree programme includes:

- a) Provision of sound academic and professional background for the production of Medical Laboratory

Scientists who would be capable of working anywhere in Nigeria.

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

c) Production of 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 medical laboratory sciences.

## **AIMS AND OBJECTIVES**

- i) To instill in the student a sense of enthusiasm for the profession; an appreciation of its application in different contexts (in areas such as general medicine, food and beverages, pharmaceutical industries, utility departments such as water corporations and research institutions.
- 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, academia 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 specialised areas involving medical sciences.
- vii) To generate in students, an appreciation or the importance of medical laboratory science in an industrial, economic, 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 equipment.
- ix) To also empower graduates of Medical Laboratory Science with skills that will enable them to engage in income yielding ventures i. e. a re-orientation from the ‘take- a job’ mentality to the ‘make-a-job’ mentality.

## **ADMISSION REQUIREMENTS**

### **a. Admission through UTME:**

- i. Candidates must satisfy the minimum University requirements for admission and are therefore to obtain credits in five subjects of English Language,

- Mathematics, Biology, Physics and Chemistry in SSCE or its equivalent in not more than two sittings.
- ii. In addition to the above, the candidate must have an acceptable score in the Unified Tertiary Matriculation Examination (UTME) conducted by JAMB.
- b. Admission by Direct Entry:
- i. Candidates holding three GCE A/L in Biology, Chemistry and Physics plus O/L Credits in five subjects of English Language, Mathematics, Biology, Physics and Chemistry.
  - ii. Medical Laboratory Technician certificate of the Medical Laboratory Science Council of Nigeria
  - iii. Candidate who transfers from other faculties of the University with relevant prerequisites.
  - iv. B.Sc. degree in relevant science disciplines like Zoology, Microbiology, Anatomy, Physiology and Biochemistry,
  - v. HND in Microbiology, Biochemistry and Pharmacology fields as approved by the senate.
- c. Transfer of students from other Universities:**  
Suitability and placement will be determined by the quality of the transcripts as approved by the senate of the University, in line with the guidelines of the professional and academic regulatory bodies

## **COURSE DURATION**

The Bachelor of Medical Laboratory Science degree programme shall run for five (5) years for UTME candidates and four (4) years for direct entry candidates.

## **EVALUATION OF STUDENTS**

Each MLS Course taught in the BMLS Programme at the University may be evaluated for grading with the use of one or several of the following criteria:

- i. Written examinations which include problem solving: -

- a. Essay: Six (6) questions to attempt four (4).
  - b. Multiple choice question (MCQ) 40 questions (5 parts) to attempt all.
  - ii. Laboratory presentations or demonstrations to the class of exercises/techniques.
  - iii. Laboratory Reports.
  - iv. Case studies/Laboratory logbook.
  - v. Continuous assessment tests.
- No students shall be allowed into the examination venue if he/she has not fulfilled the mandatory posting.

### **ATTENDANCE POLICIES**

1. Attendance is compulsory and absences from class and/or laboratories will affect student's final grade. Missed laboratory work and/or examinations must be completed.
2. Since sample procurement is difficult, laboratory absences are particularly difficult, to make up 75% attendance is a prerequisite to sit exams. Absence from laboratory postings is tantamount to carry over of posting. Students are therefore advised not to miss any laboratory session.
3. Protracted illness (three consecutive days or more) should be reported to the head of Department promptly.
4. Students shall continue their laboratory posting during holidays and this shall serve as their industrial attachment.
5. Final year students are to take compulsory call-duty in their respective Discipline. They are to be attached to Medical Laboratory Scientist on- call-duty. This shall be graded part of the 75% attendance laboratory posting.

### **LABORATORY POSTINGS**

Laboratory posting is compulsory for all Medical Laboratory Science Students. For medical laboratory science students, laboratory posting is in 300 – 500 levels and at least 75% attendance is compulsory and is a prerequisite for writing the

examinations. The posting should be in a MLSCN certified laboratory. Laboratory posting in accredited hospital or medical/ research laboratory is to be between 2-3 days in a week. Supervision and training in the hospital laboratory shall be conducted by medical laboratory scientists in collaboration with the academic staff of the Department appointed as Consultants and must hold current practicing license issued by Medial Laboratory Science Council of Nigeria.

### **PASS MARKS**

Medical Laboratory Science, being a professional programme, operates a modified course unit system

The pass mark for all 100 – 200 level courses shall be 45% while the pass mark for all core Medical Laboratory Sciences Courses (between 300 – 500 level) shall be 50%

### **CONTINUOUS ASSESSMENT SCORE**

This shall constitute 40% of the total score of 100 for a course. It shall be earned from assignments/presentations (20mks) and tests (20mks)

### **EXAMINATION SCORE**

This shall be 60% of the total mark of 100 for a course to be earned from end of semester examinations.

### **Total**

### **MOVEMENT OF STUDENTS BETWEEN ACADEMIC LEVELS**

#### **Promotion from 100 to 200 Level**



A student must not carry over more than 3 Compulsory courses and must have earned not less than 24 units of the total credit load of the courses registered for the session to move from 100 to 200 level.

### **Promotion from 200 Level to 300 Level**

A student must not carry over more than 4 Compulsory courses and must have earned not less than 24 units of the total credit load of the courses registered for the session to move from 200 to 300 level.

### **Promotion from 300 Level to 400 Level**

A student must not carry over more than 4 Compulsory courses and must have earned not less than 24 units of the total credit load of the courses registered for the session to move from 300 to 400 level.

A student who fails first professional examination at the end of 400 level shall not proceed to 500 level.

### **Promotion from 400 Level to 500 Level**

A student who has any carry over at the end of 400 level shall repeat the year (Full- Academic session) until failed courses are passed

### **Requirements of Professional Examinations**

Students must not carry any course over to the professional examinations.

### **Repeat**

Any student who fails to meet any of the movement criteria shall repeat that level for not more than one year.

### **WITHDRAWAL**

A student who fails after repeating a particular level SHALL be advised to withdraw from the programme.

### **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.

### **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.

### **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.

## **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
Pass	1.0 – 1.49

<b>Scores</b>	<b>Grade</b>	<b>Credit point</b>
70 – 100%	A	5
60 – 69	B	4
50 – 59	C	3
45 – 49	D	2
40 – 44	E	1
0 – 39	F	0

## **INDEXING/ REGISTRATION OF STUDENTS WITH THE MEDICAL LABORATORY SCIENCE COUNCIL OF NIGERIA**

This is carried out on-line and the portal will open for the registration of students between **JULY** and **SEPTEMBER** every year. Indexing of students is carried out on or before the completion of 300 level programme. It involves:

- i) Completion of **ONLINE** student Registration Enrolment Form by the Head of Department or as may be delegated and should be a registered member of MLSCN with current practicing licence.

- ii) Payment of prescribed fees.
- iii) Presentation and screening of credentials for eligibility.
- iv) Eligible students are then enrolled as student Medical Laboratory Scientists with student registration number.
- v) Students' enrolment letters are sent through the Head of Department
- vi) Students that fail the screening would be advised to withdraw from the programme forthwith.

## **FIRST AND FINAL PROFESSIONAL EXAMINATIONS**

Students are examined in two phases for:-

First Professional Examination (400 level) and Final Professional Examination (500 level). To pass the examination, a student must score a minimum of 50% of Practical mark and subject to an overall average of 50%. Only students without any re-sit or carry-over are eligible to sit for professional examinations. The guiding policy also involves:

- a) Attendance policies – 70% of lectures and laboratory posting attendance is required
- b) Laboratory posting
- c) Appointment of External Examiners and MLSCN Assessors
- d) Council pass mark – 50%
- e) Students should not carry any course over to any of the professional examinations
- f) A letter of intent and request for the appointment of MLSCN Assessors must be written to MLSCN with respect to the conduct of the professional examinations.

**The First Professional Examination Consists of:-**

Log Book Assessment (10marks)

MCQ: 20 practically oriented MCQs in each of Chemical Pathology, Histopathology, Medical Microbiology, Parasitology, Haematology and Blood Transfusion Science (30 Marks). Practical paper of 3hrs duration and including spot tests (40marks). Oral examination in all disciplines (20marks). Students who fail this examination shall be allowed to re-sit after 3 months.

**The Final Professional Examination consists of:-**

Log book Assessment (10marks)

MCQ: 50 practically oriented MCQs in any of Chemical Pathology, Histo-cytology, Medical Microbiology, Parasitology, Haematology and Blood Transfusion Science (20 marks)

Practical Paper of 3hrs duration and including spot tests (50 marks)

Oral examination in one of the all disciplines (20 marks). Students who fail this examination shall be allowed to re-sit after 3 months.

***Student project defence is part of the professional examination.***

**Assessment of Professional Examination and Appointment of External Examiners**

For First Professional Examination (400L), University will appoint an external examiner who should be a registered member of Council and must not be below the rank of senior lecturer. In addition, the Council will appoint an External

Assessor. For Final Professional Exam (500L), the university will appoint an external examiner for each discipline, all of which should be registered members of the Council and the Council will also appoint an Independent Assessor.

## **INDUCTION OF GRADUATES**

The induction of Medical Laboratory Science graduates is a statutory function of the Medical Laboratory Science Council of Nigeria. All graduates are inducted into the profession following completion of their academic and professional programmes. This involves administration of oath and education on professionalism and ethics in their practice. The induction should take place within 8 weeks of completion of the degree examination.

### **Induction Guidelines**

Compliance with the under listed requirements by the Faculty/Department of Medical Laboratory Science is essential before MLSCN will induct graduands of Medical Laboratory Science (MLS) into the profession.

- a) Presentation/submission of the approved final examination result by the University Senate
- b) Letter of intent and request for date from MLSCN with a minimum of one month notice.
- c) Induction Lecture should be presented by experienced qualified Med Laboratory Scientist.
- d) Sitting arrangements should be such that University functionaries and Council officials are represented.
- e) Order of procession – Inductees first, Lecturers, University Functionaries, Registrar/CEO of Medical Laboratory Science Council of Nigeria and the Vice

Chancellor. The reverse order is applied during recession.

- f) At induction, the inductees are presented with provisional license, log book and Act Cap M25 LFN 2004.

## **INTERNSHIP PROGRAMME**

In pursuance of Section 4(a) of Act 11 of 2003, Medical Laboratory Science graduates are statutorily required to undergo compulsory one-year continuous internship training under the supervision of registered and licensed Medical Laboratory Scientists in Medical Laboratory Science Council of Nigeria approved internship centers (Hospital, Research Institutes, and Medical Laboratories). Full registration which is accompanied by issuance of license to practice as a Medical Laboratory Scientist is granted after successful completion of the internship programme.

## **DRESS CODE**

**MALE:** A good pair of trousers (not jeans) with neat shirt, a matching tie and a pair of shoes.

**FEMALE:** Corporate gown with sleeve or skirt (not jeans) below the knee with sleeved shirt/blouse and a pair of shoes.

***Student professional Lapel pin should be worn always on their dresses/shirt***

Wearing of Laboratory coat is compulsory for all clinical laboratory postings and practical classes.

**EXAMINATION MISCONDUCT IN  
ACCORDANCE WITH THE UNIVERSITY  
REGULATIONS**

The following sanction shall apply to case of examination misconduct as stipulated below.

**PENALTIES FOR EXAMINATION  
MISCONDUCTS**

S/N	Misconducts	Penalties
1.	Possession/copying of any written materials relevant to the examination, tests and assignments.	Rustication for two semesters.
2.	Impersonation	Expulsion
3.	Plagiarism	Rustication for one semester.
4.	Unauthorized access to examination materials	Expulsion
5.	Unauthorized collection of items from another student during an examination without the knowledge of the invigilator	Letter of caution
6.	Falsification of evaluation form and other academic records or documents	Expulsion



7.	Appearing for examination, without meeting attendance requirement	Letter of caution and prevention from writing the examination.
8.	Disobedience to instructions/ disruption during an examination/harassment of invigilator	Disqualification from the examination.
9.	Harassment of Invigilators	Rustication for one semester.
10.	Anti-safety behaviour during practical, workshops, studio work, etc.	Letter of caution
11.	Attempted inducement of examiners and invigilators	Disqualification from the examination
12.	Aiding and abetting examination misconduct	Expulsion.
13.	Destruction of evidence of examination misconduct	Rustication for one semester
14.	Refusal to complete examination misconduct form	Rustication for one semester.
15.	Any previous arrangement made for access to examination materials whether it succeeds or not	Rustication for two semesters.

16.	Refusal to submit examination scripts	Failure in the examined course.
17.	Any other misconduct recorded from time to time	Penalty shall be determined based on the recommendation of the panel.

## GRADUATION REQUIREMENTS

Minimum number of the cumulative credit units as may be approved from time to time and all core courses including the professional examinations must be passed for a student to graduate.



### CODE SYSTEM

It contains an abbreviated letter code of three and three digits. MLS is a prefix that indicates level.

The first digit represents the level of study. For 100 – 500 levels, the second digit number if odd denotes first semester and if even it denotes second semester while the last digit denote sequence

### Core/Compulsory Course:

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

### Required Course

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

**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.

**Optional Course**

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

**Pre-requisite Course**

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

**Minimum Credit Load per Semester**

The Minimum credit load per semester is 15.

**Medical Laboratory Science Practicals**

Practical contents of the Medical Laboratory Science courses are taught under Laboratory postings and assessed using the format of professional examination.

**FIRST YEAR (100L) COURSES FOR THE DEPARTMENT OF MEDICAL  
LABORATORY SCIENCE.  
COURSE OUTLINE: 100 LEVEL MEDICAL LAB SCIENCE  
FIRST SEMESTER**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>UNIT</b>	<b>STATUS</b>	<b>Lecture Contact hour/ week</b>	<b>Practical contact hour/ week</b>	<b>Tutorial Contact hour/ week</b>
MTH 111	Elementary Mathematics I: Algebra	3	C	3	0	1
CHM 111	General Chemistry I	3	C	3	0	1
CHM 115	General Chemistry Practical I	1	C	0	1	0
PHY 111	General Physics Practical I	3	C	3	0	1
PHY 119	General Physics I	1	C	0	1	0
GST 111	Communication in English I	2	C	2	0	1
GST 112	Use of Library and ICT	2	C	2	0	1
GST 114	Nigerian People & Culture	2	R	2	0	1
BIO 111	General Biology	3	C	3	0	1
BIO 117	General Biology Practical I	1	C	0	3	0
CSC 111	Introduction to Computer Science	2	C	2	0	0
CIT III	IT Certification	0	R	2	0	0
EDS 111	Entrepreneurial Development Studies	1	C	1	3	0
<b>TOTAL</b>		<b>24</b>		<b>23</b>		

## SECOND SEMESTER

COURSE CODE	COURSE TITLE	UNIT	STATUS	Lecture	Contact	Practical	contact	Practical	Contact
BIO 121	General Biology II	3	C	3	0	1			
BIO 127	General Practical Biology II	1	C	0	3	0			
PHY 121	General Physics II	3	C	3	0	0			
PHY 129	Experimental Physics II	1	C	0	1	0			
CHM 121	General Chemistry II	3	C	3	0	0			
CHM 129	Introductory Chemistry II	3	C	3	0	0			
CSC 121	Introduction to Computer Science	2	C	2	0	1			
GST 121	Communication in English II	2	C	2	0	1			
CIT 121	IT Certification I: MS Excel	0	R	1	1	0			
EDS 121	Entrepreneurship Dev. Studies II	1	R	1	1	0			
MTH 121	General Mathematics II	3	C	2	0	1			
BTG 121	Introduction to Biotechnology	1	R	1	0	0			
<b>TOTAL</b>		<b>23</b>		<b>23</b>					

## SECOND YEAR (200L) COURSES FIRST SEMESTER

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>UNIT</b>	<b>STATUS</b>	<b>Contact hour/ Practical contact hour/week</b>	<b>hour/ week</b>	<b>Tutorial Contact hour/week</b>	<b>hour/ week</b>
ANA 211	Human Anatomy	2	C	2	I	0	
MLS 211	Introduction to Medical Laboratory Science I	2	C	2	0	1	
PIO 211	Human Physiology	2	C	2	3	0	
PHS 219	Practical Physiology I	0	R	3	3	0	
ANA 212	History of Basic Tissues	2	R	2	1		
ANA 219	Anatomy Practical	1	R	0	3	0	
MLS 212	Medical Microbiology & Parasitology	2	C	2	2	1	
PIO 212	Principle of Cell Physiology I	2	R	2	2	0	
GST 113	Logic, Philosophy of Human Existence	2	R	2	0	0	
STA 111	Medical Biostatistics	2	R	2	0	1	
BCH 211	General Medical Biochemistry	3	R	3	0	1	
BCH 219	Practical Biochemistry I	1	R	0	3	1	
GST 213	Peace Conflict & Resolution Studies	2	R	2	0	0	
<b>TOTAL</b>		<b>24</b>		<b>24</b>			

## SECOND SEMESTER

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>UNIT</b>	<b>STATUS</b>	<b>Lecture Contact Hour/Week</b>	<b>Practical Contact Hour/Week</b>	<b>Tutorial Contact Hour/Week</b>
MLS 221	Introduction to Medical Laboratory Science II	2	C	2	0	1
ANA 221	Gross Anatomy	2	C	2	1	0
ANA 222	Systemic Histology	2	C	2	1	0
BCH 221	Introductory Biochemistry II	3	C	3	0	0
ANA 224	General Embryology	2	C	2	0	1
ANA 229	Human Anatomy Practicum II	2	C	0	4	0
BCH 223	Bioenergetics	3	C	3	3	0
PIO 221	Autonomic Nervous System Gastro Intestinal Tract and Renal Physiology	3	C	3	3	0
PIO 222	Endocrinology & Reproduction	3	C	3	3	0
GST 222	Leadership Skills	2	R	2	0	1
BCH 229	Practical Biochemistry II	1	R	0	3	0
<b>TOTAL</b>		<b>24</b>		<b>24</b>		

**THIRD YEAR (300L) COURSES  
FIRST SEMESTER**

COURSE CODE	COURSE TITLE	UNIT	STATUS	Contact Hour/Practical	Contact Hour/Lecture	Tutorial Contact Hour/Week
MLS 316	Laboratory Posting I and Practical	3	C	0	9	0
MLS 312	Basic Haematology	3	C	3	3	0
MLS 314	Basic Histopathology	3	C	3	0	0
MLS 311	Basic Clinical Chemistry	3	C	3	3	0
BCH 311	Chemistry & Metabolism of Amino Acids & Proteins	2	R	2	0	0
MLS 313	Basic Medical Microbiology	2	C	2	2	2
MLS 315	Basic Immunology	2	R	2	0	0
EDS 311	Entrepreneurship	1	R	1	0	1
MLS 315	Biostatistics	2	C	2	0	1
PHE 222	The Principles of Epidemiology and Disease Surveillance	1	R	1	0	0
BCH 319	Practical Biochemistry III	1	C	0	3	0
<b>TOTAL</b>		23		23		

### 300 LEVEL - SECOND SEMESTER

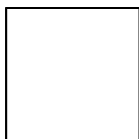


COURSE CODE	COURSE TITLE	UNIT	STATUS	Lecture Contact Hour/Week	Practical Contact Hour/Week	Workshop Contact Hour/Week
MLS 321	Laboratory Posting and Practicals II	3	C	0	9	0
MLS 322	Basic Parasitology	3	C	3	3	0
MLS 323	Laboratory Instrumentation & Techniques	3	C	3	3	0
MLS 324	Fundamental Blood Transfusion Science	2	C	2	2	0
MLS 325	Medical Laboratory Science Ethics	2	C	2	0	0
MLS 326	Basic Histopathology	3	C	3	3	0
MLS 327	Laboratory Management & Organization	2	C	2	0	0
PCO 321	Basic Pharmacology and toxicology	2	C	2	0	0
PCO322	Practical Pharmacology and toxicology	1	C	0	3	0
<b>TOTAL</b>		21		21		

**N/B:** Year three marks the beginning of the professional training. Core Courses are handled by qualified and registered Medical Laboratory Scientists. MLS 311 and 321 are assessed as Oral, MCQ, Practicals and Logbook/Hospital Laboratory posting performance.

#### **400 LEVEL - FIRST SEMESTER**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>UNIT</b>	<b>STATUS</b>	<b>Lecture Contact Hour/Week</b>	<b>Practical Contact Hour/Week</b>	<b>Tutorial Contact Hour/Week</b>
MLS 411	Laboratory Posting III and Practicals	3	C	0	9	0
MLS 412	Medical Parasitology & Entomology	3	C	3	3	0
MLS 413	Basic Medical Bacteriology & Mycology	3	C	3	3	0
MLS 414	Introduction to Blood Group Systems, Compatibility Tests Hemoglobin and haemoglobinopathy	3	C	3	3	0
MLS 415	Analytical Clinical Chemistry	3	C	3	3	0
MLS 416	Nucleic Acid Biochemistry & Basic Concepts of Molecular Biology	2	C	2	0	0
MLS 417	Cytological techniques	1	C	1	3	0
<b>TOTAL</b>		<b>18</b>		<b>18</b>		



### 400 LEVEL - SECOND SEMESTER

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>UNIT</b>	<b>STATUS</b>	<b>Lecture Contact Hour/Week</b>	<b>Practical Contact Hour/Week</b>	<b>Tutorial Contact Hour/Week</b>
MLS 421	Laboratory Posting IV and Practicals	3	C	0	9	0
MLS 422	Virology	3	C	3	3	0
MLS 423	Histopathology and Museum Techniques	3	C	3	3	0
MLS 424	Biomedical Engineering	2	C	3	3	0
MLS 425	Biotechnology & Bioinformatics	2	C	2	0	0
MLS 426	Counseling skills	2	C	2	0	1
MLS 427	Immunology/Immunochemistry	3	C	3	0	0
MLS 428	First professional examination	3	C	0	9	0
<b>PHA 421</b>	Chemotherapy of Microbial Diseases, Vaccines and Sera	2	R	2	0	0
<b>TOTAL</b>		<b>23</b>		<b>23</b>		

*MLS 411, 421 and 428 are assessed as Oral, MCQ, Practicals and Logbook/Hospital Laboratory posting performance.*

### **FIFTH YEAR (500L) COURSES**

**CHEMICAL PATHOLOGY SPECIALTY  
FIRST SEMESTER**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>UNIT</b>	<b>STATUS</b>	<b>Lecture Contact Hour/Week</b>	<b>Practical Contact Hour/Week</b>	<b>Tutorial Contact Hour/Week</b>
MLS 511	Laboratory Posting V and Practicals	3	UOG C	0	9	0
MLS 512	Seminar	2	C	0	0	2
MLS 513	Research Methodology	3	C	2	0	1
MLS 514	Carbohydrate, protein and Lipid Metabolism	3	C	3	3	0
MLS 515	Renal, Liver and Neurochemistry	3	C	3	3	0
MLS 516	Clinical Enzymology	3	C	3	3	0
MLS 517	Nutrition and Clinical Vitaminology	2	C	2	0	0
<b>TOTAL</b>		<b>19</b>		<b>19</b>		

**SECOND SEMESTER**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>UNIT</b>	<b>STATUS</b>	<b>Lecture Contact Hour/Week</b>	<b>Practical Contact Hour/Week</b>	<b>Tutorial Contact Hour/Week</b>
MLS 521	Laboratory Posting VI and Practicals	3	C	0	9	0
MLS 522	Genetics & Molecular Biology	2	C	2	0	0
MLS 524	Project	6	C	0	6	0
MLS 526	Drug Monitoring, Toxicology & Inborn Error of Metabolism	3	C	3	0	1
MLS 527	Clinical & Reproductive Endocrinology	3	C	3	3	0
MLS 528	Techniques in Clinical Chemistry	3	C	3	3	0
MLS 540	Final Professional examination	3	C	0	9	0
<b>TOTAL</b>		<b>23</b>		<b>23</b>		

**HAEMATOLOGY & BLOOD TRANSFUSION SCIENCE  
(SPECIALTY)FIRST SEMESTER**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>UNIT</b>	<b>STATUS</b>	<b>Lecture Contact Hour/Week</b>	<b>Practical Contact Hour/Week</b>	<b>Tutorial Contact Hour/Week</b>
MLS 511	Laboratory Posting V and practicals	3	C	0	9	0
MLS 512	Seminar	2	C	0	0	2
MLS 513	Research Methodology	3	C	3	0	1
MLS 519	Cytogenetics	2	C	2	0	0
MLS 531	Haemopoiesis, Hemoglobin, Haemoglobinopathies & Myeloproliferations	3	C	3	3	0
MLS 532	Blood Group Systems & Compatibility Tests	3	C	3	3	0
MLS 533	Serology & Blood Transfusion Science	3	C	3	3	0
<b>TOTAL</b>		<b>19</b>		<b>19</b>		

**SECOND SEMESTER**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>UNIT</b>	<b>STATUS</b>	<b>Lecture Contact Hour/ Week</b>	<b>Practical Contact Hour/ Week</b>	<b>Tutorial Contact Hour/ Week</b>
MLS 521	Laboratory Posting VI	3	C	0	9	0
MLS 522	Genetics & Molecular Biology	2	C	2	0	0
MLS 524	Project	6	C	0	6	0
MLS 542	Advanced Haematological Techniques	3	C	3	3	0
MLS 543	Advanced Blood Group Serology Techniques	3	C	3	3	0
MLS 544	Coagulation and Fibrinolysis Studies	3	C	3	3	0
MLS 540	Final Professional examination	3	C	0	9	0
<b>TOTAL</b>		<b>23</b>		<b>23</b>		

**HISTHOPATHOLOGY (SPECIALITY)  
FIRST SEMESTER**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>UNIT</b>	<b>STATUS</b>	<b>Lecture Contact Hour/ Week</b>	<b>Practical Contact Hour/ Week</b>	<b>Tutorial Contact Hour/Week</b>
MLS 511	Laboratory Posting V and practicals	3	C	0	9	0
MLS 512	Seminar	2	C	0	0	2
MLS 513	Research Methodology	3	C	3	0	1
MLS 519	Cytogenetics	2	C	2	0	0
MLS 534	Fundamental Histopathology	3	C	3	3	0
MLS 535	Systemic Histopathology	3	C	3	3	0
MLS 536	Histochemistry and Histopathological Techniques	3	C	3	3	0
<b>TOTAL</b>		<b>19</b>		<b>19</b>		



## SECOND SEMESTER

COURSE CODE	COURSE TITLE	UNIT	STATUS	Lecture Contact Hour/Week	Practical Contact Hour/Week	Tutorial Contact Hour/Week
MLS 521	Laboratory Posting VI	3	C	0	9	0
MLS 522	Genetics & Molecular Biology	2	C	2	0	1
MLS 524	Project	6	C	0	6	0
MLS 548	Medical Cytology	2	C	2	0	0
MLS 561	Embalment Science and Museum Techniques	2	C	2	2	0
MLS 562	Immunochemi stry	2	C	2	2	0
MLS 563	Stains and Staining Techniques	3	C	3	3	0
MLS 540	Final Professional examination	3	C	0	9	0
<b>TOTAL</b>		<b>23</b>		<b>23</b>		

## MEDICAL MICROBIOLOGY (SPECIALITY)

### FIRST SEMESTER

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>UNIT</b>	<b>STATUS</b>	<b>Lecture Contact Hour/Week</b>	<b>Practical Contact Hour/Week</b>	<b>Tutorial Contact Hour/Week</b>
MLS 511	Laboratory Posting V and practical	3	C	0	9	0
MLS 512	Seminar	2	C	0	0	2
MLS 513	Research Methodology	3	C	3	0	1
MLS 537	Systematic Bacteriology	3	C	3	3	0
MLS 538	Advanced Entomology	2	C	2	0	1
MLS 539	Public Health Microbiology	3	C	3	3	0
MLS 551	Medical Mycology	3	C	3	3	0
<b>TOTAL</b>		<b>19</b>		<b>19</b>		

### SECOND SEMESTER

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT LOAD</b>	<b>STATUS</b>	<b>Lecture Contact Hour/ Week</b>	<b>Practical Contact Hour/ Week</b>	<b>Tutorial Contact Hour/Week</b>
MLS 521	Laboratory Posting VI	3	C	0	9	0
MLS 522	Genetics & Molecular Biology	2	C	2	0	1
MLS 524	Project	6	C	0	6	0
MLS 564	Medical Virology	3	C	3	3	0
MLS 566	Pharmaceutical Microbiology & Microbial Genetics	3	C	3	3	0
MLS 568	Laboratory Techniques in Microbiology	3	C	3	3	0
MLS 540	Final Professional examination	3	C	0	9	0
<b>TOTAL</b>		<b>23</b>		<b>23</b>		

## **DESCRIPTION OF COURSES**

### **200 LEVEL COURSES**

### **FIRST SEMESTER COURSES**

## **MLS 211: INTRODUCTION TO MEDICAL LABORATORY SCIENCE I (2 Units)**

General introduction to medical laboratory science subjects namely, Clinical Chemistry, Haematology and Blood Transfusion Science. Medical Microbiology, Histopathology and Immunology, Specimen collection, reception and registration. Storage and disposal, Specimen bottle. Safety precaution in pathology laboratories against chemical, biological, electrical materials and radiation hazards. Techniques and principles of chemical sterilization and physical methods. Glassware cleaning care and maintenance, Breeding of laboratory animals.

## **ANA 211: HUMAN ANATOMY, ANATOMY OF UPPER LIMBS AND LOWER LIMBS (3 units)**

Descriptive terms, planes 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. Osteology of the upper limb, pectoral region and the breast, brachial plexus, scapular region and the axilla, shoulder joint, arm, cubital fossa and elbow. Forearm, wrist joint and hand. Vessels and lymphatic drainage of the upper limb. Surface anatomy, applied and radiological anatomy of the upper limb. Osteology of Lower Limb, front of the thigh I (femoral triangles, femoral canal and hernia, sub-sartorial canal). Front of thigh II, medial side of the thigh, gluteal region, back of the thigh, popliteal fossa, front of the leg and the dorsum of the foot, lateral side of the leg, back of the leg, sole of the foot (arches of the foot). Hip joint and the knee joint, tibio-fibular joints and ankle joints. Surface anatomy, applied and radiological anatomy of the lower limb.

## **ANA 212: HISTOLOGY OF BASIC TISSUES (3Units)**

Description: Structure and the function of the cell, general histology and basic tissues of the body. Preparation of tissues

for microscopy is a practical oriented course that is studied alongside with the theoretically based lecture.

### **ANA 224: GENERAL EMBRYOLOGY (3 Units)**

General consideration of the male and female reproductive organs. Gametogenesis, fertilization, implantation, cleavage, the morula, the blastocyst formation of the primitive streak, the Bilaminar and trilaminar germ disc. Development of tissues and organ systems of the embryo, the chorionic and amniotic cavities. Foetal membranes, placental formation and functions. The molecular regulation in differentiation of tissues and organs and in the establishment and patterning of the body axis. Birth defects, chromosomal and genetic factors. Twins and twin defects, general characteristics of the embryonic environment and foetal periods.

### **BCH 211: GENERAL AND MEDICAL BIOCHEMISTRY (3 Units)**

Short history and Definition of Biochemistry. Importance of Biochemistry to medicine and other scientific disciplines. The living cell. Organization and Molecular architecture. Types of cells and their characteristics. Structure and organization of Biological membranes. Biomolecules and the origin of life. Chemistry of Biomolecules. Carbohydrates Classification, structure, distribution and functional role of named examples. Chemical properties and reactions. Essential fatty acids, Eicosanoids, fat-soluble vitamins – Structure and functions. Peptide bonds and hierarchy of protein structure Nucleic acids. RNA and DNA. Structure/function of enzymes. Zymogens. Active site and specificity of enzymes. Inhibition and Activation of enzymes. Factors affecting enzyme catalysis reaction. Allosteric enzymes. Isoenzymes. The Concepts of Avitaminoses, Hypovitaaminoses and Antivitamins. Vitamins and their Co-enzyme function. Biomedical importance of vitamins.

**BCH 211 EXPERIMENTAL/ PRACTICAL  
BIOCHEMISTRY (2 Unit)**

Laboratory exercises on the practical contents of introductory biochemistry

**PIO 211: HUMAN PHYSIOLOGY (3Units)**

Cell physiology, Physiochemical principles, Body fluids and Blood transport: Control systems. Excitable and contractile Cells. Introduction to ANS. Introduction and definition of body fluids and body fluid compartments. Regulation of body fluid volumes. Physiological variation of body fluid volumes. Techniques for quantifying various body fluid volumes. Blood: Functions of blood and classifications of blood cells. Erythropoiesis. Haematological indices. Hemoglobin genotype and Blood groups. Immunology and cell defence

**PIO 212: PRINCIPLES OF CELL PHYSIOLOGY (3 Units)**

Definition and functions of the cardiovascular system, Cardiac muscle, Cardiac myoelectrophysiology, cardiac cycle, Circulation of blood: cardiac output and regulation. Blood pressure. Haemodynamics and microcirculation. Pulmonary, Cerebral, Coronary, Splanchnic and muscle circulation, Shock and cardiovascular changes in exercise. Definition and functions of the respiratory system, Physiologic anatomy of the respiratory system. Respiratory dynamics and work. Pulmonary ventilation: Lung volumes and capacities, Spirometry. Mechanism and mechanics of breathing, Lung surfactant, pulmonary circulation. Gas exchange and Gas transport. Oxygen Haemoglobin dissociation curve. Hypoxia and Dyspnea. Respiratory changes in exercise and barometric changes. Control of breathing

**GST 221: CONTEMPORARY HEALTH ISSUES (2 Units)**

Diet, exercise and health, nutritional deficiency diseases, malaria, other infections, hypertension, organ failure, air-borne diseases, sexually transmitted diseases, cancer and its prevention, sickle cell disease. HIV/AIDS: Introduction, epidemiology of HIV, natural history of HIV infection, transmission of predisposing factors to HIV, Impact of HIV/AIDS on the society, management of HIV infection, prevention of HIV. Drugs and Society: sources of drugs, classification of drugs, dosage forms and routes of drug administration, adverse drug reactions, drug abuse and misuse, rational drug use and irrational drug use. Human kinetics and health education: personal care and appearance, exercise and health, personality and relationship, health emotions, stress, mood modifiers, refusal to tobacco, alcohol and other psychoactive drugs.

### **ENT 201: INTRODUCTION TO ENTREPRENEURIAL STUDIES (2 Units)**

This course introduces students to the definition, functions, types, and characteristics of entrepreneurship. This course further examines entrepreneurship and ethics, entrepreneurship theories and practice; new venture creation; forms of business, business opportunities, starting a new business, innovation, legal issues in business, insurance, and environmental considerations, possible business opportunities in Nigeria and introduction to biographies of successful entrepreneurs etc.

### **MLS 221: INTRODUCTION TO MEDICAL LABORATORY SCIENCES II (2 Units)**

Microcopy and micrometry-use and care of microscopes. Refrigeration and freeze-dries-principles, uses, care and maintenance. Handling of laboratory animals. Laboratory location and floor plan. Laboratory organization and management. Simple analytical techniques in chemical pathology. Presentation of volumetric analysis. Urinalysis,

principles of tissues preservation; fixation, processing and staining. Handling of surgical autopsy specimens. Removal of formal in pigments, basic, tools of the microbiologist-wire loop cotton wool, pipettes, swab and their uses, preparation of films and basic staining techniques: Gram's stain, ZiehlNeelson's stain. Hematological stain principle and components. Blood film preparation and staining, pipettes, chambers care and uses. Haemoglobin, PCV estimation, WBC counting. Evolution of Medical laboratory science in Nigeria. History of medical laboratory Laboratory practices and training. Regulatory body. Contributions of IBMS. MLSCN Act, 2003.

### **ANA 221: GROSS ANATOMY (3 Units)**

Thorax - Osteology of the thoracic cage, intercostal space (intercostal muscles, vessels and nerves), pleura and lungs, mediastinum, cardiac plexus and thoracic diaphragm. Abdominal alimentary tract, liver, spleen, pancreas and kidneys and suprarenal glands Pelvis and Perineum: Male and female perineum, pelvic wall and floor, pelvic peritoneum, viscera, nerves and vessels. Surface anatomy, Radiological anatomy.

### **ANA 222: SYSTEMIC HISTOLOGY (3 Units)**

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

### **BCH 221:INTRODUCTORY BIOCHEMISTRY II (3 units)**

Structural inter-relationships of sugars. Stereochemistry of sugars. Hexoses, pentose's, disaccharides, starch, glycogen and polysaccharides. Methods of identifying sugars. Carbohydrate metabolism, digestion and absorption. Control of glycolysis, TCA cycle and pentose phosphate pathway. Glyoxylate pathway, gluconeogenesis, glycogenolysis, glycogenesis. Mitochondrial electron transport chain and oxidative



phosphorylation. Energy generation and storage in biological systems. Disorders of carbohydrate metabolism. The pyruvate and alpha-ketoglutarate complexes and their regulation. Metabolism of lipids, digestion, absorption. Role of lipoproteins in lipid transport. Metabolism of lipoprotein in health and disease. Triacylglycerol oxidation and oxidation of fatty acids. Storage and mobilization of energy stores in adipocytes. Ketone bodies and ketosis. Interrelationships of fatty acid and carbohydrate biosynthesis/ oxidation. Biological importance of eicosanoids, glycolipids and sphingolipids. The chemistry and metabolism of steroids and steroid hormones. Biochemical rearrangement in G-6-PD deficiency. Sickle cell anemia. Glycogen storage disease etc. Illustrative laboratory exercises.

### **BCH 223: BIOENERGETICS (2 Units)**

An outline of biologic oxidations leading to intermediary metabolism of carbohydrates, lipids, proteins, amino acids, nucleic acids and nucleotides. Electron transport and oxidative phosphorylation's ATP and other high energy compounds and their importance.

### **PIO 221: AUTONOMOUS NERVOUS SYSTEM, GASTRO- INTESTINAL TRACT AND RENAL PHYSIOLOGY (3 Units)**

Definition and functions of the kidney. Physiologic anatomy of the kidney. Glomerular filtration. Tubular functions. Urine formation: - Dilute and concentrated urine. Counter current mechanism, Plasma clearance, renal autoregulation, ECF regulation, Acid-Base balance, Renin-Angiotensin system. Physiology of excitable tissues. Functional organization of Autonomic Nervous System, basic characteristics of

sympathetic and parasympathetic divisions. Introduction to human Genetics, Biotechnology and Human Genome. Definition and functions, Physiologic anatomy and Innervations of the GIT, Mastication, Deglutition, Salivary gland, Digestion and food absorption, Movement and Stomach emptying, Movements of the GIT, Vomiting and defecation, GIT secretions and juices, Liver and General metabolism (BMR).

### **PIO 222: ENDOCRINOLOGY & REPRODUCTION(3**

Credits)

Definition and functions, Definition of Hormones, Methods of Measurement, Types and mechanism of Actions, Regulation, Physiologic anatomy, Hypothalamus-Hypothalamic releasing factors, Hypothalamic Nuclei, Hypothalamo-hypophyseal system, Pituitary gland, Tropic Hormones, GIT and other local hormones. Structure and functions of male and female reproductive organs, Androgens, Spermatogenesis and fertility. Infertility in male. Monogenesis, Sexual cycle and hormonal regulations. Fertilization, Pregnancy and Parturition, Fertility and infertility in female. Family planning.

### **GST 222: LEADERSHIP SKILLS (2 Units)**

Transformation is a fundamental shift in the deep orientation of a person, organization or society such that the world is seen in new ways and new actions and results become possible that were impossible prior to the transformation. Transformation happens at the individual level but must be embedded in collective practices and norms for the transformation to be sustained. Leadership development programme (LDP) proposes novel approaches to teaching and learning, which emphasizes

the practical involvement of participants. It is interactive and involves exercises and actual implementation of breakthrough projects by teams that make difference in the lives of the target population. In this course, leadership concepts comprising of listening, conversation, emotional intelligence, breakthrough initiatives, gender and leadership, coaching and leadership, enrolment conversation and forming and leading teams will be taught.

### **GST 213: PEACE STUDIES AND CONFLICT RESOLUTION (2 Units)**

This course provides the basic concepts in peace studies and conflict resolution, peace as vehicle of unity and development, conflict issues, types of conflicts, e.g. ethnic, religious, political, economic 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.

### **PHE 222: The Principles of Epidemiology and Disease Surveillance (3 Units)**

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.

### **300 LEVEL COURSES:**

#### **BCH 321: CHEMISTRY AND METABOLISM OF AMINO ACIDS AND PROTEIN (3 Units)**

Amino acids as building blocks of proteins, amino acid sequence of proteins, covalent backbone of proteins. Chemistry/structure/Reactions/classification of amino acids, Properties of the peptide bond. Levels of organization of proteins. Protein isolation, fractionation, purification and characterization. Biological functions of proteins. Genome organization. Evidence for DNA as the carrier of genetic information. Purines and pyrimidines, Nucleoside and Nucleotide Structure and Nomenclature, abnormalities in nucleic acid metabolism, Structure of RNA & DNA. DNA Organization into Chromosomes. Early foundation for DNA structures, Forces involved in DNA helices, Denaturing and Annealing, Hypochromic Effect, Erwin Chargaff's rule. Metabolism of one carbon units, metabolism of inorganic nitrogen

#### **EDS 311: ENTREPRENEURIALSKILLS ((2 Units)**

The course focuses the attention of the students to the practical aspects of entrepreneurship by venturing into any of the

following categories: agriculture/agro allied, (fish farming, crop production, animal husbandry such as poultry, piggery, goat etc. groundnut oil making, horticulture (vegetable garden, flower garden); services (bakery, radio/TV repairs, barbing/hair dressing salon, car wash, catering, courier, event planning, fashion design, vehicle maintenance, film production, interior decoration, laundry, music production, phone call center, rental, restaurant, tailoring/knitting, viewing center); manufacturing (carving, weaving, sanitary wares, furniture making, shoe making, plastic making, table making, bead making, bag making, sachet water production, cosmetics, detergents); commerce (buying and selling, purchasing and supply, bookkeeping, import and export etc.); information and communication technology (ICT) (business center, computer maintenance, handsets repairs, internet café etc.); mining/extraction (kaolin, coal mining, mental craft such as blacksmith, tinsmith, etc., vegetable oil/and salt extractions etc.); environment (fumigation, household cleaning waste disposal etc.); tourism (car hire, craft work, hotel/catering, recreation center); power (generator mechanic, refrigeration/air conditioning, electricity wiring etc.); production/processing (glassware production/ceramic, metal work/fabrication, steel and aluminum door and windows, paper production, water treatment/conditioning/packaging, bricklaying, iron welding, building drawing, tailoring, carpentry, leather tanning, printing, food processing/packaging/preservation). Students are to select two of the above areas of interest for practical. Topics should also include products/service exhibition and quality control, business ownership structures, mentorship.

### **MLS 316: LABORATORY POSTING AND PRACTICAL I (3 Units)**

Posting of students to all sections of routine medical laboratories for on the job training under the supervision of qualified medical laboratory scientists for 2 days weekly for the entire semester. Scored log books are kept by each student per posting.

**MLS 325: MEDICAL LABORATORY SCIENCE ETHICS  
(3 Units)**

History and philosophy of ethics in the practice of Medical Laboratory Science. Relationship between religion and socio—cultural values on medical ethics. Ethical issues involved in private practice. Relationship between the Medical laboratory scientist and other members of the health team. Intra professional auditing, Medical laboratory Sciences ethic and consultancy services. Elements of informed consent in research. Relationship between proper dressing, personal comportment and patient care—the psychologist’s view: Medical Laboratory Science ethics as it affects paternity disputes, infertility studies, and sexually transmitted disease etc. real case presentation medico—legal aspects of medical Laboratory practice

**MLS 322: BASIC PARASITOLOGY(3 Units)**

Introduction to parasitism, and other animal associations, adaptation to parasitic way of life. How parasites invade their host. The ineffective agents of parasites. Basic knowledge of structure, classification and life cycle of parasites of medical importance, vectors and intermediate hosts of parasites. Introduction to anthropoids of medical importance. Biology of the mosquito in relation to the transmission of malaria, filariasis and viral infections.

**MLS 326: MEDICAL PHYSICS(3 Units)**

Kinematical and mathematical problems—circulation of pulse, blood pressure and volume changes. The heart and blood surface tension effect. Temperature and heat flow/electricity, electrocardiograms, general radiation linear energy transfer and

radiation measurement, radiation damage-detection and safety, X-ray generation and application radioisotopes production, use and disposal.

### **MLS 311: BASIC CLINICAL CHEMISTRY (3 Units)**

Traditional and S. 1 units in clinical chemistry; Reference values: Gastric function test; Agents for Gastric stimulation. Ward procedures and laboratory investigation of Gastric secretion: Intestinal function tests; Digestion and absorption; cause of Malabsorption. Laboratory investigation of malabsorption. Renal functions of the kidney; measurement of Renal plasma flow, Glomerular filtration rate. Creatinine clearance, insulin clearance, concentration and dilution tests; urinary, acidification tests, urine specific gravity/Osmolality. Dye Excretion test. Water and Electrolyte status. 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 lipoprotein. Plasma proteins and physiology functions; factors affecting synthesis and catabolism. Methods for the determining of total protein in serum. Carbohydrate metabolism; blood glucose homeostasis, Hyperglycemia diabetes mellitus-its cause and investigation: Hypoglycemia—types causes and investigation.

### **MLS 315: BASIC IMMUNOLOGY (2 Units)**

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

### **MLS 317: BIOSTATISTICS (3 Units)**

Aims, characteristics and application of biostatistics in biomedical sciences- samples, population variables, frequently distribution, vital and descriptive statistics, measurement of central tendencies – mean, median, mode dispersion, standard

deviation and coefficient of variation. Collection and presentation of data, probability distribution. Hypothetical tests of statistical significance. Analysis of variance, regression and correlation, experimental designs and clinical trails.

### **MLS 321: LABORATORY POSTING AND PRACTICAL II (3 Units)**

Posting of students to all section of routing medical laboratories for on-the-job training under the supervision of qualified medical laboratory scientist for 2 days per week scored logbook records per bench are kept for each student per posting.

### **MLS 313: BASIC MEDICAL MICROBIOLOGY(2 Units)**

History, Morphology, growth and nutrition. Classification and identification of bacteria. Bacterial genetics, Bacteriophages, viruses, infection and resistance to infection. Sterilization and disinfection. Antimicrobial agents. Introduction to parasites and fungi.

### **MLS 323: MEDICAL LABORATORY INSTRUMENTATION & TECHNIQUES (3 Units)**

Instrument aspects of qualitative and quantitative analysis - theory and practice of some common analytical techniques; colorimetry, spectro-flourimetry flame - photometry, conductometry, polarography etc. Osmometry, nephelometry, Turbidometry, PH measurement by ion specific electrodes— separation techniques including Electrophoresis; paper, cellulose acetate, Agar gel starch and polyacrylamide gel; Isoelectric focusing, Isotophoresis, Chromatography, Ion exchange, Gel filtration, molecular sieves; dialysis filtration, solvent Extraction, centrifugation – Ultracentifugation, Immunoelctrophoretic techniques, radio immunoassay,



competitive protein binding, Isotope dilution techniques; Enzyme Immuno assay, receptor Assay, automation, Micro and Ultra Micro Analysis. Practical based on the above topics.

### **MLS 324: FUNDAMENTAL BLOOD TRANSFUSION SCIENCE (2 Units)**

ABO and Rhesus Blood Groups, Inheritance, distribution and Genetic Theory. Blood Grouping Techniques –principles, Disadvantages and Advantages. Preparation of Antisera, Antiserum titration avidity, potency and specificity. Plant lectins—preparation and standardization of antisera from lectinase.*Dolichos biflorus*. Anticoagulants used in BGS; ACD, CPD-CPA-A etc in modes of action and side effects. Blood bottles (MRC) and plastic Bags-Advantages and disadvantages. Donor screening—using CUSO<sub>4</sub> method –other methods of screening. Preparation of blood products—cryoprecipitate, platelet rich plasma, packed cells fresh frozen plasma, fibrinogen etc. storage of blood and blood products- various methods, advantages and disadvantages. Blood banking – organization structures, facilities and records. Blood group specific substance – synthesis, identification method (s) and application. Quality control of physical and chemical reagents. Practical/Tutorials. ABO and Rhesus grouping method Antiserum Titration DCT and ICT antibody screening.

### **MLS 312: BASIC HAEMATOLOGY (3 Units)**

Origin, development and function of blood cells. Synthesis and breakdown of hemoglobin. Methods of Haemoglobin estimation. Methods of cell counting. Absolute values. Introduction to Homeostasis. Principles and mode of action of common anticoagulants. Principle and components of Hematological stains. Simple tests used in blood coagulation. Blood films –normal and abnormal practical classes. Iron metabolism, folate and Vit B 12 metabolism, Nomenclature, classification and investigation of common haemoglobinopathies, hemolytic anemia's; myeloproliferative

disorder; homeostasis and disorder of homeostasis; investigation of bleeding disorders. Bone marrow. Practical classes.

### **MLS 314: BASIC HISTOPATHOLOGY(3 Units)**

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

### **MLS 327: LABORATORY MANAGEMENT & ORGANIZATION (2 Units)**

Laboratory Management, planning a medical laboratory including the provision for the reception of patient's selection and storage of chemicals, materials and apparatus. Detailed knowledge of the principles, use and maintenance of common laboratory apparatus and equipment. Ventilation, air conditioning and dust control in the laboratory. Equipment used in special workbench e.g cutting—up benches media-pouring, etc sterilization of air. Laboratory hazards and safety measures to be taken in the use of radioactive and dangerous materials. Emergency treatment for accidents. Laboratory Records Maintenance of records: reception, recording storage, filling and indexing of specimens and result. Organization and operation of a system of quality control. Supply Chain Management: Introduction to commodity supplies, SOP

Manual for facilities and staff in SCM, Cataloging and Indexing of Laboratory supplies, Introduction to LMIS, Max-Min, Inventory control system, Adjust Max-Min level. Inventory, storage and distribution of health commodities, Assessing health logistics, system selection, quantification of Medical laboratory and Health commodities, Supply, Planning and Shipment. Introduction to Medical Laboratory commodities procurement, monitoring and supervision. Methods of recording experiments.

**PCO 321: BASIC PHARMACOLOGY AND TOXICOLOGY (2 Units)**

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

**PCO 322: BASIC PHARMACOLOGY AND TOXICOLOGY- PRACTICAL (1 unit)**

Practical exercises on the topics thought in Basic Pharmacology & Toxicology

**400 LEVEL COURSES:**

**MLS 411: LABORATORY POSTING AND PRACTICALS III (3 Units)**

Posting of students to all sections of routine Medical Laboratories for on-the-job training under the supervision of qualified Medical Laboratory Scientists, for 2 days per week in the entire semester. Scored logbook records per bench are kept for each student per posting.

### **MLS 412: MEDICAL PARASITOLOGY AND ENTOMOLOGY(3 Units)**

Introduction to the parasites. Classification of protozoa, (the amoebas, the ciliates, the flagellates, Nematodes. (Ascaris, Strongyloidies, Trichuris, Guinea worms, Trichinella, Enterobius, etc.). Life cycle and pathogenicity of cestodes. (The tapeworms, larval forms of Cestodes). Life cycle and pathogenicity of the Trematodes (The Schistosoma, Fasciola, paragonimus etc.). methods of demonstration of parasite in blood, faces, vagina, urine urethra, pus from lung and liver, skin snips, etc Mechanisms of their disease production; Epidemiology and control of parasitic diseases. Arthropods of medical importance—the crustaceans Arachnida Hexapoda, Myiasis, etc.-their biology, life cycles and control. Life history as disease vectors various disease of medical importance transmissible by insects. Biology of mosquito in relation to transmission of malarial, filariasis and viral infections etc.

### **MLS 413: BASIC MEDICAL BACTERIOLOGY AND MYCOLOGY (3 Units)**

Methods for the demonstration of bacterial form and structure. Design and preparation of culture media. Sterilization and other methods of bacterial control. Aseptic procedures and methods for pure culture isolation, procedures for receiving, handling and processing of clinical specimens. Antibiotic assay, sensitivity test and chemotherapy. Plate reading. Principle and techniques of anaerobic bacteriology. Methods of total and viable counts. Stock culture preservation, quality control of culture and media. Record-keeping in Bacteriology laboratory. Staining techniques for spores, capsules and negative staining procedure, wet preparation, motility tests. Introductory mycology.

### **MLS 414: INTRODUCTION TO BLOOD GROUP SYSTEMS & COMPATIBILITY TESTS (3 Units)**

Blood groups –other blood groups e.g MNS, Duffy, Kell, Kidd etc. grouping techniques and antibody screening, clinical significance, serostatus. Antenatal serology – screening and Titration (quantitation) compatibility procedures-different methods, advantage 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 diseases. Compatibility procedures- advantages and disadvantages. Practical based on the above topics.

### **MLS 415: ANALYTICALCLINICAL CHEMISTRY (3 Units)**

Principles of analytical techniques in clinical chemistry- devising new techniques, biological trials and tests for acceptability. Solid/dry phase chemistry, dipstick technology, thin film technology immobilized enzymes – analytical techniques for qualitative and quantitative determination of enzymes, hormones, proteins, lipid, trace elements, non-protein nitrogen, volumetric analysis -partition, adsorption, gel filtration, ion exchange and gas liquid chromatography. Electrochemical analysis- principles of potentiometric analysis. Fractionation of proteins-fractional precipitation (salting out), chromatographic and electrophoretic procedures. Protein precipitants-mode of action and choice in analytical procedures.

### **MLS 416: NUCLEIC ACID BIOCHEMISTRY AND BASIC CONCEPTS OF MOLECULAR BIOLOGY (2 Units)**

Nomenclature of bases, nucleosides and nucleotides. Nucleic acids. Hydrolysis of nucleic acids. Analysis of nucleotide sequence in nucleic acids and its application in diagnosis of

diseases. Nucleic acid protein complexes. Genetic role, structure and replication of DNA. Introduction to polymerase chain reaction and its application in laboratory diagnosis.

**MLS 417: Cytological techniques (1 unit)**

Collection, selection and preparation of cytology specimens (cervical smear, vaginal smear, bronchial aspirates, ascitic fluids and other fluids). Cytology staining techniques, normal, atypical and malignant cells. Cornification index. Maturation index, progesterone/androgen effects.

**MLS 421: LABORATORY POSTING IV AND PRACTICALS(3 Units)**

2 days weekly for the entire semester. Scored log books are kept by each student per posting.

**MLS 422: VIROLOGY (3 Units)**

Morphology and life cycle of viruses, nomenclature and classification of viruses – various methods. Reproduction and multiplication of viruses, resistance, pathology, collection of clinical specimens for viral culture. Culture methods for isolation of viruses, purification, immunity, laboratory diagnosis of viral infection. Haemagglutination test, CFT, Neutralization test, systematic study of viral diseases. Interferon, immunotherapy and chemotherapy in viral infection, inclusion bodies and cytopathic effects. Viral and host interactions and identifications, Viral vaccines and immunoprophylaxis.

**MLS 423: HISTOPATHOLOGY AND MUSEUMTECHNIQUES (3 Units)**

Principle of photochemical methods. DNA - demonstration by Feulgen techniques. Silver impregnation methods. Genes and genetic code. Tissue culture techniques; chromosome analysis. Autoradiography – Definition and principle. Organization of a medical Museum. Method of colour maintenance. Fixation and

storage of museum specimens. Special museum techniques e.g Dawson's Method. Principle of photography- Macro and Microphotography. Preparation of stained sections for microphotography. Preparation of specimens for macro photography. Cytological normal cells. Histology of tissues. Atypical and malignant cells. Collection of cytological smears and processing and screening. Principles of general pathology. Systemic pathology. Gastrointestinal tract. Urogenital, coetaneous. Principle of electron microscopy. Practical based on the topics.

#### **MLS 424: BIOMEDICAL ENGINEERING (3 Units)**

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

#### **MLS 425: BIOTECHNOLOGY AND BIOINFORMATICS (2 Units)**

General preparation and storage of reagents for diagnostic use. Preparation and purification of antibody and antigen for diagnostic tools. Monoclonal and polyclonal antibodies. Concepts of vaccination. Preparation, purification and storage of vaccine. Introduction to Mathematical and Computation Genomics. Its application to medicine in general and laboratory diagnosis specifically.

#### **MLS 426: COUNSELING SKILLS (3 Units)**

Definition of counseling, care and support, types of counseling pre-test, post-test prevention primary or secondary, crisis management, problem-solving, decision-making couple spiritual and pastoral; who needs counseling Prospect/benefits of counseling constraints in counseling, rewarding listening skills, prevention and managing conflicts. Genetic counseling

including sickle cell trait in marriage, Blood donation campaign HIV infection etc. Case studies.

### **MLS 427: IMMUNOLOGY/IMMUNOCHEMISTRY**

**(3 Units)**

Immunoglobulin-Structure and infection. Gene Organization and assembly. Mediators of cellular Immunity. Phagocytic cell-Chemotaxis and effectors function of Macrophage and Granulocytes. The complement system. Laboratory methods of detection of antigens and antibodies. Autoimmunity, Tissue and Graft reactions Immunotolerance, self and nonself, Histocompatibility, Transplantation, Tumor Immunology, Hypersensitivity and allergy.

### **PHA 421 Chemotherapy of Microbial Diseases,Vaccines and Sera (2 Units)**

Antibacterials/Antibiotics The sulphonamides and Trimethoprim. The penicillins and cephalosporins. Tetracyclines and Chloramphenicol. The Aminoglycosides. The Macrolides etc. Miscellaneous Antimicrobials, Polypeptides. Antifungal and antiviral agents. Drugs used in the treatment of Tuberculosis and Leprosy Vaccines and Sera

### **MLS 428: FIRST PROFESSIONAL EXAMINATION**

### **500 LEVEL COURSES:**

### **GENERAL COURSES FOR ALL THE STUDENTS**



**MLS 511: LABORATORY POSTING V (3 credits)**

Each student undergoes on the bench training in the different analytical techniques used in the area of specialization. The students are to participate in the routine operation of the laboratory. Log books are kept by each student under the supervision of a qualified medical laboratory scientists.

**MLS 512: SEMINAR (2 credits)**

Students are to carry out intensive literature research and present seminar on selected approved topics to the Departmental colloquium. Each presentation will be for about 15 to 20 minutes followed by general discussion. The presentation will be scored by the group of internal assessors appointed by the department.

**MLS 513: RESEARCH METHODOLOGY (3 Credits)**

Introduction to research methodology. Collection of literature review articles. Problem definition. Sampling techniques. Experimental designs of medical and data public health studies. Questionnaire design and data 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 Aims, characteristics and application of biostatistics. Measures of central tendencies and variation. Collection and presentation of data. Probability sampling. Test of statistical. Significance. Experimental designs and clinical trials. Other applications of biostatistics to clinical and preventive medicine projects. Research proposals and sourcing of funding for research projects. Arts of scholarly publications, and instructional design.

**MLS 519: CYTOGENETICS (2 Credits)**

Theory and practice of clinical cytogenetics. Chromosome analysis, structure, organization and staining techniques. Chromosomes in man Normal karyotype and chromosome abnormalities. Mosaicism, trisomy, monosomy, translocation Klinefelters and Turner's syndromes, sex chromatins. Inactivation of X –chromosome and sex determination. Genetic diseases. Clones, mapping of autosomes, DNA synthesis, gene in kindred segregation. X-linked inheritance. Chimeras. Genes in families and population. Selection, pedigree analysis, mutation and mutagens, Hardy Weinberg equation, genetic drift, inbreed. Slide reporting. Philadelphia and Christ church chromosomes.

**MLS 521: LABORATORY POSTING VI (3 Credits)**

Each student undergoes on the bench training in the different analytical techniques used in the area of specialization. The students are to participate in the routine operation of the laboratory. Log books are kept by each student under the supervision of a qualified medical laboratory scientists.

**MLS 522: GENETICS AND MOLECULAR BIOLOGY  
(2 Credits)**

Genomic Gene purification and amplification, polymerase chain reaction technique. Construction of genetic maps. Biotechnology – recombinant DNA, Hybridoma.

**MLS 524: PROJECT (6 Credits)**

A supervised research project on an approved topic to be undertaken by each student for the partial fulfillment of the BMLS degree requirement. Assessment of the project will be by both oral defense and grading of the project content.

**CLINICAL CHEMISTRY SPECIALTY**

**MLS 514: CARBOHYDRATE, PROTEIN AND LIPID METABOLISM (3 Credits)**

Carbohydrate metabolism and disorder. Pathophysiology of diabetes mellitus. Diabetic ketoacidosis, Hyperosmolar non ketotic coma, lactic acidosis, Glycogen storage diseases. Insulinoma. Diagnostic criteria and Laboratory investigation. Fasting Plasma glucose, random plasma glucose, glucose tolerant test, pancreatic hormones and glycosylated hemoglobin. Lipid lipoproteins and apoproteins structure, composition and function, intravascular metabolism and catabolism of lipoproteins. Disorders of lipid and lipoproteins. Lipid storage diseases. Cardiovascular function test. Recent advance in diagnosis of lipids disorders. Plasma proteins in health and diseases. Definition, cause and investigation of Para protein; (Bence Jones proteinuria) and significance. Fractionalization of proteins. Protein electrophoresis in health and diseases. Protein degradation. Metabolic disorder and regulation of amino acid metabolism.

### **MLS 515: RENAL, LIVER & NEUROCHEMISTRY (3 Credits)**

Physiology of kidney, renal clearance and glomerular filtration rate. Renal plasma flow, maximal tubular excretory and reabsorptive capacity. Urea, creatinine and insulin clearance. Concentration and dilution tests. Renal failure, azotaemia, anurea, sodium loss in renal diseases. Aminoaciduria. Kidney diseases and kidney function test. Urinalysis in health and diseases. Features of hypernatraemia and hyponatraemia. Investigation of water and electrolyte imbalance. Homeostasis in clinical chemistry. Acid-base balance.

The liver anatomy and physiology-an overview. Biosynthesis of bilirubin, excretion of bile pigments. Jaundice anatomical and physiological classification. Pigment excretion in jaundice. Liver diseases and liver functions test to include congo red test for amyloisis and faecal fat estimation. Biochemistry of Neoplastic disorders. Diseases of the nervous system. Basic neurochemistry, CSF-normal composition and changes in diseases. Diseases of muscles.

### **MLS 516: CLINICAL ENZYMOLOGY (3 Credits)**

Mechanics of Enzyme action and kinetics, Activation repression phenomenon. Enzyme induction, inhibition, purification and specificity. Clinical Enzymology; Coenzymes and Isoenzymes in medicine, diagnosis importance of isoenzymes in biotechnology.

### **MLS 517: NUTRITION AND CLINICAL VITAMINOLOGY (2 Credits)**

Vitamins History and biochemical functions. Chemistry and metabolism of water and fats soluble vitamins. Their deficiency states and physiological significance. Relationship with hormones. Vitamin in health and diseases. Methods of analysis. Trace elements-Bioavailability, biochemical function, metabolism, and interaction. Hormonal control and methods of analysis. Specific elements in health and diseases. Bone diseases and investigation of bone disorders. Types, causes etc. Causes and Investigation of nutritional disorders.

### **MLS 526: DRUG MONITORING, TOXICOLOGY AND INBORN ERROR OF METABOLISM (3 Credits)**

Introduction to assimilation, distribution, elimination and excretion of drugs. Practical and theoretical aspect of poisoning. Investigation of suspected cases of poisoning. Estimation of blood alcohol, Salicylate sulphonamide, cyanide, oxygen, CO<sub>2</sub>, ammonia and Detection of barbiturate, cocaine heroin, opium, phenothiazine, methaqualone etc in blood, urine, sweat, aspirates, etc. Porphyrin, causes, symptoms and laboratory investigation of porphyriaemia, porphyria and porphyrinuria. Haemoglobin, synthesis, Chemistry of Haemoglobinopathies, Sulp Hb, CoHb, Met Hb. Definition, causes, consequences and investigation of some inborn errors of metabolism; Phenylketonuria, galactosemia fructose intolerance, Albinism, aminoaciduria.

### **MLS 527: CLINICAL AND REPRODUCTIVE ENDOCRINOLOGY (3 Credits)**

Endocrine glands-organization. Cellular communication by endocrine glands. Endocrine receptor binding control of endocrine action. Endocrine glands functions; the hypothalamus, the pituitary, the parathyroid, adrenal cortex, adrenal medulla. The gonads and reproductive endocrinology. Foeto-placental function. Endocrine control of metabolism and endocrine diseases/disorder; water balance, insulin action thyroid hormone and reproduction. Investigation of male and female infertility.

### **MLS 528: TECHNIQUES IN CLINICAL CHEMISTRY (3 Credits)**

Analytical techniques, standardization and quality control. Validation of assay. Birth of a new method, devising new techniques. Biological trial and tests for acceptability. Solid/dry phase chemistry. Dipstick technology, thin film technology. Immobilized enzymes. Functional test in clinical chemistry. Liver function test. Renal function test. Gastro intestinal function test etc. Analytical techniques employed in qualitative and quantitative. Determination of (1) Enzymes-phosphates. Transaminases, Dehydrogenases, kinases (2) Hormones (3) protein-Total proteins, Albumin and globulin specific protein (4) Lipids-cholesterol, triglycerides glycerol, fatty acids and lipoproteins. (5) Trace elements-Fe, Cu, Zn, Mg, selenium (6) Non-protein nitrogen-Urea, creatinine, uric acid, amino acids and ammonia, urinalysis, determination of urine specific gravity, osmolarity, qualitative tests for protein, glucose and reducing substances. Ketone bodies, bilirubin, urobilinogen and blood. Haemoglobin and haemoglobin derivative in urine. Spectroscopy of Haemoglobin and its derivative in blood and urine. Astrup techniques. Chromatography, spectroscopy,

spectrophotometry and photometry, AAS, Flame Photometer, (AES), Radioimmunoassay, ELISA and EIA.

## **HAEMATOLOGY AND BLOOD TRANSFUSION SCIENCE SPECIALITY**

### **MLS 531: HAEMOPOIESIS, HAEMOGLOBIN, HAEMOGLOBINOPATHIES &MYELOPROLIFERATIONS (3 Credits)**

Erythropoiesis and Blood cell counts in health and diseases. Blood indices. Anaemia, disorders of Iron metabolism, vitamin B12 and Folate deficiencies, Haemochromatosis and related storage disorders. The spleen and splenomegaly syndromes. Drugs, chemical and the blood Haemoglobinopathy, Haemoglobin genotype and phenotype.

Blood in infancy, childhood and pregnancy, Hereditary and blood disorders. Blood in microbial infections. Identification of blood parasites Immuno-Haematological disorders, autoimmune diseases, thrombocytopenia, leucopenia, Leukemia systemic and disseminated lupus erythematosus, rheumatoid arthritis myelomatosis and order paraproteinaemia. Preparation and cytology of blood and bone marrow films in health and disease.

### **MLS 532: BLOOD GROUP SYSTEMS AND COMPATIBILITY TESTS (3 Credits)**

ABO and other blood groups- MNS, KELL, Kidd, Duffy, Lewis, p-1 etc. Antenatal Serology; Hemolytic diseases of the newborn. Type, etiology, antenatal and post natal management. Blood group serology in paternity dispute. Haemolysin titration. Absorption and elution techniques. Indication and complication of blood transfusion. Red cell survival tests— radioisotope and differential agglutination methods. Screening of blood donor for infective agents – HIV, HBV, malaria, filarial, trypanosomes, syphilis, etc. anonymous result in blood

grouping. False positive and false negative result in compatibility testing. Preparation and standardization of AHG.

### **MLS 533: SEROLOGY AND BLOOD TRANSFUSION SCIENCE (3 Credits)**

Leucocytes and platelet antigen and antibody. Auto-immunization IgM, IgG, IgA antibodies. National Blood Transfusion Service. Preparation of commercial quantities of polyclonal antisera. Principles, uses and techniques of producing monoclonal and polyclonal antibodies. Types of blood substitutes and preservations. Preparations of blood products. WHO standards in BGS. Red cells membrane structure in relation to blood antigen locations.

### **MLS 542: ADVANCED HAEMATOLOGICAL TECHNIQUES (3 Credits)**

Principles and techniques of isoelectric focusing. Protein separation of column chromatography. Finger printing, principles and techniques. Purification of proteins and enzymes. Ultracentrifugation and molecular weight determination. Culture of blood cells and parasite. Leukocyte typing platelet aggregation- principles and techniques. Radioisotopes in Haematology; Isotope labeling techniques, measurement of radioactivity Fluorescent antibody techniques. Radioimmunoassay, ELIZA, western blotting immune-electrophoresis, competitive protein binding. Automation in Haematology, Electrophoresis- starch agar gel and polyacrylamide gel. Principle of polymerase chain reaction. Cytochemical procedures. Lymphocyte Transformation Tests and Paul—Bunnell's Test.

### **MLS 544: ADVANCED BLOOD GROUP SEROLOGY TECHNIQUES (3 Credits)**

Techniques for emergency compatibility testing – low ionic sucrose solution, spin coomb's albumin special compatibility techniques Exchange and extracorporeal blood transfusion.

Preparation of enzymes used in BGS. Forensic application of BGS, Two stage Coomb's technique Automation in BGS-Group and cross matchings Techniques, autoanalysers for antibodies and antigen detection and identification, etc.

### **MLS 545: COAGULATION AND FIBRINOLYSIS STUDIES (3 Credits)**

Platelet functions, normal and abnormal haemostasis, measurement of bleeding time. Vascular integrity. Coagulation factors, Assessment of coagulation time. One stage prothrombin time, "Thrombotest" Thromboplastin generation. Haemophilia state, assay of anti-haemophilic factor (VIII), recalcification time. Fibrinolytic activities, rapid demonstration of fibrinogen deficiency. Simple assessment of fibrinolysis. General Principles underlying clotting factor assay and measurement of fibrinolytic activity. Platelet substitute solutions. Fibrin plates. Control of anticoagulant therapy.

## **HISTOPATHOLOGY SPECIALTY**

### **MLS 534: FUNDAMENTAL HISTOPATHOLOGY (3 Credits)**

Fixation: Purpose and effect of fixative composition and uses of fixatives and their respective action on tissue components. Microscopic appearance of tissues after various methods of fixation. Function and scope of secondary fixation, post fixation and post mordantings. Knowledge of fixation of tissues for histochemical methods to include freeze drying and freeze drying substitutes. Decalcification - processing techniques - paraffin wax, embedding media for mechanical and manual processing. Microtomy - Microtomes (manipulation and uses of rocking, rotary, sledge, freezing, cryostat and ultra-microtomes), knives - selection and maintenance for various microtomes, manual and mechanical sharpening. Section cutting (techniques used with different



embedding media, attachment of sections to slides-frozen section techniques method for rapid diagnosis.

### **MLS 535: SYSTEMIC HISTOPATHOLOGY (3 Credits)**

This course exposes the students more into general pathology, control of results and management of Histopathology laboratory. More facts of Electron microscopy and Autoradiography are highlighted. Principles of general pathology applied to individual organs. Systemic Pathology. Hypertensive heart disease, heart failure and cardiomyopathies. Respiratory – Tuberculosis, pneumonia, Nephropathy associated with infestations and infections. CNS, special senses. Malignant lymphomas (non-Hodgkins and Hodgkins lymphoma, Burkitts). Idiopathic-tropical splenomegaly syndrome. Liver –cirrhosis liver cells carcinoma. Hepatitis. Female reproductive organs –pelvic inflammatory diseases. Cancer-cervical, trophoblast, ovarian. Skin leprosy, kaposi sarcoma. Electron microscopy- preparation of materials for electron microscopy. Toxicity of some reagents used in Electron microscopy. Techniques involved in autoradiography, Laboratory Management. Quality control and automation in histopathology laboratory. Slide Reporting.

### **MLS 536: HISTOCHEMISTRY AND HISIOLOGICAL TECHNIQUES (3 Credits)**

Enzyme histochemistry and its diagnostic application. The theory of stains and application, metallic impregnation and various histochemical methods. The dye theory. Properties of natural and synthetic dyes. Composition, preparation and storage of staining reagents. Testing of reagents. Common nuclear stain and counter stain for general tissue structures. Staining methods to demonstrate elastic, connective tissues and fibers. Toxicity of some reagents used as it applies to autoradiography, electron microscopy and ultra microtomy.

Suitable fixatives for use, processing techniques, impregnation/embedding and slide preparation /interpretation.

**MLS 548: MEDICAL CYTOLOGY (2 Credits)**

Study of epithelial cells. Introduction/definition of medical exfoliative cytology. Definitions and principle of exfoliative cytological methods. Gynaecological and non gynaecological cytology. Cytology of normal and malignant cells. Diagnostics criteria for all malignancy. Kinds of tumours. Methods of collection of samples for gynaecological & non gynaecological. Types of fixatives used. Staining techniques applied. Hormonal evaluation/assessment. Identification of virus, parasites, bacteria and fungi in smears. Slide identification/interpretations. Principle of liquid basal cytology. Usefulness and advantages, disadvantages and diagnostic application.

**MLS 561: EMBALMENT SCIENCE AND MUSEUM TECHNIQUES (2 Credits)**

History and science of embalment. Formalin based embalment techniques. Other methods of preservation of dead, cryopreservation (history, procedure and applications) and mummification (history, procedure and applications). Different embalment techniques and problems. Museum mounting of whole organs, techniques, importance and application. Factors affecting embalming fluids. Setting up a mortuary/medical museum. Forensic pathology as it applies to post mortem examination, recording of pathological changes of organs and collection of clinical data during autopsy especially as it relates to drowning poisoning, strangulation e.t.c. Practical based on the above topics are advised. Dogs/goats can be used for practical exercise.

**MLS 562: IMMUNOHISTOCHEMISTRY (2 Credits)**

Immunohistochemistry/immunocytochemistry, basic principles, staining procedures and techniques. Peroxidase and anti-

peroxidase major histocompatibility. Immunotyping of tumors, proteins and other diseases. Antibody and antigen preparation from cells and tissues. Human leucocytes antigen. Reading and interpretation of immunohistochemical/ immunocytochemical stained slides. Preparation and production of immunohistochemical/immunocytological stains.

### **MLS 563: STAINS AND STAINING TECHNIQUES (3 Credits)**

Rapid H&E Frozen section, Grams techniques. Maccivello techniques, phloxinetetrazine, ziehl nelson, Perl's Prussian blue, schmorl's reaction, Masson Fontana, Feulgen Reaction, Giemsa, H&E, Gordon and Sweets, Haem Van Gieson, P.A.S., Jone's Mathenamine Sliver, Congo Red, Verhoeff's MSB, PAS/Orange G., Aldehydefuchsin, Heidenhains iron haem, P.T.A.H., Alcian blue/PAS, Best's Kossa, Oil Red O., Nile blue method. Bieschosky's method, Marsland, Glee's method, papannicolaou, Barr body count, Hormonal Evaluation Gynae.

## **MEDICAL MICROBIOLOGY SPECIALITY**

### **MLS 537: SYSTEMATIC BACTERIOLOGY (3 Credits)**

History of pathogenic microbiology. Normal body flora, pathogens sources of infection, laboratory diagnosis and identification of bacteria. The pyogenic cocci, (Staphi, Strep, Pneumococci and Neisseriae). The Enterobacteriaceae, coliforms, gastroenteritis, salmonellosis, Shigallosis, cholerae, Vibrios, Pseudomonae, Bacteriodes etc. The Haemophilic bacillus (haemophilus, Brucellae, Yersinia, Bordetella etc. Anaerobic Spore formers, Aerobic spore formers, (Bacillus, Clostridia, Spirochetes, Mycobacterium), Rickettsiae, Chlamydiae Mycoplasma, L-forms, Listeria, Erysipelothrix, Bartonella etc. General pathology, epidemiology, features, diagnosis, control and therapy anaerobiosis

**MLS 538: ADVANCED ENTOMOLOGY(3 Credits)**

Structure and classification of Arthropods of medical importance. Diptera:- Families – Culicidae, Psychodidae, Sunuliidae, Ceratopogonidae, Tabanidae, Muscidae, Calliophoridae, Oestridae, Hemiptera: Families – Cimicidae, Reduviidae. Anoplura: Family – Pediculidae Siphonaptera: Families – Pubicidae, Ceratophyllidae, Leptosylliae, tungidae. Acerina:- Families- Ixodidae, Argasudae, Trombiculidac, Sarcoptidae, Demodicidae, Dermanyssidae, Poroceohalidae, Liinguatulidae.

The epidemiology and geographical distribution of human diseases. Larval migrants. Group Spirochaetacea Immune reactions (serology).

**MLS 539: PUBLIC HEALTH MICROBIOLOGY (3 credits)**

General principles of microbial disease transmission – waterborne, airborne, food borne, arthropod-borne and contagious disease. Principles and techniques for water treatment, waste-water disposal. Preventive measures in the control of bacterial, parasitic and viral infections. Vaccines and immunisation. Immunisation programme and schedule (EPI).

**MLS 550: MEDICAL MYCOLOGY(3 credits)**

General characteristics of fungi's diseases, types of mycoses and properties; opportunistic fungi, Diagnosis and chemotherapy, Systemic mycoses (Cryptococcosis-Blastomycoses, Histoplasmosis, Coccidioidomycoses). Opportunistic mycoses (candidiasis, Phycomycoses; sporotrichoses, Chromoblastomycosis, etc.) Cutaneous mycoses- Dermatophytoses. Superficial mycoses. General properties, pathogenesis, diagnosis, epidemiology, control and recognition of fungi.

### **MLS 564: MEDICAL VIROLOGY(3 credits)**

The dermatropic and viscerotropic viruses. Smallpox, cowpox, and vaccination; measles, rubella, chickenpox and shingles, Herpes Viruses, Yellow fever, lassa fever, Hep A, B and C, influenza, arbo viruses. The neurotropic viruses (rabies, poliomyelitis, encephalitis, Lymphocytic Choriomeningitis viruses, mumps, viral transformation and types of tumors and viruses. Oncogen theory etc. Viral gastroenteritis, miscellaneous, viruses, vaccines, production and immunization.

### **MLS 565: PHARMACEUTICAL MICROBIOLOGY AND MICROBIAL GENETICS (3 Credits)**

Principle of Antibiotics and chemotherapy. Mode of bacterial resistance to antibiotics. Sensitivity testing. Preparation of antibiogramdics. Minimum inhibitory concentration of antibiotics. History of antibiotics, mode of action, classification, antibiotics assay, use of animal model in the study of microbial infections. Evolution and inheritance mutation. Bacterial DNA in hereditary and mutation. Molecular basis of mutation, isolation of mutants. Bacteriophages, plasmids, episomes, transposons and bacterial DNA transfers. Recombinant DNA technology and its applications.

### **MLS 566: LABORATORY TECHNIQUES IN MICROBIOLOGY (3 Credits)**

Culture media (Different types, compounding from basic constituent and preparation of media). Examination, cultivation and identification of bacteria from different samples, pleural, CSF, urine, sputum, ascitic fluid. Blood culture, High vaginal swab, wound swabs, ear, eye, nasal and other swabs. Stool bacteriology. Sputum bacteriology. Urine bacteriology. Systemic fungal culture and identification. Semen analysis. Special -serological tests. ASO, Widal, VDRL, Rheumatoid factor. Complement fixation, neutralization, hemagglutination tests for identification of micro-organisms. General

identification of microorganisms by animal inoculation.  
Biochemical test for the identification of bacteria and fungi.

## **WARDS AND ACHIEVEMENTS**

1. Dr. T. Y. RAHEEM, was awarded a USAID K4Health grant for e-Learning research and Capacity Building (2012 -2016)
2. Dr. Mrs. R. M. KOLAWOLE received a Doctorate grant from University of Lagos. Grant worth ₦500,000.

## **LINKAGES AND COLLABORATIONS**

The University has an outstanding MoU with some notable Research Institutes and Hospitals in Nigeria, namely:

S/N	ORGANISATION	STATUS
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1	Nigerian Institute of Medical Research (NIMR)	MoU
2	Lagos State University Teaching Hospital (LASUTH)	MoU
3	Lagos State Health Service Commission	MoU
4	Educational Advancement Centre	MoU
5	Commit Technology and Consult Ltd.	MoU
6	Edustart Global Foundation	MoU
7	New Horizon Systems Solution Ltd.	MoU
8	Nigerian Employers Consultative Association (NECA)	Registered Member
9	Nigerian Association of Small and Medium Enterprises (NASME)	Registered Member

**PENALTIES FOR EXAMINATION  
MALPRACTICES**

S/N	Misconducts	Penalties
1.	Possession/copying of any written materials relevant to the examination, tests and assignments.	Rustication for two semesters.
2.	Impersonation	Expulsion
3.	Plagiarism	Rustication for one semester.
4.	Unauthorized access to examination materials	Expulsion



5.	Unauthorized collection of items from another student during an examination without the knowledge of the invigilator	Letter of caution
6.	Falsification of evaluation form and other academic records or documents	Expulsion
7.	Appearing for examination, without meeting attendance requirement	Letter of caution and prevention from writing the examination.
8.	Disobedience to instructions/ disruption during an examination/harassment of invigilator	Disqualification from the examination.
9.	Harassment of Invigilators	Rustication for one semester.
10.	Anti-safety behaviour during practical, workshops, studio work, etc.	Letter of caution
11.	Attempted inducement of examiners and invigilators	Disqualification from the examination
12.	Aiding and abetting examination misconduct	Expulsion.
13.	Destruction of evidence of examination misconduct	Rustication for one semester

14.	Refusal to complete examination misconduct form	Rustication for one semester.
15.	Any previous arrangement made for access to examination materials whether it succeeds or not	Rustication for two semesters.
16.	Refusal to submit examination scripts	Failure in the examined course.
17.	Any other misconduct recorded from time to time	Penalty shall be determined based on the recommendation of the panel.