KADUNA STATE UNIVERSITY (KASU) KADUNA

COLLEGE OF ALLIED HEALTH AND PHARMACEUTICAL SCIENCES

FACULTY OF ALLIED HEALTH SCIENCES

DEPARTMENT OF MEDICAL RADIOGRAPHY

STUDENT HANDBOOK
FOR BACHELOR OF RADIOGRAPHY
UNDERGRADUATE STUDENTS

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Mallam (Dr.) Hussaini Dikko

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UNIVERSITY OFFICIALS

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HRH, Sanusi Lamido Sanusi

Pro-Chancellor and Chairman of Governing Council
Mallam (Dr.) Hussaini Dikko

Vice Chancellor
Prof. Abdullahi Ibrahim Musa

Deputy Vice Chancellor (Academic)
Prof. Yusha'u Ibrahim Ango

Deputy Vice Chancellor (Administration)
Prof. Muhammad Bashir Ali

Deputy Vice Chancellor (Strategy, Innovation and Service Delivery)
Prof. Helen Afang Andow

Registrar
Mrs. Samira Balarabe, Esq.

Bursar
Mrs. Hauwa'u Dalhatu Muhammad

University Librarian
Dr. Babangida Umar Dangani

NAMES OF DEPARTMENTAL STAFF

S/N	NAME	RANK	NATURE OF APPOINTMENT
1.	DR JEOFFRY LUNTSI	ASSOCIATE PROFESSOR	VISITING
2.	DR UMAR ABUBAKAR	SENIOR LECTURER	VISITING
3.	DR CHRISTOPHER ISHEKWEN	SENIOR LECTURER	SABBATICAL
4.	TASIU ISAH	LECTURER II	TENURE
5.	HALIMA SULEIMAN	LECTURER II	TENURE
6.	ALKASSIM BABANGIDA	ASSISSTANT LECTURER	TENURE
7.	MUSTAPHA AHMAD	ASSISSTANT LECTURER	TENURE
8.	AISHA MAINA UMAR	ASSISSTANT LECTURER	TENURE
9.	FIRDAUSI ABDULLAHI FAHAD	ASSISSTANT LECTURER	TENURE
10.	ADAMU MUHAMMAD YUNUSA	ASSISSTANT LECTURER	TENURE
11.	MUBARAK NASIR ISAH	ASSISSTANT LECTURER	TENURE
12.	ADAMU MUHAMMAD YUNUSA	ASSISSTANT LECTURER	TENURE
13.	UMMUSALMA SALISU BOYI	TECHNOLOGIST	TENURE
14.	ABUBAKAR YUSUF IZGE	TECHNOLOGIST	TENURE
15.	RASHIDA SHUAIBU	ASSISSTANT LECTURER	PART TIME
16.	SHEMA'UMUHAMMAD SHUAIBU	TECHNICIAN	TENURE
17.	USMAN IBRAHIM	ADMIN OFFICER	TENURE

DEPARTMENT OF HUMAN ANATOMY

S/N	Name of staff	Qualification	Present rank
1.	Prof. Danladi Sambo AMAZA	B.Sc., MHPM, M.Sc., PhD.	Professor
2.	Prof. Oshiozokhai Eboetse YAMA	MBBS, NPMC, M.Sc., PhD.	Professor
3.	Dr. Samuel A. ADAVBA	MBBS, M.Sc. Human Anatomy	Senior Lecturer
4.	Dr. Abdulwaheed A. OYEWALE	B.Sc., PGDE, M.Sc. Ph.D.	Senior Lecturer
5.	Mrs. Gidok Kogi ABEDNEGO	B.Sc., M.Sc. Human Anatomy	Lecturer I
6.	Mrs. Hadiza Bello RILWAN	B. Human Anatomy Sc., M.Sc.	Lecturer II
7.	Dr. Jamilu HARUNA	MBBS, MDRMDS	Lecturer II
8.	Mrs. Aisha AMINU	BS. MSc. Human Anatomy	Assistant Lecturer
9.	Dr. Hafsat Balarabe SHEHU	MBBS	Lecturer II
10.	Mal. Idris Muhammad	B.Sc. Human Anatomy	Graduate Assistant

NON-ACADEMIC STAFF

S/N.	Name of staff	Present rank	Qualification
1.	Mal. Mukhtar ABDULKARIM	HND Business Admin.	Senior Executive Officer
2.	Mal. Aliyu GARBA	ND, HND, PGDM	Senior Lab. Technologist
3.	Mal. Nura UMAR	ND, HND.	Senior Lab. Technologist
4.	Mr. Auwal K. FALALU	B. Sc. Human Anatomy	Laboratory Technologist II
5.	Mrs. Bilkisu A. LIMAN	B.Sc. Human Anatomy	Laboratory Technologist II
6	Mr. Nura IDRIS	Diploma Public Admin; Cert. in Computer Science	Principal Secretarial Assistant
7.	Mohammed ABDULLAHI	Cert. in Public Admin	Laboratory Attendant
8.	Mr. Musa DANIEL	SSCE & Advanced Refresher Course	Senior Driver

DEPARTMENT OF HUMAN PHYSIOLOGY

S/N	Name of staff	Qualification	Present rank
1	Dr. Muhammed Kadir Amed	B.Sc., M.Sc., PhD.	Reader
2	Dr. Goji Teru A. D	B.Sc., M.Sc., PhD.	Reader
3	Dr. Ciroma Fatima Lami	B.Sc., M.Sc., PhD.	Reader
4	Dr. Yusuf Suraj Muhammad	B.Sc., M.Sc. Ph.D.	Senior Lecturer
5	Dr Ohunene Avidime Makoju	B.Sc., M.Sc. Ph.D	Senior Lecturer
6	Dr. Abdurrazak Abubakar	B.Sc., M.Sc. Ph.D	Reader
7	Dr. Sada Maryam Naiya	B.Sc., M.Sc. Ph.D	Senior Lecturer
8	Dr Danboyi Timothy	MBBS. MSc.	Lecturer I
9	Dr Ja'afar Fatima Yahaya	MBBS, MSc.	Lecturer I
10	Idris Aisha	B.Sc. MSc.	Lecturer II

DEPARTMENT OF BIOCHEMISTRY

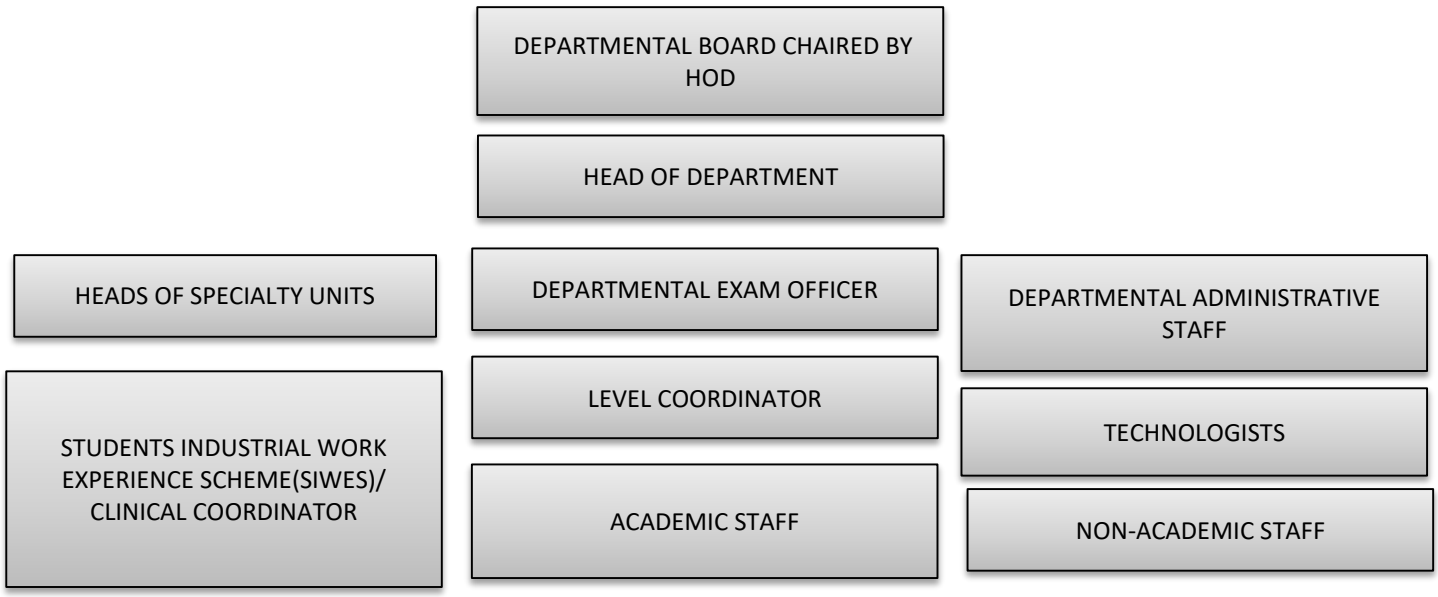
S/N	Name of staff	Qualification	Present rank
1	Prof. Richard Auta	B.Sc., M.Sc., PhD.	Professor
2	Prof. T. Bulus	B.Sc., M.Sc., PhD.	Professor
3	Dr. M. Dakare	B.Sc., M.Sc., PhD.	Reader
4	Dr. S.A James	B.Sc., M.Sc. Ph.D.	Senior Lecturer
5	Dr. P.M Waziri	B.Sc., M.Sc. Ph.D	Senior Lecturer
6	Dr. Maimuna Zubairu	B.Sc., M.Sc. Ph.D	Senior Lecturer
7	Dr. Hauwa Y. Bako	B.Sc., M.Sc. Ph.D	Senior Lecturer
8	Umar F. Halliru	BSc. MSc.	Lecturer II
9	Barakat Abdullahi	BSc. MSc.	Lecturer II
10	Aliyu Yakubu	BSc. MSc.	Lecturer II
11	Hussaini Ashafa	B.Sc. MSc.	Lecturer II
12	Hafsat Rufai	B.Sc. MSc.	Assistant Lecturer
13	Abdussalam Tahir	B.Sc. MSc.	Assistant Lecturer

DEPARTMENT OF PHARMACOLOGY AND TOXICOLOGY

S/N	Name of staff	Qualification	Present rank

1	Dr Abdulfati Adetunji Jimaoh	B.Pharm, M.Sc., PhD.	Reader
2	Dr Asma'u I.J Musa	B.Pharm, M.Sc., PhD.	Senior Lecturer
3	Dr Musa I. Yakubu	B.Pharm, M.Sc., PhD.	Senior Lecturer
4	Danjuma Mallam	B.Pharm, M.Sc.,	Lecturer I
5	Esther B. Patrick	B.Pharm, M.Sc.,	Lecturer I
6	Micah Timothy	B.Pharm, M.Sc.,	Lecturer II
7	Safiya S. Sambo	B.Pharm, M.Sc.,	Lecturer II

ORGANOGRAM OF THE DEPARTMENT



PREFACE

The Department of Radiography, Faculty of Allied health Sciences, Kaduna State University was established in 2019. National Universities Commission (NUC) resource verification was done in November 2019 and approval from NUC was given in 2020. The first set of students were admitted in to the University for 2019/2020 Academic session. The Regulatory Body visited the Department for Advisory visit in June/July 2020. The Council required the Department to be well established in the Faculty and University at large by making some vital observations and recommendation. These reports were forwarded to the appropriate Authority for immediate action.

Dr Joseph Eze was appointed the first Head of Department. The HOD appointed Heads of Units, level coordinators, exam and timetable officers as well as the departmental committees inaugurated all for the transformation of the department in to an accredited Unit of the Faculty of Allied Health Sciences.

This handbook contents, applications and clarity if expression is devoid of ambiguity. It is detailed and more inclusive in terms of rule and regulations on all matters of the department. It is imperative that the members of students should endeavor to regularly familiarize themselves with, seek counsel as appropriate, and be current on the various provisions guiding their operations, relationships, responsibilities, rights, privileges and expectations.

INTRODUCTION

Medical Radiography involves the use of ionizing radiation (including X-rays) and other forms of radiant energy such as ultrasound and nuclear magnetic resonance in the diagnosis and treatment of diseases. Medical radiography is an arm of modern Medical Sciences and the pivot of modern diagnostic medicine.

There is rapid scientific and technological advancement in the field of modern medicine that can only be fully and effectively harnessed with enhanced university educational training. University training is a pre-requisite for proper understanding and application of modern technology as well as for the necessary innovative approach in carrying out complex radiographic procedures.

There are only four institutions in the whole of Northern Nigeria besides Kaduna State University (KASU) that are offering a university-based education in Medical Radiography. In fact, the course is currently being offered in only 9 institutions in the country, namely. University of Calabar; University of Nigeria, Enugu Campus; University of Maiduguri; University of Lagos; Nnamdi Azikiwe University, Bayero University Kano, Usmanu Danfodio University, Ahmadu Bello University Zaria and Kaduna State University. The current programme is the fifth one in the entire Northern Nigeria.

UNIVERSITY VISION

The vision of Kaduna State University is to become a university of the world class standard with excellence in applied Sciences and sustainability studies.

MISSION OF THE UNIVERSITY

The Mission of the Kaduna State University is to provide all-round University education of the highest standard for the development of the individual and the State, while inculcating the spirit of love, tolerance, understanding and unity in the State in particular and the country in general.

UNIVERSITY PHILOSOPHY

As a centre of learning, the Kaduna State University shall:

i. Promote excellence in knowledge acquisition through teaching, research and community service.

ii. Fully foster innovation and creativity by taking full advantage of globalization and knowledge-based economy.

iii. Maintain the international character of a university and uphold the ideals of the community within which it is located.

iv. Harness its resources most profitably in servicing as well as giving leadership to industrial and technological development in the state.

v. Promote unity in Kaduna State and the nation at large.

UNIVERSITY OBJECTIVES

The objectives of the University shall be:

i. To encourage the advancement of learning and to hold out to all persons without distinction of race, creed, sex or political conviction, the opportunity of acquiring a higher and liberal education.

ii. To provide courses of instruction and other facilities for the pursuit of learning in all its branches, and to make those facilities available on proper terms to such persons as are equipped to benefit from them.

iii. To encourage and promote scholarship and conduct research in all fields of learning and human endeavour.

iv. To relate its activities to the social and economic needs of the people of Nigeria.

v. To undertake any other activities, appropriate for a university of the highest standard.

DEPARTMENTAL MISSION STATEMENT

The mission of the department is to provide appropriate and adequate training opportunity for the application of high technology and conventional medical imaging systems in medicine to aid diagnosis, treatment, management and research.

VISION STATEMENT

1 Students are provided with the kind of experience that will enable them to develop their full potential in open, honest, friendly and stimulating environment where people are kindly accepted, valued and ideas discussed without reservations.

2. Every staff is respected, committed and takes part in the decision-making process to provide services and quality education.

RATIONALE

1. The acute shortage of Medical Radiographers in Nigeria has received the attention of governments at various levels. The need to remedy this situation becomes more imperative today as many medical establishments and hospitals continue to acquire state-of-the-art diagnostic and therapeutic radiologic equipment.
2. Rapid scientific and technological advances can only be effectively harnessed to optimum practical application and utilization with enhanced university education.

3. The Radiographer of today needs to carry out complex radiological investigations in the hospital, design or innovate parts of equipment and accessories and apply modern management technique to organize his department for maximum efficiency.

PHILOSOPHY OF THE PROGRAMME

The philosophy of the Kaduna State University (KASU) Bachelor of Radiography degree program in the Department of Medical Radiography is to provide an educational atmosphere that imparts students with a desire for learning, excellence in clinical performance and intellectual curiosity. The program is maintained with the highest standard of excellence, and the faculty is committed to providing the students with basic and advanced knowledge in the art and science of radiography as well as developing in them, a spirit of understanding and compassion for their patients. The program provides a competency based education (CBE) with Case-based Learning (CBL) process that enable students to attain both the problem solving knowledge and the technical ability necessary to be highly skilled competent professional radiographers of international standard that can address and handle the emerging technological needs in medical radiography in accordance with the guidelines of the National Universities Commission (NUC) and the Radiographers Registration Board of Nigeria (RRBN).

The global trend for radiography practice in university-based training due to great advances in the sophistication and diversity of medical imaging equipment as well as the scientific knowledge, its application and expertise required for this practice of radiography.

The training in Radiography will prepare graduates to become confident members of healthcare teams and competent supervisors of laboratories and other clinical settings.

AIM:

The aim of introducing this course is to address the acute shortage of manpower, especially in this part of the country. There are only a handful qualified Radiographers now practicing in the entire Northern region with an estimated population of over 80 million. The primary objective of the B. RAD program is to provide a social and professional atmosphere in which the students can obtain the skills and attitudes necessary for an eventual position in the field of Medical Radiography and improve the dearth of qualified Radiographers in Northern Nigeria.

OBJECTIVES

The program is designed to fulfill the following objectives:

a. To produce Radiographers with relevant practical and technological competence in the practice of radiography at the primary, secondary and tertiary levels of health-care delivery.
b. To produce radiographers who can assume professional positions involving the use of the most complex radio-diagnostic equipment and procedures,
c. To produce professionals with a high level of proficiency in conventional radiography and with a good working knowledge of other imaging modalities including Therapeutic Radiography,
d. To produce professionals who will be eligible for postgraduate studies, research and development.

ADMISSION REQUIREMENT

Candidates seeking admission into Bachelor of Radiography (B.RAD) in the Faculty of Allied Health Sciences must have passed the Secondary School Certificate Examination NECO/West African Examination Council with Minimum of 5 credits including English Language, Mathematics Biology, Chemistry and physics in not more than two sittings. Candidates can be admitted into the programme at 100 level or 200 level.

A. UTME Requirements (100 level)

i) The compulsory UTME subjects are Biology, Chemistry and Physics and English. Candidates must obtain the appropriate cut - off points of the University in UTME.

ii) Candidates entering into 100 level from College of Basic and Remedial studies (CBRS) must also have a minimum of 2.40 GPA as well as sit for UTME with not less than 200 points and must also possess the required minimum 5 credits in English Language, Mathematics, Biology, Chemistry and Physics in not more than one sitting.

B. Direct Entry Requirements (200 level)

i) Candidates must have a minimum of upper credit at Advanced level in Biology, Chemistry and Physics together with 5 O/level passes at credit level.

i) **Board/Council Certified Diplomas** in X-ray/dark room technician

Note: Holders of Board/Council certified diplomas may be required to undergo an entry screening examination**.**

ii) Minimum of 10 points for IJMB.

iii) Candidates with a minimum of second-class upper degree in any of the Basic sciences from a recognized university.

Inter-University Transfer Mode

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

Registration Guidelines

All Students who were successfully admitted into the department at the beginning of each academic year in accordance with the rules made by the University senate shall observe the following steps during registration:

i) Each student should come with original copies of all relevant credentials and supportive documents
ii) Clearance Slips must be collected by each student from the faculty
iii) Further Screening in the Academic Planning Unit
iv) Each student will pay some dues and other charges for registration
v) Activation of Matriculation number as well as collection of pins
vi) Each student will be required to do online registration, providing all his/her basic information. Students will be required to show originals of their certificates alongside their passport photographs.
vii) They must obtain list of courses to be taken from different Faculties as well as signatures of all appropriate University Authorities and lecturers involved.
viii) All completed registration forms must be printed, photocopied; each photocopy should be submitted to the departments, Faculty, College and Academic Planning Unit of the University.
ix) All new students must attend Orientation organized by the Faculty.

PROGRAMME STRUCTURE

The duration for the B. Radiography degree programme is five (5) academic sessions which include a period of formal studies, clinical posting and project. We have two phases in the programme

a. Pre-clinical phase b. Clinical phase

(a) Pre-clinical phase: The Pre-clinical phase is from part-I to 1st semester part-III.

(b) Clinical phase: The Clinical phase commences from 2nd semester part-III (300 Level) to the end of 2nd semester part-V (500 Level)

DURATION OF THE PROGRAMME

Minimum duration

The Bachelor of Radiography (B.RAD) shall run for a minimum period of five (5) academic sessions for entry through UME and four (4) academic sessions for direct entry.

Maximum duration

For Bachelor of Radiography the maximum period of study permissible shall be nine (9) academic sessions for entry through UME and eight (8) academic sessions for direct entry.

Repeating a Class

Students shall be allowed to repeat a class (level) only once. Students shall not be allowed to repeat 100 level.

Attendance of Lectures and Continuous Assessment

i) All registered students of the faculty are expected to follow their given Time Table strictly and attend their lectures punctually as well as continuously. Except on health grounds, a student must have at least 75% lecture attendance in all registered courses to be eligible for any exams.

ii) Continuous assessment constitutes 40% of the total marks while the end of semester exams is 60%.

iii) Continuous Assessment can be given to the students at any time before the end of the semester. **No student is allowed to be absent without any genuine and approved reason**.

iv) All GSM handsets must be switched off during lectures and put away during exams.

Attendance in Laboratory Practical, Seminars, Tutorials, Clinical Sessions, Community trips and Theatres

Attendance to all these (above) are compulsory for all students at the appropriate levels.

GRADING SYSTEM

% Score	Grade	Grade Point
70 – 100	A	5
60 – 69	B	4
50 – 59	C	3

PROGRESSION FROM ONE LEVEL TO ANOTHER LEVEL

100 Level to 200 Level:

Student must pass all the **core courses** (Mathematics, chemistry, physics and biology). Scores obtained by a student in the courses under each **course** shall be summed and least average of 45% shall be the pass mark for each **course**.

200 Level to 300 Level:

A student must pass all the courses registered at Level 200. Students who fail less than or equal to 25% of the total credits registered (i.e 9 CU) at Level 200 shall **re-sit** the failed courses. A candidate who fails more than 25% (i.e 10 CU) to 50% of the credits registered (i.e 19 CU) or failed any re-sit exams shall **repeat** the level. A candidate who fails more than 50% and above of the credits registered (i.e 20 CU) would be advised to withdraw.

Total Credit Units Registered= 38 Credit Unit; GST not included.

Note: The following applies to levels 200 and above

1. **GSP** courses are not determinants of progression but they are determinants of graduation (students shall be allowed to carry over GSP courses).
2. For scores obtained by each student, an average of 50% shall be the pass mark for each **course.**
3. **Re-sit** students can only obtain a maximum score of 50% in each of the courses.
4. **Any** withdrawal decision reached at any level in any department is also withdrawal from the entire Faculty.

300 Level to 400 Level:

A student must pass all the courses registered at Level 300. Students who fail less than or equal to 25% of the total credits registered (i.e 11 CU) at Level 300 shall **re-sit** the failed courses. A candidate who fails more than 25% (i.e 12 CU) to 50% of the credits registered (i.e 23 CU) or fails **any** re-sit exam shall **repeat** the level. A candidate who fails more than 50% of the credits registered (24 CU) would be advised to withdraw.

Total Credit Units Registered= 46 Credit Unit. EEP not included.

400 Level to 500 Level:

A student must pass all the courses registered at Level 400. Students who fail less than or equal to 25% of the total credits registered (i.e 11 CU) at Level 400 shall **re-sit** the failed courses. A candidate who fails more than 25% (i.e 12 CU) to 50% of the credits registered (i.e 23 CU) **or** fails **any** re-sit examination shall **repeat** the level. A candidate who fails more than 50% of the credits registered (i.e 24 CU) would be advised to withdraw from the faculty.
Total Credit Units Registered= 46 Credit Unit. EEP not included.

500 Level

A student must pass all the courses registered at Level 500. Students who fail less than or equal to 25% of the total credits registered (i.e 8CU) at Level 500 shall **re-sit** the failed courses. A candidate who fails more than 25% (i.e 9 CU) to 50% of the credits registered (i.e 18 CU) or failed any re-sit exams shall **repeat** the level. A candidate who fails more than 50% of the credits registered (i.e 19 CU) would be advised to withdraw.
Total Credit Units Registered= 35 Credit Unit

RRBN examination system

There will be two (2) professional examinations taken at the end of year 3 and year 5 alongside school exams. Suitable external examiners shall **review** questions for the professional examinations in 300level and 500level. The examination should be on the following courses:

Part I: (lst Professional Examination) - at the end of 300 levels: Basic/radiation Physics; Hospital Practice and Care of Patients: Radiographic Anatomy, Physiology, Biochemistry and General Pathology. Candidate must pass this examination at first attempt before proceeding to 400 level.

Part II: (2nd Professional Examination) - at the end of 500 level: Radiographic Technique. Equipment for Diagnostic Radiography, Radiographic Photography and Image Processing. Candidate must pass this examination at first attempt before graduation.

There will be no re-sit for the RRBN professional examinations. Any student that fails this examination at first attempt must repeat the entire session with all the registered courses.

To qualify for the examination, students should have taken part in 75% of the academic programme. Records of clinical training (Log books) must be presented before admission into Practical and Viva-voce examinations.

STRATEGY FOR IMPLEMENTATION

For academic inputs at 100 level which require the leaching of basic sciences such as Chemistry. Physics, mathematics, biology and the Use of English, the Kaduna State University has adequate teaching facilities and manpower in handling and examining these ancillary courses.

For the academic inputs at 200 & 300 levels, which require the teaching of Anatomy, Biochemistry Physiology. Pathology and Clinical Biochemistry, the College of Medicine, Kaduna State University has an adequate facilities and staff that are participating in the teaching and evaluation of these courses.

The 3rd4thand 5th year (Clinical) will be spent in the departments of Radiology of Barau Dikko Teaching Hospital, for Clinical training and other approved clinical sites.

Mode of Study: Candidates are required to register on full time. No part time registration will be allowed.

Type of Course System: -A Course credit system will be adopted, where by instruction is by course, specified into course units.

Course Coding System: A system of identifying a course using the combination of 3 letters and 3 digits according to Kaduna State University standard would be used. The 3 letters for Medical Radiography are RDG, while the first of the three number digits donates the Level.

Classification of Degree

The B.RAD programme in Kaduna State University (KASU) is Unclassified

Passing grade

A passing grade of at least C in each examination is essential for graduation.

LIST OF HOSPITAL COLLABORATIONS

1. **Barau Dikko Teaching Hospital**
2. **Yusuf Dantsoho Memorial Hospital**
3. **44 Nigeria Army Reference Hospital**

LIST OF LABORATORIES

1. **Conventional Radiography Laboratory**
2. **Dark Room for Radiography Films Laboratory**
3. **Digital Radiography Laboratory**
4. **Ultrasound Laboratory**
5. **Dosimetry Laboratory**
6. **Virtual Radiography Laboratory**

SPECIALISATIONS

	SPECIALTY/UNIT
1	**Conventional Diagnostic Radiography & Pattern Recognition**
2	**Radiation Protection and Dosimetry**
3	**Radiological Management and Education**
4	**Radiotherapy and Nuclear Medicine**
5	**Computed Tomography & Magnetic Resonance Imaging**
6	**Ultrasonography**

ORIENTATION OF NEW STUDENT

The Faculty of Allied Health Sciences organizes and unanimously welcome her student into various departments of the faculty. However, the students are encouraged to work very hard, wake up to their responsibility as students and be the best. This gives an opportunity for Staff and the new students to interact with each other.

EXAMINATIONS

At the end of each semester, examinations are conducted for courses taught in various departments. Such examinations may take the form of written papers, oral examinations, practical, submission and defense of written projects or any combination as approved by the University Senate. All examinations are centrally organized by the Senate but administered by individual faculties. Faculty and Departmental Examination Officers coordinate the conduct of examinations.

Conduct of Examinations in the University

a. The timetable for the examinations shall be fixed, at least two weeks before the commencement of the examinations, on the various notice boards in the University stating the time and venue of all examinations.

b. Students who have clashes in the examination's schedules should immediately intimate their Departmental/Faculty Examination Officers.

c. Students who fail to intimate the appropriate Officers of the University, of impending clashes in examinations time-table, shall hold themselves responsible for any difficulty that may arise.

d. Continuous assessment during course work shall be included in determining the final score of candidates in the examinations results.

e. Results for continuous assessment shall be fixed at least one week before commencement of the examination of a particular semester, on the departmental notice boards.

f. It shall be the responsibility of each student to make sure that they are registered for the appropriate examination and be sure of dates, time and venues of examinations for which they are registered. Each student is also to ensure that they are in possession of any identification document prescribed for the examination.

g. Each candidate should be in the examination rooms at least 10 minutes before the stipulated time of the examination. He/she is required to supply his/her

writing and drawing instruments. He/she is also required to supply any other examination aid to which the provision is prescribed in the rubrics of the questions paper.

h. Any student who absents himself/herself from any examination without University's approval and has not withdrawn from the course of study shall be graded "F" for such course(s) and grade(s) shall be reflected in the calculations of his/her GPA.

i. Subject to the approval of the Senate, the University may grant deregistration concession to student(s) who could not complete or write all the examination due to certified illness or exigencies acceptable to the Senate.

j. Without prejudice to the regulations cited under Academic Misconducts, the University Senate reserves the right under the law establishing the University to decide finally on all academic matters.

k. Students who satisfy the requirements for examinations shall have access to print his/her examination card, which shall be presented to the invigilators in all examinations.

l. For a student to be admitted into any examinations, he/she must have been registered for the course units to be examined and must have fulfilled any university requirements concerning fees and other registration matters.

m. To qualify to sit for semester examinations, a student must have fulfilled any College/Faculty requirements regarding attendance at lectures and satisfactory completion of any course-work, practical, assignments or other matters. The standards necessary to satisfy these Faculty requirements shall be determined from time to time by a Faculty Board on the recommendation of the appropriate departments, and any changes shall be made known to the students by the start of the relevant semester.

n. Any student found to have infringed any of the university requirements for admission to examinations as mentioned above, shall not be issued an

examination card. These cards will be issued on the basis of lists of students submitted by each Faculty examination Officer, who shall certify that the students have been registered for the programmes of studies shown for them and have not infringed any Faculty requirements. On the other hand, the Academic Planning/ICT will have to certify that the student has not infringed any of the University requirements.

o. No student shall be allowed to enter the examination hall without the University identity card and examination card. The University shall facilitate the process of obtaining both student's Identification card and examination card before commencement of examination.

p. A candidate shall not be allowed to enter the examination hall if he/she is more than 30 minutes late except in exceptional circumstance.

q. A candidate shall not be allowed to leave the examination hall within 45 minutes after the commencement of an examination except under exceptional circumstances approved by the Head of Department or Examination Officer.

r. On entering the examination hall, it is the responsibility of the candidate to draw the attention of the invigilator to any paper or material on his/her seat, table or on the floor around him/her so that materials can be removed before the examination starts.

s. A candidate who is more than 30 minutes late after the commencement of an examination may be allowed entry only if the invigilator is satisfied with the reason for his/her lateness, but such case shall be reported in writing by the invigilator to the Faculty Examination Officer.

t. A candidate who arrives late at an examination hall shall not be allowed extra time.

u. A candidate shall deposit any handbag, briefcase, book, handout, etc. outside the examination hall or in front of the invigilator before the commencement of the examination.

v. All electronic equipment, GSM handsets, calculators are not allowed into examination hall except where a specific item is allowed for the paper. A candidate caught with such unauthorized devices during examination shall be punished in accordance with the stipulated regulations.

w. A candidate shall comply with the instructions to candidates as set out in the question paper and answer booklets or other materials supplied.

x. A candidate shall also comply with any instructions given by the invigilator, except where such instructions interfere with his right as an examinee i.e. he/she should not be made to stand up in the class or asked to go out during examination.

y. A candidate shall use only the answer booklets provided by the invigilator.

z. All rough works must be crossed out neatly before a candidate finally submits his/her script to the invigilator. Note that rough works shall only be done on the answer booklet.

aa. Under no circumstance shall a candidate write anything other than his/her matriculation number and name on the question paper. Supplementary answer sheets or booklets, even if they contain only rough work, must be neatly parked into the answer booklet.

bb. Administration of the examination misconduct form should be done during the incident and before witnesses. A staff not assigned as invigilator is not allowed to invigilate candidates during the examination.

ac. Candidates are not permitted to leave the examination hall during the course of the examination except briefly and under supervision of an invigilator.

ad. Candidates must hand in their examination scripts to the invigilators before leaving the examination hall.

ae. Absence from examination as a result of ill-health must be supported with a valid medical certificate from a government approved hospital.

af. Where a student is absent from a semester examination without a satisfactory reason, the student shall be deemed to have withdrawn from the University.

ag. Any student who leaves the examination hall shall not be readmitted, unless throughout his/her absence from the hall was escorted or accompanied by invigilator or security personnel.

Examination Misconduct and Penalties for Students

Examination misconduct for the purpose of these rules and regulations shall mean anyone or a combination of the following committed by students:

RULE No.	OFFENCE BY STUDENT	PUNISHMENT
Rule 1	Impersonation at examination including: (a) Coming into the examination hall to write for another student. (b) Coming into the examination hall with other person to write examination for the student. (c) Exchange of examination number or name(s) on answer script. (d) Intentional use of a student's number by another person in examination, including: Continuous assessment, semester examination, SIWES and projects. (e) Where the person (intruder) brought in is not a student, the person should be handed over to the appropriate authority for further investigation.	Expulsion

Rule 2	**Introduction of relevant foreign materials or cheat note, printed or written into the examination hall and usage established.**	**Expulsion**
Rule 3	**Copying from a book or cheat note written on the body, clothing, paper or any other material.**	**Expulsion**
Rule 4	**Consulting cheat note outside the examination hall in the course of the examination.**	**Expulsion**
Rule 5	**Exchange of relevant examination materials in the examination hall which may include:** **(a) Exchange of question paper containing relevant jottings and materials.** **(b) Collaboration/copying from each other.** **(c) Exchange of answer script.**	**Expulsion**
Rule 6	**Theft/removal/replacement of examination scripts or materials.**	**Expulsion**
Rule 7	**Facilitating/abetting cheating during examination.**	**Expulsion**

Rule 8	**Threats, assault and battery to an invigilator/examination officer or any constituted authority with evidence or witness.**	**Expulsion**
Rule 9	**Use of mobile phone (GSM), text message, browsing, earphone, audio recording or other such communication or electronic gadget during the examination.**	**Expulsion**
Rule 10	**Running out of the examination hall after being caught for an offence.**	**Expulsion**
Rule 11	**Possession of double scripts either secured inside and /or smuggled in from outside the examination hall.**	**Expulsion**
Rule 12	**Introduction of fake examination card or identity card in the examination hall.**	**Expulsion**
Rule 13	**Seizure and running away with cheat note(s).**	**Expulsion**
Rule 14	**Willful destruction of exhibits in the examination hall on the suspicious or on arrest for committing examination misconduct.**	**Expulsion**

Rule 15	**Any student caught with a leaked question paper and the source of the leakage investigated and confirmed.**	**Expulsion**
Rule 16	**Refusal to write a statement by the student(s) accused of examination misconduct.**	**Expulsion**
Rule 17	**Failure to honour invitation of the Ethics Committee by a student accused of examination misconduct.**	**Expulsion**
Rule 18	**Breaking into the house, office or vehicle of an examiner, lecturer, invigilator or any other officer having anything to do with the marking or evaluation of the performance of students at an examination conducted by this University.**	**Expulsion**
Rule 19	**Obtaining, procuring or possessing by any means a preview of questions intended for any examinations being conducted by this University before its due date and time.**	**Expulsion**
Rule 20	**Any student that insults an invigilator, examination officer**	**Rustication for one session**

	or constituted authority during examination and/or other indecent behavior capable of disrupting the examination.	
Rule 21	**Introduction of relevant foreign materials and cheat notes into the examination hall, but usage not established.**	**Rustication for one session**
Rule 22	**Introduction of mobile phone(s) and/or other such communication or electronic gadgets into the examination hall, but usage not established.**	**Rustication for one session**
Rule 23	**Offering or accepting any assistance whatsoever from any other student or person from within or outside the examination hall.**	**Rustication for one session**
Rule 24	**Smoking inside the examination hall.**	**Rustication for one session**
Rule 25	**Refusal to return or sneaking out with answer script after the examination, if investigated and confirmed.**	**Rustication for one session**
Rule 26	**Introduction of non-relevant materials to the examination hall.**	**Written warning**

Rule 27	**Unauthorized writing on the question paper.**	**Written warning**
Rule 28	**Refusal to give evidence or witness on another student accused of examination misconduct.**	**Written warning**
Rule 29	**Delay in the submission of answer script after an examination has ended.**	**Written warning**
Rule 30	**Soliciting for marks or change of grade from the examiner or examination officer.**	**Written warning**
Rule 31	**Speaking/conversation during examination.**	**Written warning**
Rule 32	**Partial mutilation of the answer script by alteration, cancellation, over writing of name, registration number, ID Card numbers, examination code and tearing of pages on the answer script.**	**Written warning**
Rule 33	**Unwarranted behavior in the examination hall that may not affect the conduct of the examination.**	**Written warning**

Rule 34	**Attempt to assist a course mate and is intercepted before the offence is committed.**	**Written warning**
Rule 35	**Failure to write name, registration number, signature on the attendance register.**	**Cancellation of paper**
Rule 36	**Where a student is found not wanting in any case or alleged offence/act.**	**Exoneration**

WARNING:

A student found guilty of any form of examination misconduct by the Examination Misconduct Committee shall have his examination in that course cancelled and shall face the penalty prescribed above.

IDENTIFICATION OF STUDENTS FOR EXAMINATIONS

Invigilators should NOT allow any student into the examination room without first producing his or her identity card. In order to avoid cheating in the examination room byway of copying all invigilators should search students' shoes, tissue papers, purses, dresses and pockets.

In order to avoid impersonation during examination all invigilators should ensure that the identity number on the answer book and attendance slip is the same as the one on the identity card; the photograph on the identity card should also be the same as the student writing the examination.

For the avoidance of doubt, examination misconduct regulated by these rules shall also include the following:

i. Substitution or alteration of answer scripts by any means after they have been submitted to the invigilator at the end of the examination.

ii. Breaking into the house, office or vessel of an examiner, lecturer, invigilator or any other officer having anything to do with the marking or evaluation of the performance of candidates at an examination center conducted by this University.

iii. Obtaining, procuring or possessing by any means a preview of questions intended for any examinations being conducted by this university before its due date and time.

iv. Any other misconduct related to examinations conducted by the University, which the Senate may from time to time consider as examination misconduct.

v. Any candidate found to have breached or committed any of the examination misconducts shall be liable to rustication for at least two semesters expulsion as determined by Senate after due process.

REGULATIONS GOVERNING ORGANIZATION, CONDUCT AND DISCIPLINE OF STUDENTS

General conduct

1. Students are advised to take good care of their personal belongings. The University will not be responsible for any damage to or loss of personal effects.
2. Absence from lectures, tutorials or practical classes requires the approval of heads of departments and the Deans concerned.
3. Students are not allowed to consume, keep, sell or indulge in alcoholic drinks in the University premises. Students caught contravening this provision shall be made to face Disciplinary Committee.
4. Students are not allowed to consume, keep or sell illicit drugs within the University premises. Students caught indulging in this act shall be handed over to the police. Attention is particularly drawn to penalty of decree 2 of 1984 of the Federal republic of Nigeria. If convicted, the student will automatically cease to be a KASU student.
5. Students caught with firearms within the premises of the University shall be handed over to the police. If convicted the student shall cease to be a KASU student.
6. Students shall not indulge in physical combat in the University. Students who violate this provision may face civil offence prosecution by the police.
7. Students shall not take laws into their hands. Any student who takes laws into his/her hands shall face civil offence prosecution by the police.
8. Nudity is not allowed on the University campuses. Any student caught contravening this regulation shall face civil offence prosecution.
9. Any student caught stealing within the University community shall be handed over to the University Security Division to face criminal prosecution by the police

10. Political parties and their activities are not allowed on campus but as citizens of the country, students are free to belong to any political party of their choice.
11. Any student accused of rape shall be handed over to the police and would be liable to expulsion from the University if convicted by a law court.
12. Any student caught forging any document relevant to his/her admission shall be expelled from the University and if already graduated, the degree certificate will be withdrawn.
13. Student who appears before the relevant University committees and gives false evidence that may mislead the University authority shall be liable to serve punishment
14. Students are responsible for the conduct of their visitors within the premises of the University.
15. Students who indulge in sexual harassment of fellow students and other members of the University community shall be liable to severe punishment or even expulsion
16. Cultism is prohibited in the University. Students caught conducting cultist activities on campus shall be expelled.

DRESS CODE

Students are strongly advised to dress decently to reflect the civilized institution that is the University. Decent dressing is a prerequisite for attending lectures, practical, tutorials, workshops, seminars and such other functions within the University. Indecent dressing includes among others, the wearing of short, skimpy dresses like body hugs, spaghetti and transparent wears by all students as well as the plaiting or weaving of hair and putting on earrings by the male students specifically. Students contravening this rule would be sent out of the University.

ABSENCES

Absent from course work and examination

Any student planning to be away from the university when the university is in session shall submit a written application for it to be processed and reply given before the set date for the planned trip.

Illnesses

Any student that is ill and cannot partake in academic activities has to provide a medical summary of his/her condition, which should be duly signed and stamped by a doctor from the University Health Services.

HEALTH FACILITIES

The KASU Sick Bay is functional and equipped to deal with minor injuries and illnesses. Referrals for major cases are made to Barau Dikko Teaching Hospital (BDTH). All students are required to register with the medical center.

PERFORMANCE EVALUATION CRITERIA

The procedures for the assessment of students in the Department of Medical Laboratory Science will correspond with the knowledge, abilities and skills to be developed through the training program. These include the following:

- Written examination
- Laboratory report
- Planning execution and reporting of project work
- Essay assignments
- Literature surveys and evaluation
- Collaboration project work
- Seminars/project presentation

LABORATORY SAFETY

Biological research may involve the handling of living or dead organisms that are harmful to man. It may also involve the use of toxic or corrosive materials. Therefore:

i. Students are required to obey laboratory safety rules and sings to avoid preventable accidents.
ii. As part of the safety measures, all students are expected to wear as instructed, their complete Personal Protective Equipment (PPE) when in the Laboratory for Practical.

FUNCTIONS OF LEVEL COORDINATORS

There shall be for every level of undergraduate studies a coordinator to serve as an adviser to the students of that particular level on matters relating to their academic affairs, discipline and social life on the campus.

Level coordinators should perform the following functions

a. To ensure that a candidate offered fresh admission met all the stipulated requirements before he/she is cleared for registration.
b. To ensure that the returning student is not withdrawn from the university as a result of poor academic performance or examination misconduct before issuing clearance to the student.
c. To inform and paste the courses students are to register for the session in a conspicuous place including correct courses codes, course titles and the total credits applicable for the session which must be dated and endorsed by the head of department
d. To be familiar with all the students they are coordinating and act as their mentors. They should have full details of students' personal and academic records (including screening for entry qualifications)
e. To guide students on the proper way to communicate with university authorities in cases of sickness, maternity leave, travelling, suspension of studies and other complaints that are related to their academic pursuit
f. To ensure that before signing the course registration form, each student must have correctly registered the courses he/she is supposed to take before the registration portal is closed at the beginning of each session.
g. To ensure correctness of course registration for all students before the portal is closed at the beginning of every session
h. Proper documentation of Academic records of students including approved suspension of studies, repeat, rustications e.t.c.
i. To collate, prepare and present student results in the correct format approved by the university to the departmental board of examiners under the guide of departmental examination officer
j. To prepare and issue students with end of session academic report which must be signed by the head of department and examination officer immediately results are approved by the university senate.
k. To undertake such other matters as may be assigned to him/her by the head of department for the level he/she is coordinating.

FUNCTIONS OF DEPARTMENTAL EXAMINATION OFFICER

Departmental examination officer shall perform the following functions

a. To prepare departmental lecture time table at the beginning of each semester
b. To prepare departmental examination time table and invigilation schedule at the end of each semester
c. To collect result results from servicing department within the faculty and from faculty examination officer for in the case of results coming from other servicing faculties and forward same to the level coordinators
d. To prepare and present department results at the faculty board of examiners meeting in the format approved by the university
e. To report all cases of examination misconduct to the faculty examination misconduct committee immediately
f. To liaise with faculty examination officer in handling all cases of result verification
g. To liaise with level coordinators to properly guide students on university examination regulations

PROHIBITION OF CHANGE OF NAME AND DATE OF BIRTH

A student shall only use the name and date of birth with which he is admitted/transferred into the university and which appears on the certificates used to sure the admission/ transfer. This name and date of birth shall be used in all certificates and transcripts, respectively to be issued by the university.

COURSE SUMMARY PER SEMESTER

100 Level Courses

1st Semester courses

Course Code	Course Title	Credit unit
BIO 101	General Biology I	**2**
BIO 107	General Biology Laboratory I	**1**
CHM 101	General Chemistry I	**2**
CHM 105	Practical Chemistry I	**1**
CSC 111	Introduction to Computers	**3**
PHY 107	General Physics Laboratory I	**1**
PHY 101	General Physics I	**2**
MTH 101	Elementary Mathematics I	**3**
GST 111	Communication in English	**2**
GST 125	Contemporary Health Issues	**2**

TOTAL 1st SEMESTER CREDIT UNIT=19

2ndSemester Courses

Course Code	Course Title	Credit Units
BIO 102	General Biology II	**2**
BIO 104	General Biology Laboratory II	**1**
CHM 104	General Chemistry II	**2**
CHM 108	Practical Chemistry II	**1**
PHY 102	General Physics II	**2**
PHY 104	Practical Physics II	**1**
MTH 102	Elementary Mathematics II	**3**
GST 112	Nigerian Peoples and Culture	2

TOTAL 2nd SEMESTER CREDIT UNITS=14

100 Level TOTAL (1st& 2nd SEMESTERS) CREDIT UNITS = 19 + 14 = 33

200 Level Courses

1st Semester courses

Course Code	Course Title	Credit Units
PHY 213	Radiation physics-I	**2**
RDG 205	Hospital procedure & care of patients	**1**
ANT 213	Gross anatomy-I (Upper & lower limbs	**2**
ANT 215	Embryology and Medical Genetics	**1**
ANT 211	Histology of basic tissues	**1**
HPH 221	General principles, Blood & body fluid	**2**
HPH 223	Cardiovascular and Respiratory Physiology	**2**
HPH 225	Endocrinology and Reproductive Physiology	**2**
BCH 201	General biochemistry-I	**2**
BCH 203	General biochemistry-II	**1**
AHS 201	Biostatistics	**2**
CSC 201	Introduction to Computer Science for DE	**2**
GST 201	Communication in English	**2**
GST 203	History and Philosophy of Science	**2**

TOTAL 1st SEMESTER CREDIT UNIT=22

2nd Semester courses

Course Code	Course Title	Credit Units
PHY 226	Radiation physics-II	**3**
ANT 222	Gross anatomy-II (Thorax, abdomen, pelvis & perineum)	**3**
ANT 224	Histology-II	**2**
GST 202	Logic philosophy and Human Existence	**2**
HPH 224	GIT and Renal physiology	**2**
HPH 226	Neurophysiology & special senses	**2**
RDG 204	Introduction to Radiography Procedure	**2**
BCH 202	General biochemistry-II	**2**
BCH 204	Practical biochemistry-II	**1**
GST 204	Peace studies and conflict Resolution	**2**
HPH 222	Practical Physiology	**1**

TOTAL 2nd SEMESTER CREDIT UNITS=22

200 Level (1st& 2nd Semesters) TOTAL Credit Units = 44

300 Level Courses

1st Semester courses

Course Code	Course Title	Credit Units
RDG 301	Radiographic Technique – I (Positioning)	**3**
RDG 303	Radiographic Anatomy & Physiology – I	**2**
RDG 305	Radiation Biology,	**2**
	Dosimetry & Protection	**2**
PCL 301	Introductory Pharmacology I	**2**
ANT 301	Gross Anatomy – III (Head, Neck & Sp. Senses)	**3**
ANT 303	Neuroanatomy	**2**
BCH 301	Clinical Biochemistry & Immunology	**2**
PAT 301	General Pathology I	2
	Radiographic Contrast Media	2
EEP 301	Entrepreneurship and Innovation	2

1st SEMESTER TOTAL Credit Units=24

2nd Semester courses

Course Code	Course Title	Credit Units
RDG 302	Physics of Cross-Sectional Images	**2**
RDG 304	Radiographic Technique – II (Positioning)	**3**
RDG 306	Radiographic Image Production – I	**2**
RDG 308	Radiographic Anatomy & Physiology – II	**2**
RDG 310	Radiographic Equipment – I (Operation)	**2**
PCL 316	Pharmacology for medical imaging	**2**
RDG 312	Clinical Posting – I	**3**
MMB 314	Medical Microbiology & Parasitology	**2**
RDG 316	Psychology and Medical Sociology	**2**

2nd SEMESTER TOTAL Credit Units =20

300 Level TOTAL (1st& 2nd SEMESTERS) CREDIT UNITS=46

400 Level courses

1st Semester courses

Course Code	Course Title	Credit Units
RDG 401	Radiographic Technique-III	**3**
RDG 403	Radiographic Equipment-II	**2**
RDG 405	Radiographic Image Production-II	**2**
RDG 407	Clinical Radiography Posting –II	**3**
RDG 409	Principles of Radiotherapy & Oncology	**2**
RDG 411	Computed Tomography	2
RDG 415	Magnetic Resonance imaging	2
CMD 401	Community Medicine	2
RDG 413	Radiographic Anatomy and Physiology-III	**2**
RDG 419	Artificial Intelligence	**2**
ENT 401	Business creation and Growth	**2**

1st SEMESTER Total Credit Units=24

2nd Semester courses

Course Code	Course Title	Credit Units
RDG 402	Radiographic Technique-IV	**3**
RDG 404	Radiographic Equipment-III	**2**
RDG 408	Clinical Radiography Posting –III	**3**
RDG 412	Ultrasound Imaging I	**2**
RDG 414	Radiographic Anatomy and Physiology- IV	**2**
RDG 416	Image Critique/Pattern Recognition	**2**
RDG 418	Radionuclide Imaging	**2**
RDG 420	Mammography and Breast Imaging	**2**
RDG 422	Interventional Radiological Procedure	**2**

2nd SEMESTER TOTAL CREDIT UNIT=24

400 Level (1st& 2nd Semesters) TOTAL Credit Units =48

500 Level courses

1st Semester courses

Course Code	Course Title	Credit Units
RDG 501	Radiographic Technique-V	**3**
RDG 503	Radiographic Equipment-IV	**2**
RDG 505	Radiographic Imaging-III	**2**
RDG 507	Medical Ethics and Jurisprudence	**2**
RDG 509	Research Methodology	**2**
RDG 517	Ultrasound Imaging II	**3**
RDG 511	Quality Assurance	**2**
RDG 513	Research Seminar	**2**

1st SEMESTER TOTAL CREDIT UNIT=18

2nd Semester courses

Course Code	Course Title	Credit Units
RDG 502	Radiographic Technique-VI	**3**
RDG 504	Radiological Health Administration	**2**
RDG 506	Radiography Education	**1**
RDG 508	Clinical Radiography Posting –IV	**3**
RDG 510	Research Project	**5**
RDG 512	Magnetic Resonance Imaging II	**2**
RDG 514	Image Critique and Pattern Recognition II	**2**
RDG 516	Computed Tomography II	**2**

2nd SEMESTER TOTAL CREDIT UNITS=20

500 Level (1st& 2nd Semesters) TOTAL Credit Units=38

TOTAL CREDIT UNITS REQUIRED FOR GRADUATING WITH BACHELOR IN RADIOGRAPHY (B.RAD) DEGREE: TOTAL CREDIT UNITS (100 LEVEL + 200 LEVEL + 300 LEVEL + 500 LEVEL (33 + 44 + 46 + 48 + 38) = 209 Credit **Units** for **ALL** Courses.

SUMMARY OF CREDIT LOAD

Level	Credit unit	Cumulative
100	33	33
200	44	77
300	46	123
400	48	171
500	38	209

COURSE DESCRIPTION

100 LEVEL COURSES

BIO 101: **GENERAL BIOLOGY I**

Animal cell structure, organization, and functions of the cellular organelles; Diversity, characteristics, and classification of animals; Animal reproduction and interrelationship. A generalized survey of the animal kingdom based mainly on study of similarities and differences in their external features with examples from Platyhelminthes, Annelids, Arthropods, Fishes, Amphibians, Reptiles, Birds and Mammals.

BIO 102: GENERAL BIOLOGY II

Plant cell structure and organization: functions of plant cell organelles, Diversity, characteristics and classification of plants: Plant reproduction; heredity and evolution; elements of ecology and types of habitats. A generalized survey of the plant kingdom based mainly on study of similarities and differences in their external features with examples from viruses, bacteria, protozoa, algae, fungi, bryophytes. Pteridophytes, gymnosperms and angiosperms.

CHM 101: GENERAL CHEMISTRY I

Principles of atomic structure, isotopes, empirical and molecular formula; Nuclear structure, atomic fission and nuclear energy; The electronic structure and arrangement of electrons in atoms; Electronic configuration of I^{st} and 2 rows of elements; Properties of gases: equation of state, kinetic and molecular theory of gases, and heat capacities of a gas; Equilibrium and thermodynamics; Thermo chemistry, Enthalpy of reactions, bond energies, thermodynarnic cycles. Hess" law. Born Haber cycle, the meaning of Ka. Kp and Kc, Le Chatelier's principle, $_{P}$H. ionic equilibrium, buffers, indicators, solubility product, common ion effect, redox reactions Electrode potentials, electrolytes and electrolysis; Kinetics: The Position of equilibrium and the rate at which it is attained; Factors influencing the rate of reactions Introduction of activation and catalysis.

CHM 102: GENERAL CHEMISTRY II

Historical survey of the development and importance of organic chemistry; IUPAC Nomenclature and classification of organic compounds,

Homologous series, Covalent bonds and hybridization to reflect the tetravalency of carbon in organic compounds, electronic theory

In organic chemistry; Qualitative and quantitative organic chemistry; Determination of empirical and molecular formulae; Simple techniques of writing structural formulae Isolation and purification of organic compounds: saturated hydrocarbons; structural isomerism; Properties and reactions of alkanes and cycloalkanes, mention of their chemistry and uses in petroleum; unsaturated hydrocarbons; alkenes, alkynes, Cycloalkanes: cis-trans isomerism; Simple electrophilic addition reactions; Polymerization.

CHM 104 & CHM 105: PRACTICAL CHEMISTRY I & II

Laboratory instructions and experimental products shall be conducted for the candidates from the following subject areas:

Physical: Determination of heats reaction, effect of solutes on boiling points of solvents, partition coefficient; Determination of molecular mass by Dumas and Victor Meyer methods
Measurements of rate of equation and activation energy; other experiments based on the scope of the lectures and as approved by the Department

Organic: Safety precaution instructions, classification of organic compounds by their solubility in common solvents; Qualitative analysis for
Common elements in organic compounds, identification and classification of acids and bases functional groups; Identification of the following:

neutral functional groups, alcohols, aldehydes, ketones, esters, anhydrides and others; Acetylation of aniline as an example of the preparation of solid aniline derivative; An electrophilic addition reaction
Inorganic: Qualitative and quantitative analysis; molarity, concentration and percentagepurity.

PHY 101: GENERAL PHYSICS I

Space and time, frames of reference, units and dimension, kinematics; Fundamental laws of mechanics, statics and dynamics; **Galilean** invariance; Universal gravitation; Work and energy; Rotational dynamics and angular moments conservation laws. Electrostatics: Conductors and currents; Dielectrics; Magnetic fields and induction; Maxwell's equations; Electromagnetic oscillations and waves and their applications.

PHY 102: GENERAL PHYSICS II

Molecular treatment of properties of matter, elasticity: Hook's law**;** Young's shear and bulk model: Hydrestacles; steam lines. Bernicculli and continuity equations, Turbulence, Keynoids number. Viscosity; Laminar flow, Poiseuille's equation; Surface tension; adhesion, cohesion, capillarity, drops and bubbles; Temperature; the Zeroth law of thermodynamics; heat; gas laws of thermodynamics; Kinetic theory of gases Applications.

PHY 104 &PHY 107: PHYSICS PRACTICALS I &II

This introductory course emphasizes quantitative measurements, the treatment of measurement errors, and graphical analysis. A variety of experimental techniques will be employed. The experiments include studies of matters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, viscosity, etc., covered in the above physics course.

MTH 101: ELEMENTARY MATHEMATICS I (ALGEBRA AND TRIGONOMETRY)

Elementary set theory: subsets, union, intersection, complements, Venn diagram, Real numbers, Integers, Rational and irrational numbers. Real sequences and series. Theory of quadratic equations, Binomial theorem. Circular measure. Trigonometric functions of angles of any magnitude, trigonometric formulae.

MTH 102: ELEMENTARY MATHEMATICS II (CALCULUS I)

Function of a real variable, graphs, limits and idea of continuity. The derivative, as limit of rate of change: Integration as an inverse of differentiation: methods of integration, definite integrals; Applications areas, and volumes.

AHS 125: Contemporary Health Issues

Diet, exercise, organ failure, air – borne diseases, sexually transmitted disease, cancer and its prevention, sickle cell disease. HIV/AIDS; Introduction, epidemiology of HIV, natural history of HIV infection, transmission of predisposing factors of 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.

GST 111: Communication in English

A General course to teach the use of dictionary as a language learning tool, Basic grammar, developing reading skills, comprehension and summary exercises, continuous writing, development writing skill and speaking skills.

GST 112: Nigerian Peoples and Culture

Study of Nigeria history, culture arts in pre-colonial times, Nigerians perception of this world, Culture areas of Nigeria and their characteristics, Evolution of Nigeria as a political unit, Indigene/settler phenomenon, Concepts of trade, Economics of self-reliance, Social justice, Individual and national development, Norms and values, Negative attributes and conducts (cultists and related vices), Re-orientation of moral and national values, Moral obligations citizens, Environmental problems.

200 LEVEL COURSES

ANATOMY

1. **ANT 213: Introductory Anatomy & Gross Anatomy of the Upper and Lower Limbs**

Philosophy, Methodology, Language and general descriptive terms in Anatomy. Skin, fascia, muscles, bones, joints, bloodvessels, nerves, lymphatic, etc. The pectoral girdle and associated joints (Sternoclavicular, acromioclavicular). Muscles acting on the shoulder joint, The axilla and Brachial Plexus, The Anatomy of the Breast, Blood supply. Venous drainage and lymph drainage, Flexor and Extensor-Compartments of arm, the elbow joint, and muscle acting on it. The flexor and extensor compartment of the fore-arm, Wrist Joint, and muscles acting on it. The anatomy of the hand, The blood supply and Anastomosis of the upper limb (around 17 scapula, humerus, elbow and hand), Dermatomes of the upper limb. The front of the thigh I (Femoral triangle, femoral canal and hernia, subsatorial canal). The front of the thigh II: The medial side of the thigh; The gluteal region; The back of the thigh; The popliteal fossa; The front of the leg and the dorsum of the foot; The lateral side of the leg; The back of the leg; The sole of the foot (arches of the foot); The hip joint and the knee joint; The tibio-fibular joints, ankle joint and the joints of the foot. Dermatomes of the lower limb. Surface anatomy, applied and radiological anatomy of the upper and lower limb. Gross anatomy shall include classroom lectures and dissection sections. Examinations shall include both written and practical examinations and viva-voce.

Man. The lower limb Introduction, lymphatic and venous drainage, blood supply of lower limb. The thigh-anterior medical posterior compartment, clinical aspects, drainage of limbs, the thigh — posterior compartment, popliteal fossa. The hip joint e.t.c. Leg-Anterior Lateral Posterior

compartment. Dorsum of foot, knee joint and muscles acting on it. Inversion and Eversion. Ankle joint, muscles acting on it, dermatomes of the lower limb.

2. **ANT 211: Histology of Basic Tissues (2CU)**

Introduction to histological techniques for light microscopy, units of measurements in microscopy. Components of the cell, cell cycle, chromosomes, protein secretion and transcription of DNA. General histology of the basic tissue; including special connective tissues, epithelial tissues, muscle tissues, nervous tissue, lymphoid tissues, cartilage, bone and blood. The course will have a laboratory component.

3. **ANT 215 (Embryology and Medical Genetics):** General embryology including Oogenesis, gametogenesis, development of ovarian follicle, ovulation, fertilization, cleavage, formation of blastocyst, implantation, folding of embryo, placentation that is formation and functions of placenta and umbilical cord; fetal membranes and development of limbs. Mitotic changes in oocytes, formation and function of the zona pellucida, follicular growth. Preovulatory menstruation, post-ovulation atresia. Spermatogenesis and the spermatozoa. Testis before and at puberty, seminiferous epithelium. Spermatogenic cycles and time rotations in spermatogenesis, cycles and seasons—puberty, oestrous and menstrual cycles, ovulation, pseudopregnancy and pregnancy, delays in reproduction. Fertilization- egg and sperm transport, capacitation, acrosome reaction and sperm penetration. Immediate response to sperm penetration, prenuclear development and syngamy. Errors of fertilization, fertilization in vitro. Pre-embryonic period- cleavage, embryonic cell differentiation, fetal membranes, implantation and formation of placenta at birth. Development of Cardiovascular system, Integumentary system, Respiratory system, Digestive system, Urological system. Developmental anomalies and clinical syndromes.

Introduction to genetics, chromosomal abnormalities, single gene disorders and multi factorial disorders.

4. **ANT 222: Gross Anatomy of Thorax, Abdomen, Pelvis and Perineum**

Anatomy of Thorax

The thoracic cage; apertures and its frame work: Anatomy of the lungs and pleurae, respiratory movements; superficial structure, Thoracic duct, Sternal joints, Sternocostal joints, Interchondral joints Costochondral joints, Costovertebral joints, Joints and Ligaments of the Vertebral column, intercoastal arteries and veins, internal thoracic artery, mediastina and diaphragm, Lateral parts and

pleurals, Roots of the lungs, Lobes of the lungs, Intrapulmonary structure, heart and large vessels; Sternocostal surface of the heart, Surface anatomy of the heart Chambers of the heart, Structure of walls of heart,. Trachea, bronchi; lymphatic drainage of thorax; correlation of course with clinical medicine; regional anatomy, surface anatomy and radiological anatomy. The student will dissect the thorax.

Anatomy of Abdomen

The Abdominal walls including planes; hernia, peritoneal cavity. Diaphragm, Abdominal viscera – stomach, intestines, liver, pancreas, spleen, pancreas, kidneys and suprarenal. The blood vessels and nerves in the abdomen, Lymphatic GIT. Applied anatomy, surface and radiological anatomy. The student will dissect the abdomen.

Anatomy of Pelvis and Perineum

The bony pelvis, joints of the pelvis, determination of sex of pelvic bones. The pelvic organs – male and female. Pelvic walls and floor, pelvic peritoneum, viscera, nerves and vessels. The perineum – male and female; external genitalia – correlation with reproduction, child birth and other clinical aspects. Superficial/Deep perineal pouches. The student will dissect the pelvis and perineum.

5. **ANT 211: Histology of Basic Tissues (2CU)**

Introduction to histological techniques for light microscopy, units of measurements in microscopy. Components of the cell, cell cycle, chromosomes, protein secretion and transcription of DNA. General histology of the basic tissue; including special connective tissues, epithelial tissues, muscle tissues, nervous tissue, lymphoid tissues, cartilage, bone and blood. The course will have a laboratory component.

6. **ANT: Anatomy Practical (I & II)**

ANT 303: Neuroanatomy

Definition and origin of nervous system. The anatomy of the spinal cord, medulla oblongata, cerebellum, Pons, Mid-brain and Cerebrum; Neurons and other cells; fibre tracts and their functional correlations; cranial and spinal nerves, neurocranium, Meninges; vascular supply; C.S.F; autonomic nervous system. Introduction to various types of lesions and methods of examination of the C.N.S; Clinical correlations. The student will dissect the spinal cord and brain and study their microscopic anatomy. **The practical period shall involve continuation of demonstration of gross anatomy, Brain soft tissues.**

PHYSIOLOGY

1. **HPH 221: General Principles Blood and Body Fluids (2 Credit Units)**

General physiology; Introduction to Physiology (different fields of physiology and their relationship with other field of science), homeostasis and control systems of the body, it also covers **cellular physiology** including cell structures and organelles, cell membrane, cell juncture, cellular transport passive and active, Dynamic resting membrane potentials and its causes, Electrolyte changes, Homeostasis and positive/negative feedback mechanism and its significance. Osmosis, diffusion, active transport, Cell organelles — forms and functions, Intracellular communications, receptors and ions channels. Cells signaling, introduction to path clamp technique.

Excitable Tissues and Autonomic Nervous System; Basis of RMP, AP, graded potentials, synapses types mechanism and properties, neuromuscular junction, Mechanisms of skeletal muscle contraction, structure of skeletal muscle, types of muscle fibers, types of contraction, excitability changes, ionic changes, mechanical changes, Metabolic changes, thermal changes. Fate of lactic acid, effect of successive stimuli tetanus, and effect of loading, Fatigue and its causes, comparison between skeletal, smooth and cardiac muscles. Electrophysiology of the heart, cardiac cycle, venous return, circulatory adjustment to exercise. General, origin, distribution and functions of parasympathetic and sympathetic nervous system, Pharmacology of autonomic nervous system, Classification, comparison between sympathetic and Parasympathetic, sympathetic, origin distribution, function. Parasympathetic origin distributed and functions, Types of automatic receptors and the receptors pharmacology, adrenergic ribers and receptor, distribution and catecholamine, sympathomimetics and sympatholytic, cholinergic fibers and receptors acetylcholine, sites cholinergic blockers, ganglionic blockers muscarinic and nicotinic receptors. Atropine, parasympathomimetic and parasympatholytic.

Blood, Immunology, and blood vessels, general functions of blood, composition of blood, plasma proteins, types, origin and its functions. Red blood cells structure, functions, hemoglobin and it functions and haemoglobinopathies, Erythropoiesis and factors affecting it, Anemia, degradation of Hemoglobin, bilirubin and development of jaundice, Fe3+ metabolism, Blood coagulation, bleeding time and mechanism of blood coagulation, clotting time, hemophilia and purpura, Role of Ca2+ and platelets in blood coagulation. It also covers blood cells, classification, basis and type of immunity, role of lymphocytes, T-lymphocyte, immunoglobulins, humoral and cell mediated immunity. It explains the basis of immunological diseases, blood groups and Blood transfusion Arteries, arterioles, vein, venules, capillaries, Interstitial fluids (IF) and vessels through which they flow. Lymph and lymph vessels, Cerebrospinal fluid and its vessels.

2. **HPH 223: Cardiovascular and Respiratory Physiology (2 Credit Units)**

Cardiovascular physiology; Functional anatomy of the heart, functional organization system of the CVS, cardiac properties, Cardiac cycle, study of cardiac cycle, ECG, pulse, heart sound, Jugular venous pulse, Innervations of the heart, heart rate and its regulation, Cardiac output and factors affecting it, Types of blood vessels, and peripheral resistance. Arterial blood pressure, types, factors affecting, maintaining and regulating it. Types of shock, Effect of hemorrhage, edema, types and causes. Pulmonary circulations, Coronary circulation, environmental effect on CVS, exercise, flight high attitudes, Heart failure, myocardial infarction. The basis of heart Automaticity (a) Sinoatrial node (pace maker) (b) Atrioventricular node (c) The Bundle of Hiss, Stanius experiment Heart Block, fibrillation, Refractory period of the cardiac muscle: Extra systole External manifestations of cardiac Activity: Apex beat, Heart Sounds, Control of cardiac activity, Nervous control, Reflex control: Intracardiac reflex responses – Reflex effects of the pericardium, reflex effects of the coronary pulmonary, atria and ventricular vessels, Effects of vascular reflexogenic zones, Reflex effects of visceral receptors. Effects of the cerebral cortex on cardiac Activity. Humoral control of Cardiac Activity, effects of electrolytes: K+& Ca2+ ions, effects of neurotransmitters, effects of hormones: Thyroxine, insulin, Gonadal hormones, Adrenaline and nor adrenaline. Types of shock, Effect of hemorrhage, edema, types and causes. Pulmonary circulations, Coronary circulation, environmental effect on CVS, exercise, flight high attitudes, Heart failure, myocardial infarction.

Respiratory physiology; Introduction, general functions of respiratory passage, factors protecting respiratory alveoli. I.P.P. its significant, surfactant, respiratory work., lung volumes and capacities, vital capacities and its significant, Dead space, Neural regulation of respiration, peripheral, central and chemical regulation of respiration, centers of respiration in medulla oblongata, hypoxia, cyanosis, effect of high attitude on respiration, Role of respiratory system in maintaining Acid-Base Balance, effect of exercise on respiration, effect of diving on blood gases.

3. **HPH 225: Reproductive and endocrine physiology**

Physiology of pregnancy and endocrine-related changes: Pregnancy and fetal development, physical and physiological changes of pregnancy. The antenatal period: Antenatal medical team, antenatal care. Complications of Pregnancy: ectopic pregnancy, gestational diabetes, pre-eclamptic toxemia, eclampsia, ante partum hemorrhage, placenta-previa, Back pain, Sacroiliac joint dysfunction, sciatica, pregnancy associated osteoporosis, nerve compression syndromes (carpal tunnel syndrome, posterior tibial nerve compression), circulatory disorders (varicose veins in the legs, hemorrhoids, muscle cramp, thrombosis and thromboembolism).Physical and physiological

changes of labor: the stages of labor, signs of labor, normal labor and delivery, labor pain and causes of labor pain, the effect of labor on maternal and fetal physiology, the effect of labor on the pelvic floor and perineum, the duration of labor, positioning in labor.

An in-depth explanation into the Female genital system structure, structure of ovary, graafian follicle, structure of uterus fallopian tubes, mechanism of female puberty, ovarian cycle, oogenesis, menstrual cycle, vaginal cycle, ovulation, female contraception hormones, control of pregnancy, factor maintaining pregnancy, formation of placenta, functions and hormones of placenta, delivery, mechanism and hormonal control, hormones acting on female breast, mechanism of lactation, prolactin hormone abnormalities of lactation. It also discusses the male genital organ, structure of testis, spermatogenesis, hormonal control and temperature, function of testosterone hormone, mechanism of male puberty sperm and sperm count. Physiology of menopause, coitus, fertilization physiological abnormalities of human reproduction: - pubescence abnormalities, chromosome Abnormalities, abnormalities of genital tract, differentiation, infertility, Abnormalities of menstrual cycle: - Secondary amenorrhea, dysmenorrhoea, oligomenorrea, menorragia metorhagia, Eunuchoidism.

General functions of hormones, nature of hormones, mechanisms of action and control. Hypothalamic releasing factors, pituitary glands interior, pituitary protection hormone functions, hormones, function and control G.H function and its abnormalities, and other releasing factors under control of hypothalamus, thyroid gland hormones T3 and T4 physiological function and its abnormalities, Adrenal (minerals corticoids, glucocorticoids and sex hormones), Adrenal cortex structure and hormones steroid hormones, functions and its abnormalities. Medullary Hormones, ca 2+ functions and homeostasis, Hormones regulating serum calcium (PTH, Calcitonin, 21, DH cholecalciferol, pancreatic hormones, hormones Rosulates glucose, dialect mellitus, pineal gland hormones, melatonin.

4. **HPH: Introduction to Practical Physiology I&II**

A basic practical demonstration of some important areas covered in human physiology I-IV.
Blood Grouping, Packed Cell Volume, WBC, RBC, Differential Count, Pulse Rate and Blood Pressure, e.t.c.

5. **HPH 222: GIT and Renal Physiology**
   i. **Renal physiology**, Introduction, General functions of the kidney, Structure of kidney, nephron structure. Differences in nephron structure. Mechanism of urine formation, GFR, tubular transport, absorption and tubular secretion, Blood flow to kidney auto regulation of blood flow, blood vessels, arteries, arterioles, vein,

venules, capillaries, Interstitial fluids (IF) and vessels through which they flow, Lymph and lymph vessels, Cerebrospinal fluid and its vessels. Cortical and Juxtaglomerular apparatus, and determination of renal blood flow. Clearance, insulin and Para amino hippacric acid clearance, glomerular filtration rate, factors affecting it, Proximal convoluted tubules, loop of henle, and distal convolutated tubule, Differences between cortical and medullary nephron, vasa recta, and tubular transport in glucose maximal. Role of urea and other electrolytes concentrate urine, concentration of urine and renal regulation of body water (osmolarity) and chabedesinspidus. Renal regulation of blood (ECF) volume, micturition reflexes innervation of urinary bladder, Role of kidney in acid base balance, Basis of dialysis, Diuretics, excretion of hormones Gluconeogenesis. Counter-current system. Water volume and ionic regulation. Micturition. Abnormalities of renal function. The skin function, temperature regulation, abnormalities of temperature regulation mechanism; factors regulating metabolism. Conditions for measuring basal metabolic rate. Compartmentalization and composition of body fluids. Deferminants of Glomerular Filtration Rate: Glomerular capillary filtration coefficient (Kf) Bowman's capsule Hydrostatic pressure, Glomerular capillary, colloid Osmotic pressure Organic solutes that are reabsorbed: Glucose, amino acids, organic acids, peptides and proteins, urea. Organic solutes that are reabsorbed and secreted: Urea. Inorganic ions that are reabsorbed: Mg2+,Ca2+,PO42,-SO24-, HCO3- Inorganic ions that are secreted: Renal handling of H+ ions. Inorganic ions that are reabsorbed and secreted: K+, Na+ Renal handling of Nat and water Renal handling of Fe, vitamins, carbolydrates, proteins and lipids Renal Failure- proteinuria. Loss of concentrating and diluting ability, Acidosis, Abnormal Nat metabolism, Control of Glomerular Filtration: Activation of the sympathecus. Hormonal and Autacord control of Renal Circulation – Angiotesin II. Endothelial – Derived Nitric Oxide – prostaglandin's and Bradykinin; Autoregulation of GFR. Mechanism of urine concentration counter – current mechanism; current multiplier system. Quantity, composition and properties of urine.

ii. **GIT** Introduction to GIT: Functions of GIT. Methods of studying the functions and structure of the G.I.T: Layers, Neural and Humoral control, Autonomic innervations of the G.I.T. Sympathetic and Parasympathetic Gastro-intestinal reflexes Functional types of movements in the G.I.T; Propulsive and mixing. Hormonal control of G.I.T.

Motility. Oral Cavity: Mastication. Salivary glands, functions of Saliva, Salivary reflexes, Inhibition of salivary secretion. Physio-anatomical consideration of the stomach; Functions of the stomach, mixing and propulsion of food in the stomach, regulation of gastric motility. Gastric Secretion; Composition, properties and functions of gastric juice. Effects of Nutrient patterns on gastric secretion. Regulation of gastric secretion Stomach (gastric) emptying.

Vomiting; Composition, properties and functions of pancreatic juice, effects of Nutrient composition on pancreatic secretion, functions of the liver, Composition, properties and functions of bile ejection, regulation of production and secretion of bile by the liver, mechanism of gall bladder emptying, gall stones. Intestinal glands-villi and microvilli, types of intestinal digestion Uniqueness of intestinal secretion of enzymes, small intestine motility control — neural, hormonal and small intestine reflexes, intestinal reflexes and intestinal inhibitory reflexes, gastro-intestinal reflex. Large intestine and Rectum, Colonic mortality, defecation, control of colonic and rectal motility myogenic and neural control Physiology of absorption, mechanism of absorption, absorption in the mouth, Stomach, small and large intestines (Note: absorption of CHO, proteins, fats, water, sodium e.t.c.) Location and functions of the Alimentary canal, Sensations of satiation, hunger and thirst; appetite physiology of Gastrointestinal disorders, Appendicitis, Diarrhea, constipation cancerous tumors eating disorders peptic ulcer Jaundice. Effects and factors, which modify it Nervous influences, Humoral factors, biological rhythms, Sex, Age & posture Indices of Cardiac Activity: Stroke (Systolic volume Cardiac Output, Heart work, Venous return. Functions of the liver, Composition, properties and functions of bite bile ejection. Regulation of production and secretion of bile by the liver. Mechanism of gall bladder emptying. Gall stones. Intestinal glands-villi and microvilli. Types of intestinal digestion Uniqueness of intestinal secretion of enzymes small intestine motility control of small intestine motility – Genic, neural, hormonal small intestine reflexes. Intestino-intestinal and an intestinal inhibitory reflex; gastro-intestinal reflex. Large intestine and Rectum, Colonic mortality, defecation, control of colonic and rectal motility myogenic and neural control Physiology of absorption, mechanism of absorption, absorption in the mouth, Stomach, small and large intestines (Note: absorption of CHO, proteins, fats, water, sodium e.t.c.) Location and functions of the Alimentary canal, Sensations of satiation, hunger and thirst;

appetite physiology of Gastrointestinal disorders, Appendicitis, Diarrhea, constipation cancerous tumors eating disorders peptic ulcer Jaundice.

physiology of peptic ulcer, gastrin and vomiting. C.C.K., other G.I. Hormones, Functions of duodenum, jejunum and ileum secretions, Digestion and mechanism of absorption of fat, absorption, motility and functions, proteins, carbohydrate, water and vitamins, large intestine secretions, absorption, motility and functions Defecation. Diarrhea, Liver and Biliary System Including histological structure of liver, liver functions and liver functions test, jaundice and causes, types of hepatitis. Biliary system, structure of gall bladder, function of gall bladder, Structure and functions of bile salts, bile pigments direct and indirect bilirubin Gall stone and exocrine functions pancreas, hormonal and nervous control of pancreatic secretion, diseases of biliary system and pancreas.

6. HPH 226: (NEUROPHYSIOLOGY AND SPECIAL SENSES)

The central Nervous system- brain and the spinal cord. The Peripheral nervous system. Sensory system including receptors, types and pathway of sensation, pain sensation, analgesic system, disturbances of sensation thalamus, sensory cortical areas, sensory functions of cerebral cortex, reaction to sensation. Reflex arc, Properties of reflex arc, general reflexes, spinal reflexes, stretch reflex, Muscle tone. Motor system sensory cortical areas including motor cerebral cortex, basal ganglia, cerebellum, temperature control, hypothalamus, limbic system, reticular formation, higher functions of cerebral cortex, learning and memory abnormalities, Speech and its abnormalities, temperature control, Excitation, action potential, development of resting membrane potential, action potential in skeletal, cardiac and other smooth muscles, characteristics of action potential in nerve tissue. Nerve cell- morphology of a nerve cell, types of nerve fibres, propagation of action potential in different types of nerves, salutatory and neighborhood conductions. Synapse- morphology of synapses, types of synapses, synaptic transmission of impulses, properties of synaptic transmission, synaptic junction. Applied physiology. Neuromuscular junction- morphology of a neuromuscular junction, neuromuscular transmission, transmission of impulse at neuromuscular junction. Applied physiology-myasthenia gravis. Muscles- Morphology of skeletal, cardiac and other smooth muscles. Molecular basis of muscle contraction- structure and function of the contractile protein, structure and function of regulatory proteins. Mechanism of contraction, excitation and coupling in muscle contraction. Applied

physiology of muscle contraction. Autonomic Nervous System (ANS)- general description of the ANS, basic physiology of the ANS and homeostasis Posture reflex function of spinal cord, sleep and EEG mechanism and abnormalities.

Special senses; including eye structure cornea, lens, vitrous humur, litlary body and aqueous humor structure and functions of retina, visual path way, accommodation reflex and papillary light reflex, Colour vision, theories, visual activity, visual field, area 17, 18, 19 and 8, Mechanism of retina stimulation, Abnormalities and lesions of visual pathway, Hearing including introduction. Physical properties of sound including structure of external ear, Middle ear and internal cochlea, Structure of cochlea, basement membrane, organ of corti, mechanism of hearing, hearing pathway, abnormalities of hearing, hearing test, physical properties of sounds, area 42, 22. Sensation linear and rotational, utricles, saccules pathway, equilibrium, smell sensation including structure of smell receptors mechanism of stimulation, olfactory nerve, olfactory bulb and limbic system. Taste sensation on the tongue, types of taste, mapping of different taste sensation ant 2/3 path ways, to cortex and Abnormalities.

BIOCHEMISTRY

BCH 251- GENERAL BIOCHEMISTRY I (1 CU)

(Chemistry and Functions of Amino acids and Proteins)

Structure, properties and classification of amino acids; pH, pKa and buffer; Peptides. Reaction of specific amino acids; separation and sequence analysis of peptides; chemistry of proteins and enzymes including their basic structural levels, and types of bonds stabilizing them; Properties, functions, and classifications of proteins.

BCH 253- GENERAL BIOCHEMISTRY II (2 CU)

(Chemistry and Functions of Carbohydrates, Lipids and Nucleic acids)

Classification and physical properties of carbohydrate, structure of glucose: projection and perspective formulae; structure and properties of other monosaccharide; Chemistry, classification and properties of lipids, methods of analyses of lipids; lipoproteins, membranes and membrane structure. Chemistry of nucleic acid, (bases, sugars and phosphoric acids, nucleosides, nucleotides, and nucleic acids). The structure and roles of RNA and DNA.

BCH 254- GENERAL METABOLISM (2 CU)

(Carbohydrate metabolism, Lipids metabolism, Amino acids Metabolism, Nucleic acid metabolism)

Degradation and digestion of carbohydrates; Storage polysaccharides and cell walls. Glycogenesis, glycogenolysis glycolysis, tricarboxylic acid cycle, Phosphogluconate pathway, cori cycle, calvin cycle and gluconeogenesis, glyoxylate cycle. Disorders of carbohydrate metabolism; Oxidation of fatty acids. Formation and oxidation of ketone bodies, biosynthesis of fatty acids, triacylglycerols, phospholipids, glycolipids, cholesterol, Acetyl CoA as a central precursor for biosynthesis of lipids. Genetic disorders of lipid metabolism.

Metabolism of amino acids and their derivatives; urea cycle; metabolism of inorganic nitrogen and sulphur cycle. Genetic Disorders of amino acid metabolism. Metabolism of purines and pyrimidines, Nucleosides and Nucleotides. Disorders of Nucleic acid metabolism. Genetic code, gene structure. Replication, Transcription and Translation. Genetic diseases and gene therapy.

BCH 255- CELL BIOCHEMISTRY AND INTRODUCTION TO METABOLISM (2 CU)

Cell theory, Major cell organelles, their functions, and Preparation of subcellular fractions and methods for studying cellular components; Prokaryotic versus Eukaryotic cells. Elementary treatment of membrane structure (the fluid mosaic model) and functions in the eukaryotic cell; Definition and types of metabolisms; concept in Bioenergetics; Introduction to Glycolysis). Flow of energy and matter in the biosphere. The laws of thermodynamics and their applications to biological systems. Concept of free energy and free energy changes in biochemical processes. Endergonic and exergonic reactions. Thermodynamics of open systems; disequilibrium as a condition for life. Metabolic pathway as an open thermodynamic system. Concept of equilibrium and non-equilibrium reactions. High energy compounds and their importance in biochemical reactions, chemical potential, electrochemical potential. Electron transport chain and oxidative phosphorylation. Regulation of ATP production.

BCH 258- GENERAL BIOCHEMISTRY PRACTICALS (1 CU)

(General Biochemistry practical I & II)

Introduction to the laboratory and laboratory equipment. Safety, housekeeping, washing and drying of glassware in the laboratory. Accuracy of measurement and transfer of liquids and solids. Qualitative and quantitative tests for amino acids and proteins. Introduction to photometry and

colorimetry; standard curve and absorption spectra; Biuret method and the estimation of proteins. pH and buffer systems.

Qualitative test for carbohydrates; thin layer chromatographic separation of sugars. Estimation of glucose in biological fluids (blood and urine). Analysis of lipids for double bonds and free fatty acids; separation by thin layer chromatography.

RDG 301: **CLINICAL BIOCHEMISTRY AND IMMUNOLOGY**

Liver functions tests - detoxification, deamination, bilirubin test. Jaundice, Fouchest test for bile pigment. Carbohydrate metabolism - glucose tolerance test, etc. abnormalities in protein metabolism. Clotting factor, flocculation tests. Colloidal Gold reaction, thymol Turbidity test. Enzymes. Acute Hepatic necrosis. Liver failure. Viral Hepatitis. Chronic Hepatitis. Cirrhosis, Formation of Gall stones. Insulin. Diabetes, Synthesis of hemoglobin. Porphyrinuria. Electrolytes and Acid - base balance. Acidosis and alkalosis. Kidney Immunity types and processes etc.

DESCRIPTION OF RADIOGRAPHY DEPARTMENTAL COURSES FOR BACHELOR IN MEDICAL RADIOGRAPHY DEGREE (B. RAD) PROGRAM,

PHY 213 RADIATION PHYSICS-I

Electrostatic, capacitance and uses in Radiological equipment. Basic X-ray circuitry. Electromagnetic induction, mutual and self-induction; principles and construction of transformer: transformer parameters, uses of mutual and self-inductance in Autotransformers and High-tension transformers. Solid state conductor devices, principles and uses in radiology. Concept of energy, wave and quantum methods of energy transfer. Bohr's atom and application in radiology. Rectification, production of X-rays, radioactivity and radioactive decay. Half-life, counters, units of activity and measurement. K-capture, the atom. Isotopes. Isobars. Nuclear binding energies. Interaction of X and gamma radiation: attenuation and inverse square law: effect of filtration. Luminescence and their applications.

PHY 226: RADIATION PHYSICS-II

Optical spectra and X-rays. Hydrogen spectrum, Bohr theory of hydrogen atom, Excitation potentials, X-rays spectra, X-ray Absorption Edges. X-ray Fluorescence. X-ray Interaction with matter. Reduction in intensity due to absorption, filtration and inverse square law. X - ray measurement of Intensity, measurement of dose-rate, exposure, the Roentgen, the Rad. Simple principle of dosimeters. Fluorescent effect of X -rays. The photographic film as a dosimeter. X-ray quality, KVP, Half-Value layer and Routine method of quality assurance. Radiation Protection - Historical development. Biological effects. Permissible exposure. International recommendations

and current "Code of Practice on Exposure to lionizing Radiation". Protective materials. Design of X-ray tube and X - ray room protection. Protection of patients, public and environment. Personnel monitoring and survey of the department. Radioactivity - Radioactivity decay and radioactive substances, Production of Radioisotopes and Radiation detectors.

RDG 203: INTRODUCTION TO RADIOGRAPHIC PROCEDURES

Introduction to radiography. Principle of image formation, factors affecting image quality. Appropriate imaging technique. Radiation protection in a clinical setting, appropriate techniques, image presentation. Identification and preparation of the patient for different radiographic examinations. Image presentation format Terminologies relating to radiographic anatomy; physiology and pathology. The student will be oriented to the profession of radiography in relation to various accreditation and credentialing agencies. Professional opportunities for growth and development will be discussed.

RDG 205 HOSPITAL PROCEDURES AND PATIENT CARE

This course is intended to emphasize the importance of the patient and his welfare, providing the student with an overview of radiography, and its role in the health care delivery system. The course will provide a basic understanding of skills needed to allow the student to work comfortably and safely with patients. Some of the areas covered will include basic nursing care, proper body mechanics, aseptic technique, communication, and patient monitoring to include vital signs and medical emergencies. Pharmacology and the use of radiographic contrast, including risk factors and reactions, will be taught. During the lectures on specified topics, practical demonstrations are provided. The teamwork involved in patient treatment is highlighted and the student is made to appreciate his role. Topics to be covered include; basic first aid, principle of nursing, general and special preparation, general and special care, professional attitude of the Radiographer, hygiene, infection and principles of asepsis. Special and emergency care of patient. Moving and lifting technique. Pharmacological classification of Drugs. Pharmacology and the use of radiographic contrast, including risk factors and reactions, will be taught. Design and citing of Radio-diagnostic and Radiotherapy department. Medico-legal aspects.

RDG 305: RADIATION BIOLOGY

The course discusses the concept of radiation biology in order to equip students to apply effective radiation protection measures to patients, personnel and members of the public. The course introduces Cell Theory and genetic apparatus. The radiation effects on molecules, cells, tissues and the body as a whole is also taught. Radiation chemistry. Effect of Radiation on DNA molecules,

amino acid, protein, etc., and Cellular damage, survival curves will also be discussed. The course will establish fundamental concepts of radiation biology through a discussion of radiation interaction with tissue, radio sensitivity, early and late effects of radiation. Theories of Biological effects of radiation, short- and long-term effects (stochastic and non-stochastic). Radio sensitivity and modifiers, post irradiation clinical events. Organ pathology Syndromes, Evidence from Hiroshima and Nagasaki. Target Theory and Lethal Dose.

MCB 314: **MICROBIOLOGY & PARASITOLOGY**

Infectious agents. Commensal microbes. Pathogens, types of infectious agents - Viruses - general features and structure. Bacteria - general features and structure, laboratory studies of bacteria. Microbes in our environment. Sources and mode of spread of infections. Natural and acquired resistance to infection, determination of Innate Immunity, individual differences and influences of age. Hormones, sex and nutritional factors. Mechanism of innate immunity. Bactericidal substances of the tissues and body fluid. Antiseptic. Disinfectant and Sterilization. Deep tissue infections. Superficial bacterial infection. Fungal infections, deep or systemic mycosis. Respiratory diseases cause by fungi. Osseous infections. Viral infections. Parasitic infections. Hospital associated infections.

RDG 318: GENERAL PATHOLOGY

Ultrastructure of normal cell, Cell Injury and Death, Degeneration, Necrosis and Intracellular Accumulation, Adaptive Responses: Hypertrophy, Hyperplasia, metaplasia and atrophy, Dysphasia, Disturbances of Fluid Balance: Oedema and Dehydration. Neoplasia: Definition, Classification, Nomenclature, Characteristics, Local and Systemic Effects. Hemodynamic Disturbances: Hemorrhage – Causes, Local Effects, Systemic Effects including shock, Thrombosis, Embolism and Infarction. Inflammation: Acute and Chronic Inflammation, Chemical Mediators of Inflammation, Local and Systemic Effects of Inflammation. Healing and Repairing Regeneration, Primary and Secondary Healing, Factors and delay wound healing, Hypersensitivity reactions. Pathologic Calcification.

RDG 309: RADIOGRAPHIC CONTRAST MEDIA

The course covers the following: classification of contrast media used in medical imaging namely conventional Xray, CT, ultrasound, and MRI, their pharmacodynamics, pharmacokinetics, side effects and allergic protocols to be employed where necessary.

RDG 301 PHARMACOLOGY (PCL 3201 GENERAL PHARMACOLOGY)

Origin and source of drugs; Routes of Administration of drugs; Pharmacokinetics; Absorption of drugs: Excretion of drugs; Drugs Toxicity, Adverse drug Reactions. Drug Interactions; Cholinergic

and adrenergic; Vomiting. Constipation - purgatives; H2 Receptor antagonists; Oxygen therapy, Bronchodilator drugs. Asthma. Cough Suppressants; respiratory stimulants; Anticoagulants. Heparin, Fibrinolysis; Vasodilators; Diuretics; renal failure. Immunity, Major Features of Malignant Diseases; Principles of Cancer Chemotherapy; radioactivity; Nervous system stimulants; Anticonvulsant drugs,

RDG 316: **PSYCHOLOGY FOR RADIOGRAPHERS**

The Psychology of the sick patient, management of children, the elderly, the disabled; Potentially violent patients and patients in terminal stages of diseases; Communication with and general care of patients and relationship with staff; Acceptance of responsibility for care of patient; Motivation and emotional adjustment.

RDG 305: RADIATION PROTECTION & DOSIMETRY

This course introduces the current standards for radiation protection through a discussion of the two triads of radiation protection, the fundamentals of radiation protection for personnel, patients and the public, including structural requirements, personnel monitoring, gonadal shielding and other factors which affect the amount of radiation exposure during diagnostic procedures. The course concludes with a discussion of radiation health and safety requirements of federal and state regulatory agencies, accreditation agencies and health care organizations in Nigeria. The course will help students meet the entry to practice competencies of the registry for radiation, health and safety in diagnostic imaging. Units of radiation measurement and Role of International Committee on Radiological protection, radiation dosimetry and instruments are discussed. The purpose and scope of radiation protection, systems of Dose limitation and personnel monitoring are emphasized.

RADIOGRAPHIC TECHNIQUE COURSES

Courses line up for this subject is to ensure full exposure of student to the procedures for radiographic examinations. It emphasizes the close relationship between the theory and practical. It involved using the knowledge of anatomy, physiology, radiation physics/protection to produce diagnostically accepted radiographs. It involves introduction to radiography: Principles of Image formation. Factors affecting Image quality, and radiation protection in clinical setting; appropriate technique presentation format; Identification and preparation of patient for the radiographic examination.

RDG 301: RADIOGRAPHIC TECHNIQUE-I

This course will provide students with General anatomy terminologies and positioning principles. It will also provide theoretical foundations and laboratory demonstrations necessary to develop the psychomotor skills that are essential for the achievement of routine diagnostic radiographs and those requiring supplementary views for patients at any stage of the life span. Radiation protection and Applications of Principle will be discussed. Students will be able to describe the radiographic planes of the body, cavities, and anatomical landmarks; Describe bone classifications and types of joints; explain the characteristics associated with patient body hiatus; Define terminologies associated with radiographic exams; and discuss the general principles of radiographic positioning. Coursework will cover essential anatomy and clinical radiographic positioning used for radiography of (a) Chest, (b) Upper Limb: fingers, thumb, hand, wrist, elbow, fore arm etc. and (d) Bony Thorax. Coursework also includes concepts of mobile radiography and operating room applications. Pediatric radiographic practices will be included. The course contents will be accomplished through the use of lectures, demonstrations in the Radiographic Laboratory with a Radiographic Phantom and self-instruction.

RDG 304: RADIOGRAPHIC TECHNIQUE-II

This course will provide students with General anatomy terminologies and positioning principles. It will also provide theoretical foundations and laboratory demonstrations necessary to develop the psychomotor skills that are essential for the achievement of routine diagnostic radiographs and those requiring supplementary views for patients at any stage of the life span. Specifically, Radiographic projections for lower limbs, pelvic girdle and hip: Vertebral column (cervical, cervico-thoracic and thoraco-lumber).

RDG 401: RADIOGRAPHIC TECHNIQUE-III

This course will provide students with General anatomy terminologies and positioning principles. It will also provide theoretical foundations and laboratory demonstrations necessary to develop the psychomotor skills that are essential for the achievement of routine diagnostic radiographs and those requiring supplementary views for patients at any stage of the life span. Specifically, review of general patient care (Care before, during and after the procedure); Radiographic examination of the skull; Dental Radiography; Skeletal surveys; Plain radiography of the viscera and soft tissue; Accident and emergency radiography.

RDG 402: RADIOGRAPHIC TECHNTQUE-IV

This course will provide students with General anatomy terminologies and positioning principles. It will also provide theoretical foundations and laboratory demonstrations necessary to develop the

psychomotor skills that are essential for the achievement of routine diagnostic radiographs and those requiring supplementary views for patients at any stage of the life span. Specifically, a review of general patient care (Care before, during and after the procedure); Introduction to investigations involving contrast media; Pharmacy radiography; Urinary system, HSG, and Fistulography.

RDG 501: RADIOGRAPHIC TECHNIQUE-V

This course will provide students with General anatomy terminologies and positioning principles. It will also provide theoretical foundations and laboratory demonstrations necessary to develop the psychomotor skills that are essential for the achievement of routine diagnostic radiographs and those requiring supplementary views for patients at any stage of the life span. Specifically, a review of general patient care (Care before, during and after the procedure); Contrast examination of the gastrointestinal system; Sialography; Dacryocystography; Arthrography; Mammography and operating theater/ward radiography techniques.

RDG 502: RADIOGRAPHIC TECHNIQUE VI

This course will provide students with General anatomy terminologies and positioning principles. It will also provide theoretical foundations and laboratory demonstrations necessary to develop the psychomotor skills that are essential for the achievement of routine diagnostic

Radiographs and those requiring supplementary views for patients at any stage of the life span.

Specifically, a review of general patient care (Care before, during and after the procedure); other specialized radiographic procedures —

Angiography; Myelography: air encephalography; Cholangiography should be covered in details.

RADIOGRAPHIC IMAGE PRODUCTION & EVALUATION COURSES **RDG 306: RADIOGRAPHIC IMAGE PRODUCTION & EVALUATION -I**

The course introduces technical factors involved with the production processing and evaluation of the radiographic image. The course discusses in depth, the production of X-ray, its attenuation and filtration. This course includes the characteristics of radiographic film, intensifying screens, & filters. The basics of processing radiographic film processor, including the manual & automatic processing. The darkroom structure & protocol are also discussed.

RDG 405: RADIOGRAPHIC IMAGE PRODUCTION &EVALUATION -II

This course is a continuation of the concepts covered in RDG 3320. This course includes the basic principles of image production, including radiographic density, contrast and definition. Appreciation and application of all the factors that will enable the Radiographer to produce x-ray films of good quality and diagnostic value. The various parameters that affect the technical quality

of the radiograph are also discussed. Image analysis exposure controls, and exposure calculations are emphasized in this course. The lectures will be linked with practical demonstration to illustrate the importance of all that goes to make up correct exposure conditions for obtaining a quality radiograph.

RDG 406: RADIOGRAPHIC IMAGE PRODUCTION & EVALUATION -III

This course is a continuation of the concepts covered in RDG 3320 and RDG 4321. The course will teach the principles of fiber optics and video transmission and explain the principles of fluoroscopy according to: image acquisition, equipment operation, procedures performed and radiation exposure dose to the patient and radiographer. It will also explain the principles of conventional tomography and the principles of magnification radiography according to: image acquisition, equipment operation, procedures performed and radiation exposure dose to the patient & radiographer. The course will discuss the basic principles of computed tomography according to: image acquisition, equipment operation, procedures performed and radiation exposure dose to the patient and radiographer.

RDG 505: RADIOGRAPHIC IMAGE PRODUCTION & EVALUATION -IV

This course is a continuation of the concepts covered in RDG 3320 and RDG 4321. Digital image acquisition, display, and modification are covered. Computed radiography (CR), and digital radiography (DR) methods are discussed. Students will be able to explain the principles of digital imaging in terms of image acquisition equipment operation, terminology descriptions, exposure latitude, dynamic range, image quality parameters, image analysis, and radiation exposure dose to the patient. The course will examine some special imaging processes like: xeroradiography, Duplication of radiographs and Subtraction radiography.

RADIOGRAPHIC EQUIPMENT COURSES

This Course is in series of I, II. Ill, IV & V. It will teach: Mains supply, Basic principles of Generators including falling load and frequency multipliers. Control and stabilizing equipment. High-tension circuits, Meters, Exposure Timers and switches. Fuses, Circuit breakers. Interlocking Circuits. The X-ray tube: Construction and operation, high-tension cables. Tube stands, effect and control of scatter radiation. General principles of scatter radiation. Grids, collimators and beam centering devices, portable and mobile units. Special Equipment's -Tomographic equipment's, Fluoroscopic equipment. Dental equipment, Mammography equipment, equipment for Neuro Radiography, accident and emergency equipment. Imaging intensifies. Rapid Series Equipment.

RDG 310 RADIOGRAPHIC EQUIPMENT-I

This course includes the study of imaging equipment and its safe operation in clinical application. Generators. X-ray circuitry, tube components, and QA monitoring maintenance are covered. Mains Supply. Basic principles of Generators including falling load and frequency multipliers. Control and Stabilizing equipment. High-tension circuits, Meters, Exposure Timers and switches. Fuses, Circuit Breakers, Interlocking Circuits. The X-ray tube: Construction and operation, high-tension cables. Tube Stands, effect and control of scatter radiation. General principles of scatter radiation. Grids, collimators and beam centering devices, portable and mobile units. Computed Tomography, MRI, Mammography and Diagnostic Imaging equipment are discussed.

RDG 310 RADIOGRAPHIC EQUIPMENT-I

This course includes the study of imaging equipment and its safe operation in clinical application. Generators. X-ray circuitry, tube components, and QA monitoring maintenance are covered. Mains Supply. Basic principles of Generators including falling load and frequency multipliers. Control and Stabilizing equipment. High-tension circuits, Meters, Exposure Timers and switches. Fuses, Circuit Breakers, Interlocking Circuits. The X-ray tube: Construction and operation, high-tension cables. Tube Stands, effect and control of scatter radiation. General principles of scatter radiation. Grids, collimators and beam centering devices, portable and mobile units. Computed Tomography, MRI, Mammography and Diagnostic Imaging equipment are discussed.

RDG 403: RADIOGRAPHIC EQUIPMENT-II

X-ray tube: construction and operation, high-tension cables; Tube stands, effect and control of scatter radiation, and general principle of scatter radiation; Grids, Collimators and beam centering devices; Portable and mobile units

RDG 404: RADIOGRAPHIC EQUIPMENT-III

Special equipment- tomographic equipment; Fluoroscopic equipment: Dental equipment; Mammographic equipment

RDG 503: RADIOGRAPHIC EQUIPMENT-IV

Equipment for Neuro-radiography; Accident and emergency equipment; Image intensifiers; Rapid series equipment

RDG 504: **RADIOGRAPHIC EQUIPMENT-V**

Basic principles of modern imaging modalities (CR, DDK); Care and maintenance of equipment; Practical and 'Trouble shooting" knowledge based on the entire course in radiographic equipment.

RADIOGRAPHIC ANATOMY & PHYSIOLOGY COURSES

A series of courses in Radiographic Anatomy. RDG 3225 Radiographic Anatomy-I, RDG 3326 Radiographic Anatomy-II, RDG 4348 Radiographic Anatomy-Ill. RDG 4349 Radiographic Anatomy-IV. The series provides the study of anatomy of the body using radiographic films, commonly called x-rays from both the projection and cross-sectional point of view. Conventional and contrast Radiographic Anatomy of the systems are also studied. Emphasis is placed on the development of a systemic perspective of anatomical structures and physiological processes.

RDG 303: RADIOGRAPHIC ANATOMY & PHYSIOLOGY -I

Specifically, the topics include: body organization; cell structure and functions; tissue classifications: the integumentary system; the skeletal system; the muscular system; the respiratory system; the digestive system: and the urinary system. Knowledge of the normal structure and function of the different parts of the body must be coupled with some idea of the way in which disease arises and extends, so that the radiographer can assist in the various procedures used in diagnosis and treatment. The syllabus gives the main headings-the names of organs and systems to indicate the scope of teaching required both in diagnosis and treatment. Knowledge of the **size** and position of an organ is of paramount importance. Laboratory experience supports classroom learning.

RDG 308: RADIOGRAPHIC ANATOMY & PHYSIOLOGY-II

This course continues the study of the anatomy and physiology of the human body. The course provides the study of anatomy using radiographic films, commonly called x-rays from both the projection and cross-sectional point of view. Conventional and contrast Radiographic Anatomy of the systems are also studied. Topics include: the reproductive system; the cardiovascular system; the blood and lymphatic systems; the nervous and sensory systems: the endocrine system; and the immune system. Laboratory experience supports classroom learning. Surface, radiographic and cross-sectional anatomy of the spine (cervical, thoracic, lumbar, sacral and coccyx); The pelvic girdle, hip joint, femur and patella, tibia and fibula, knee joint ankle joint. bones of the foot.

RDG 413: RADIOGRAPHIC ANATOMY & PHYSIOLOGY -III

This course continues the study of the anatomy and physiology of the human body. Definition of skull; classification of cranial bones into calvaria, bones of the floor of the skull and facial bones;

mention of the boundaries, articulations and foramina associated with cranial bones; sutures of the skull and fontanelles and their classification by age (adult and infants); The facial bones; anatomic position , shape and functions and radiographic/cross sectional imaging appearance: The temporomandibular joint; anatomy on closed and opened mouth view; radiographic and cross sectional imaging correlation; The paranasal sinuses: definition development, shapes and radiographic/cross sectional imaging anatomy; mention the view for demonstration of each paranasal sinuses. The orbit; definition, shape, axial projection of the orbits and its significance in position for optic foramen view, the bony orbits: The petrous of the temporal bones and its content; The external ear. middle ear (tympanic cavity) including the mastoid portion, the inner ear (vestibular cavity). The brain: normal anatomy on ultrasound. CT, and MRI; The cerebral circulation; blood vessels of the brain, the carotid angiogram. internal and external carotids, intracranial portion of the internal carotid artery and its terminal branches; The cerebral veins and the great veins of the neck on ultrasound, CTA & MRA.

RDG 414: **RADIOGRAPHIC ANATOMY & PHYSIOLOGY -IV**

The urinary systems: General functions of the urinary system: Components of the urinary system. Functions of the kidneys, ureters and the urinary bladder; Radiographic anatomy of the kidneys, ureters, urinary bladder and urethra including the cross-sectional anatomy/imaging and relations; Normal orientation and position of the kidneys. Renal blood vessels; Macroscopic and microscopic structures of the kidneys with emphasis on the structure of the Nephrons: Urine production. The gastrointestinal tract: General functions of the gastrointestinal systems; Components of the gastrointestinal tract; Upper gastrointestinal tract; The oral cavity (mouth). Pharynx, Esophagus, stomach, small intestine, large intestine; Boundaries and functions of the oral cavity; The accessory organs in the oral cavity and their functions; The salivary glands, production of saliva and functions; The pharynx: Radiographic anatomy: Cavities that communicates with the pharynx; The process of deglutition/swallowing; The Esophagus: Relations and functions; The process of swallowing and peristalsis in the esophagus; Anatomy of the stomach: Location, orientation, openings and curvatures including its subdivisions; Mucosal folds of the stomach; Distribution of barium suspension and air in the stomach during barium meal in various positions; The different types of body habitus as it affects the position of the stomach and other abdominal organs: Anatomy of the duodenum and its relations to the head of the pancreas; Mechanical and Chemical processes of digestion; Lower gastrointestinal tract; Anatomy and differences between the jejunum and ileum; Quadrant and cross sectional locations of the different parts of the small bowel; Anatomy of the

large intestine and the appendix; Differences between small and large intestine; Distribution of barium and air in the large intestine during barium enema. The accessory organs of digestion: Anatomy of the Salivary glands, pancreas, liver and gall bladder/bile ducts.

CLINICAL RADIOGRAPHY PRACTICUM

RDG 312: CLINICAL RADIOGRAPHY-I

Students are provided with practical experience in the functioning of the radiology department. Included are basic radiology office skills, familiarizing students with the clinical affiliate and developing fundamental skills in radiologic technology, darkroom technique, equipment manipulation and patient interaction. This course represents the beginning of the clinical competency program. Students shall attend postings at the department of Radiology, Burau Dikko Teaching Hospital and future affiliated Hospitals (at least 18 hours per week) with hands on clinical radiographic examinations covered in RDG 301 Radiographic Technique-I including: (a) Chest, (b) Upper Limb: fingers, thumb, hand, wrist, elbow, fore arm etc. and (d) Bony Thorax.

RDG 407: CLINICAL RADIOGRAPHY-II

This clinical practicum represents a continuation of the clinical competency program. Students shall attend postings at the department of Radiology; Barau Dikko Teaching Hospital and future affiliated Hospitals (at least 18 hours per week) with hands on clinical radiographic examinations covered in RDG 304 Radiographic Technique-II including: (a) Lower extremity (b) Pelvic girdle and Hip (c) Vertebral column including cervical, cervico-thoracic. Thoracic-thoraco-lumbar etc. This also includes training in Computed Tomography (CT), Ultrasound and Magnetic Resonance Imaging (MRI).

RDG 408: CLINICAL RADIOGRAPHY-III

This clinical practicum represents a continuation of the clinical competency program. Students shall attend postings at the department of Radiology: Barau Dikko Teaching Hospital and future affiliated Hospitals (at least 18 hours per week) with hands on clinical radiographic examinations covered in RDG 401 Radiographic Technique-Ill including: (a) skull; (b) Dental Radiography; (c) Skeletal surveys; (d) Plain radiography of the viscera and soft tissue; (e) Accident and emergency radiography. This also includes training in Computed Tomography (CT), Ultrasound and Magnetic Resonance Imaging (MRI).

RDG 507: CLINICAL RADIOGRAPHY-IV

This clinical practicum represents a continuation of the clinical competency program. Students shall attend postings at the department of Radiology; Barau Dikko Teaching Hospital and future affiliated Hospitals (at least 18 hours per week) with hands on clinical radiographic examinations covered in RDG 402 Radiographic Technique-IV including: Introduction to investigations involving contrast media: Pharmacy radiography; Urinary system. HSG, and Fistulography. Contrast examination of the gastrointestinal system; Sialography; Dacryocystography; Arthrography; Mammography, Operating theatre and admission ward radiography techniques.

RDG 508: CLINICAL RADIOGRAPHY-V

This clinical practicum represents the final of the clinical competency program. Students shall attend postings at the department of Radiology; Barau Dikko Teaching Hospital and future affiliated Hospitals (at least 18 hours per week) with hands on clinical radiographic examinations covered in all previous radiographic examinations and RDG 502 Radiographic Technique-VI including: other specialized radiographic procedures-angiography; Myelography; air encephalography; Cholangiography should be covered in details.

RDG 422 MAMMOGRAPHY AND ADVANCE BREAST IMAGING
COURSE CONTENTS

History of mammography: Mention W.C Roentgen, 1895, Albert Salomon (German Surgeon) on 1913, Comparism of surgical tissue and healthy breast. Uses of Mammography. Equipment for mammography. Compression devices, the magnification setup, use of grids and automatic exposure controls, X-ray generators in Mammography. Anatomy of breast (Overview), Factors of good quality Mammogram: Radiographer, Patient factor, equipment. Technique and special mammographic procedure: Adequate penetration, Contrast and patient dose. Patient preparation, techniques and views. Male Mammography: breast cancer and gynecomastia. Indication and techniques for ductography.

RDG 415: MAGNETIC RESONANCE IMAGING I
COURSE CONTENTS

Designs of MR scanners: Open, closed systems. Superconductors, Permanent magnets, Resistive magnets. Cooling mechanisms, Nitrogen, Helium and many others. Oxygen levels. Oxygen gauges and meters, Oxygen displacement by helium. Loss of superconductivity. Quench, Shielding systems, The Faraday's cage. Strength of Magnets. Magnet homogeneity. Shimming, Characteristics of the main magnet Strength of the field produced. Tesla (T). Gauss. Magnets in clinical use and in research. Parameters, image quality and trades off: SNR, Slice Thickness FOV, Matrix, NEX**,** Pixels and voxels**.** Slice thickness, slice Gap**.** Noise, Partial volumes. FOV, Matrix,

Number of excitations, Acquisition time. TR, TE, Receive bandwidth. Spatial Encoding and Image Formation: The homogenous magnetic field, Behaviour of protons in the magnetic field, Protons and Lamour frequency, Slice direction, Phase direction and Frequency direction.

Spatial Encoding and Image Formation: The homogenous magnetic field, Behavior of protons in the magnetic field, Protons and Lamour frequency, Slice direction, Phase direction and Frequency direction, Slice encoding gradient, Slice select gradient, Use of varying bandwidth, Modifying the steepness of the gradient, Gradient fields, Frequency encoding, Phase encoding, K – Space filling, Fourier transformation. Techniques --- Central Nervous System: Coil selection, Immobilization devises, Ear defenders, Aids for claustrophobic patients—mirror glasses, eye shields, Artifact considerations, Use of saturation bands, Flow compensation, Indications for MRI in the brain and spines, Parameters and, image quality considerations, Patient positioning, Important landmarks and reference points, Protocol selection, Essential and complementary sequences, Image weighting for particular, indications, Thick and thin slices, High resolution slices, Contrast enhancement, Introduction to diffusion weighted imaging.

RDG 417: ULTRASOUND IMAGING I
COURSE CONTENTS

Common ultrasound terminologies. Normal Pelvic Anatomy: Uterus – anatomy and ultrasound examination. Vagina – sonographic appearance. Ovaries – Anatomy to include shape, size in prepubertal, menstrual and post menstrual stages. Supporting structures – Divisions of the pelvis ie true & false pelvis, location and functions of supporting muscular structures. Sites of fluid accumulation – anterior and posterior cul-de-sac, space of Retzius and fornices. Vasculature – roles of uterine and ovarian arteries. Physiology: Menstrual Cycle – role of the pituitary gland in menstruation should be stated. pregnancy Test – indicators of pregnancy. Fertilization – formation of embryo. Infertility and Endocrinology. Contraceptives. Sonographic findings with IUCDs. First Trimester: Gestational Sac – embryology of the gestational sac. Sonographic findings of gestational sac development: Yolk Sac, Ovaries (corpus Luteum), Pregnancy failure – Fetal demise, anembryonic pregnancy (blighted ovum), threatened abortion, inevitable, missed, habitual, complete/spontaneous abortion. Ectopic pregnancy. Sonographic examination in the first trimester. Determination of presence or absence of fetal life. Determination of fetal number.

RDG 411: COMPUTED TOMOGRAPHY 1

COURSE CONTENTS

Introduction to Computed Tomography: Basic terminology, Components – imaging, computer and display systems, Digital image processing overview, Image manipulation. Overview of imaging

parameters; Protocol selection, Motion reduction. Overview of clinical applications of CT, Information gained, Pathology demonstrated, Basic positioning guidelines. Patient and personal safety: Radiation dose considerations, Table weight limits, Pregnancy, Emergency in the scanning area, Contraindications to patient scanning. Computer Technology: Review of Computers and their operation, Digital Image Processing; CT Components: Equipment and Software: Data acquisition and Reconstruction: Acquisition methods, Spiral CT, Scanogram, Technical Factors, Image Quality/Manipulation, Radiation Dose, Artifacts, Correcting Suboptimal Images, Display/Recording/Storage and Quality Assurance.

Cross-Sectional Anatomy of CNS Computed Tomography of the Head and Central Nervous System: Scanning Considerations: Preparation criteria, Positioning criteria, Planes / anatomy best demonstrated, technical parameters, Artifact and motion reduction, Windowing, Pathology: Clinical Indications Anatomic Locations.

RDG 412: COMMUNITY HEATH

Epidemiology - definition, principles and methods. Health Education, Environmental health. Occupational Health, Public health administration /health care: Epidemiology of communicable and non-communicable diseases; Social medicine, National and International Regulations relating to health.

RDG 409: **PRINCIPLES OF RADIOTHERAPY AND ONCOLOGY**

Application of ionizing radiation to Tumours and other Diseases; Superficial and Deep therapy; Heat and Immunotherapy; Nature and type of cancer, staging of cancer, causes and management; Radiotherapy and Chemotherapy; Equipment for production of radiation therapy Beam; Radiation Beam Measurement; Beam Modifiers and applicators; Simulators and their uses; Manual and Automatic Planning; Definition and units of radiotherapy/radiation; Production of x- and gamma rays; Fractionation in radiation therapy; Types of radiotherapy; Complications of radiotherapy

RDG 418: RESEARCH SEMINAR

The Research seminar Course is an informal forum for the presentation and discussion of work in progress and published works. This is an opportunity for us to find out about current research being undertaken, to develop our own research, and to share ideas. The Research Seminar course consists of scientific seminars including published work, work published in abstracts, and research in progress presented in seminar form. They are designed as scientific seminars including newly published work and research in progress. The main aim is to gather journal publications with a view to addressing scientific topics in-depth, and breaking new ground. Each student will be required to make two seminar presentations. Further, each student will be required to produce a manuscript in

the usual journal format on the topic under investigation. For each candidate, literature review and/or development of relevant models related to intended dissertation topics will be acceptable. Presentation of paper by each student on an approved topic to a department colloquium.

RDG 416: **IMAGE CRITIQUE & PATTERN RECOGNITION**

Definition, pathophysiology, and patterns of the following: pneumonia, tuberculosis, pulmonary carcinoma, hyper-trans-radiant and cystic lung lesions. Approach to focal bone lesions, choice of imaging modality, patient demographic consideration; Benign and malignant focal bone lesions, sites of predilection, periosteal reaction, soft tissue extension, and multiplicity of lesion. Bone infection, pathophysiology. Clinical and radiographic features, acute and chronic, radionuclide scanning in bone infection; Joint infection, septic and tuberculosis arthritis; tuberculous and pyogenic spondylitis.

Trauma imaging, definition and classification of fractures, special types of fracture, process of fracture healing, complication of fracture healing; Regional trauma, head injury; emphasis on the value of CT and its pattern. Review of the plain film and cross-sectional anatomy of the abdomen, mention of the four quadrant and the nine quadrant models; Indications for plain abdominal radiograph; Image critique of AP supine and upright abdominal radiographs: Pattern recognition on abdominal radiograph; mention of abnormal gas. masses, stones and bones pattern; GIT contrast studies; mention of types of GI contrast medium; review of the normal barium swallow, meal, small bowel follow through and enema; Pattern on barium swallow; mention of esophageal ulcers, strictures and varices; Pattern on barium meal; discussion on peptic ulcer, gastric masses and thickened mucosal folds; Pattern on small bowel follow through, fold thickening, stricture and nodular patterns; Colonic pattern, colonic carcinoma, diverticulosis, and thumb printing patterns. Review of the radiographic anatomy of the kidneys, ureters, urinary bladder and the urethra; Image critique of the plain radiography of the abdomen for the urinary tract and the intravenous urography films; Plain film and IVU patterns of abnormal kidneys/pelvicalyceal system, ureters, bladder and urethra; Renal ultrasonography; normal renal and bladder anatomy, patterns of kidney and bladder lesions (hydronephrosis, calculi, masses, cystic lesions). Micturition cystography and retrograde urethrography; normal anatomy, mention of abnormal pattern

RDG 419: ARTIFICIAL INTELLIGENCE
COURSE CONTENTS

Introduction to artificial intelligence: understanding natural languages, knowledge representation, expert systems (CT scan, MRI, Ultrasonography and many others, Pattern recognition, Medical

Image Analysis, image Segmentation, registration, visualisation, computing. Deterministic versus statistical models, global versus local representations of appearances, neural networks and texture analysis. Principles of mathematical modelling of biological systems, computer algorithms and extraction of qualitative information/automations of systems and processes Deep learning and Machine learning in imaging. Applications of AI in Radiography as it affects patient documentation and data management, Image acquisition, processing, interpretation and storage/retrieval.

RDG 516: COMPUTED TOMOGRAPHY II

Course Contents

Computed Tomography II provides a concise overview of the essential principles for CT imaging of the central nervous system. It focuses on understanding cross-sectional anatomy, proper scanning techniques, and the recognition of common CNS pathologies. The course introduces the key anatomical structures of the brain, cerebellum, brainstem, and spinal cord as seen on CT. It emphasises identifying the ventricular system, intracranial compartments, cranial fossae, vascular landmarks, and normal anatomical variations in different imaging planes. It also outlines the major considerations for CT scanning of the head, beginning with patient preparation, clinical indications, history taking, and removal of metallic artefacts. Positioning techniques are explained, including correct alignment using standard reference lines and the use of immobilisation aids to minimise movement. The course highlights the importance of selecting appropriate imaging planes and technical parameters such as kVp, mAs, slice thickness, pitch, field of view, and reconstruction algorithms. It explains methods for reducing artefacts and improving image quality, as well as proper use of brain, bone, stroke, and post-contrast window settings.Finally, it summarises the common CNS pathologies evaluated with CT, including traumatic injuries, stroke, infections, tumours, and hydrocephalus. It also covers anatomical localisation of lesions and provides focused insight into orbital imaging, temporal bone evaluation, and spinal CT pathology.

RDG 507: MEDICAL ETHICS AND JURISPRUDENCE

COURSE CONTENTS

The criminal procedure code (1908), all the provisions of the above-mentioned law. Medical jurisprudence, legal procedures, Human body: Elements of anatomy & physiology, identification, Death- its medicolegal aspects, post-mortem examination, medicolegal aspects of radiography.

RADG 517: ULTRASOUND IMAGING II

COURSE CONTENTS

Simple description of common artefacts and their origin, Dosimetry, bio effects regulations and standard of practice, quality assurance and equipment specifications. Second and Third Trimester

(Normal Anatomy): Basic guidelines for obstetric sonograms. Foetal biometry, Basic survey of fetal anatomy to rule out abnormality. Evaluation of foetal Cranium, Spine, Heart, abdominal organs and limbs.

Abdominal Sonography: Liver, Structure and Anatomy: Sonographic appearances in normal and disease conditions. Biliary Tree**:** Anatomy of the gall bladder, nature & function of the Bile ducts, Bile and splincter of odds should be stressed. Normal anatomical variants – functional fold, Phrygian cap, Hartmann's pouh, Scanning techniques d. Indications & laboratory values. Pancreas**:** Anatomy – subdivisions, Pancreatic ducts; duct of wirsung, ducts of santorim, blood supply, functions – endocrine & exocrine systems. Scanning techniques & laboratory values.

RDG 517: ULTRASOUND IMAGING II

Simple description of common artifacts and their origin, Dosimetry, bio effects regulations and standard of practice, quality assurance and equipment specifications. Second and Third Trimester (Normal Anatomy): Basic guidelines for obstetric sonograms. Fetal biometry, Basic survey of fetal anatomy to rule out abnormality. Evaluation of fetal Cranium, Spine, Heart, abdominal organs and limbs.

Abdominal Sonography: Liver, Structure and Anatomy: Sonographic appearances in normal and disease conditions. Biliary Tree: Anatomy of the gall bladder, nature & function of the Bile ducts, Bile and splincter of odds should be stressed. Normal anatomical variants – functional fold, Phrygian cap, Hertmann's pouh, Scanning techniques d. Indications & laboratory values. Pancreas: Anatomy – subdivisions, Pancreatic ducts; duct of wirsung, ducts of santorim, blood supply, functions – endocrine & exocrine systems. Scanning techniques & laboratory values.

RDG 512: MAGNETIC RESONANCE IMAGING II

Spatial Encoding and Image Formation: The homogenous magnetic field, Behavior of protons in the magnetic field, Protons and Lamour frequency, Slice direction, Phase direction and Frequency direction, Slice encoding gradient, Slice select gradient, Use of varying bandwidth, Modifying the steepness of the gradient, Gradient fields, Frequency encoding, Phase encoding, K – Space filling, Fourier transformation. Techniques --- Central Nervous System: Coil selection, Immobilization devises, Ear defenders, Aids for claustrophobic patients—mirror glasses, eye shields, Artifact considerations, Use of saturation bands, Flow compensation, Indications for MRI in the brain and spines, Parameters and, image quality considerations, Patient positioning, Important landmarks and reference points, Protocol selection, Essential and complementary sequences, Image

weighting for particular, indications, Thick and thin slices, High resolution slices, Contrast enhancement, Introduction to diffusion weighted imaging.

RDG 509: **RESEARCH METHODOLOGY**

Application of bio-statistical tools and methods; Types of Scientific enquiry; Research design; Formulation of hypothesis: Data collection methods; Validity and reliability issues and their importance, sensitivity and deduction, inductive and inferences; Ethics in Medical Research. Orientation to statistics, definition and examples of basic statistical terminology; Data presentation. Populations, samples and the Normal distribution. Design of experiments. Introduction to Demography in medicine; Procedures for hypothesis testing. Analysis of variance. Correlation and Regression. Chi Square. Nonparametric technique, relative risk and measures of strength of association.

Application of bio-statistical tools and methods; Types of Scientific enquiry; Research design; Formulation of hypothesis; Data collection methods; Validity and reliability issues and their importance, sensitivity and deduction, inductive and inferences; Ethics in Medical Research**.**

RDG 506: RADIOGRAPHY EDUCATION

Education training methods: Instructor-led classroom training, interactive method, hands on training, computer-based training, video training and coach/mentoring methods. Emphasis on knowledge, skills and attitudes needed to function in health care environment and Interdisciplinary expertise. Community and public health theories and models and their application to real-world situations. Comparative training durations/curricula of radiography in Nigeria, Africa, Europe, America etc.

RDG 504: **RADIOLOGICAL HEALTH MANAGEMENT**

Application of managerial structure, healthcare policy, interdependence of various Departments. Radiology department and organizational structure, financial resources and management. Vital statistics and records, inventory, information control, personnel Management; management and communication process; patient patient-flow and appointment system.

Public relations, evaluation of management principles and performance. Principles of

Counseling; interaction skills; information classification and management; counseling patients, Tact and diplomacy in counseling

RDG 511: **QUALITY ASSURANCE**

The Quality assurance course teaches planned and systematic actions that provide adequate confidence that a diagnostic x-ray facility will produce consistently high-quality images with minimum exposure of the patients and healing arts personnel. The course entails the determination of what constitutes high quality to be made by the facility producing the images. Knowledge that Quality assurance actions include both "quality control" techniques and "quality administration" procedures will be taught in this course.

RDG 510: **RESEARCH PROJECT**

Each student must produce a bound thesis report on an approved topic based on any relevant/acceptable area of study in Medical Imaging Science; It must be a research work carried out by the student under an approved supervisor in the final year as part of the partial fulfillment of the B. RAD degree requirements. Assessment of the project would be by grading of the project content by the panel of internal assessors and external assessors, including supervisors, to be chaired by the Head of Department.