2012

Certificate in Medical Imaging Technology

Post FSc One Year Modular Program leading to Diploma/Associate Degree

Eligibility:

1. FSc Medical Technology
2. FSc Pre-Medical
3. FSc Pre-Engr with Matric (Science)
4. F.A with Matric (Science)

DEVELOPED IN COLLABORATION WITH

National Vocational & Technical Training Comission (NAVTTC)

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National Institute of Medical & Social Sciences (NIMSS)

Allied Health Sciences Board of Studies

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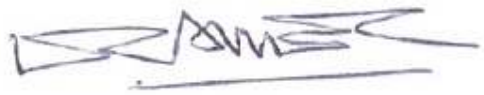
Preface

National Institute of Medical & Social Sciences (NIMSS) Islamabad is in process to provide state of art teaching in the field of medicine, dentistry, nursing, allied health sciences and post graduate studies. Considering the wide gap between the professional knowledge of the medics and the nurses/paramedics, it is deemed essential to commence paramedic technical courses. The College of Allied Health Sciences/NIMSS in collaboration with National Vocational & Technical Training Commission (NAVTTC) intends to start one year certificate course (G-1) for Lab technicians, X-ray technicians and physiotherapists in February 2012. This is an exit program which desirably can be vertically integrated to the Second Year Diploma Program (G-2), onwards to Third Year Associate Degree (G-3) and finally to Fourth Year BSc Degree (G-4). The paramedics qualifying through these courses will meet the national as well as global demand for employment available both at the primary health care centers and tertiary health care centre.

The curricula have been designed to meet the international standards. It is based on credit hours with pivotal emphasis on acquiring competency based knowledge and skills, 60 % has been assigned to practicum being the major component of the curricula. Further, with advantage of the Institute of Online Learning (IOL) available to NIMSS, the distant learning for the theory interactive lectures has been designed. The students will be issued Laptops through which they will be able to learn/ acquire knowledge while at home. In addition, the practicum have been planned to be conducted close to the student's home. These curricula will facilitate the lesser privileged individuals to benefit from the program.

A team of experts representing Karachi, Quetta, Lahore and Islamabad were involved for the last three months. A group of specialist doctors and experienced technologists were involved in designing the curricula. In particular we would like to acknowledge the experts from the Liaquat National Hospital and Medical College Karachi, including Dr. Farah Deeba, Dr. Saad Saleem, Mr. Nasir Mansoor, Ms. Uzma Usman, Dr. Bushra Rehan and Dr. Jawaid Iqbal. Also intimately involved were Dr. Sheima Baig, Col. (Retd) Dr. Pervez Saleem Qureshi, Dr, Ahsen Farooq, Dr. Fauzia Zahid, Col. (Retd) Dr. Azra Javed, Mr. Qazi Habib, Ms. Sabeen Abid, Mr. Sanaullah Sanai and Mr. Jawad Akbar. We extend our gratitude to ED NAVTTC Mr. Tariq Shafi Chak and his team in particular Mr. Shahid Tarrar, Mr. Mohammad Nasir Khan and Ms. Rehana Tiwana, without their guidance and support the course may not have been a reality.

We welcome valid suggestions to add value to this endower.



Dr. Mian Amer Masud
CEO

Rationale

The purpose of this document is to introduce and implement structured training in clinical X-Ray procedures with quality assurance. Subsequent to approval by the academic council of NIMSS, it will be forwarded to NAVTTC, after necessary authorization the curriculum will be formally inducted.

Program Description

The x-ray Technician program encompasses the performance and evaluation of x-ray photography of human body. The results of tests determine the presence of disease, aid in treatment, and monitor therapy. This is a dynamic profession that changes as new medical knowledge is discovered. Medical Imaging Technicians (MIT), have the technical expertise necessary to perform a wide variety of routine and specialized x-ray photography on patient to help the physician in the diagnosis and treatment of disease. To do this, the X-ray Techs uses the latest available electro-medical equipment, often interfaced with computers to generate accurate, reliable tests results. It is the goal of this course of study to equip the students with the necessary knowledge and skills to perform competently in an X-ray setup in all areas of radiographic diagnosis. Students who graduate from this program of study are also equipped to sit for the American Society of Clinical radiology International certification examination.

Health Care Problem

Negligence in radiographic imaging procedures can lead to erroneous diagnosis and in turn incorrect treatment.

Importance of the Problem

The qualitative challenge includes; the deterioration in maintaining requisite standards along with professional obligations. Quantitatively the magnitude of the problem is directly proportional to inadequate training and inappropriate attitude and inversely proportional to knowledge.

Educational goals

Overall - By the end of training, students will be able to perform adequate radiographic techniques with desired quality assurance.

Specifically the training will:

1. Provide the instructive and clinical experience necessary to acquire knowledge in x-ray technology subjects.
2. Ensure that, upon completion of the program, students are competent at the career entry level and have the knowledge and background to successfully prepare them for employment.
3. Inculcate a sense of duty and professionalism while interacting with patients, their relatives, colleagues and other health care providers.
4. Communicate effectively and professionally.
5. Prepare them for team work.
6. Impart sufficient technical knowledge to prepare them for employment.
7. Understand the significance of continuing education.
8. Impart professional honesty.

General Competencies

1. By the end of this program, the student should be able to:

A. Demonstrate an understanding of the history and physics of the radiography and the Professionalism desired in technical

personnel.

B. Exhibit behavior consistent with the ethical practice.
C. Maintain confidentiality of all patients and test results.
D. Demonstrate an appreciation for the special knowledge and talent of other members of the health care team.
E. Explain the harmful effects of radiation.
F. In addition be able to demonstrate procedures to safely handle radiographic machines.
G. Evaluate quality control values and fulfill the requirements of national and international radiation standards.
H. Safely process clinical radiology according to established procedures.
I. Perform radiographic techniques with accuracy and safety.
J. Operate basic x-ray equipment, safely and according to established procedures, using only necessary supplies to maximize resources.
K. Correctly demonstrate standard techniques, using only necessary supplies to maximize patient and self safety.
L. Exhibit an understanding of safety hazards and demonstrate the proper techniques to avoid accidents.
M. Take vital signs.
N. Perform basic radiographic procedures.
O. Explain accreditation and certification.
P. Identify and use basic medical terminology as it applies to the clinical radiology.

Skill levels

The skill level will be divided in to two; level I for initial six months and level II denotes competencies covered during second half of training.

Skill Level I

- Demonstrates proficiency in basic x-ray lab skills.
- Demonstrates knowledge of the essential components of equipment.
- Demonstrates competency in working with chemicals and equipment.
- Knows the procedure for incidence reporting of any untoward event like accidental spills, injury.

Skill Level II

- Be able to work independently.
- Demonstrate knowledge about radiology.
- Demonstrate sufficient knowledge about patient dealing from reception to reporting.
- Demonstrate quality control.
- Demonstrate computer data management.
- Produce diagnostic Radiographs of all routine x-ray examinations and the common special examinations.
- Operate equipment efficiently and safely.
- Take all possible precautions to minimize radiation dose to himself/herself, other personnel and the patients.

- Prepare trays/trolleys for the common and special examinations.
- Carry out simple first aid procedures.
- Perform x-ray office procedures such as filing patient's records, including X-Ray films/cassettes, preparing instructions to patients for special x-ray examinations.

Educational Strategies:

- On line Lectures
- On line Discussions
- Audio-Visual materials
- Demonstrations
- Laboratory Practice
- Radiology dept Trips

Textbooks:

- Physics for radiology students, by Dr. M.B. Zafar
- First year Physics for radiographer, by E. Hughes
- X-ray Equipment for student radiographer, by DN & MO Chesney
- Medical X-ray techniques in diagnostic radiology, by Ploat Plublisher
- Merril's allas on radiographic position procedures

Program Requirements, Examinations and Grading

A. Student Evaluation

1. Measurement

A- Formative:

- Quizzes after every lecture, 25%
- Discussion questions in chat room 25%
- Training assessment by SCT: 25%
- Real Time on Line Tracking System: Tracking of Training by learning management system (LMS): 25%
- **SCT:** Script Concordance Test to measure a student's progress in Problem Solving .The student will be required to explore internet and retrieve articles from professional journals.

B- Summative:

- **Face to Face:** After each semester during face to face session written examinations will be given over lecture material and the accompanying laboratory exercises, and will comprehensively assess the student's knowledge of concepts, principles, techniques and procedures as related to the instructional material.

2. **Measurement of Practical work** –

- OSCE: Objectively Structured Clinical Exams

  Points are awarded for the successful completion of exercises as related to the specific objectives for each exercise through OSCE.

3. Peer & Self Assessment:

- Students Self Assessment form 50%
- Peer Assessment checklist 50%

4. Determination of Final Grade

a) 70 % of final grade

1. Formative Test: 70%
2. Summative Examination: 20%
3. Peer and self assessment: 10%

b) 30% of final grade

1. Completion of work OSCE
2. Two practical exams
3. Review of Safety Manual all exercises and study questions must be organized and turned In at end of the term, preferably in a binder or notebook, for validation by the Instructor.

Note:-

Incomplete assignments will receive grade "I". A student must have a passing average (70% or above) and have completed at least 80% of the course work.

Attendance Policy

Attendance is required at all times and arrival by the beginning of the class period is expected. Roll call will be taken at every class and practicum meeting. The student is required to notify an instructor if an absence is anticipated. If absences exceed 10 %, the student will be dropped from the course unless there are EXTREMELY extenuating circumstances. A student who is fifteen (15) minutes late is considered tardy. Three (3) tardies constitute one absence. It is the student's responsibility to keep track of his/her attendance record and all assignments, materials, examinations, etc., missed.

Failure or Dismissal from this Course Grading Scheme

A = 90-100%

B = 80-89%

C = 70-79%

D = 60-69%

F = 59% and below

A. A minimum grade of "D" (60%) is required in both the lecture and laboratory components of this course to remain on the program.
B. Any student may be dropped from this course due to excessive absences and/or consistently failing to meet class assignments, for disruptive conduct during lecture or lab or for displaying conduct detrimental to the ethics of medical radiology practices.
C. The instructors and lecturers understand that learning in group situations can be beneficial. However, each student is expected to demonstrate his/her own competency by doing his/her own work. Any student caught cheating in examinations, will be subject to disciplinary action, and possible withdrawal from the program.

Program Evaluation:

Research & Evaluation department will evaluate the program on the basis of student success rate and following feedbacks

A- Credit/ Contact hours:

Same as accepted internationally for face to face, on-line and Practicum

B- Student Evaluation:

Evaluation system is a confidential avenue for submitting honest, constructive feedback about the instructors and courses

i- Trainer evaluation

ii- Lecturer/Faculty evaluation

iii- Course evaluation

iv- PGY-1 Survey

C- Faculty Evaluation:

i- Self assessment form

ii- Peer Assessment checklist

iii- Course evaluation

JOB DESCRIPTION OF A RADIOLOGIC TECHNOLOGIST

Radiologic technician assist the radiology Technologists and Radiologist physician with the process of imaging and diagnosing illness. Radiologic technician works under supervision of radiology Technologists and Radiologist physician. Radiologic technician job descriptions include tasks such as: capturing the image, obtaining the best quality image, and ensuring the patients are comfortable and safe. The radiologic technologist however, does not do the actual diagnosing as this is the function of the Radiologist. It is very important that they do what is necessary to obtain a high quality image that will be sufficient for thorough examination by the physician and allow for correct diagnosis.

- Patient communication and preparation including removal of garments or jewelry that may interfere with procedure and explaining how the process works.
- Positioning patients properly to obtain x-rays, CT scans, MR scans, or mammograms
- Setting the equipment to obtain the best density, detail, and contrast of the area being imaged.
- Taking preventative steps to avoid unnecessary exposure to radiation.
- Applying their knowledge of anatomy and physiology to the process in order to help the physician diagnose problems.
- Must be able to closely follow physician instructions, prepare radiography equipment, position patients, and obtain optimal images for diagnosis.
- Must be able to communicate calmly, compassionately, and professionally with all different types of patients including the elderly, ailing, and handicapped.

PROTECTION AGAINSTRADIATION HAZARDS

Before undertaking any radiological examination, it is important that the physician, radiologist and technologist all understand the potential risks of radiation and also its advantages or benefits to the patients.

On the other hand, the benefits of diagnostic radiology are well known. However since radiation exposure entails inherent risks of radiation effects, no decision to expose an individual can be undertaken without weighing benefits of exposure against potential risks, that is, making a benefit risk analysis

Principles of radiation protection

The current radiation protection standards are based on three general principles :-

1. Justification of a practice i.e. no practice involving exposures to radiation should be adopted unless it provides sufficient benefit to offset the detrimental effects of radiation.
2. Protection should be optimized in relation to the magnitude of doses, number of people exposed and also to optimize it for all social and economic strata of patients.
3. Dose limitation, on the other hand, deals with the idea of establishing annual dose limits for occupational exposures, public exposures, and exposures to the embryo and fetus.

Radiation Protection Actions

The triad of radiation protection actions comprise of "time-distance-shielding". Reduction of exposure time, increasing distance from source, and shielding of patients and occupational workers have proven to be of great importance in protecting patients, personnel, and members of the public from the potential risks of radiation.

Time

The exposure time is related to radiation exposure and exposure rate (exposure per unit time).

Distance

The second radiation protection action relates to the distance between the source of radiation and the exposed individual. The exposure to the individual decreases inversely as the square of the distance. This is known as the inverse square law.

Shielding

The third radiation protection action relates to shielding. Shielding implies that certain materials (concrete, lead) will attenuate radiation (reduce its intensity) when they are placed between the source of radiation and the exposed individual.

There are four aspects of shielding in diagnostic radiology:

1. X-ray tube shielding
2. Room shielding

(a) X-ray equipment room shielding

(b) Patient waiting room shielding.

3. Personnel shielding
4. Patient shielding (of organs not under investigation)

X-ray tube shielding (Source Shielding)

The x-ray tube housing is lined with thin sheets of lead because x-rays produced in the tube are scattered in all directions. This shielding is intended to protect both patients and personnel from leakage.

Room shielding (Structural Shielding)

The lead lined walls of Radiology department are referred to as protective barriers because they are designed to protect individuals located outside the X-ray rooms from unwanted radiation. There are two types of protective barriers.

(a) Primary Barrier: is one which is directly struck by the primary or the useful beam.

(b) Secondary Barrier: is one which is exposed to secondary radiation either by leakage from X-ray tube or by scattered radiation from the patient.

The shielding of X-ray room is influenced by the nature of occupancy of the adjoining area. In this respect two types of areas have been identified.

(i) Control Area: Is defined as the area routinely occupied by radiation workers who are exposed to an occupational dose.

· **(ii) Uncontrolled areas:** Are those areas which are not occupied by occupational workers.

X-ray examination room shielding

Rooms housing diagnostic X-ray units and related equipment are located as far away as feasible from areas of high occupancy and general traffic, such as maternity and pediatric wards and other departments of the hospital that are not directly related to radiation and its use.

Patient waiting area

Patient waiting areas are provided outside the X-ray room. A suitable warning signal such as red light and a warning placard is provided at a conspicuous place outside the X-ray room and kept 'ON' when the unit is in use to warn persons not connected with the particular examination from entering the room.

Shielding of the X-ray control room:

The control room of X-ray equipment is a secondary protective barrier which has two important aspects:

(a) The walls and viewing window of the control booth, which should have lead equivalents of 1.5mm.

(b) The location of control booth, which should not be located where the primary beam falls directly, and the radiation should be scattered twice before entering the booth.

Personnel shielding

Shielding of occupational workers can be achieved by following methods:

(a) Personnel should remain in the radiation environment only when necessary (step behind the control booth, or leave the room when practical)

(b) The distance between the personnel and the patient should be maximized when practical as the intensity of radiation decreases as the square of distance (inverse square law).

(c) Shielding apparel should be used as and when necessary which comprise of lead aprons, eye glasses with side shields, hand gloves and thyroid shields.

Patient shielding

Most radiology departments shield the worker and the attendant, paying little attention to the radiation protection of the patient. It has been recommended that the thyroid, breast and gonads be shielded, to protect these organs especially in children and young adults. In gonadal shielding, a lead apron is placed appropriately on the patient to protect the gonads from primary beam radiation exposure . A lead bib and collar worn over the patient's neck and thorax have been documented to effectively shield radiosensitive organs like the thyroid and the breast, and are therefore recommended for routine use in dental X-rays and head CT examinations.

Radiation detection and measurement

The instruments used to detect radiation are referred to as radiation detection devices. Instruments used to measure radiation are called radiation dosimeters.

Methods of Detection

There are several methods of detecting radiation, and they are based on physical and chemical effects produced by radiation exposure. These methods are:-

1. Ionization

2. Photographic effect

3. Luminescence

4. Scintillation

Personnel Dosimetry

Personnel Dosimetry refers to the monitoring of individuals who are exposed to radiation during the course of their work. Personnel Dosimetry policies need to be in place for all occupationally exposed individuals. The data from the dosimeter are reliable only when the dosimeters are properly worn, receive proper care, and are returned on time. Proper care includes not irradiating the dosimeter except during occupational exposure and ensuring proper environmental conditions.

Monitoring is accomplished through the use of personnel dosimeters such as the pocket dosimeter, the film badge or the thermo luminescent dosimeter. The radiation measurement is a time-integrated dose, i.e., the dose summed over a period of time, usually about 3 months. The dose is subsequently stated as an estimate of the effective dose equivalent to the whole body in mSv for the reporting period. Dosimeters used for personnel monitoring have dose measurement limit of 0.1 - 0.2 mSv (10-20 mrem) .

Pocket Dosimeter

The pocket dosimeter monitors dose to personnel. It consists of an ionization chamber with an eyepiece and a transparent scale, as well as a hollow charging rod and a fixed and a movable fiber. When x-rays enter the dosimeter, ionization causes the fibers to lose their charges and, as a result, the movable fiber moves closer to the fixed fiber. The movable fiber provides an estimate of gamma or x-ray dose rate.

Film Badge Monitoring

These badges use small x-ray films sandwiched between several filters to help detect radiation. Film badges are inexpensive, easy to use, and easy to process. Although they are useful for detecting radiation at or above 0.1 mSv (10 mrem), they are not sensitive enough to capture lower levels of radiation. Their susceptibility to fogging caused by high temperatures and light means that they cannot and should not be worn for longer than a 4-week period at a stretch. Another major drawback to film badge monitoring is that it is an enormous task to chemically process a large number of small films and subsequently compare each to some standard test film.

Thermo luminescent Dosimetry (TLD) Monitoring

The limitations of the film badge are overcome by the Thermo luminescent dosimeter (TLD). Thermolumine-scence is the property of certain materials to emit light when they are stimulated by heat. Materials such as lithium fluoride (LiF), lithium borate ($Li_2B_4O_7$), calcium fluoride (CaF_2), and calcium sulfate ($CaSO_4$) have been used to make TLDs.

Wearing the dosimeter

(a) During Radiography

During radiography (when no protective lead apron is worn), the personnel dosimeter is worn at one of two regions :

1. on the trunk of the body at the level of the waist, on the anterior side of the individual,

2. on the upper chest region at the level of the collar area on the anterior surface of the individual.

At these positions, the dosimeter readings represent an estimate of exposure at two different levels ie the whole body exposure is estimated by the trunk level badge and exposures dose to internal organs like thyroid is measured by the collar level badge.

(b) During Fluoroscopy

During fluoroscopy a protective apron should always be worn. It is further recommended that ideally two dosimeters should be worn by radiation personnel. One at the collar level outside the lead apron and the other at the trunk level underneath the lead apron.

The one at the collar level gives an accurate estimate of the radiation dose to the unprotected regions of head and neck. The dosimeter worn underneath the lead apron at the trunk level provides an accurate estimate of the radiation to the protected organs .If only one dosimeter is worn it must be worn at the collar outside the lead apron, because, the neck receives 10-20 times more radiation than the trunk which is protected by lead

Radiation protection survey and programme

The responsibility for establishing a radiation protection programme rests with the hospital administration / owners of the X-ray facility .

- **1. Investigation:** To obtain information regarding layout of the department, workload, personnel monitoring and records.
- **2. Inspection:** Each diagnostic installation in the department is examined for its protection status with respect to its operating factors, control booth and availability of protection devices.
- **3. Measurement:** Measurements are conducted on exposure factors. In addition scattered radiation and patient dose measurements in radiography and fluoroscopy are performed

4. Evaluation: The radiation protection status of the department is evaluated by examination of records, equipment working, status

of protective clothing and the radiation doses obtained from phase-3.

5. Recommendations: A report is prepared on the protection status of the department and the problem areas if any identified, for which recommendations are made regarding corrective measures.

Summary & Conclusions

Radiation protection is an integral component of the working infrastructure of any radiology department. The main principles of radiation protection are to provide adequate protection from undue exposure of radiation to personnel directly or indirectly involved with radiation, without unduly limiting the benefits of radiation exposure. The components of radiation protection include justification of the procedure involving the radiation exposure, use of minimum radiation exposure compatible with the procedure with provides adequate diagnostic information, shielding of the personnel and patient from unwanted radiation exposures and monitoring of radiation exposure to the occupational workers and the working environment. Regular surveillance of the department for radiation levels and monitoring of the radiation protection programmes and regular educational activities form an integral part of the responsibilities of administrative authorities of the department/hospital.

Course Outline

Duration: 1Year

Course #	**Subject**
Orientation	
OC-011	Basic Computer Skill
OC-012	English
OC-013	Ethics

Semester I

Codes	**Courses**	**Credit Hrs**
HGC-011	Public Health Care System & First Aid	2 (1-1)
HGC-012	Anatomy / Physiology	3(1-2)
HGC-013	Medical Terminology	3(1-2)
HGC-018	Applied Computer Skills-I	3(1-2)
XTC-010	Radiographic Technique I	5(1-4)
XTC-011	Introduction to Radiographic Modalities	2(1-1)
	Sub Total	**18(6-12)**
HGC-014	Islamic Studies	1(1-0)
HGC-017	English I	1(1-0)
	Total Credit Hrs	**20(8-12)**

Semester II

Codes	Courses	Credit Hrs
XTC-009	Radiographic Anatomy I	2(1-1)
XTC-012	Radiographic Equipment	3(1-2)
XTC-013	Radiographic Photography	3(1-2)
XTC-014	Radiographic Anatomy II	2(1-1)
XTC-015	Radiographic Technique II	3(1-2)
XTC-016	Radiation Physics	1(1-0)
XTC-017	General Physics	1(1-0)
HGC-018	Applied Computer Skills-II	2(0-2)
	Sub Total	**17(7-10)**
HGC-017	English II	1(1-0)
	Total Credit Hrs	**18(8-10)**
	Total Semester I & II	**38(16-22)**

Percentage Theory = 42 %, Practical = 58 % (Excluding Islamic Studies and English)

Note 1: i. "OC" represents Orientation Courses and carries no weightage

ii. "HGC" represents courses as per approved syllabus for HEC

iii."PTC" represents technical courses with following description:

Note 2: According to Higher Education Commission (HEC) rules of credit hrs 1 credit hr is equal to 1 hr of face to face session/lecture every week for 18 weeks. Therefore 1 credit hr is equal to 18 hrs of face to face session/lectures. For internet learning 1 credit hr is equal to 3 hrs of internet session which will include 1.3 hours of lecture and 1.7 hrs of reading material, presentation, chat room discussion, quizzes.

Theory = 1 Credit hr = 18 hrs of lecture

Practical = 1 Credit hr = 36 hrs of Practicum

SEMESTER - I

Course Description

HGC-011 Public Health Care System & First Aid 2(1-1)

MODULE 1-A

A PUBLIC HEALTH – CLASS 1 Crd.hr = 18 hrs
B First Aid

Modules	Learning Units (LU)	Topics	Learner's Desired Outcomes	Recommended Methodology	Practicum	Skill Developed	Work Place	Duration	Scheduled Dates
Module.1-B Public Health	**(LU-1)** Introduction to Public Health	1. Definition of Health and Wellness 2. Scope of Public Health 3. Policies & Ethics 4. Essential Services 5. Behavioral Sciences 6. Communication 7. Needs / Assessments 8. Determinants of Health Goals	Awareness / Knowledge of Public Health in a community and the impact on human behavior, conceptual approach for primary health behavior for prevention of illness disease and other health conditions, role of community participation, provides incentive for consumers by development of programs.	LMS	Online Class, White Board	Able to construct ideas for development and programs of public health involving community regarding various disease,	Class	1 Hr	

	(LU-2) Health Infrastructure	1. Role of AHP at different levels of health delivery system 2. Organizational Organ gram of the health infrastructure 3. Steps to achieve the goal / slogan "Health for all by the Year 2020" 4. Leading health indicators 5. Programming of Needs impact based module 6. Regional Health Indicators	The job description of the AHP will be more specified and authentic health delivery system will be a door step. Awareness to disease with communication to the relevant department will be more specified. Engaging community leaders or interested peoples who would be involved in improving health. Maintain cohabitation among the provinces and districts.	LMS	Online Class, White Board	He will be able to recognize health indicators effectively and reporting to the concerned authorities	Class	1 Hr	
	(LU-3) Environmental Factors affecting health in a community and occupational health safety	1. Composition of a Healthy Environment 2. Air Pollution Categories as noises/ water/ factories/ mills etc 3. Different types of waste disposable outside and	Awareness to the public to utilize preventive measures to avoid hazards of environmental pollution, methods for the proper disposal of the waste, hazards in use of electronics / chemical material, precautionary	LMS	Online Class, White Board	He will be able to guide people in safe disposal of the waste, he will be able to display charts on the methodology of waste disposal	Class	1 Hr	

		hospitals 4. Importance of ventilation 5. Hazards of over crowding 6. Airborne diseases both communicable and non communicable 7. Diseases related to occupation in factories	measures in factories, display of charts related to various disease hazards. Importance of precautionary measures to be taken for health safety.						
	(LU-4) An account of water bourn diseases along with different sources of water and the impurities	1. Natural sources of water 2. Artificial sources of water 3. Impurities of water 4. Purification of the water 5. Types of water bourn diseases with prophylactic measures 6. Importance of hand wash both and methodology in the hospitals and at home on WHO	Public awareness on hazard's of impure water. Methodology to purify water, this will help to evaluate the impact and control on health status.	LMS	Online Class, White Board	H will be able to demonstrate and also do himself in appropriate form of hand wash as recommended by WHO, will be able to control water bourn diseases by informing the people of methods related to water purification	Class	1 Hr	

		guidelines.							
	(LU-5) Waste Management	1. Introduction to the types of waste material 2. Introduction to different types of waste bourn diseases 3. Different methods of waste disposal and collection / transportation / recycling 4. Reuse of used medical materials in hospitals and nursing homes 5. Use of incinerators in the hospitals 6. Hazard's leading to the infectious diseases due to improper	Improvement in the environmental hygiene leading to prevention of spread of Waste Bourne diseases, reutilization of waste after recycling in different forms, prevention of labor class from various health hazards related to working area, use of proper methodology for destroying the medical disposable material i.e syringes / gloves / Empty IV Fluids Bags / Urine Bags / Royal stubs etc	LMS	Online Class, White Board	Able to differentiate between infectious toxic and non toxic waste, he will be able to provisionally diagnose waste bourn diseases, he will be able to use proper methods to destroy medical waste material.	Class	2 Hrs	

		waste disposal 7. Precautionary measures to be taken by factories for waste disposal 8. Precautionary measures to be taken by the laborer in factories and at construction sites							
	(LU-6) Communicable and Non Communicable diseases	1. Introduction to Communicable and Non Communicable Diseases 2. Difference between Communicable and Non Communicable Diseases 3. Types of	The role of AHP is to aware the public of both communicable and non communicable diseases and to take precautionary measures at different levels and to educate the community for adopting measures to prevent from these diseases.	LMS	Online Class, White Board	He will be of the knowledge of both communicable and non communicable diseases and can give the guidelines to the community for the prevention from these diseases.	Class	3 Hrs	

		Diseases / sources / routes 4. Precautionary Measures 5. Public awareness through proper communication by media / banners / posters/ workshops							
	(LU-7) EPI (Expanded program of immunization)	1. Definition of EPI 2. Epidemiological Importance of EPI 3. Types of EPI as per lay down policy of WHO 4. Diseases preventable through EPI 5. Advantages and Disadvantages of EPI	AHP will be knowledgeable regarding the EPI program and will help in implementation by working as a leader, the successful EPI program will decrease infant / child / morbidity and mortality rate, prevention of epidemic and endemics, door to door service will be provided by	LMS	Online Class, White Board	EPI program will be very helpful to AHP in awareness to the community and its implementation through community leaders for a health society; he will be well equipped with the knowledge of various diseases preventable through EPI.	Class	2 Hrs	

		6. Cold chain process with preservation of vaccine in a specified temperature 7. Role of EPI in prevention of pandemics / endemics/ epidemics 8. Display of Organogram in form of Chart at the working site for public awareness 9. Proper EPI cards format to be designed with proper registration	maintaining the record, follow up of the infant child EPI will be maintained as per policy.			Schedule EPI Cards will add to public to awareness, the important role of EPI in prevention of endemic, epidemic and pandemic.			
	(LU-8) Family Planning and reproductive health	1. Introduction of family planning 2. Needs and Assessment 3. Methods of family	Overview of the public health commitment to vulnerable population including child care, aging, person with disabilities and socio	LMS	Online Class, White Board	He will know the basic advantages and needs of family planning, will guide the couples on reproductive	Class	2 Hrs	

		planning 4. Reproductive Health lessons in community groups 5. Pre marriage counseling in specified centers for family planning 6. Importance of breast feeding in family planning 7. Pre natal and post natal checkup to avoiding mishaps with proper booklet for follow up	economically disadvantaged population, it will decrease the morbidity and mortality in child birth leading to healthy mother and healthy child.			health by given the community lessons along with educating with family planning methods, pre marriage counseling will be helpful in reproductive health and importance of breast feeding family planning.			
	(LU-9) Epidemiology	1. Epidemiological Principles 2. Terminology of Epidemiology	Epidemiological survey will impact on mortality and morbidity from	LMS	Online Class, White Board	He will be able to provide informative indicators of a	Class	1 Hr	

		3. Population Perspectives 4. Health Indicators 5. Public Health Surveillance 6. Types of Epidemiological Research 7. Vital Statistics	various acute chronic and physical disease condition which will be reflect the epidemiological and demographic transitions occurring in different areas in country, screening for early detection of diseases for social and medical management of diseases thus decreasing the mortality and morbidity rate, it will help in community orientation and the public health worker will be able to grasp and communicate the Epidemiology of a disease including rates, risk factors, disease determination, causation and public health surveillance			community reflecting the health care system which can further fill up the gap in the health care. The heath indicator statistic will be based on demographic epidemiological surveys and data.			

	(LU-10) Public Health Worker Preparedness and Disaster Management	1. Essential role of public health worker in preparedness for and response to natural or terrorism related disasters 2. Management of the casualties at site with evacuation to the hospital	The AHP with the cooperation of the public and trained paramedics for First Aid will be able to manage the site and evacuate the causalities to the nearest secondary and treasury care hospitals.	LMS		He will be able to do the situational analysis and take necessary managerial measures in the event of disasters.	Class	2 Hrs	
	(LU-11) Primary Health Care	1. Role of Primary Health care in curative / preventive/ therapeutic / diagnostic areas 2. History of primary health care and its important role 3. The Eight	A public health worker (AHP) following the roles of PHC will help in leadership/ epidemiological surveillance/ community participation/ disease prevalence. Role of communication in behavioral sciences, record of health indicators, population growth.	LMS	Online Class, White Board	The AHP will be able to implement the Eight Elements of primary health care at various level in a community in the light of need and assessment.	Class	2 Hrs	

		Elements of PHC 4. PHC as health informative and indicator of a country 5. Health Education for methods and techniques in prevention and control of local endemic diseases and role of paramedics 6. Formulary of the basic essential drugs (EDL) required as per WHO							

Assessment – Public Health

Learning Units	Theory Days / Hrs	Workplace Days / Hrs	Recommended Formative Assessment	Recommended Methodology	Scheduled Dates
Topics LU-1 to LU-11			1. MCQS based on objectives a) True / False b) Fill in the blanks c) Choose the correct answer d) Modify the sentence 2. Short Assignments on topics 3. Maintenance of Log book 4. Maintenance of the record and graphic chart displayed in BHU / RHU 5. Inter sector knowledge of any endemic and epidemic through communication 6. Demonstration of *chlorinemetry* of water in specified village with gastrointestinal disorders	Audio Visual Presentation White board with Flip charts presentation s. Observatory Visits to BHU/RHU/MCH Visit to water filtration plants /dept. visit to incinerator for hospital waste disposal, visit to health care international agency and observe the health programs being conducted in specified areas under the supervision of foreign health agencies.	

MODULE 1-B A PUBLIC HEALTH
B FIRST AID – PRACTICUM 1 CR HR = 36 HRS

Modules	Learning Units (LU)	Topics	Learner's Desired Outcomes	Recommended Methodology	Practicum	Skill Developed	Work Place	Duration	Scheduled Dates
Module.1-A First Aid	**(LU-1)** Introduction to First Aid	9. Definition 10. Responsibilities 11. Policies / Protocols 12. Record 13. Referral 14. Assessment	Respondent action will be defined according to policy with proper referral and onsite First Aid Treatment	Audio / Visual Aids Presentations	Hands on	Will be versed with meaning of first aid in medical emergence handling and disposal	Training Site	1 Hr	
	(LU-2) Techniques and Equipments used in First Aid	7. Introduction to First Aid Equipments in Emergency 8. Use of the Equipments in proper way 9. Maintenance of the equipments	Use o f the right equipment with proper method as per emergency reporting for First Aid i.e. causality handling	Audio / Visual Aids Presentations	Hands on	He will be able to identify and the importance of medical instruments as air way, vital signs, splints, bandages,	Training Site	2 Hrs	

						cardiac crash trolley			
	(LU-3) Types of First Aid Emergencies / Casualties Reporting	1. Introduction to all topics related to life saving procedures i.e. Breathing and Circulation / Resuscitation for adult and child / Choking summary charts for both adult and child 2. Importance of open airway for cardio respiratory maintenance 3. Handing of unconscious adult and child 4. Resuscitation chart for both adult and child 5. Choking due to foreign body etc for both adult and child	The AHP will be able to differentiate and diagnose the type of causality reporting and with the assistance of the chart displace will provide the required treatment. He will be able to restore cardio pulmonary system and take necessary measure for referral to the tertiary care.	Audio / Visual Aids Presentations	Hands on	He will implement A.B.C on unconscious patient. Handling of an unconscious patient, treatment and handling of chocking patient by hewer method.	Training Site	4 Hrs	

	(LU-4) Resuscitation (CPR)	7. Definition 8. Methods 9. CPR Techniques 10. Methodology of BLS / ALS 11. BLS through A.B.C 12. Vital Sign Monitoring 13. Cardiac crash trolley 14. Referral	Will be able to resuscitate in a sequence with monitoring of the vital signs in both digital method and manual. Will be able to utilized cardiac crash trolley, Will be able to sustain the cardio palmary system for referral to concerned department.	Audio / Visual Aids Presentations	Hands on	The AHP will be capable to position the patient and perform CPR in steps along with use of cardiac crash trolley and helping hands.	Training Site	4 Hrs	
	(LU-5) Circulatory System and Respiratory System	8. Brief Introduction to Hearth and Repertory System 9. Types of Emergencies related to Hearth and respiratory system 10. Cardiac Shock / Hearth failure / infarction etc	Will be able to Restore breathing / relieve pain and normalize the cardio pulmonary system with referral to specialist concerned.	Audio / Visual Aids Presentations	Hands on	He will be able to asses' patient head to toe examination and will follow the subject of S.A.M.P.	Training Site	4 Hrs	

		11. Status asthmatics 12. Choking / Drowning / inhalation of Fumes etc 13. Head-to-toe Assessments steps in the format of S.A.M.P.L.E				L.E. Immediate CPR will be performed to restore A.B.C to comply with the need of oxygen to the patient.			
	(LU-6) Wounds and Bleeding / Use of bandages	1. Brief Hematology related to Human Anatomy 2. Bleeding Disorders and types of wounds 3. Mild and Severe Bleeding 4. Crush injuries 5. Cuts and Grazes 6. Abdominal and Vaginal bleeding 7. Management of Various types of bleeding sites 8. Different form of Bandages used at	Control of bleeding site to minimize shock along with reassurance To patient and relatives, necessary arrangements in case of blood transfusion required call the concerned specialist for further management.	Audio / Visual Aids Presentations	Hands on	He will be skilled to use the type of bandages in accordance to the bleeding site, assessment of external and internal bleeding, application of	Training Site	3 Hrs	

		different sites and types of bleeding in accordance to severity of injury.				bleeding control sequence, use of pressure bandages.			
	(LU-7) Bone Joint and Muscle Injuries	8. Brief introduction to skeletal system 9. Various injuries to joints and bones 10. Dislocation of joints 11. Backache / sciatica 12. Types of springs 13. Methods of supporting the injured bone site 14. Splints / Bandages used for bone injuries 15. R.I.C.E and I.A.C.T methodology	Assessment of place and degree of injury, control of bleeding if any, minimize the shock by reassurance and analgesic will support the fractured sites by the use of splints and bandage for further treatment.	Audio / Visual Aids Presentations	Hands on	Assessment will be done and treatment will be based on R.I.C.E or I.A.C.T to the relative joint or born injury.	Training Site	3 Hrs	
	(LU-8) Nervous System Emergen	1. Brief introduction to nervous system 2. Level of	Conscious level evaluation, clear airway, prevention of colonic / tonic	Audio / Visual Aids Presenta	Hands on	He will be able to immediat e	Training Site	3 Hrs	

	cies	consciousness 3. Head injuries 4. Types of strokes 5. Seizures in adult and child 6. Systematic Diseases effecting CNS 7. Spinal injuries 8. Headache / migraine 9. Diseases of meningies 10. Management	convulsions, checking of reflexes maintains air entry, assessment of neurological deficit. Handling of spinal injury with referral to specialist. IV infusion with monitoring of neurological sign and symptoms including level of consciousness / reflexes / ophthalmic reaction.	tions		stabilize the patient with immobilization and clear airway along with treat shock with checking of the CNS system as a whole along with spinal injuries stabilization.			
	(LU-9) Environmental injuries	1. Brief anatomy of skin and vital areas 2. Types of burns and scalds 3. Electrical and Chemical Burns 4. Rule of 9 (Nine) to Determine the	Assessment of the degree of the environment injury, maintenance of body fluent and temperature, relief of pain, measures to relief the pain on the burn site by	Audio / Visual Aids Presentations	Hands on	Assessment of type and depth of bourn, immediate treatment of the shock by	Training Site	3 Hrs	

		area of burn 5. Fluid and Electrolyte Balance 6. CS Spray injuries 7. Frostbite / Hypothermia 8. Heath exhaustion / Heat Cramps / Heat Stroke 9. Sun burns 10. Prickly heat / body rash	medication,			medication, use of anti doubt in poisoning subject to availability, thermal injury patient to be removed from the site and referred for tertiary care.			
	(LU-10) Foreign Body Injuries	1. Sensory Organs 2. Types of splinters 3. Site of injury 4. Inhaled foreign object 5. Swallowed foreign object	Will be able to assess the status of foreign body injuries and to take measures to prevent further damage, possible removal of the foreign body with specialized instrumentation, control bleeding by maintaining I.V fluids	Audio / Visual Aids Presentations	Hands on	Care of the bleeding with use of antiseptic measures, removal of the foreign body if accessible ,avoid	Training Site	3 Hrs	

						interference to major damage to avoid bleeding			
	(LU-11) Poisoning bites stings	1. Types of various poises affecting the body system 2. Swelled poisons 3. Chemical / inhaled poisons 4. Insect bites / stings 5. Ticks / snake / animal bite 6. Rabies / Dog Bites 7. Use of various anti dotes 8. Drug reactions / poisoning 9. Chart to be maintained for treating effects of poisoning	Assessment and Identification of piousness material, comforts and reassurance, recording of the vital signs, treatment of poison accordingly, drug poisoning / drug allergy to be highlighted and anti dote to be given accordingly, assurance of availability of drugs used to be present in emergency.	Audio / Visual Aids Presentations	Hands on	Reassurance to the patient, first aid care according to the type of poison inhaled, anti-dote to be given subject to availability, stabilize the patient and then refer.	Training Site	3 Hrs	
	(LU-12) Miscellaneous Emergency First	First Aid in miscellaneous emergencies for management of fever/ headache /	With brief introduction to miscellaneous emergency he will be able to provide first	Audio / Visual Aids Presentations	Hands on	He will be able to handle minor ailments	Training Site	3 Hrs	

	Aid	abdominal pain/ vomiting / diarrhea/ allergy / vertigo etc	aid to relief the symptoms			reporting in the medical health centre and will be knowledg eable to refer to the concerne d specialist as required.			

Assessment – First Aid

Learning Units	Theory Days / Hrs	Workplace Days / Hrs	Recommended formative assessment	Recommended Methodology	Scheduled Dates
Topics LU-1 to LU-12			1. MCQS based on objectives e) True / False f) Fill in the blanks g) Choose the correct answer h) Modify the sentence 2. Identification of First Aid Equipments i.e Splints / Airways / Bandages / Fluids / Monitor 3. Short Assignments on Management of Various First Aid Procedures in reporting emergencies 4. Maintenance of Log book 5. Monitoring of cardio pulmonary vital signs 6. Steps of BLS / ALS 7. Steps on road traffic accident at site	Audio Visual Presentation	

HGC-012 Anatomy & Physiology 3(1-2)

Competencies

1. Understanding the structure of the human body and its regional and systemic organization.
2. Understanding the human body function at the cellular, tissue and system level.

Learning Objectives

a. To understand the descriptive anatomical and physiological terms

b. To describe anatomical regions, sections & planes.

c. To introduce various systems of human body and their functions, including circulatory system, nervous system, digestive system, respiratory system, excretory system, gynecology and obstetrics and endocrinology.

d. To introduce various sub-divisions of anatomy.

e. To introduce osteology, orthrology (joints), neurology, mycology (muscles) and visceral anatomy.

Distribution of Credit Hours HGC-012
(ANATOMY & PHYSIOLOGY)

Credit Hours: 3(1+2) [Theory 1 credit hour = 18 hours and Practical 1 credit hour =36 Hours]

Theory: 18 hrs

Anatomy = 9 hrs

Physiology = 9 hrs

Practical: 72 hrs

Anatomy = 01 hr for 4 days/wk

Physiology = 01 hr for 4 days/wk

Summary

Modules	Learning Units(LU)	Topics	Learners should be able to achieve these Outcomes/Objectives	Duration hours per week	Workplace Days/hours	Recommended Methodology
Module I **Anatomy**	**LU 1:** Anatomy: Introduction to Anatomy	1. Definition and the sub-divisions of Anatomy 2. Anatomical and fundamental positions 3. The descriptive anatomical regions, sections, planes and basic terminologies	1. Understand the definition of the anatomy of human body. 2. Understand the different branches of Anatomy 3. Understand the anatomical and fundamental positions 4. Understand the regions, sections, planes, and basic terminologies.	2 Hours	Lab 1hrs/day	Multimedia Lectures
	LU 2: Anatomy: Osteology	1. Introduction to Skeleton and description of bone and cartilage. 2. Skeletal bones identification and structural details (upper and lower extremities)	1. Understand the different parts of skeleton, Cartilages, and bones 2. Understand, identify, give structural details, and demonstration of different bones of the human body (upper and lower extremities)	2 Hours	Lab 1hrs/day	Multimedia Lectures

	LU 3: Anatomy: Osteology and Arthrology	1. Skeletal bones identification and structural details of Skull, thorax, vertebral column, 2. Definition and classification of joints	1. Understand, identify, give structural details, and demonstration of skull, thorax and vertebral column 2. Understand the different types of joints of human body and structural details .	2 Hour	Lab 1hrs/day	Multimedia Lectures
	LU 4: Anatomy: Arthrology	1. Description of joints of upper limb with their anatomical structures 2. Description of joints of lower limb with their anatomical structures 3. Description of joints of spine with their anatomical structures	1. Understand and identify joints of upper limbs and learn their functions and movements. 2. Understand and identify joints of lower limb and learn their functions and movements. 3. Understand and identify joints of spine and learn their functions and movements.	3 Hours	Lab 1hrs/day	Multimedia Lectures

Modules	Learning Units(LU)	Topics	Learners should be able to achieve these Outcomes/Objectives	Duration hours per week	Workplace Days/hours	Recommended Methodology
Module II **Physiology**)	**LU 1:** Physiology: 1. Introduction physiology (human body, cell, skin)	1. Introduction to physiology. Definition, structure and function of cell 2. Structure and function of Skin and temperature regulation of skin	1. Define physiology and understand the functioning of human body 2. Understand the functioning of the cell and types of cell 3. Understand the different layers of skin, their functioning, and its temperature regulation	2 Hours	Lab 1hrs/day	Multimedia Lectures
	LU 2: Physiology: Nervous System	1. Introduction to nervous system, neural cells and its divisions 2. Brief description of CNS, with structure and function of brain and Spinal Cord	1. Understand the different parts of nervous system, its cells and differentiate between neural cells and other human body cells 2. Understand and differentiate between CNS and PNS 3. Understand, identify, give structural details, and demonstration of CNS with brief functioning details of CNS	2 Hours	Lab 1hrs/day	Multimedia Lectures

	LU 3: Physiology: Nervous System	3. Brief description of PNS, with Cranial Nerves (names and functions), and Spinal Nerves [major nerves (names and functions)].	1. Understand, identify, give structural details, and demonstration of PNS with brief functioning details of PNS 2. Understand, identify, give structural details, and demonstration of cranial and spinal nerves 2. Understand and differentiate between CNS and PNS	2 Hours	Lab 1hrs/day	Multimedia Lectures	
	LU 4: Physiology: Circulatory System	1. Introduction to Circulatory System 2. Structure and function of circulatory system 3. Heart rate and Blood pressure Regulation and Assessment of heart sounds 4. Composition and function of blood	1. Understand the functioning and structural details of the circulatory system including heart, arteries, veins, and capillaries 2. Understand the composition of blood and identify the different components blood, clotting factors, and their values 3. Differentiate and describe the heart rate, blood pressure, and heart sounds and describe their importance	3 Hours	Lab 1hrs/day for 4 days /wk for 18 wks	Multimedia Lectures	

Lesson Plan

LU 1	**Topic**	**Duration** depends on previous knowledge	**Learning outcomes** After completing this topic, the learner should be able to:	**Materials required** NOTE: Participants should have their own workbooks and pens	**Learning place**	**Skills**
Anatomy: Introduction to Anatomy	1. Anatomical and fundamental positions 2. The descriptive anatomical regions, sections, planes and basic terminologies	2 lessons (2 hours)	1. Understand the anatomical and fundamental positions 2. Understand the regions, sections, planes, and basic terminologies.	1. Worksheets (depending on the previous knowledge of the students) 2. PowerPoint Presentations for illustrating different sections and planes 3. Anatomical Atlas for Demonstrations	Classroom/ anatomy lab	Able to assist movements in different planes

LU 2	**Topic**	**Duration** depends on previous knowledge	**Learning outcomes** After completing this topic, the learner should be able to:	**Materials required** NOTE: Participants should have their own workbooks and pens	**Learning place**	**Skills**
Anatomy: Osteology	1. Introduction to Skeleton and description of bone and cartilage. 2. Skeletal bones identification (upper and lower extremities)	3 lessons (3 hours)	1. Demonstrate the different parts of skeleton, Cartilages, and bones 2. Identify, give structural details, and demonstration of different bones of the limbs of human body.	1. Worksheets (depending on the previous knowledge of the students) 2. Anatomical Atlas for Demonstrations 3. Whole Human Skeleton and Separate Bones (single) for demonstrations	Anatomical Lab	Able to understand and explain the anatomical names of human skeleton (upper and lower extremities)

LU 3	**Topic**	**Duration** depends on previous knowledge	**Learning outcomes** After completing this topic, the learner should be able to:	**Materials required** NOTE: Participants should have their own workbooks and pens	**Learning place**	**Skills**
Anatomy: Osteology and Arthrology	1. Identification and structural details of head, neck and vertebral column. 2. Joints and its types	3 lessons (3 hours)	1. Identify, give structural details, and demonstration of different bones of the head and spine and their structural details. 2. Identify the major structures of joint and its components.	1. Worksheets (depending on the previous knowledge of the students) 2. Anatomical Atlas for Demonstrations 3. Whole Human Skeleton and Separate Bones and separate joints for Demonstrations.	Anatomical Lab	Able to understand and explain the anatomical names of human skeleton (head, neck, and vertebral column)

LU 4	Topic	Duration depends on previous knowledge	Learning outcomes After completing this topic, the learner should be able to:	Materials required NOTE: Participants should have their own workbooks and pens	Learning place	Skills
Anatomy: Arthrology	1. Description of joints of upper limb with their anatomical structures 2. Description of joints of lower limb with their anatomical structures 3. Description of joints of spine with their anatomical structures	5 lessons (5 hours)	1. Demonstrate the different joints of upper limb and their movements 2. Demonstrate the different joints of lower limb and their movements 3. Demonstrate the different joints of spine and its movements.	1. Worksheets (depending on the previous knowledge of the students) 2. Anatomical Atlas for Demonstrations 3. Whole Human Skeleton and Separate Bones and separate joints for demonstration. 3. Cadavers	1. Classroom 2. Anatomical Lab	Able to understand and explain the anatomical names of joints of human skeleton.

LU 1 and 2	Topic	Duration depends on previous knowledge	Learning outcomes After completing this topic, the learner should be able to:	Materials required NOTE: Participants should have their own workbooks and pens	Learning place	Skills
Physiology: Nervous System	1. Demonstration of structure of Brain and spinal cord 2. Demonstration of Cranial and Spinal Nerves (major nerves).	3lessons (3 hours)	1. Demonstrate and identify the different parts of brain and spinal cord 2. Identify different spinal nerves	1. Worksheets (depending on the previous knowledge of the students) 2. Anatomical Atlas for Demonstrations 3. Brain 4. Spinal Cord 5. Cadavers	1. Classroom 2. Anatomical Lab	Able to explain the parts and functions of brain and spinal cord with relation to nerves.

LU 3 and 4	**Topic**	**Duration** depends on previous knowledge	**Learning outcomes** After completing this topic, the learner should be able to:	**Materials required** NOTE: Participants should have their own workbooks and pens	**Learning place**	**Skills**
Physiology: Circulatory System	1. Structure circulatory system 2. Heart rate and Blood pressure monitoring and heart sounds	2 lessons (2 hours)	1. Demonstrate and identify the different parts of Heart 2. Demonstration of correct methods of measuring heart rate, blood pressure.	1. Worksheets (depending on the previous knowledge of the students) 2. Anatomical Atlas for Demonstrations 3. Cadavers 4. B.P. apparatus 5. Stethoscope	1. Anatomical Lab 2. Classroom.	Able to identify the structure of heart and explain and monitor the heart rate and blood pressure

Assessment

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended methodology	Scheduled dates
Human Body And Disease (Anatomy / Physiology	Module - I	Class	Examples	• Multiple Choice Questions • Best Choice Questions • Viva	After every module
Anatomy LU1 – LU4	Module - I	Class	**MCQ'S;** Q.1. Branches of Anatomy are: a. Gross anatomy b. Clinical anatomy c. Embryology d. Surface anatomy Q.2. Ankle joint : a. Is a condylar type of synovial joint b. Deltoid ligament has superficial and deep parts c. Posterior tibiotalar is a deep part of deltoid ligament d. Supplied by deep peroneal and tibial nerves	• Multiple Choice Questions • Best Choice Questions • Viva	After every module

			Q.3. Joint in which each joint surface is both convex in one plane & concave in other is: a. Saddle joint b. Type of synovial joint c. Plane joint d. Ball & socket joint Q.4. Bones of foot: a. There are 7 tarsal bones b. Navicular bone is boat shaped c. Calcaneus form heel of bone d. There are 15 phalanges **BCQ'S** Q.1. Anatomy is the study of: a. Is a branch of biology and medicine and the study of internal functions of the human body b. Is a branch of biology and medicine that is the consideration of the structure of living things c. Is the study of bones and muscles of human body only d. Is the study of bones and joints of the human body Q.2. Frontal axis is an imaginary line around		

			which rotation occur in _____ plane: a. Sagittal plane b. Coronal plane c. Frontal plane d. Transverse plane Q.3.Which one is example of synovial hinge type of joint a. Symphisis pubis b. Sternoclavicular c. Elbow d. Radioulnar Q.4. Anatomical snuff box. a. Is bonded anteriorly by tendon of extensor policis longus. b. Is bonded posteriorly by tendon of extensor policis brevis c. Contain basili vein in roof d. Contain cephalic vein in roof.		

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended methodology	Scheduled dates
Human Body And Disease (Anatomy / Physiology	Module - I	Class	Examples	• Multiple Choice Questions • Best Choice Questions • Viva	After every module
Physiology LU1 –LU4	Module - I	Class	**MCQ'S;** Q.1. Human Physiology a. Is concerned with the specific characteristics and mechanisms of the human body that make it a living body b. Is the sub division of physiology c. Is to explain the physical and chemical factors that are responsible for the origin, development, and progression of human life d. Is confined to explain the mechanism is diseased conditions Q.2. The cell a. Membrane thickness is 7.5 to 10 nanometers b. Membrane is composed almost entirely of proteins and lipids c. Membrane contain cholesterol	• Multiple Choice Questions • Best Choice Questions • Viva	After every module

			molecules only d. Membrane has lipid bilayer Q.3. Peripheral nervous system is basically classified into. a. Autonomic and sympathetic nervous system b. Somatic and autonomic nervous system. c. Sympathetic and parasympathetic nervous system. d. A and C both are true. Q.4. Following conditions are results in heat production: a. Heat production increases in response to decrease body temperature. b. Vasodilation of skin blood vessels. c. Thyroxine secretion. d. Vasoconstriction of skin blood vessels. **BCQ'S:** Q.1. Myelin sheet: a. Is a carbohydrate layer. b. Is only a lipid layer. c. Is only a protein layer.		

			d. Acts as an insulator. Q.2.Two major parts of cell are a. Nucleus and cell b. Cell and cytoplasm c. Nucleus and cytoplasm d. Nucleus and cell membrane. Q.3. All are the functions of blood except. a. Transportation b. Regulation c. protection d. secretion 4. The process for the clearance of blood from the waste product is called: a. Filtration. b. Dialysis. c. Reabsorption. d. Secretion.		

HGC-013 Medical Terminology 3(1-2)

Name of course: Medical terminology

Course Description: This course will provide students with a basic medical terminology vocabulary for use in the health care setting.

Course Objectives:

- Describe how medical terms are created.
- Use basic medical suffixes and prefixes accurately.
- Defines directional terms and anatomic planes of the body.
- Identify selected body systems structures and their related word parts.
- Use system word parts, prefixes, and suffixes to build and define words.
- Define medical terms related to selected diseases.
- Define selected diagnostic and surgical procedural terms for each body system.
- Define other selected medical terms and related to color and medical specialties.
- Recognize selected abbreviations related to each body system.
- Spell, pronounce, and use specific medical terms.

Competencies gained after completion of course:

This knowledge will enable them to become successful communicators (especially in the health care setting). Thru the course and semester projects students will learn ways to become active community members and life-long learners.

Summary

Module	Learning Units (LU)	Topics	Learners should be able to achieve these Outcomes	Theory Days/hours	Workplace Days/hours
Module 1 (First Semester)	LU 1 Building Medical Vocabulary	1. Word building. 2. Word roots, combined Forms, Prefixes & Suffixes. 3. Combining word parts to write medical Terms. 4. Pronunciation of medical terms.	• Identify the role and recognize example of word, roots, prefixes, suffixes & combining forms. • Demonstrate correct usage of the combining vowel. • Recognize the importance of spelling and correctly pronounce medical terms using phonetic system.	2 Hr	4 Hr
	LU 2 The blood and other body fluids	1. Body fluids and composition of blood 2. Abnormalities of the formed elements of blood. 3. Morphologic abnormalities of Erythrocytes. 4. Blood coagulation and Immune System. 5. Hemoglobinopathies and additional word parts.	• Demonstrate the important role of body fluids. • Recognize the meaning of word parts and use them to write hematologic terms. • Describe several important processes and characteristics of blood. • Indentify the function and principal conditions that effect erythrocytes, and blood platelets. • Accurately spell medical terms • Correctly pronounce medical terms. • Write the meanings of the abbreviations.	2 Hr	4 Hr

	LU 3 The Circulatory and Lymphatic System.	1. Cardio vascular pump and blood circulation. 2. Cardio vascular diagnostic procedure. 3. Lymphatic system.	• Recognize the names of the structure of cardio vascular system and define terms. • Demonstrate understanding of the significance of the lymphatic system and analyze associated terminology. • Write the meaning of word parts associate with the circulatory system and use the word part to build and analyze terms. • Differentiate terms as being relate to diagnosis anatomy, surgery, therapy, or radiology. • Accurately spell the terms. • Correctly pronounce the terms. • Know the meaning of the abbreviations.	2 Hr	4 Hr
	LU 4 The Respiratory System	1. Respiration and its functions. 2. Composition of the Respiratory System 3. Respiratory diseases or disorders.	• Recognize names of the structure of respiratory system and define terms associated with these structures. • Write the meaning of word parts associated with the respiratory system and use the word parts to build and analyze terms. • Differentiate terms as being related to the diagnosis anatomy, surgery, therapy, or radiology. • Correctly pronounce the term. • Know the meaning of the abbreviations.	1 Hr	2 Hr

	LU 5 The Digestive System.	1. Composition of the Digestive System. 2. Accessory organs of digestion.	• Describe the structure and functions of the digestive system. • Recognize and define the meaning of the terms and use the word parts to write terms related to the digestive system. • Recognize the role of pancreas in diabetes mellitus and hypoglycemia. • Differentiate terms being related to diagnosis anatomy surgery, therapy, or radiology. • Accurately spell and pronounce the terms.	1 Hr	2 Hr
	LU 6 The Urinary System	1. The urinary tract and renal disorders. 2. Composition of Urinary System 3. Genito urinary infections and urinalysis.	• Describe the structure and function of urinary tract. • Use the word parts to build and analyze terms related to urinary system. • Recognize the diagnostic importance of urinalysis. • Categorize the terms as an anatomical, surgical, diagnostic or radiological. • Accurately spell and pronounce the terms. • Know the meanings of the abbreviations.	2 Hr	4 Hr
	LU 7 The Muscular and skeletal system	1. Composition of bone. 2. The skeleton. 3. Joints. 4. Muscles and supporting structures.	• Recognize the major bones of the body. • Describe the functions of bones, Muscle and supporting structures. • Use the word parts to build and analyze terms related to the skeletal and muscular system.	3 Hr	6 Hr

			• Accurately spell and pronounce the terms. • Recognize the location of different types of vertebrae.		
	LU 8 The Nervous System and Psychological disorder	1. Composition of the Nervous System 2. The Central Nervous System. 3. The Peripheral Nervous System and the Sense Organs.	• Describe the structure of the Nervous System and understand their relationship. • Use the word parts to build and analyze terms concerning the Nervous system. • Demonstrate the understanding of several disorders of the sense organs. • Accurately spell the terms. • Correctly pronounce the terms. • Know the meaning of the abbreviation.	1 Hr	2 Hr
	LU 9 The Integumentary System	1. Structure and function of the skin. 2. Associated skin structures. 3. Diagnostic, Pharmaceutical and therapeutic terms.	• Demonstrate understanding of the structures and functions of the skin. • Write the meaning of word parts pertaining to the Integumentary system and use them to build and analyze Medical Terms. • Recognize the functions of structures associated with the skin. • Accurately spell the terms. • Correctly pronounce the terms. • Know the meaning of the abbreviations.	1 Hr	2 Hr
	LU 10 The Endocrine System	1. Composition of Endocrine System. 2. The Pituitary Gland. 3. Harmones released by the Neurohypophysis.	• Understand the relationship between pituitary gland and other glands. • Identify the relationship of glands and target organs.	1 Hr	2 Hr

		4. The functions of the Adenohypophysis other endocrine tissues and Homeostasis.	• Identify several disorders caused by hormonal • Write the meaning of word parts pertaining to the endocrine system and use them to build and analyze medical terms. • Accurately spell and pronounce the terms. • Know the meaning of Abbreviations.		
	LU 11 The Reproductive System	1. The female Genitalia. 2. The composition of Female Reproductive System. 3. Menstrual cycle and pregnancy. 4. Male Genitalia 5. The composition of male Reproductive System. 6. Sexually Transmitted diseases.	• Describe the structure and function of female and male genitalia. • Use the word parts to build and analyze terms pertaining to the reproductive system. • Understand relationship between menstrual gents of cycle and pregnancy. • Describe several types of sexually transmitted diseases. • Know the causative agents of sexually transmitted disease and recognize the difficulty of treating those caused by viruses. • Accurately spell and pronounce the terms. • Know the meaning of abbreviation.	2 Hr	4 Hr

Lesson Plan

LU	Topic	Duration depends on previous Knowledge	Learning outcomes after completing this topic , the learner should be able to	Materials required NOTE: Participants should have their own workbooks and pens	Learning Place / Practical (LMS)
LU 1 Building Medical Vocabulary	1. Word building. 2. Word roots, combined Forms, Prefixes & Suffixes.	1 lesson (60min) 20 min 40 min	• Identify the role and recognize example of word, roots, prefixes, suffixes & combining forms. • Demonstrate correct usage of the combining vowel.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation
	1. Combining word parts to write medical Terms. 2. Pronunciation of medical terms.	1 lesson (60min) 40 min 20 min	• Demonstrate correct usage of the combining vowel. • Recognize the importance of spelling and correctly pronounce medical terms using phonetic system.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation

LU	Topic	Duration depends on previous Knowledge	Learning outcomes after completing this topic , the learner should be able to	Materials required NOTE: Participants should have their own workbooks and pens	Learning Place / Practical
LU 2 The blood and other body fluids	1. Body fluids and composition of blood 2. Abnormalities of the formed elements of blood.	**1 lesson (60min)** **30 min** **30 min**	• Demonstrate the important role of body fluids. • Recognize the meaning of word parts and use them to write hematologic terms. • Describe several important processes and characteristics of blood. • Correctly pronounce medical terms. • Know the meaning of the abbreviations.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation
	1. Morphologic abnormalities of Erythrocytes. 2. Blood coagulation and Immune System. 3. Hemoglobinopathies and additional word parts.	**1 lesson (60min)** **20 min** **20 min** **20 min**	• Recognize the meaning of word parts pertaining to the various abnormalities of blood cell and use them to build and analyze medical terms. • Accurately spell medical terms • Correctly pronounce medical terms. • Know the meaning of the abbreviations.		Online Exercises Online Presentation

LU	Topic	Duration depends on previous Knowledge	Learning outcomes after completing this topic , the learner should be able to	Materials required NOTE: Participants should have their own workbooks and pens	Learning Place / Practical
LU 3 The Circulatory and Lymphatic System.	1. Cardio vascular pump and blood circulation.	**1 lesson (60min)** **60 min**	• Recognize the names of the structure of cardio vascular system and define terms. • Write the meaning of word parts associate with the circulatory system and use the word part to build and analyze terms. • Differentiate terms as being relate to diagnosis anatomy, surgery, therapy, or radiology. • Accurately spell the terms. • Correctly pronounce the terms. • Know the meaning of the abbreviations.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation
	1. Cardio vascular diagnostic procedure. 2. Lymphatic system.	**1 lesson (60min)** **40 min** **20 min**	• Demonstrate understanding of the significance of the lymphatic system and analyze associated terminology.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation

			• Differentiate terms as being relate to diagnosis anatomy, surgery, therapy, or radiology. • Accurately spell the terms. • Correctly pronounce the terms. • Know the meaning of the abbreviations.		

LU 4 The Respiratory System	1. Respiration and its functions. 2. Composition of the Respiratory System 3. Respiratory diseases or disorders	**1 lesson (60min)** **20 min** **20 min** **20 min**	• Recognize names of the structure of respiratory system and define terms associated with these structures. • Write the meaning of word parts associated with the respiratory system and use the word parts to build and analyze terms. • Differentiate terms as being related to the diagnosis anatomy, surgery, therapy, or radiology. • Correctly pronounce the term. • Know the meaning of the abbreviations.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation

LU	Topic	Duration depends on previous Knowledge	Learning outcomes after completing this topic , the learner should be able to	Materials required NOTE: Participants should have their own workbooks and pens	Learning Place / Practical
LU 5 The Digestive System.	1. Composition of the Digestive System. 2. Accessory organs of digestion.	**1 lesson (60min)** **30 min** **30 min**	• Describe the structure and functions of the digestive system. • Recognize and define the meaning of the terms and use the word parts to write terms related to the digestive system. • Recognize the role of pancreas in diabetes mellitus and hypoglycemia. • Differentiate terms being related to diagnosis anatomy surgery, therapy, or radiology. • Accurately spell and pronounce the terms.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation

LU	Topic	Duration depends on previous Knowledge	Learning outcomes after completing this topic , the learner should be able to	Materials required NOTE: Participants should have their own workbooks and pens	Learning Place / Practical
LU 6 The Urinary System	1. Composition of Urinary System 2. The urinary tract and renal disorders.	**1 lesson (60min)** **30 min** **30 min**	• Describe the structure and function of urinary tract. • Use the word parts to build and analyze terms related to urinary system. • Categorize the terms as an anatomical, surgical, diagnostic or radiological. • Accurately spell and pronounce the terms. • Know the meanings of the abbreviations.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation
	1. Genito urinary infections and urinalysis.	**1 lesson (60min)** **60 min**	• Recognize the diagnostic importance of urinalysis. • Categorize the terms as an anatomical, surgical, diagnostic or radiological. • Accurately spell and pronounce the terms. • Know the meanings of the abbreviations.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation

LU	Topic	Duration depends on previous Knowledge	Learning outcomes after completing this topic , the learner should be able to	Materials required NOTE: Participants should have their own workbooks and pens	Learning Place / Practical
LU 7 The Muscular and skeletal system	1. Composition of bone. 2. Joints.	**1 lesson (60min)** **30 min** **30 min**	• Recognize the major bones and joints of the body. • Describe the functions of bones and joints. • Use the word parts to build and analyze terms related to the skeletal and muscular system. • Accurately spell and pronounce the terms.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation
	1. The skeleton.	**1 lesson (60min)** **60 min**	• Use the word parts to build and analyze terms related to the skeleton system. • Recognize the location of different types of vertebrae. • Use the word parts to build and analyze terms related to the skeletal and muscular system. • Accurately spell and pronounce the terms. • Recognize the location of different types of vertebrae.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation

	1. Muscles and supporting structures.	**1 lesson (60min)** **60 min**	• Use the word parts to build and analyze terms related to the muscular system. • Use the word parts to build and analyze terms related to the skeletal and muscular system. • Accurately spell and pronounce the terms. • Recognize the location of different types of vertebrae.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation

LU 8 The Nervous System and Psychological disorder	1. Composition of the Nervous System 2. The Central Nervous System. 3. The Peripheral Nervous System and the Sense Organs.	**1 lesson (60min)** **20 min** **20 min** **20 min**	• Describe the structure of the Nervous System and understand their relationship. • Use the word parts to build and analyze terms concerning the Nervous system. • Demonstrate the understanding of several disorders of the sense organs. • Accurately spell the terms. • Correctly pronounce the terms. • Know the meaning of the abbreviation.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation

LU	Topic	Duration depends on previous Knowledge	Learning outcomes after completing this topic , the learner should be able to	Materials required NOTE: Participants should have their own workbooks and pens	Learning Place / Practical
LU 9 The Integumentary System	1. Structure and function of the skin. 2. Associated skin structures. 3. Diagnostic, Pharmaceutical and therapeutic terms.	**1 lesson (60min)** **20 min** **20 min** **20 min**	• Demonstrate understanding of the structures and functions of the skin. • Write the meaning of word parts pertaining to the Integumentary system and use them to build and analyze Medical Terms. • Recognize the functions of structures associated with the skin. • Accurately spell the terms. • Correctly pronounce the terms. • Know the meaning of the abbreviations.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation

LU	Topic	Duration depends on previous Knowledge	Learning outcomes after completing this topic , the learner should be able to	Materials required NOTE: Participants should have their own workbooks and pens	Learning Place / Practical
LU 10 The Endocrine System	1. Composition of Endocrine System. 2. The Pituitary Gland. 3. Harmones released by the Neurohypophysis. 4. The functions of the Adenohypophysis other endocrine tissues and Homeostasis.	**1 lesson (60min)** **15 min** **15 min** **15 min** **15 min**	• Understand the relationship between pituitary gland and other glands. • Identify the relationship of glands and target organs. • Identify several disorders caused by hormonal • Write the meaning of word parts pertaining to the endocrine system and use them to build and analyze medical terms. • Accurately spell and pronounce the terms. • Know the meaning of Abbreviations.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation

LU	Topic	Duration depends on previous Knowledge	Learning outcomes after completing this topic , the learner should be able to	Materials required NOTE: Participants should have their own workbooks and pens	Learning Place / Practical
LU 11 The Reproductive System	1. The female Genitalia. 2. The composition of Female Reproductive System. 3. Menstrual cycle and pregnancy.	**1 lesson (60min)** **20 min** **20 min** **20 min**	• Describe the structure and function of female genitalia. • Use the word parts to build and analyze terms pertaining to the female reproductive system. • Understand relationship between menstrual gents of cycle and pregnancy. • Accurately spell and pronounce the terms. • Know the meaning of abbreviation.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation
	1. Male Genitalia 2. The composition of male Reproductive System. 3. Sexually Transmitted diseases.	**1 lesson (60min)** **20 min** **20 min** **20 min**	• Describe the structure and function of male genitalia. • Use the word parts to build and analyze terms pertaining to the male reproductive system. • Describe several types of sexually transmitted diseases. • Know the causative agents of sexually transmitted disease and recognize the difficulty of treating those caused by viruses. • Accurately spell and pronounce the terms.	1. White board. 2. A-V Display 3. Online presentation.	Online Exercises Online Presentation

Assessment

Learning Units	Theory (hrs-days)	Workplace (days)	Recommended formative assessment	Recommended methodology	Scheduled Dates
M1-LU 1: Building Medical Vocabulary			1. A _____ is the main body of the word. a) Suffix b) Prefix c) Root 2. The combining form of cyst is _____. a. cyst/a b. cyst/e c. cyst/o	1. MCQs 2. Terminology review Exercises. 3. Online assessment exercises.	Week 1 & Week 2
M1-LU 2: The blood and other body fluids	3 hrs	IOL (3 days)	1. Hemophilia is _____. a. Deficiency of red blood cells. b. A blood disorder. c. Deficiency of white blood cells. 2. A blood clot that forms in a blood vessel in the heart is called _____. a. Thrombus. b. Isotope. c. Macrophage. 3. The one who studies cells is called _____. a. Psychologist b. Hematologist. c. Cytologist.	1. Label the Given Diagram. 2. Reinforcement exercise. 3. MCQs 4. Online Assessment Exercise.	Week 3 & Week 4

M1-LU 3: The circulatory and lymphatic system.	4 Hrs	IOL	1. Give meaning of the following abbreviations ; i) C P R ---------- ii) E C G ---------- iii) M I ---------- iv) S A ---------- v) C T ---------- 2. Match suffixes in the right column to their correct meaning: a. – atomy A. membrane b.—phobia B. swelling c.---edema C. artificial Opening d.—meter D. abnormal fear e,-- ium E. instrument to Measure 3. True/False statements: i) Defibrillator is an instrument to cause fibrillation. T/F ii) A narrowing of the aorta or its orifice is called aortic stenosis. T/F iii) Lymphadenoma is an enlarged lymph node. T/F iv) A primary disease of the heart muscle is termed as cardiomyopathy. T/f	1. Internet assignment 2. Online assessment 3. MCQs	Week 5 & Week 6

M1- LU 4: The Respiratory system	3 Hrs	IOL	1) Match the following structures with their functions: 1.pharynx — A. Communication with paranasal sinus 2.alveoli — B. contains vocal cords. 3.nose — C. where blood picks up oxygen. 4.bronchus — D. where tonsils are located. 5.larynx — E. one of the two branches of trachea. 2) Give meanings of the following suffixes : a) algia ---------- b) capnia ---------- c) centesis ---------- d) ectasia ---------- e) iasis ---------- 3) Give one answer for each of the following MCQs: a) Air or gas in the pleural cavity is ----------. i) Pneumothorax ii) Pleuropneumonia	1. MCQs 2. Label the given diagram. 3. Internet presentation.	Week 7

			iii) pulmonary edema		
M1-LU5: Digestive System	3 Hrs	IOL	1.Complete the table by writing a word part or its meaning in each blank : 1. Suffix meaning 1. cele ---------- 2. clysis ---------- 3. megaly ---------- 4. ---------- digestion 5. ---------- bad 2) Select one correct answer for each of the following MCQs: 1. Loss of appetite for food is called ----------. i. Euphoria ii. Dyspepsia iii. Dysphagia 2. Stomatitis is the inflammation of ----------. i. Stomach ii. Intestines iii. Mouth 3. Enteral means pertaining to ---------- i. Digestive tract ii. Stomach iii. Intestines	2) Review exercise 3) Internet assignment	Week 8

			4. Polydipsia is ---------- ------ i. greater than normal lipids ii. excessive vomiting iii. excessive thirst		
M1-LU6: Urinary system			1) Write words for: (i) Difficult urination ---------- (ii) without urine ---------- (iii)inflammation of bladder --------- (iv).inflammation of urethra -------- (v) ketones in urine ---------- 2) complete the following words that begin with intra- ; a) within the cell is intra - --------- b) within the vein is intra - -------- c) within the chest is intra- ------- d) within a lung is intra- ----------.	1. MCQs 2. Terminology review exercise 3. Label the given diagram. 4. Online assessment.	Week 9 & Week 10

M1-LU7: The muscular and skeletal system.			1) Match the column ; 1.ab------- a. Change or next 2.infra----- b. joined; together 3.supra---- c. backward 4.retro----- d. situated below 5.syn------- e. away 6.meta----- f. above 2) Give words for ; a) joint inflammation ---------- b) any disease of muscle ---------- c) Formation of bone ---------- d) muscle hernia ---------- 3) choose one answer for each of the MCQs; A. abnormal hardness or heaviness of bones is ----------. i) Osteopenia ii) osteosclerosis iii) osteoid B. lateral curvature of the vertebral column is called --------- i) pagot's disease ii) scoliosis iii) osteoid	1. MCQs 2. Working practice review exercises. 3. Label the given diagram. 4. Online assessment exercises. 5. Terminology review exercises.	Week 11 & Week 12

<table>
<tr>
<td>M1-LU8:

The Nervous System and Psychological disorders</td>
<td></td>
<td></td>
<td>1. Match prefixes with their meanings;
<table>
<tr><td>1.di-</td><td>1. Against</td></tr>
<tr><td>2. Hemi-</td><td>2. Two</td></tr>
<tr><td>3. inter-</td><td>3. Half</td></tr>
<tr><td>4. Contra-</td><td>4. Between</td></tr>
</table>
2) True/False statement ;
a) the Gray matter that covers the cerebrum is called cerebral cortex. T/ F
b) Paralysis of one side of body is called hemiplegia. T/F
c) Pain of many nerve is called polyneuralgia . T/F</td>
<td>1. MCQs
2. Online assessment exercises.
3. Terminology review exercises.</td>
<td>Week 14</td>
</tr>
</table>

M1-LU9: The Integumentary System			A. True and False Statement: i) Hidr/o means sweat. T/F ii) Heat stroke & Sun stroke are examples of hypothermia. T/F iii) A partial or total absence of pigment in the skin, hair and eyes is called albinism. T/F B. Write the meaning of Following abbreviations: i) BX ii) SLE iii) UV iv) FANA C. Write the meaning of combining forms listed below: i) Albin/o----------	1. MCQs 2. Online assessment exercises. 3. Terminology review exercises.	Week 15

			ii) Lethy/o---------- iii) Seb/o---------- iv) Xer/o----------		

M1-LU10: The Endocrine System			A. Match glands with the harmonies they secrete. <table><tr><td>Thyroxin</td><td>Pituitary</td></tr><tr><td>Insulin</td><td>Thyroid</td></tr><tr><td>Growth harmonies</td><td>pancreas</td></tr></table> Choose one answer for each of the following MCQs. A. Which type of term is "mastectomy"? i) Anatomical ii) Diagnostic iii) Radiological iv) Surgical B. Enlargement of the adrenal gland is: i) Adrenitis ii) Adenoma iii) Adrenomegaly iv) Adrenalectomy C. Hormones that produce masculine sex characteristics are: i) Androgens ii) Prolactins iii) Estrogens iv) Triiodothyronines	1. Label the given Diagram. 2. Terminology review exercises. 3. Online assessment exercises.	Week 16

M1-LU11: The Reproductive System			A. Match prefixes with their meanings: Ante---- None Ecto----- Many Multi---- First Neo----- Before Nulli----- After Post------ Outside Primi----- new Choose one answer for each of the following MCQs. A. An infection involving more or less the entire female genital tract is: i) Oophoritis ii) Salpingitis iii) Pelvic inflammatory disease B. Another name for an extrauterine pregnancy is: i) Ectopic pregnancy ii) False pregnancy iii) Pseudocyesis Write the meaning of Following abbreviations: 1. ARC---------- 2. GU---------- 3. IUD---------- 4. LMP---------- 5. PID----------	1. MCQs 2. Terminology review exercises. 3. Internet assignment. 4. Online assessment exercises.	Week 17 & Week 18

HGC - 018 Applied Computer Skill - I 3(1-2)

Name of course: HGC-018 Applied Computer Skills

Overall objective of course:

This survey course provides students with an overview of computer technology topics – Hardware, software, networking, Internet, data management, system design, ethical issues, mobile computing, programming, and careers in computer technology. It is designed as a first course for students pursuing a degree in the computer field

Competencies gained after completion of course:

This course will develop students' knowledge of:

- Technical terminology related to computers, electronic communications, and applications software.
- Electronic systems, communications networks, and applications in use today.
- The societal impact of Information Systems.
- The functions of an operating system, including allocating system resources, and media and file management.
- Control structures and development issues associated with computer programming.
- Bibliographic resources to identify and synthesize current information.

Summary

Modules	Learning Units(LU)	Topics	Learner's desired outcomes	Recommended Methodology	Practicum	Skill developed	Work place	Duration	scheduled dates
Module 1: Introduction to computer Science	LU1	Introduction	Use correct terminology associated with information Technology Describe an Information System using examples from business, education, and personal use	Online Lecture. Multimedia presentation.		Students should able to the importance of Information technology in Education	Online Class-rooms, Lab	1 Hr 1 Hr/Day For 4 Day/week	After every topic
	LU2	History of Computer Science 1. Abbacus 2. Generation 0f Computers 3. Languages	Students able to know the brief history of information technology	Online Lecture. Multimedia presentation. Video Demonstration		Students should be able to understand the history and Background of Computer Science	Online Class-rooms Lab	1 Hr 1 Hr/Day For 4 Day/week	After every topic
Module 2: Introduction of Hardware	LU3	CPU and Memory	Define CPU in terms of manufacturer, model number, speed, maximum addressable	Online Lecture. Multimedia presentation. Video	Activity: Students will prepare a research document	Students able to know structure of CPU and importance	Online Class-rooms Lab	2 Hr 1 Hr/Day For 4 Day/week	After every topic

			RAM, and bus size	Demonstration	on the Importance of CPU.	of Memory			
	LU4	Data storage device	Use correct terminology associated with information processing & Data storage	Online Lecture. Multimedia presentation. Video Demonstration	Activity: Students will work on Microsoft Access	Students able to understand the data processing and storage devices	Online Class-rooms Lab	1 Hr 1 Hr/Day For 4 Day/week	After every topic
	LU5	Input/output device	Compare input and output devices found with a variety of PCs – sub-notebooks, notebooks, laptops, desktops, and etc	Online Lecture. Multimedia presentation. Video Demonstration	Activity: Students will gather the list of I/O devices	Students able to understand the input and output devices	Online Class-rooms Lab	1 Hr 1 Hr/Day For 4 Day/week	After every topic
Module 3: Introducti on to Software	LU6	Standard & Application Software's	List and describe classes of software available for use today	Online Lecture. Multimedia presentation. Video Demonstration		Students will able to understand the software's and its applications	Online Class-rooms Lab	2 Hr 1 Hr/Day For 4 Day/week	After every topic
Module 4: Operating Systems	LU7	What is Operating Systems: • Standards OS • Windows • Linux • Macintosh	Identify common elements in a graphical user interface. Compare and contrast operating systems to include	Online Lecture. Multimedia presentation. Video Demonstration		Students able to understand the OS and types of Operating Systems	Online Class-rooms Lab	3 Hr 1 Hr/Day For 4 Day/week	After every topic

			graphical user interface and nongraphical user interface environments.						
Module 5: Networks	LU8	Network basic Network Standards Section of Networks	Identify media, hardware, software, and procedural components linking networks systems	Online Lecture. Multimedia presentation. Video Demonstration		Students able to understand the Networks and types of networks	Online Class-rooms Lab	2 Hr 1 Hr/Day For 4 Day/week	After every topic
	LU9	The Internet and the World Wide Web & Web Page	Evaluate options for connecting to the Internet. Send e-mail, and identify resources available on the Web.	Online Lecture. Multimedia presentation. Video Demonstration		Students able to understand the Internet and Communica tion System	Online Class-rooms Lab	2 Hr 1 Hr/Day For 4 Day/week	After every topic
Module 6: Informatio n Systems in Education	LU10	Introduction to Education Application	Discuss current ethical issues from personal, business, and education perspectives. Describe how spreadsheet packages are used in a variety of settings. Describe how presentation graphics packages	Online Lecture. Multimedia presentation. Video Demonstration		Students able to understand the education application and their structures i.e. LMS	Online Class-rooms Lab	2 Hr 1 Hr/Day For 4 Day/week	After every topic

			are used in a variety of settings. List the advantages and disadvantages of database systems.						
Module 7: Database	LU11	Introduction to database Productivity Software -- Spreadsheets Databases	List the advantages and disadvantages of database systems. Develop strategies necessary to retrieve electronically published articles.	Online Lecture. Multimedia presentation. Video Demonstration		Students able to understand the Database and types of database.	Online Class-rooms Lab	1 Hr 1 Hr/Day For 4 Day/week	After every topic

Practicum:

Students will work on the Microsoft Offices (Word, Excel, PowerPoint and Access) and Adobe Photoshop as practicum 1 Hour for 4 days a week.

Assessment

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended methodology	Scheduled dates
LU1 Introduction to computer Science	Module 1	Online Class	Exmaple	• Multiple Choice Questions • Best Choice Questions • Viva	After every module
LU2	Module 1	Online Class	MCQs 1. CD-ROM stands for _____ a. Compactable Read Only Memory b. Compact Data Read Only Memory c. Compactable Disk Read Only Memory d. Compact Disk Read Only Memory 2. VGA is a. Video Graphics Array b. Visual Graphics Array c. Volatile Graphics Array d. Video Graphics Adapter 3. IBM 1401 is _____ a. First Generation Computer b. Second Generation Computer c. Third Generation Computer d. Fourth Generation Computer	• Multiple Choice Questions • Best Choice Questions • Viva	After every module

			4. WAN stands for a. Wap Area Network b. Wide Area Network c. Wide Array Net d. Wireless Area Network 5. Chief component of first generation computer was a. Transistors b. Vacuum Tubes and Valves c. Integrated Circuits d. None of above		

XTC 010 Radiographic Technique I 3(1-2)

Competencies

The students must be able to position patients correctly for radiographic examinations of the skeletal system

Learning Objectives

1. Taking x-rays of the skeletal system
2. Performing patient positioning and related task
3. Remove all items that would compromise the quality of the image
4. Plan; adapt positioning requirements according to patient condition.
5. Demonstrate knowledge of imaging procedure
6. Discuss factors affecting radiographic quality

Content

- Principles of exposure
- Latent image formation
- Principal factors of exposure
- Factors affecting radiographic quality , contrast
- Conditions that determine exposure factors
- Identification

- Terminology in Radiography/Radiology
- Terms used to identify projections.
- Implications of clinical information
- Technique for examination upper limbs- hand wrist
- Techniques used for examination of the lower limbs- foot, ankle, leg, hip etc.
- Technique for examination of spine eg C/spine, T/Spine, Lumbo-sacral spine, sacrum, coccyx, sacro-iliac joint.
- Technique for examination of the skull , mandible, facial bones, paranasal sinuses, temporo- mandibular joint, mastoids
- Technique for the examination of the teeth
- Technique for the examination of ribs and sternum.
- - Measures to protect staff from unnecessary radiation

Summary

Learning unit	Topics	Objective	Outcome desired	Learning place	Recommended methodology	Practicum	Skill/competency acquired	Duration
I. Pre-requisites / preparation for X-ray examination	- Identification - Clinical information - Examination -Removal of dress/items compromising quality of image - Pregnancy status in case of females of reproductive age. - Level of comfort of the patient - Explaining the examination (con-sent). -Immobilization - Equipment	To properly identify, prepare and position the patient on examination table keeping in view the comfort and privacy.	The student should be able to take the appropriate steps from initiation to completion of the radiographic examination including room/patient/equipment preparation & post examination processing of the film	- Class room - Radiology department	- Lecture - Presentation - Demonstration - Hands on training.	1. Completing a check list prior to the procedure about the prerequisites / pre-paration / exam-ination / equip-ment. 2. Filling in a questionnaire regarding patient's examination, request, presenting complaints, past history. 3. Explanation of the examination to the patient 4. Consent	Thorough knowledge of patient's condition, examination required anticipated results, potential com-plications and limitations.	- Theory (2 Hrs) - Practical (8 Hrs)

II. Skull	1. - Anatomical terminology landmarks / planes / lines. - Positioning terminology - projection terminology - patient preparation / immobilization. - General image quality guide lines and radiation protection. - Film processing	To describe & recognize the bony landmarks / planes / lines on patient in proper position for specific examination & over the actual radiograph.	The student should be able to prepare the patient and equipment for an optimum examination keeping in view the radiation protection measures.	- Class Room - Radiology Department	- Lecture - Presentation - Demonstration - Hands on training	Recommended positioning of the patient for the desired examination.	Correct radiographic position with accurate projection resulting in a good quality radiograph.	- Theory (2 Hrs) - Practical (8 Hrs)
	2. – Cranium - Optic foramina. - Jugular foramina 3. Temporal bones 4. Mastoid 5. Peterous bone	To have a comprehensive knowledge of varied reco-mmended projections for the anatomic part to be imaged.	The student should be able to performed the requested examination with a desired level of satisfaction.	Radiology Department	- Demonstration - Hands on training	Actual performance of required exa-mination with optimum exposure factors.	Good quality radi-ograph of diagnostic value free of artifacts.	Practical (8 Hrs)

Learning unit	Topics	Objective	Outcome desired	Learning place	Recommended methodology	Practicum	Skill/competency acquired	Duration
III. Face / para-nasal sinuses	1. - Patient preparation / imm-obilization. - Equipment - General image quality guideline and radiation protection.	To describe & recognize the bony landmarks / planes / lines on patient in proper position for specific examination & over the actual radiograph.	The student should be able to prepare the patient and equipment for an optimum examination keeping in view the radiation protection measures.	- Class Room - Radiology Department	- Lecture - Presentation - Demonstration - Hands on training	Recommended positioning of the patient for the desired examination	Correct radiographic position with accurate projection resulting in a good quality radiograph	- Theory (2 Hrs) - Practical (8 Hrs)
	2. Facial Bones 3. Zygomatic arches 4. Orbits 5. Nasal bones 6. Mandible 7. Temporo-mandibular joint 8. Paranasal Sinuses	To have a comprehensive knowledge of varied reco-mmended projections for the anatomic part to be imaged.	The student should be able to perform the requested examination with a desired level of satisfaction.	Radiology Department	- Demonstration - Hands on training	Actual performance of required examination with optimum exposure factors.	Good quality radi-ograph of diagnostic value free of artifacts.	Practical (12 Hrs)

IV. Dental Radiography	1. – Dentition -Dental formulae - Terminology - Occlusal Planes - X-ray equipment - Radiation protection - Cross infection control - Film processing	To identify & recognized different teeth, occlusal planes on patient in proper position for specific examination and over the actual radiograph after processing.	The student should be able to prepare the patient and equipment for an optimum examination keeping in view the radiation protection and cross infection control.	- Class Room - Radiology Department	- Lecture - Presentation - Demonstration - Hands on training	Recommended positioning of the patient for the desired examination	Correct radiographic position with accurate projection resulting in a good quality radiograph	- Theory (2 Hrs) - Practical (8 Hrs)
	2. Intraoral radiography - Bitewing - Periapical - Occlusal	To have a comprehensive knowledge of varied reco-mmended projections for the anatomic part to be imaged.	The student should be able to perform the requested examination with a desired level of satisfaction.	Dentistry Department	- Demonstration - Hands on training	Actual performance of required exa-mination with optimum exposure factors.	Good quality radi-ograph of diagnostic value free of artifacts.	Practical (16 Hrs)

Learning unit	Topics	Objective	Outcome desired	Learning place	Recommended methodology	Practicum	Skill/competency acquired	Duration
	3. Extraoral Radiography - Lateral Oblique - Dental Panoramic Tomography -Cephalometry	-- do ---	-- do ---	-- do ---	-- do ---	-- do ---	-- do ---	-- do ---
V. Vertebral column	1. – Vertebral curves / levels - Useful landmarks - Positioning Terminology - Projection terminology - Patient pre-paration / imm-obilization. - Equipment - General image quality guideline and radiation protection	To describe & recognized the vertebral curves/levels on patient in proper position for specific examination and over the actual radiograph.	The student should be able to prepare the patient and equipment for an optimum examination keeping in view the radiation protection and cross infection control	- Class Room - Radiology Department	- Lecture - Presentation - Demonstration - Hands on training	Recommended positioning of the patient for the desired examination	Correct radiographic position with accurate projection resulting in a good quality radiograph	- Theory (2 Hrs) - Practical (8 Hrs)

	2. Cervical spine 3. Cervicothoracic Junction 4. Thoracic spine 5. Lumbar spine 6. Lumbosacral Junction. 7. Sacrum 8. Coccyx	To have a comprehensive knowledge of varied recommended projections for the anatomic part to be imaged.	The student should be able to perform the requested examination with a desired level of satisfaction.	Radiology Department	- Demonstration - Hands on training	Actual performance of required examination with optimum exposure factors.	Good quality radiograph of diagnostic value free of artifacts.	Practical (16 Hrs)

Learning unit	Topics	Objective	Outcome desired	Learning place	Recommended methodology	Practicum	Skill/competency acquired	Duration
VI. Bones of the thorax	1. - Anatomical terminology landmarks / planes / lines. - Positioning terminology - projection terminology - patient preparation / immobilization. - General image quality guide lines and radiation protection.	To describe & recognize the bony landmarks / planes / lines on patient in proper position for specific examination & over the actual radiograph.	The student should be able to prepare the patient and equipment for an optimum examination keeping in view the radiation protection measures.	- Class Room - Radiology Department	- Lecture - Presentation - Demonstration - Hands on training	Recommended positioning of the patient for the desired examination	Correct radiographic position with accurate projection resulting in a good quality radiograph	- Theory (2 Hrs) - Practical (4 Hrs)
	2. Ribs 3. Sternum	To have a comprehensive knowledge of varied recommended projections for the anatomic part to be imaged.	The student should be able to perform the requested examination with a desired level of satisfaction.	Radiology Department	- Demonstration - Hands on training	Actual performance of required examination with optimum exposure factors.	Good quality radiograph of diagnostic value free of artifacts.	Practical (08 Hrs)

VII. Shoulder & Upper Extremity	1. - Anatomical terminology landmarks / planes / lines. - Positioning terminology - projection terminology - patient preparation / immobilization. - General image quality guide lines and radiation protection	To describe & recognize the bony landmarks / planes / lines on patient in proper position for specific examination & over the actual radiograph.	The student should be able to prepare the patient and equipment for an optimum examination keeping in view the radiation protection measures.	- Class Room - Radiology Department	- Lecture - Presentation - Demonstration - Hands on training	Recommended positioning of the patient for the desired examination	Correct radiographic position with accurate projection resulting in a good quality radiograph	- Theory (2 Hrs) - Practical (8 Hrs)
	2. Shoulder - Glenohumeral Joint - Acromioclavicular Joint - Clavicle	To have a comprehensive knowledge of varied recommended projections for the anatomic part to be imaged.	The student should be able to perform the requested examination with a desired level of satisfaction.	Radiology Department	- Demonstration - Hands on training	Actual performance of required examination with optimum exposure factors.	Good quality radiograph of diagnostic value free of artifacts.	Practical (16 Hrs)

Learning unit	Topics	Objective	Outcome desired	Learning place	Recommended methodology	Practicum	Skill/competency acquired	Duration
	3. Sterno-clavicular Joint 4. Scapula 5. Humerus 6. Elbow Joint 7. Forearm 8. Bones of the Wrist + Joint 9. Hand - Thumb - Fingers	-- do ---	-- do ---	-- do ---	-- do ---	-- do ---	-- do ---	-- do ---

VIII. Pelvis & Lower Extremity	1. - Anatomical terminology landmarks / planes / lines. - Positioning terminology - projection terminology - patient preparation / immobilization. - General image quality guide lines and radiation protection	To describe & recognize the bony landmarks / planes / lines on patient in proper position for specific examination & over the actual radiograph.	The student should be able to prepare the patient and equipment for an optimum examination keeping in view the radiation protection measures.	- Class Room - Radiology Department	- Lecture - Presentation - Demonstration - Hands on training	Recommended positioning of the patient for the desired examination	Correct radiographic position with accurate projection resulting in a good quality radiograph	- Theory (2 Hrs) - Practical (8 Hrs)
	2. Pelvis 3. Sacroiliac Joints 4. Hip Joints 5. Femur 6. Knee Joint 7. Tibia / Fibula 8. Ankle Joint	To have a comprehensive knowledge of varied reco-mmended projections for the anatomic part to be imaged.	The student should be able to perform the requested examination with a desired level of satisfaction.	Radiology Department	- Demonstration - Hands on training	Actual performance of required examination with optimum exposure factors.	Good quality radi-ograph of diagnostic value free of artifacts.	Practical (16 Hrs)

Learning unit	Topics	Objective	Outcome desired	Learning place	Recommended methodology	Practicum	Skill/competency acquired	Duration
	9. Calcaneum 10. Foot 11. Lower Limb Alignment	-- do ---	-- do ---	-- do ---	-- do ---	-- do ---	-- do ---	-- do ---
IX. Skeletal Surgery	- Introduction - Indications - Recommended Projections.	To demonstrate the bony involvement by the pathological process.	The student should be able to demonstrate the bones involved and their extent	- Class Room -Radiology Department	- Lecture - Presentation - Demonstration - Hands on training	Actual performance of required examination with optimum exposure factors.	Good quality radiograph of diagnostic value free of artifacts.	Theory (2 Hrs) Practical (4 Hrs)

XTC-011 Introduction to Radiographic Modalities 2(1-1)

Learning unit	Topics	Objective	Outcome desired	Learning place	Recommended methodology	Practicum	Skill/competency acquired	Duration
I). Conventional Radiography (X-rays) - Static Radiographs - Fluoroscopy	- Introduction - Equipment Used - Basic Mechanism of image formation - Recognition of Image - Applications - Advantages - Limitations	To have fundamental concepts about X-rays, to identify the components of the equipment & to recognize the images.	The student should be able to have an overall idea about X-rays, its application in medical field, risks involved and limitations of the technique.	- Class Room - X-ray Department.	- Lecture - Presentation - Demonstration	Visits to the X-ray department	Basic knowledge of Conventional Radiography and its scope.	- Theory (4 Hrs) - Practical (8 Hrs)
II). Ultra-sonography - Conventional ultrasound - Antenatal ultrasound - Ultrasound Doppler - 3D + 4D obstetrical ultrasound - Endocavitary ultrasound - Ech-	- Introduction - Equipment Used - Basic Mechanism of image formation - Recognition of Image - Applications - Advantages - Limitations	To have fundamental concepts about ultrasound, to identify the components of the equipment & to recognize the images.	The student should be able to have an overall idea about ultrasound, its application in medical field, risks involved and limitations of the technique.	- Class Room - Ultrasound Department.	- Lecture - Presentation - Demonstration	Visits to the Ultrasound department	Basic knowledge of the Ultrasound and its scope.	- Theory (4 Hrs) - Practical (8 Hrs)

ocardiography - Ultrasound guided procedures								
III). Computed tomography (CT)- Multiplanar Imaging of Human body with & without contrast - CT Angiography - Virtual CT - CT guided procedures	- Introduction - Equipment Used - Basic Mechanism of image formation - Recognition of Image - Applications - Advantages - Limitations	To have fundamental concepts about CT, to identify the components of the equipment & to recognize the images.	The student should be able to have an overall idea about CT, its application in medical field, risks involve and limitations of the technique.	- Class Room - CT Department.	- Lecture - Presentation - Demonstration	Visits to the CT department	Basic knowledge of the CT and its scope.	- Theory (4 Hrs) - Practical (8 Hrs)

Learning unit	Topics	Objective	Outcome desired	Learning place	Recommended methodology	Practicum	Skill/competency acquired	Duration
IV) Magnetic Resonance Imaging (MRI) - Multiplanar imaging of human body with & without contrast - Magnetic Resonance Angiography - Magnetic Resonance Cholangio-pancreatography - Functional MRI - Magnetic Resonance Spectroscopy	- Introduction - Equipment Used - Basic Mechanism of image formation - Recognition of Image - Applications - Advantages - Limitations	To have fundamental concepts about MRI, to identify the components of the equipment & to recognize the images.	The student should be able to have an overall idea about MRI, its application in medical field, risks involved and limitations of the technique.	- Class Room - MRI Department.	- Lecture - Presentation - Demonstration	Visits to the MRI department	Basic knowledge of the MRI and its scope.	- Theory (4 Hrs) - Practical (8 Hrs)

V). Mammo-grapy - Diagnostic Mammography - Screening Mammography -Breast Biopsies & Needle localization.	- Introduction - Equipment Used - Basic Mechanism of image formation - Recognition of Image - Applications - Advantages - Limitations	To have fundamental concepts about Mammography, to identify the components of the equipment & to recognize the images.	The student should be able to have an overall idea about Mammography, its application in medical field, risks involved and limitations of the technique.	- Class Room - Mamm-ography Department.	- Lecture - Presentation - Demonstration	Visits to the - Mammography Department	Basic knowledge of the Mammography and its scope.	- Theory (2 Hrs) - Practical (4 Hrs)
VI). Angio-graphy - Digital Angiography - Distal Subtraction Angiography - Guided Interventional procedures	- Introduction - Equipment Used - Basic Mechanism of image formation - Recognition of Image - Applications - Advantages - Limitations	To have fundamental concepts about Angiography, to identify the components of the equipment & to recognize the images.	The student should be able to have an overall idea about Angiography, its application in medical field, risks involved and limitations of the technique.	- Class Room - Angio-graphy Department.	- Lecture - Presentation - Demonstration	Visits to the Angiography department	Basic knowledge of the Angiography and its scope.	- Theory (4 Hrs) - Practical (8 Hrs)

Learning unit	Topics	Objective	Outcome desired	Learning place	Recommended methodology	Practicum	Skill/competency acquired	Duration
VII). Nuclear Medicine - Gama Imaging - Single Photon emission computed tomography (SPECT) - Positron emission tomography	- Introduction - Equipment Used - Basic Mechanism of image formation - Recognition of Image - Applications - Advantages - Limitations	To have fundamental concepts about Nuclear Medicine, to identify the components of the equipment & to recognize the images.	The student should be able to have an overall idea about Nuclear Medicine, its application in medical field, risks involved and limitations of the technique.	- Class Room - Nuclear Medicine Department.	- Lecture - Presentation - Demonstration	Visits to the Nuclear Medicine department	Basic knowledge of the Nuclear Medicine and its scope.	- Theory (4 Hrs) - Practical (8 Hrs)

HGC-015 Islamic Studies 1(1-0)

Summary:

Modules	Learning Units(LU)	Topics	Learners should be able to achieve these Outcomes	Theory Days/hours	Workplace Days/hours	Credits
MODULE 1 (Orientation)	**NA**	. Introduction . Course outlines . Method and procedure regarding classes . Assessment criteria	• Clear understanding regarding their input to the subject	01 hr. 01 hr.	NA	NA
MODULE 2 (Semester 1)	**Learning <u>Unit 1</u>**	1.Preservation of the Holy Quran 2. Preservation of the Ahadith of the Holy Prophet(s.a.w.) 3.Selection from the Holy Quran 4. Selection from the Hadith of the Holy Prophet (s.a.w.)	By the end of the lesson students should be able to, 1. Outline the main stages of compilation of the Quran 2. Outline the main stages of compilation of Hadith 3. Reasons to why both were preserved 4. Importance of their preservation 5. Quranic concept about the world and its nature 6. Relationship of man with this world 7. Teachings of the Holy Prophet(s.a.w.) to understand his status	04hour	-	-

	Learning Unit 2	1.Rights of Allah and Rights of His creation: Theory & Practice 2.Companions of the Holy Prophet (s.a.w) 3.Stories of the Prophets Ibrahim(a.s.), Yousaf(a.s) and Isa (a.s.) 4.Muslims contribution to science	- The different kinds of rights and then the expected duties towards others - basic demands of belief - Main lessons from the lives of the Prophets (a.s.) - Importance of the Muslim contribution to the science	04hours	-	-

	Learning Units 3 **Learning Unit 4**	1.Relation with non Muslims 2.Freedom of thought and living in Islamic perspective 3.Muslim world : Past and future 4.Merits of serving humanity in Islam 1.Modern issues in medical science and the Islamic point of view 2.Pillars of Islam	- Main teachings of Islam regarding behaving towards other religions - Limitations and restrictions with permissions granted in Islam in few aspects of life - Brief introduction of Islamic world and its importance - Identify some benefits which other can get from us as individuals - Know the principles to apply them on newly born issues in medical science - Know the basic teachings with importance of the pillars of Islam	04hour 04hour	- -	- -

Semester Plan:

Unit 1				
	week: 01	**week: 02**	**week: 03**	**week: 04**
Topics	1. Introduction 2. Moral teachings of the Holy Quran	• Moral teachings of the Holy Prophet(S.A.W)	• Health and disease ,an Islamic framework	• Nursing in the Islamic history
Lecture Notes and reading material	• Will be given during the class	• Will be given during the class	• Will be given during the class	• Will be given during the class
Tests			• Quiz/Writt	• Quiz

Unit 2				
	week: 05	**week: 06**	**week: 07**	**week: 08**
Topics	• Preservation of the Revelations	• Nursing and the rights of fellow beings (*Huquq ul Ibad*)	1.Nursing and the rights of fellow beings (*Huquq ul Ibad*)	Contemporary issues in the modern Medical science and Religious Views
Lecture Notes and reading material	• Will be given during the class	• Will be given during the class	• Will be given during the class	• Will be given during the class
Tests	• Unit 1 test	•	• Quiz	• Students' presentations

Unit 3

	week: 09	**week: 10**	**week: 11**	**week: 12**
Topics	• Reason and revelation	• Faith and practice: an analytical approach	• Relations with Non Muslims (teachings and practice)	• Nursing profession and Modesty
Lecture Notes and reading material	• Will be provided in the class	• Will be provided in the class	• Will be provided in the class	• Will be provided in the class
Tests	• Mid term exam	•		• Quiz

Unit 4

	week: 13	**week: 14**	**week: 15**	**week: 16**
Topics	Pillars of Islam :significance in the practical life	1.Muslims' contribution in the Medical field 2.Pillars of Islam: Description and Significance	1.Social norms and the Nursing 2. Selected supplications	• End of Term exam
Lecture Notes and reading material	•	• Will benProvided Before Lecture	• Will be Provided Before Lecture	
Tests	• Unit 4 test	•	•	• Final Term exam

HGC-017 English - I 1(1-0)

Course Name: English

Rationale

Students level of understanding, and analytical skills should be enhanced. They will be able to communicate in English in a better way**.**

Aim

To provide opportunities for students to enhance their comprehension, grammar, listening, speaking and writing skills.

Objectives

The main objectives of this course are;

- Students will be able to comprehend English.
- They will be able to converse in English in a better way.
- Students will be able to write different reports in their required field.

Summary

Modules	Learning Units(LU)	Topics	Learners should be able to achieve these Outcomes	Theory Days/hours	Workplace Days/hours
Module 1 (orientation course) Module 2 (1st semester) Module 3 (2nd semester)					
Module 2 (1st semester)	1. Communication Skills	1. Introduction to communication skills. 2. Types of effective communication 3. Techniques of effective communication.	1. Learn about the needs of effective communication. 2. Learn about the importance of effective communication. 3. Learn about different types of effective communication. 4. Learn / understand about the various techniques of effective communication. 5. Apply their knowledge in different situation.		

Module 2 (1st semester)	2. GRAMMER	1. Vowel & Consonants 2. Forms of Sentences 3. Compound Sentences 4. Preposition 5. The Present Tenses (2hrs) 6. The Past Tenses (2hrs) 7. Future + Revision (2hrs)	By the end of the lesson students should be able to, 1. Differentiate between Vowel & Consonants sounds. 2. Explain different forms of sentences. 3. Complete the given exercises with the help of Conjunctions. 4. Use correct preposition in the given sentences. 5. Recall the basic rules of present tenses. Convert the given sentences from one tense to other. 6. Revise the rules of past tenses. Use the past tense in its correct context. 7. Learn the rules of future tense. Revise all the tenses. Convert one tense to another. 8. Learn about all the 7 punctuation makes. Use them correctly in the given exercises. 9. Differentiate between different parts of speech. Use them correctly in the given exercises. 10. Write the correct verb according to its subject. 11. Differentiate between prefix suffix & root words. Complete the given exercises about prefix, suffix & root words.	11 DAYS	

Module 2 (1st semester)	3.Comprehension	1. Comprehension passages from the given in books. 2. English grammar & composition by Wren & Martin. 3. Junior English Grammar. 4. http://www.teachervision.fen.com/tv/printables/0876281420121.ptf	1. Comprehend the given passages. 2. Revise the given passage. 3. Answer the given questions. (Oral & Written) 4. Search the past tense from the passage. 5. Rewrite the given passage in their own words.	4 DAYS	
Module 2 (1st semester)	4.Composition	1. Paragraph writing 2. Essay writing	1. Write a paragraph/essay on the given topic. 2. Differentiate between paragraph and essay writing. 3. Use different grammar components in each given topics. 4. Differentiate between essay.	4 DAYS	

Lesson Plan

LU	**Topic**	**Duration** depends on previous knowledge	**Learning outcomes** After completing this topic, the learner should be able to:	**Materials required** NOTE: Participants should have their own workbooks and pens	**Learning place**
LU 1. COMMUNICATION SKILLS	Introduction to communication skills.	1 LESSION (60 MINTS) 60 min	1. Learn about the needs of effective communication. 2. Learn about the importance of effective communication. 3. Apply their knowledge in different situation.	1. Online presentation	Learning Management System (LMS)
LU 2. COMMUNICATION SKILLS (CONTINUED)	Introduction to communication skills.	1 LESSION (60 MINTS) 60 min	1. Learn about the needs of effective communication. 2. Learn about the importance of effective communication. 3. Apply their knowledge in different situation.	1. Online presentation	Learning Management System (LMS)

LU 3 COMMUNICATION SKILLS & GRAMMAR	Types of effective communication Vowels and Consonants	1 LESSION (60 MINTS) 40 min 20 min	1. Learn about the importance of effective communication. 2. Learn about different types of effective communication. 3. Apply their knowledge in different situation. 4. Differentiate between Vowel & Consonants sounds.	1. Online presentation 1. Work sheets 2. White board 2. Text book (English Grammar and composition by Wren & Martin)	Learning Management System (LMS)
LU 4. COMMUNICATION SKILLS & COMPREHENTOIN	Techniques of effective communication Comprehension	1 LESSION (60 MINTS) 30 min 30 min	1. Learn / understand about the various techniques of effective communication. 2. Apply their knowledge in different situation. 3. Comprehend the given passages. 4. Revise the given passage. 5. Answer the given	Online presentation Work sheets White board	Learning Management System (LMS)

			questions. (Oral & Written)		
LU 5. COMPREHENSION & GRAMMAR	Comprehension Forms And Sentences	1 LESSION (60 min) 20 min 40 min	1. Use different grammatical components in given topic. 2. Comprehend the given passages. 3. Revise the given passage. 4. Answer the given questions. (Oral & Written)	1. Work Sheets 2. White Board 3. Oral presentation	Learning Management System (LMS)
LU 6. COMPOSITION	Paragraph writing	1 LESSION (60 min) 60 min	1. Write a paragraph on the given topic.		Learning Management System (LMS)
LU 7. COMPOSITION & GRAMMAR	Paragraph writing Compound sentences	1 LESSION (60 min) 40 min 20 min	1. Write a paragraph on the given topic. 2. Demonstrate different forms of sentences. 3. Differentiate between simple and compound sentences.		Learning Management System (LMS)

LU 8. & COMPREHENSION	Comprehension	1 LESSION (60 min) 60 min	4. Comprehend the given passages. 5. Revise the given passage. 6. Answer the given questions. (Oral & Written).	1. Work Sheets 2. White Board 3. Oral Presentation	Learning Management System (LMS)
LU 9. COMPOSITION	Essay Writing	1 LESSION (60 min) 60 min	1. Differentiate between paragraph and essay writing. 2. Write essay on given topics.	1. Work Sheets 2. White Board 3. Online Presentation	Learning Management System (LMS)
LU 10. COMPOSITION (CONTINUED) & GRAMMAR	Essay Writing Preposition	1 LESSION (60 min) 30 min 30 min	1. Differentiate between paragraph and essay writing. 2. Write essay on given topics. 3. Use correct preposition in the sentences. 4. Use different grammatical components in given topics.	1. Work Sheets 2. White Board 3. Online Presentation	Learning Management System (LMS)

LU 11. GRAMMAR	The Present Tense	1 LESSION (60 min) 60 min	1. Revise the rules of Present Tenses. 2. Use the Present tense in its correct context.	1. Work Sheet 2. A-V Presentation 3. PowerPoint Presentation.	Learning Management System (LMS)
LU 12. GRAMMAR	The Past Tense	1 LESSION (60 min) 60 min	1. Revise the rules of Past Tenses. 2. Use the Past tense in its correct context.	1. Work Sheet 2. A-V Presentation 3. PowerPoint Presentation.	Learning Management System (LMS)
LU 13. GRAMMAR	The Future Tense	1 LESSION (60 min) 60 min	1. Revise the rules of Future Tenses. 2. Use the Future tense in its correct context.	1. Work Sheet 2. White Board 3. Revision work Sheet (Online)	Learning Management System (LMS)
LU 14. GRAMMAR	Revision Exercise of Different Tenses	1 LESSION (60 min) 60 min	1. Demonstrate the rules of all the tenses for enhancement in the communication skills.	1. Work Sheet 2. White Board 3. Revision work Sheet (Online)	Learning Management System (LMS)

LU 15. COMPREHENSION	Comprehension	1 LESSION (60 min) 60 min	1. Comprehend the given passages. 2. Revise the given passage. 3. Answer the given questions. (Oral & Written)	4. Work sheet 5. Website (Online Comprehension)	Learning Management System (LMS)
LU 16. COMPOSITION	Essay Writing	1 LESSION (60 Min) 60 min	1. Differentiate between paragraph and essay writing 2. Write essay on given topics.	1. Work Sheet 2. White Board 3. Online Presentation	Learning Management System (LMS)
LU 17 COMMUNICATION SKILLS & COMPREHENSION	Communication skills Online Comprehension	1 LESSION (60 min) 30 min 30 min	1. Learn about the needs of effective communication. 2. Learn about the importance of effective communication. 3. Learn about different types of effective communication. 4. Learn / understand about the various techniques of effective communication.	1. Work Sheet 1. White Board	

			5. Apply their knowledge in different situation.		
LU 18. COMPREHENSION	Revision (Online Comprehension + tenses)	1 LESSION (60 min) 60 min		1. Work Sheets 2. White Board 3. Online Comprehension 4. Work Sheet (Revision)	Learning Management System (LMS)

Assessment

Learning Units	Theory hours	Workplace Days	Recommended formative assessment	Recommended methodology	Scheduled dates
LEARNING UNIT 1 Communication Skills			A. True/False statements: - There are only three channels for interpersonal communication. T/F - Avoiding of argument is a part of effective communication technique. T/F - Communication Skills are important in our daily life. T/F - Body language is a part of effective Communication. T/F - It is easy to acquire communication Skills. T/F B. MCQs i) There are ------- types of communication skills. a. 2 b. 3 *c. 4* i) The responding step of listening: 1. is the result of remembering. 2. is nonverbal. 3. is verbal. 4. can be verbal or nonverbal	LU 1:QUIZ (MCQS) LU1: ASSIGNMENT LU1: PRESENTATION LU 2: EXERCISE LU1: QUIZ LU3:ASSIGNMENT LU2: EXERCISE LU3: ASSIGNMENT LU4: ASSIGNMENT LU2: EXERSISE LU 4: ASSIGNMENT LU3: EXCERSISE LU 4:	Week 1 Week 2 Week 3 Week 4 Week 5 Week 6 Week 7 Week 8 Week 9 Week 10 Week 11

			2. Logic and reasoning are key to 1. message understanding 2. receiving a message 3. responding to as message 4. critical listening 3. Which of the three components are parts of the human communication process? 1. Message, recording, feedback 2. Noise, feedback, jargon 3. Message, noise, feedback 4. Feedback, message, critiquing	ASSIGNMENT LU2: EXERCISE LU4: PRESENTATION LU2: EXERCISE LU2: EXERCISE LU2: EXERCISE LU2: EXERCISE LU3: ONLINE PRESENTATION LU4: ONLINE PRESENTATION LU1: ONLINE PRESENTATION LU 3: ASSIGNMENT LU 3: ONLINE PRESENTATION AND EXERCISE	Week 12 Week 13 Week 14 Week 15 Week 16 Week 17 Week 18

LU 2. **GRAMMER**			How many sounds are there in English language? a. 44 b. 26 c. 42 There are form of sentences a. 3 b. 4 c. 5 There are main tenses. a. 2 b. 3 c. 4 In future tense use __ a. Will b. Are c. Had The sample present tense is used to ____ a. Express a habitual action and general truth. b. Express a general truth. c. Express a habitual action. d. Non of these There aren't _____ people here. 1. Much 2. Many 3. a lot 4. some		

			You should _____ your homework. 1. Make 2. Do 3. Work 4. Give		
LU 3: COMPREHENSION			1. Rewrite the given passage in your own words. 2. Answer the MCQs from the given Passage. 3. Answer the given questions from the comprehension passage.		
LU 4: COMPOSITION			1. Write the Paragraph/Essay on the given topic.		

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SEMESTER - II

XTC-009 Radiographic Anatomy - I 2(1-1)

Competencies

1. Know the structures of the skeletal system
2. Identify structures on the Radiographs
3. Apply the knowledge in the practice of Radiography.

Learning Objectives

1. To Know accurate and appropriate terms in describing various anatomical features.
2. To know structures that comprises the parts of the skeletal system.
3. To identify types of fractures and understand process involved in healing of same.
4. To identify appearances of the skeletal system structures on Radiographs.

Content:

Muscular skeletal system.

Skull, Vertebral Column, Shoulder girdle, bones of upper

Extremities, Bones of lower extremities.Thorax and pelvic girdle.

Summary

Learning unit	Topics	Objective	Outcome desired	Learning place	Recommended methodology	Practicum	Skill/com-petency Acquired	Duration
I). Introduction of skeletal system	Parts, basic structure and functions of skeletal system, general features and types of bones and joints. Ossification of bones.	To identify the general bony structure, different parts of skeletal system and joints	The student should be able to understand the general function of the skeleton as a whole with types of movements at the joints	- Class Room - Anatomy department	Lectures /Demonstration Presentation	Visits to the anatomy department – demonstration & hands on experience on whole skeletal modals and individual bones.	Recognition of bones comprising the human skeleton with types of movements at different joints.	-Theory (2 Hours) -Practical (4 Hours)
II). Axial Skeleton	1). Skull	To identify the different bones comprising the skull, their evolution and contents	The student should be able to name and locate the parts of the skull, to label the anatomy on given radiographs and to define the medical terms associated to skull.	- Class	Lectures	Visits to the anatomy department-	Recognition of bones, their place in the skeleton	-Theory (6 Hours) -Practical (12

	2. Vertebral Column	To identify different types of vertebrae, their alignment and joints	The student should be able to name and locate different vertebrae making up the vertebral column and their associated anatomy on given radiograph and to define the medial terms associated with vertebral column	Room - Anatomy department	/Demonstration Presentation	demonstration & hands on experience with individual bones, their features & the parts comprising them	and involvement in a joint.	Hours)
	3. Thorax	To identify the general anatomical structures of thorax and sternum	The student should be able to name and locate radiographically the anatomical structures of ribs and sternum and to define the medical terms associated with them					

III). Appendicular skeleton	1. shoulder girdle & bones of upper extremity	To identify the bones and joints of shoulder girdle and upper extremity with associated joints	The student should be able to name and locate the associated anatomy of upper extremity, to label the radiographic anatomy and to define the medical terms associated with upper extremity skeletal system	- Class Room - Anatomy department	Lectures /Demonstration Presentation	Visits to the anatomy department-demonstration & hands on experience with individual bones, their features & the parts comprising them	Recognition of bones, their place in the skeleton and involvement in a joint.	-Theory (6Hours) -Practical (12 Hours)

Learning unit	Topics	Objective	Outcome desired	Learning place	Recommended methodology	Practicum	Skill/com-petency Acquired	Duration
	2. Pelvic girdle and bones of lower extremity	To identify the bones and joints of pelvic girdle and lower extremity with associated joints	The student should be able to name and locate the associated anatomy of lower extremity, to label the radiographic anatomy and to define the medical terms associated with lower extremity skeletal system			.		
IV). Skeletal Pathology	1. Trauma	To identify different fractures, types and their complications	To demonstrate knowledge of the traumatic process, its course and radiographic representations	Class Room	Lectures /Demonstration Presentation			Theory (4 Hours)

	2. Inflammatory, degenerative, neoplastic and congenital / hereditary disease processes in skeletal system	To identify changes associated with these processes, their progression and eventual outcome	To demonstrate knowledge of ongoing process its course and radiographic representation	Class Room	Lectures /Demonstration Presentation			practicum (8 Hours)

XTC 012 Radiographic Equipment 3(1-2)

Competencies

1. Be able to operate x-ray equipment safely
2. To recognize abnormal symptoms in the equipment.

Learning Objectives

1. To understand the scientific principles involved in the production of x-rays
2. To understand the functioning of x-ray equipment

Content

- Electrical System, Main supply, components and control in x-ray circuits
- Generation of electrical energy, Distribution and uses of electrical energy.
- High tension transformer , the control of kilo voltage , filament circuit and tube current, high frequency transformer
- X-ray tubes – features of fixed and rotating anode tubes, cooling of x-ray tubes, tube housing.
- Characteristics Mammography x-ray tubes, faults that may develop.
- Construction and operation of high tension rectifiers.
- Control equipment – Autotransformer, compensators, voltage indicators, control current timers, high tension cables, fuses, earthing and insulation.
- Exposure switches and exposure timers, switching and timing systems, exposure switching and its radiographic application.

- Dental x-ray equipment
- Portable x-ray equipment
- Electrical hazards , safety devices , interlocks
- Accessories – Grids, beam limiting devices, beam centering devices immobilizers
- Care and maintenance of x-ray equipment.

XTC 013 Radiographic Photography 3(1-2)

Competencies

1. To know the requirements for recording image on x-ray film
2. To carry out Photographic procedures for producing a radiographic image.
3. To know the requirement of a darkroom
4. To understand the principles of processing x-ray films.

Learning Objectives

1. Mixing of processing chemicals.
2. Load and unload cassettes
3. Process x-ray films
4. Discuss the constitution of x-ray films, cassettes and intensifying screens.
5. Print the names of the patients on the x-ray film before processing with the use of actinic markers.

Content

- Fundamentals of Photography- production of image, recording of image, processing of image, latent image.
- X-ray films- structure, types of films, handling and storage of films.
- Intensifying screens-constitution, types, handling and cleaning, maintenance.
- Cassette- construction, types, care.
- Processing- constituents of the developer, standardization by time and temperature control, exhaustion and replenishment.

Constituents of the fixer, exhaustion and regeneration. Rinsing, washing, drying. Film processing unit, Accessories. Manual and automatic processing.

- Dark site construction, layout of lighting, and storage facilities.
- Film faults: identification, cause, prevention

XTC 014 Radiographic Anatomy - II 2(1-1)

Competencies

1. Know the structures of the body system
2. Identify structures on the Radiographs
3. Apply the knowledge in the practice of Radiography.

Learning Objectives

1. To know the structures and organs that makes up the body excluding the skeletal system
2. To know locations and functions of systems
3. To identify location of organs by surface landmarks and vertebral levels..

Content

1. **Cardio Vascular System**
   a) Heart
   b) Arterial System
   c) Venous System

2**. Lymphatic System**
   a) Circulation of lymph, Lymph Gland and Thoracic duct

3**. Digestive System**
   a) Oral Cavity, Oesophagus, Stomach, Small intestine, Large Intestine, Liver, Gall bladder, Pancreas, Spleen.

4. **Respiratory System**
   a) Nose, Larynx, Trachea, Lungs

5**. Nervous System**

a) Brain, Meninges, Ventricles, Spinal Cord & Nerves

6**. Reproductive System**

a) Female Organs - Uterus, Follopian Tubes and Ovaries.

b) Male Organs - Penis, Testes, Prostate

7. Urinary System

a) Kidneys, Ureter, Urinary bladder, Urethra.

8. Endocrine System

a) Pituitary gland, Pineal gland, Thymus, Thyroid, Parathyroid, Adrenal glands

9. Miscellaneous

a) Skin, eyes and ear.

XTC 015 Radiographic Technique II 3(1-2)

Competencies

1. Taking x-rays of the chest and abdomen
2. Able to perform ward and theatre radiography

Objectives

1. The student will be able to perform radiographic examination of the chest and abdomen correctly
2. Students will be able to understand the basic principles of contrast examination which they will encounter in the Radiographic department.
3. Students will be able to perform ward and theatre radiography.

Content

- Procedures for examination of the chest and mediastinum
- Procedures for examination of the abdomen
- Principles of contrast media, preparation and dangers.
- Introduction to the basic principles of contrast examinations- Alimentary, Bilary, Urinary, Respiratory, Renal and Reproductive Systems.
- Ward Radiography
- Operating Theatre Radiography.

XTC 016 Radiation Physics 1(1-0)

Competency

Apply protective measures necessary in a knowledgeable manner.

Objectives

1. To provide the student with an understanding of the principles involved in the use of ionizing radiation
2. To be knowledgeable of the effects of ionizing radiation and the means of protection.

Content

- Atomic structure
- Electromagnetic radiation, electromagnetic waves
- Production of x-rays; intensity and quality
- Properties of x-rays.
- X-ray interaction with matte: ionization, absorption of x-rays.
- Scatter transmission through the body, filtration of x-rays.
- Permissible exposure, International recommendations.
- Protective materials- use of lead and other materials.
- Personnel Monitoring

XTC- 017 General Physics 1(1-0)

Competency

1. Identify and discuss the basic concepts of general physics

Learning Objectives

1. To understand the basic principles of the requirements for equipment needed to produce x-rays,
2. To provide the students with in depth knowledge of electricity and magnetism

Content

Revision of basic mathematics-decimals, fractions, percentage, equations.

Competency

2. Explain and discuss fundamentals of electricity and electrical circuits.

Learning objectives

1. Apply Ohm's law and Kirchhoff's law to analyze electrical circuits with resistors.
2. Analyze circuits with capacitors.
3. Study resistors and capacitors for their properties.

Competency

3. Investigate magnetism due to various sources**.**

Learning objectives

1. Study the principle of magnetism: electric effect of permanent, temporary, electromagnet, natural magnet and earth as a magnet.
2. Study magnetism due to a conductor carrying electric current.
3. Generation of alternating current.

Competency

4. Investigate the functioning of generator, motor and transformer

Learning objectives

1. Apply Faraday's law of induction and Lenz's law to explain the functioning of generator and motor.
2. Distinguish between motor and generator.
3. Explain the functioning of transformer.
4. Describe transformer theory and construction
5. Identify electrical circuits, conductors and insulators

Summary

Learning Unit	Topics	Objective	Outcome Desired	Learning Place	Recommended Methodology	Practicum	Skill/com-petency acquired	Duration
I). Basic concepts of general physics	Matter, Energy, Types of Energy Mass - energy equation, force, work, power, motion, velocity, acceleration, heat, heat transfer, system of units	To define the basic terms and to understand the characteristics of matter, energy and their inter relationship	The student should able to apply the basic concepts to the working equipment and radiological processes	Class room	Lecture /Presentation Interactive discussion			Theory (3 Hours) Lab 5hrs
II). Revision of basic mathematics	Decimal, fraction, percentage, logarithmic and exponential forms of numbers	To indentify and to understand the numeric forms, exponential and algorithmic notations	The student should be able to solve problems using fractions, decimals, exponents and algebric equation and to convert one into another	Class room	Lecture / Presentation - Interactive discussion - Answering the written questions			Theory (2 Hours)

III). Fundamentals of electricity and electric circuits	1. Electrostatics, electrodynamics Electric charge, laws governing electric charge, Electric potential and power	To define basic concepts regarding electricity, their inter relationship, hazards and safety.	The student should be able to incorporate and understand the role of electricity in radiologic equipment.	Class Room	Lecture / Presentation / Diagrams			Theory (2 Hours) Lab 3 hrs
	2. Electric current, types of current, laws governing the electric current.	To identified units of current and type of current used in the equipment	The student should be able to know the electrical working of the equipment in optimum circumstances					Theory (1 Hour) Lab 3hrs
	3. Electric circuits, type of electric circuits and laws governing them	To identify the type of circuits used and different meters in the electric circuitry	The student should able to read the meters on the equipment keeping in view the optimum working condition	Class Room Console Room	Lecture / Presentation/Diagram/Demonstration			Theory (1 Hour) Lab 3hrs.
	4. Resistors & capacitors	To understand their working and role in radiologic equipment	The student should be able to identify the resistors, the capacitors and their significance in radiologic equipment.	Class Room	Lectures /Presentation Diagram/Demonstration			Theory (1 Hour) Lab 3hrs

	5. Conductors, insulators and types of conductions.	To understand the basic concept of conduction and insulation	The student should be able to identify the materials used as conductors and insulators in general and in radiologic equipment	Class Room	Lectures /Diagram/Demonstration Presentation			Theory (1 Hour) Lab 3hrs
IV. Magnetism	1). Definition, sources, types and principles / laws of magnetism	To define magnetism, provide examples and understand the principles governing the process of magnetism.	The student should be able to understand the basic fundamentals of magnetism and their application.	Class Room	Lectures / Demonstration / Presentation			Theory (2 Hours) Lab 4hrs

Learning unit	Topics	Objective	Outcome desired	Learning place	Recommended methodology	Practicum	Skill/com-petency acquired	Duration
	2). Earth as a magnet, interaction between matter and magnetic fields, magnetic states of matter	To comprehend the magnetic interactions and the effects of magnetic fields	The student should be able to apply basic knowledge of magnetism to the working requirements.	Class Room	Lectures / Presentation			Theory (1 Hour) Lab 4hrs
	3). Electro-magnetic induction, relation between electricity and magnetism, laws of electromagnetic induction	To have an in depth idea about the process of electromagnetic induction and significance of electric current in inducing a magnetic field	The student should be able to understand the process of electromagnetic induction in the radiologic equipment	Class Room	Lectures /Diagram/Demonstration Presentation			Theory (2 Hours) Lab 4hrs.

V). Electro-mechanical Devices	Motor, Generator, Transformer	To have a knowledge of the components and functions of the devices	The student should be able to identify the electromechanical devices used in radiologic equipment with their working	Class Room Console Room	Lectures /Diagram/Demonstration Presentation			Theory (2 Hours) Lab 4hrs.

Radiology Practicum for X-ray Technicians

Competencies

1. Provide safe and effective patient care
2. Prepare patients for X-ray examinations.

Learning Objectives

1. The student will gain the required knowledge to provide patient care.
2. The student will learn measures to protect patient and staff/others from radiation hazards.

Content

- History of discovery of x-rays.
- Nature of x-rays
- The characteristics of x-rays.
- Properties of x-rays.
- Hazards of x-rays.
- Requirements for the production of x-rays.
- Practical applications of x-rays.
- Medical applications of x-rays.
- Protective devices used in the x-ray department to protect staff and patients.
- Cross infection : causes , prevention
- Dealing with accidents in the x-ray department.
- Preparation of patients for x-ray examinations