CURRICULUM

of

BS Radiography and Imaging Technology (RIT)

(w.e.f. Fall 2024)

DEPARTMENT OF ALLIED HEALTH SCIENCES

UNIVERSITY OF SARGODHA

RATIONALE

Allied Health Professionals are the professionals who have the technical expertise in a wide variety of disciplines to help the Physicians and surgeons in the Diagnosis and treatment of various diseases. Radiography and Imaging Technology is the back bone of Medical Sciences and a Radiology and Imaging technologist is conducting all radiological diagnosis the patients. It deals with the methods of disease diagnosis based on radiations and different radiological techniques.
BS Radiography and Imaging Technology (RIT) is a 4-year degree program that imparts scientific knowledge and skills to train students in the basic to advanced radiographic techniques used in X-Rays, CT scan, MRI, Nuclear Medicine, Mammography and Fluoroscopy.

GOALS OF THE PROGRAMME:

The purpose of BS Radiography and Imaging Technology (RIT) program is to prepare professionals/technologists who will:

1. Keep pace with the advancements in the modern diagnostic sciences.
2. Be primary provider of diagnostic care
3. Fulfill the health care system needs and should be well versed with the basic and advance diagnostic methods to improve the patient treatment.
4. Serve as responsible members in the professional community and are willing and able to assume leadership roles in the communities they serve.
5. Identify researchable problems, advocate and participate in research, and incorporate research findings into clinical practice.
6. Skillful, competitive and knowledgeable both practically and theoretically.
7. Cater the local and international needs for diagnosis.
8. Have the capacity, knowledge and capability to undertake career in enhancing patient diagnosis to improve treatment in community and health care systems.
9. Correlate theory with practice and think creatively about, react to, adapt or shape new practice environments.

OBJECTIVES OF THE PROGRAMME:

Graduates of the BS Radiography and Imaging Technology (RIT) program will:

1. Be the primary member of the team involved in diagnosing the patients illness.
2. Develop accuracy and meticulousness to attain high levels of ethics and technical proficiency.
3. Develop good leadership, problem solving, planning and management skills.
4. Serve as responsible members in the professional community and are willing and able to assume leadership roles in the communities they serve.
5. Advocate evidence based practice and participate in high quality research programs.
6. Practice respecting the social, economic and cultural issues of practice and effectively advocate for changes in policy
7. Integrate theoretical and practical knowledge and should be creative and adaptive to different working environments.
8. Participate in continuous education for communities, patients, peers, students and others.

Eligibility Criteria

HSSC/A-levels/Equivalent (12 years of schooling) in Pre-Medical Group with minimum of 60% marks.

SCHEME OF STUDIES

BS RADIOGRAPHY AND IMAGING TECHNOLOGY

FIRST PROFESSIONAL YEAR			
FIRST SEMESTER			
COURSE CODE	**Course**	**Category**	**Credit Hours**
RGIT-5301	ANATOMY –I	Major	4(3-1)
RGIT-5302	PHYSIOLOGY-I	Inter Disciplinary	3(2-1)
RGIT-5303	FUNDAMENTALS OF RADIOGRAPHY AND IMAGING TECHNOLOGY	Major	3(2-1)
URCG-5118	ENGLISH-I (FUNCTIONAL ENGLISH)	General Education	3(3-0)
URCG-5122	IDEOLOGY AND CONSTITUTION OF PAKISTAN	General Education	2(2-0)
URCG-5123	APPLICATIONS OF INFORMATION COMMUNICATION TECHNOLOGIES (ICT)	General Education	3(2-1)
URCG-5111	TRANSLATION OF THE HOLY QURAN – I (Non-Credit)	Compulsory course	Non-Credit
	Credit Hours		**18**
SECOND SEMESTER			
COURSE CODE	**Course**	**Category**	**Credit Hours**
RGIT-5304	ANATOMY –II	Major	4(3-1)
RGIT-5305	PHYSIOLOGY-II	Inter Disciplinary	3 (2-1)
RGIT-5306	GENERAL RADIOLOGY	Major	3(2-1)
URCG-5119	ENGLISH-II (EXPOSITORY WRITING)	General Education	3 (3-0)
URCG-5105	ISLAMIC STUDIES ** (OR) RELIGIOUS EDUCATION / ETHICS IN LIEU OF ISLAMIC STUDIES ONLY FOR NON-MUSLIM STUDENTS	General Education	2(2-0)
URCG-5125	CIVICS AND COMMUNITY ENGAGEMENT	General Education	2(2-0)
URCG-5127	SEERAT OF THE HOLY PROPHET (SAW)	General Education	1(1-0)
	Credit Hours		**18**
SECOND PROFESSIONAL YEAR			
THIRD SEMESTER			
COURSE CODE	**Course**	**Category**	**Credit Hours**
RGIT-5307	ANATOMY –III	Major	4(3-1)
RGIT-5308	PHYSIOLOGY-III	Inter Disciplinary	3(2-1)
RGIT-5309	MEDICAL PHYSICS	Major	2(2-0)
RGIT-5310	MOLECULAR BIOLOGY & GENETICS	General Education	3(3-0)
RGIT-5311	HEALTH AND WELLNESS	General Education	2(2-0)
URCG-5120	QUANTITATIVE REASONING	General Education	3(3-0)
URCG-5111	TRANSLATION OF THE HOLY QURAN – II **(Non-Credit)**	Compulsory Course	***Non-Credit***
	Credit Hours		**17**
FOURTH SEMESTER			

COURSE CODE	Course	Category	Credit Hours
RGIT-5312	ANATOMY-IV (Neuro Anatomy)	Major	3(2-1)
RGIT-5313	RADIATION SCIENCE AND TECHNOLOGY-I	Major	3(2-1)
RGIT-5314	BIOCHEMISTRY I	Inter Disciplinary	2(2-0)
URCG- 5116	SCIENCE OF SOCIETY-I	General Education	2(2-0)
URCG-5124	ENTREPRENEURSHIP	General Education	2(2-0)
URCG-5121	TOOLS FOR QUANTITATIVE REASONING	General Education	3(3-0)
RGIT-5316	PROFESSIONAL PRACTICE (LAWS, ETHICS AND ADMINISTRATION)	General Education	2(2-0)
	Credit Hours		**17**
THIRD PROFESSIONAL YEAR			
FIFTH SEMESTER			
COURSE CODE	**Course**	**Category**	**Credit Hours**
RGIT-6317	PATHOLOGY & MICROBIOLOGY I	Inter Disciplinary	2(2-0)
RGIT-6318	PHARMACOLOGY & THERAPEUTICS I	Major	2(2-0)
RGIT-6319	RAIOLOGICAL INSTRUMENTATION	Major	3(2-1)
RGIT-6320	GENERAL RADIOLOGICAL TECHNIQUES	Major	3(2-1)
RGIT-6321	BIOCHEMISTRY II	Inter Disciplinary	3(2-1)
RGIT-6322	SUPERVISED CLINICAL PRACTICE I	Major	3(0-3)
URCG-5111	TRANSLATION OF THE HOLY QURAN – III **(*Non-Credit*)**	Compulsory Course	***Non-Credit***
	Credit Hours		**16**
SIXTH SEMESTER			
COURSE CODE	**Course**	**Category**	**Credit Hours**
RGIT-6323	PATHOLOGY & MICROBIOLOGY II	Inter Disciplinary	3(2-1)
RGIT-6324	RADIATION SCIENCE AND TECHNOLOGY-II	Major	3(2-1)
RGIT-6325	BIOSAFETY AND BIOSECURITY	Major	3(2-1)
RGIT-6326	PHARMACOLOGY & THERAPEUTICS II	Major	2(2-0)
RGIT-6327	COMMUNITY MEDICINE & BEHAVIORAL SCIENCE	Inter Disciplinary	3(3-0)
RGIT-6328	SUPERVISED CLINICAL PRACTICE II	Major	3(0-3)
	Credit Hours		**17**
FOURTH PROFESSIONAL YEAR			
SEVENTH SEMESTER			
COURSE CODE	**Course**	**Category**	**Credit Hours**
RGIT-6329	MEDICINE-I	Major	3(3-0)
RGIT-6330	SURGERY-I	Major	3(3-0)
RGIT-6331	NUCLEAR MEDICINE	Major	3(2-1)
RGIT-6332	SPECIAL RADIOLOGICAL TECHNIQUES-I	Major	3(2-1)
RGIT-6333	RESEARCH METHODOLOGY & SCIENTIFIC INQUIRY	Inter Disciplinary	2(2-0)
RGIT-6334	SUPERVISED CLINICAL PRACTICE III	Major	3(0-3)
URCG-5111	TRANSLATION OF THE HOLY QURAN – IV (Non-Credit)	Compulsory Course	Non-Credit

	Credit Hours		**17**
EIGHTH SEMESTER			
COURSE CODE	**Course**	**Category**	**Credit Hours**
RGIT-6335	MEDICINE II	Major	3(3-0)
RGIT-6336	SURGERY II	Major	2(2-0)
RGIT-6337	SPECIAL RADIOLOGICAL TECHNIQUES-II	Major	3(2-1)
RGIT-6338	FORENSIC SCIENCE	Major	2(2-0)
RGIT-6339	AI APPLICATIONS IN HEALTH CARE	Inter Disciplinary	2(2-0)
RGIT-6340	CAPSTONE / RESEARCH PROJECT	Major	6
	Credit Hours		**18**
	TOTAL CREDIT HOURS		**138**

Total theory/Lectures for eight Semesters	103
Total Practical Hours for eight Semesters	20
Total Clinical Hours for eight Semesters	09
Total Research Hours for eight Semesters	06

Note *

Credit hours distribution is as following:

Theory: one credit hour shall be equal to one hour of teaching per week throughout the semester.
Practical / lab: one credit hour shall be equal to two hours of lab work per week throughout the semester.
Clinical: one credit hour shall be equal to three hours of clinical work per week throughout the semester.
Research: One credit hour shall be equal to three hours of research work per week throughout the semester.

FIRST SEMESTER

1. **ANATOMY -I**
2. **PHYSIOLOGY-I**
3. **FUNDAMENTALS OF RADIOGRAPHY AND IMAGING TECHNOLOGY**
4. **ENGLISH-I (FUNCTIONAL ENGLISH)**
5. **IDEOLOGY AND CONSTITUTION OF PAKISTAN**
6. **APPLICATIONS OF INFORMATION COMMUNICATION TECHNOLOGIES (ICT)**
7. **TRANSLATION OF THE HOLY QURAN – I (Non-Credit)**

DETAILS OF COURSES

1. ANATOMY- I

CREDIT HOURS 4(3-1)

COURSE DESCRIPTION

The focus of this course is an in-depth study and analysis of the general and regional organization of the human body. Emphasis is placed upon structure and function of human movement. A comprehensive study of human anatomy histology, embryology, with emphasis on the nervous, musculoskeletal, and circulatory systems is incorporated. Introduction to general anatomy lays the foundation of the course. Dissection and identification of structures in the cadaver supplemented with the study of charts, models, prosected materials and radiographs are utilized to identify anatomical landmarks and configurations of the upper limb

LEARNING OBJECTIVES

- Define basic technical terminology and language associated with anatomy
- Describe the structure, composition and functions of the organs in the human body
- Comprehend the concepts (& associated principles) for each general type of anatomical structures
- Demonstrate skills in the surface markings of clinically important structures, on normal living bodies and the correlation of structure with function
- Describe concepts of embryology and histology
- Identify histological slides of the human body
- Describe the interdependency and interactions of the structural and functional components of upper limb

COURSE CONTENTS

GENERAL ANATOMY AND FUNCTIONAL ANATOMY

- Terms related to position and movements
- The skin and subcutaneous tissues
- Layers of skin
- Integuments of skin
- Glands associated with hair follicle
- Microscopic picture of skin

BONES AND CARTILAGES

- Osteology
- Functions of Bones
- Classification of bones
- Parts of developing long bones
- Blood supply of bones
- Lymphatic vessels & nerve supply
- Rule of direction of nutrient foramen
- Gross structure of long bone
- Surface marking
- Cartilage
- Development of bone and cartilage
- Microscopic picture of cartilage and bone

THE MUSCLE

- Introduction
- Classification
- Histological Classification
- Functions of muscles in general
- Type of skeletal muscles
- Parts of skeletal muscle and their action
- Nomenclature.
- Microscopic picture of muscle

STRUCTURES RELATED TO MUSCLES & BONES

- Tendons
- Aponeurosis
- Fasciae
- Synovial bursae
- Tendon Synovial sheaths
- Raphaes
- Ligaments

- Condyle
- Epicondyle
- Ridge
- Tuberosity
- Tubercle
- Foramen
- Canal
- Groove
- Process
- Spur

THE JOINTS

- Introduction
- Functional classification
- Structural classification
- Structures comprising a Synovial joint
- Movements of joints
- Blood supply of Synovial joints, their nerve supply and lymphatic drainage
- Factors responsible for joint stability
- Development of joints

CARDIOVASCULAR SYSTEM

- Definition
- Division of circulatory system into pulmonary & systemic
- Classification of blood vessels and their microscopic picture
- Heart and its histology
- Function of the Heart
- Anastomosis

NERVOUS SYSTEM

- Definition
- Outline of cellular architecture
- Classification of nervous system
- Parts of the central nervous system
- Microscopic picture of cerebrum, cerebellum, spinal cord
- Functional components of nerve
- Typical spinal nerve
- Microscopic picture of nerve
- Introduction of autonomic nervous system
- Anatomy of neuromuscular junction

GENERAL HISTOLOGY

- Cell
- Epithelium
- Connective tissue
- Bone
- Muscle tissue
- Nerve tissues
- Blood vessels
- Skin and appendages
- Lymphatic organs

GENERAL EMBRYOLOGY

- Male and female reproductive organs
- Cell division and Gametogenesis
- Fertilization, cleavage, blastocyte formation and implantation of the embryo. Stages of early embryonic development in second and third week of intrauterine life
- Foetal membrane (amniotic cavity, yolk sac, allantois, umbilical cord and Placenta)
- Developmental defects

UPPER LIMB OSTEOLOGY

- Detailed description of all bones of upper limb and shoulder girdle along their musculature and ligamentous attachments.

MYOLOGY

- Muscles connecting upper limb to the axial skeletal
- Muscles around shoulder joint
- Walls and contents of axilla
- Muscles in brachial region
- Muscles of forearm
- Muscles of hand
- Retinacula
- Palmar apouenrosis
- Flexor tendon dorsal digital expansion

NEUROLOGY

- Course, distribution and functions of all nerves of upper limb
- Brachial plexus

ANGIOLOGY (CIRCULATION)

- Course and distribution of all arteries and veins of upper limb
- Lymphatic drainage of the upper limb
- Axillary lymph node
- Cubital fossa

ARTHROLOGY

- Acromioclavicular and sternoclavicular joints
- Shoulder joint
- Elbow joint
- Wrist joint
- Radioulnar joints
- Inter carpal joints
- Joints MCP and IP
- Surface anatomy of upper limb
- Surface marking of upper limb

DEMONSTRATION

- Shoulder joint, attached muscles and articulating surfaces
- Elbow joint
- Wrist joint

- Radioulnar joint
- MCP and IP joints
- Acromioclavicular joint
- Sternoclavicular joint
- Brachial plexus
- Blood supply of brain
- Structure of bones

LAB WORK

During study of this course, emphasis should be given on applied aspects, practical histology, radiological anatomy, surface anatomy and cross-sectional anatomy of the region covered in the respective semester /year

Note

The students are expected to make a practical note book. The book is a collection of evidence that learning has taken place. It is a reflective record of their achievements. The practical note book shall contain a record of the surface landmarks and cross-sectional views of parts which student would have observed

RECOMMENDED BOOKS

1. Gray's Anatomy by Prof. Susan Standing 41st Ed., Elsevier.
2. Clinical Anatomy for Medical Students by Richard S. Snell.
3. Clinically Oriented Anatomy by Keith Moore.
4. General Anatomy by Prof.
5. Ghulam Ahmad, latest Ed.
6. Clinical Anatomy by R. J. Last, Latest Ed.
7. Cunningham's Manual of Practical Anatomy by G. J. Romanes, 15th Ed., Vol-I, II and III.
8. The Developing Human. Clinically Oriented Embryology by Keith L. Moore, 6th Ed.
9. Wheater's Functional Histology by Young and Heath, Latest Ed.
10. Medical Histology by Prof. Laiq Hussain.
11. NeuroaSnatomy by Richard S. Snell 7th edition.
12. Jancquera textbook of histology
13. Colourd atlas of histology by defiero
14. Langman`s embryology
15. Clinicaly oriented developmental anatomy by k.l.moore

2. PHYSIOLOGY- I

CREDIT HOUR 3(2-1)

COURSE DESCRIPTION

The course is designed to study the function of the human body at the cellular, tissue and systems levels. The course will help students in understanding the complexities of the cells, tissues, and major organs and systems of the human body, concentrating on basic mechanisms underlying human life processes and important diseases affecting normal human function

LEARNING OBJECTIVES

- Define the terminology related to the structure and function of the human body systems
- Compare and contrast the structural and functional characteristics of the various human body cells
- Describe basic chemical concepts and principles as they apply to the structure and functioning of the blood and neuromuscular system
- Analyze the interrelationships of body organ systems, homeostasis, and the complementarity of structure and functioning of the blood and neuromuscular system

- Demonstrate advance techniques to investigate the body and interpret data to be used for diagnosis and treatment
- Define the principles behind medical instrumentation and their usage

COURSE CONTENTS

CELL PHYSIOLOGY

- Functional organization of human body
- Homeostasis
- Control systems in the body
- Cell membrane and its functions
- Cell organelles and their functions
- Genes: control and function

NERVE AND MUSCLE

- Structure and function of neuron
- Physiological properties of nerve fibers
- Action potential
- Conduction of nerve impulse
- Nerve degeneration and regeneration
- Synapses
- Physiological structure of muscle
- Skeletal muscle contraction
- Skeletal, smooth and cardiac muscle contraction
- Neuromuscular junction and transmission
- Excitation contraction coupling
- Structure and function of motor unit

BLOOD

- Composition and general functions of blood
- Plasma proteins their production and function
- Erythropoiesis and red blood cell function
- Structure, function, production and different types of haemoglobin
- Iron absorption storage and metabolism
- Blood indices, Function, production and type of white blood cells
- Function and production of platelets
- Clotting mechanism of blood
- Blood groups and their role in blood transfusion
- Complications of blood transfusion with reference to ABO & RH incompatibility
- Components of reticuloendothelial systems, gross and microscopic structure including tonsil, lymph node and spleen
- Development and function of reticuloendothelial system

LAB WORK

- Use of the microscope
- Determination of haemoglobin
- Determination of erythrocyte sedimentation rate
- Determining packed cell volume
- Measuring bleeding and clotting time
- RBC count
- Red cell indices

- WBC count
- Leukocyte count
- Prothrombin and thrombin time.
- Blood indices in various disorders
- Clotting disorders
- Blood grouping and cross matching

Note
The students are expected to make a practical note book. The book is a collection of evidence that learning has taken place. It is a reflective record of their achievements

RECOMMENDED BOOKS
1. Textbook of Physiology by Guyton and Hall, 12th Ed.
2. Review of Medical Physiology by William F. Ganong, 23rd Ed.
3. Physiology by Berne and Levy, 6th Ed.
4. Human Physiology: The Basis of Medicine by Gillian Pocock, Christopher D.Richards 4th Ed.
5. Physiological Basis of Medical Practice by John B. West and Taylor, 12th Ed.

3. FUNDAMENTALS OF RADIOGRAPHY AND IMAGING TECHNOLOGY
CREDIT HOURS 3(2-1)

COURSE DESCRIPTION
Allied health professionals are considered the backbone of any healthcare work force and greatly influence the health care delivery system. This course is designed to give knowledge to the students about Radiology and Imaging Sciences and the role of Radiology Profession and the professionals in medical & healthcare field. General introduction, importance, infrastructure, problems and the solutions of the problems encountered in different laboratories related to various sub sections of Radiology Laboratory are the main focus of this course. This course aims at familiarizing the students with the basic radiological procedures, preparation of different types of contrast medias, and reagents used during radiological examinations.

LEARNING OBJECTIVES
- Identify the fundamental principles of radiography, including the properties of x-rays, radiation safety, and basic imaging techniques.
- Apply principles of patient care and communication skills in radiographic procedures, including positioning, immobilization, and radiation protection.
- Apply basic knowledge of digital imaging technologies and techniques in radiography practice.
- Analyze the role of radiography in healthcare delivery and interdisciplinary collaboration.
- Demonstrate critical thinking skills in problem-solving and decision-making related to radiographic procedures and image interpretation.

COURSE CONTENTS

Introduction to Radiology, What is Radio-Imaging, Branches of Radiology; Diagnostic Radiology, Interventional Radiology, Therapeutic Radiology, Radiation Oncology, Brief introduction to various subspecialties of Radiology, Basic principles of Radiology, Planning and Organization of Radiology Lab/Department, Staffing in Radiology Lab/Department, Importance and role of Radiology department in health care, Medical Radiology profession and professionals, professionalism in medical personnel, Code of professional conduct for Radiology personnel, Qualities/characteristics of Radiology Technologists, Different sub-disciplines of Radiological Procedure/Techniques.
Definition of atoms, structure of atom, model of atom, Atomic number, Mass Number, Isotopes and types of isotopes, Radio-Isotopes, Definition of Ionization energy,

Radioactivity and Radiations, radioactive materials and radioactive decay,
Types of radiations; Electromagnetic radiations, Ionizing and Non Ionizing radiations,
Radiation energy, Radioactive decay law, Units of Radioactivity
Interaction of radiation with matter, Radiation units, Absorption of Radiations
Biological effects of Radiations, Harmful tissue reactions, Sources of radiations; Natural vs Man Made Radiations, Use of Radio-Isotopes, Radioactive wastes,
Introduction to Medical Radiology and Radiobiology, Scope of modern radiology and health care.
Units of measurements and dosage calculations:
Brief discussion about benefits and adverse effects of radiology procedures
Different types of chemicals/contrast media, gels used in radiological procedures.
Contrast Agents
A. Types of compound: 1. Metallic salts, 2. Organic iodides: a. Ionic contrast agents, b. Nonionic contrast agents. 3. Gaseous, 4. Oils: Myelograms, sinouses, 5. Tablets: cholecystograms
B. Beam attenuation characteristics
1. Radiolucent (negative), 2. Radiopaque (positive), 3. Impact of atomic number
C. Composition and functions of contrast agents
1. Chemical composition, 2. Absorption characteristics
Characteristics of a good contrast medium, Solubility, Viscosity & Iodine Content, Systemic reactions to contrast medium, Precautions & contraindications of administering Contrast Media
Brief overview of radiological procedures: X rays, Ultrasound, Flouroscopy, CT Scan etc.
Dark Room
Dark Room Construction & Equipment, Theory of photographic process, Photographic process fundamentals, Construction of film, handling, Density Ratio, Constituents of dark room, Developer, Fixer, Automatic Processing, Difference between manual & automatic processing,
Film Artifacts & their Causes, Sensitometery, Densitometry & Optical density, Radiation Protection
Different types of radiation hazards encountered in radiology department
Infection control in radiology department
Practical:
Use of PPEs, Preparation or use of various contrast media for radiological procedures, Contrast Materials (Market Availability, Method, Area of use), Measurements and calculation of radiations and radiation doses, Handling of various equipments, chemicals, reagents used in radiological procedures, Preparing patient for radiological examination.
Dark Room Construction & Equipment
RECOMMENDED TEXT BOOKS

1. Radiological science for technologists by Stewart C. Bushong 7th edition published by Mosby, Inc: A Harcout health company.
2. A guide to radiological procedures by Stephen Chapman & Richard Nikielny 3rd editionin by Bailliere tindall London
3. Merrill atlas of radiography positioning and radiologic procedure vol 3 by Philip W Ballinger.
4. Ultrasound teaching manual: The basics of Performing and Interpreting ultrasound Scans by Mathias Hofer.

4. ENGLISH- I (FUNCTIONAL ENGLISH)
CREDIT HOURS 3(3-0)

The course aims at providing understanding of a writer's goal of writing (i.e. clear, organized and effective content and to use that understanding and awareness for academic reading and writing. The objectives of the course are to make the students acquire and master the grammatical academic writing skills. The course would enable the students to develop argumentative writing techniques. The students would be able to

logically add specific details on the topics such as facts, examples and statistical or numerical values. The course will also provide insight to convey the knowledge and ideas in an objective and persuasive manner. Furthermore, the course will also enhance the students' understanding of ethical considerations in writing academic assignments and topics including citation, plagiarism, formatting and referencing the sources as well as the technical aspects involved in referencing.

Contents

1. Developing Analytical Skills
2. Transitional devices (word, phrase and expressions)
3. Development of ideas in writing
4. Reading Comprehension
5. Precis Writing
6. Developing argument
7. Sentence structure: Accuracy, variation, appropriateness, and conciseness
8. Appropriate use of active and passive voice
9. Organization and Structure of a Paragraph
10. Organization and structure of Essay
11. Types of Essays

Recommended Texts

1. Bailey, S. (2011). Academic writing: A handbook for international students (3rd ed.). New York: Routledge.
2. Eastwood, J. (2011). A Basic English grammar. Oxford: Oxford University Press.
3. Swales, J. M., & Feak, C. B. (2012). *Academic writing for graduate students: Essential tasks and skills* (3rd ed.). Ann Arbor: The University of Michigan Press.
4. Swan, M. (2018). *Practical English usage* (8th ed.). Oxford: Oxford University Press.

Suggested Readings

1. Biber, D., Johansson, S., Leech, G., Conrad, S., Finegan, E., & Quirk, R. (1999). *Longman grammar of spoken and written English*. Harlow Essex: MIT Press.
2. Cresswell, G. (2004). *Writing for academic success*. London: SAGE.
3. Johnson-Sheehan, R. (2019). *Writing today*. Don Mills: Pearson.
4. Silvia, P. J. (2019). *How to write a lot: A practical guide to productive academic writing*. Washington: American Psychological Association
5. Thomson, A. J., & Martinet, A. V. (1986). *A Practical English Grammar*. Oxford: Oxford University Press

5. IDEOLOGY AND CONSTITUTION OF PAKISTAN
CREDIT HOURS 2(2-0)

This course focuses on ideological background of Pakistan. The course is designed to give a comprehensive insight about the constitutional developments of Pakistan. Starting from the Government of India Act, 1935 till to date, all important events leading to constitutional developments in Pakistan will be the focus of course. Failure of the constitutional machinery and leading constitutional cases on the subject. Moreover, students will study the process of governance, national development, issues arising in the modern age and posing challenges to Pakistan. It will also cover the entire Constitution of Pakistan 1973. However, emphasis would be on the fundamental rights, the nature of federalism under the constitution, distribution of powers, the rights and various remedies, the supremacy of parliament and the independence of judiciary

Outline:

- **Ideology of Pakistan**

  Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-e-Azam Muhammad Ali Jinnah.

  Two Nation Theory and Factors leading to Muslim separatism.

- Constitutional Developments

  Salient Feature of the Government of India Act 1935
  Salient Feature of Indian Independence Act 1947
  Objectives Resolution

  Salient Feature of the 1956 Constitution

  Developments leading to the abrogation of Constitution of 1956
  Salient features of the 1962 Constitution

  Causes of failure of the Constitution of 1962

  Comparative study of significant features of the Constitution of 1956, 1962 and 1973

- Fundamental rights
- Principles of policy

Federation of Pakistan President Parliament

The Federal Government

- Provinces

  Governors

  Provincial Assemblies

  The Provincial Government

- The Judicature
- Supreme Court High Courts
- Federal Shariat Courts Supreme Judicial Council

Administrative Courts and tribunals

- Islamic Provisions in Constitution
- Significant Amendments of Constitution of Pakistan 1973

Recommended Books:

1. Constitutional and Political History of Pakistan by Hamid Khan
2. Mahmood, Shaukat and Shaukat, Nadeem. Constitution of the Islamic Republic of Pakistan, 3rd re edn. Lahore: Legal Research Centre, 1996.
3. Munir, Muhammad. Constitution of the Islamic Republic of Pakistan: Being a Commentary on the Constitution of Pakistan, 1973. Lahore, Law Pub., 1975.
4. Rizvi, Syed Shabbar Raza. Constitutional Law of Pakistan: Text, Case Law and Analytical Commentary. 2nd re edn. Lahore: Vanguard, 2005.
5. The Text of the Constitution of the Islamic Republic of Pakistan, 1973 (as amended).

6. APPLICATIONS OF INFORMATION COMMUNICATION TECHNOLOGIES (ICT) CREDIT HOURS: 3(2-1)

COURSE DESCRIPTION

The course introduces students to information and communication technologies and their application in the workplace. Objectives include basic understanding of computer software, hardware, and associated technologies. How computers can be used in the workplace, how communications systems can help boost

productivity, and how the Internet technologies can influence the workplace. Students will get basic understanding of computer software, hardware, and associated technologies. They will also learn how computers are used in the workplace, how communications systems can help to boost productivity, and how the Internet technologies can influence the workplace.

Contents

1. Introduction, Overview of Information Technology.
2. Hardware: Computer Systems & Components, Storage Devices.
3. Software: Operating Systems, Programming and Application Software.
4. Databases and Information Systems Networks.
5. File Processing Versus Database Management Systems.
6. Data Communication and Networks.
7. Physical Transmission Media & Wireless Transmission Media.
8. Applications of smart phone and usage.
9. The Internet, Browsers and Search Engines.
10. Websites and their types.
11. Email Collaborative Computing and Social Networking.
12. E-Commerce.
13. IT Security and other issues.
14. Cyber Laws and Ethics of using social media.
15. Use of Microsoft Office tools (Word, Power Point, Excel) or other similar tools depending on the operating system.
16. Other IT tools/software specific to field of study of the students if any.

Recommended Texts

1. Discovering Computers 2022: Digital Technology, Data and Devices by Misty E. Vermaat, Susan L. sebok; 17th edition.

Suggested Readings

1. Computing Essentials 2021 by Timothy J. O'Leary and Linda I. O'Leary, McGraw Hill Higher Education; 26th edition.
2. Computers: Understanding Technology by Fuller, Floyd; Larson, Brian: edition 2018.

URCG-5111 **Translation of the Holy Quran – I** **1 (0+1)**

Topic	Details
Semester/Level	In some discipline 1st semester and in some discipline 2nd Semester/ ADP Program 1st Year
Course Code	URCG-5111
Course Title	Translation of the Holy Quran – I
Credit Hours	1(0-1)
Objectives	• To familiarize the students to keys and fundamentals of recitation of the holy Quran. • To develop the skill of the students of recitation the last revelation. • Students will learn the basic Arabic grammar in a practical way. • To develop an eagerness among the students to explore the last divine Book.
Course Contents:	• تیسواں پارہ-ناظرہ مع تجوید • بنیادی عربی گرامر اسم اور اسکے متعلقات: اسم فاعل، مفعول، تفضیل، مبالغہ فعل اور اسکی اقسام: ماضی، مضارع، امر، نہی حرف اور اسکی اقسام: حروف علت، حروف جارہ، مشبہ بالفعل
Memorization:	تیسویں پارے کی آخری بیس سورتیں (حفظ مع ترجمہ)

SECOND SEMESTER

1. **ANATOMY-II**
2. **PHYSIOLOGY-II**
3. **GENERAL RADIOLOGY**
4. **ENGLISH-II (EXPOSITORY WRITING)**
5. **ISLAMIC STUDIES/ETHICS**
6. **CIVICS AND COMMUNITY ENGAGEMENT**
7. **SEERAT OF THE HOLY PROPHET**

1. ANATOMY- II
CREDIT HOURS 4(3-1)

COURSE DESCRIPTION

The focus of this course is an in-depth study and analysis of the regional and systemic organization of the body. Emphasis is placed upon structure and function of human movement. A comprehensive study of human anatomy with emphasis on the nervous, musculoskeletal and circulatory systems is incorporated. Introduction to general anatomy lays the foundation of the course. Dissection and identification of structures in manikins/smart board systems supplemented with the study of charts, models, prosected materials and radiographs are utilized to identify anatomical landmarks and configurations of the lower limb, abdomen and pelvis

LEARNING OBJECTIVES

- Describe gross anatomy of neuro-musculoskeletal and circulatory system of lower limb, abdominal wall and pelvis.
- Demonstrate anatomical landmarks and configuration of the lower limb, abdominal wall and pelvis through dissection/identification of structures in the manicans / smart board systems supplemented with the study of charts, models, prosected materials, and radiographs.
- Describe major stages of embryological development of the lower limb with development of the neurological and vascular supplies to the lower limb.

COURSE CONTENTS

LOWER LIMB OSTEOLOGY

- Detailed description of all bones of lower limb and pelvis along with their markings

MYOLOGY

- Muscles of gluteal region
- Muscles around hip joint
- Muscles of thigh
- Muscles of lower leg and foot

NEUROLOGY

- Course, distribution, supply of all nerves of lower limb and gluteal region
- Lumbosacral plexus

ANGIOLOGY

- Course and distribution of all arteries, veins and lymphatic drainage of lower limb

ARTHROLOGY

- Pelvis
- Hip joint
- Knee joint
- Ankle joint
- Joints of the foot
- Surface Anatomy of lower limb
- Surface Marking of lower limb

ABDOMEN

ABDOMINAL WALL

- Structures of anterior abdominal wall: superficial and deep muscles
- Structure of rectus sheath
- Structures of Posterior abdominal wall
- Lumbar spine (vertebrae)
- Brief description of viscera

PELVIS

- Brief description of anterior, posterior and lateral walls of the pelvis
- Inferior pelvic wall or pelvic floor muscles
- Sacrum
- Brief description of perineum
- Nerves of perineum

EMBRYOLOGY

- Introduction to developing human
- Gametogenesis, Spermatogenesis, Oogenesis
- Fertilization and phases of fertilization
- Germ layers
- Development of limbs, Muscular system and Nervous system

LAB WORK

During study of Gross Anatomy, emphasis should be given on applied aspect, radiological anatomy, surface anatomy and cross-sectional anatomy of the region covered in the respective semester /year.

Note

The students are expected to make a practical note book. The book is a collection of evidence that learning has taken place. It is a reflective record of their achievements

RECOMMENDED BOOKS

1. Gray's Anatomy by Prof. Susan Standing 41st Ed., Elsevier.
2. Clinical Anatomy for Medical Students by Richard S. Snell.
3. Clinically Oriented Anatomy by Keith Moore.
4. General Anatomy by Prof. Ghulam Ahmad, latest Ed.
5. Clinical Anatomy by R. J. Last, Latest Ed.
6. Cunningham's Manual of Practical Anatomy by G. J. Romanes, 15th Ed., Vol-I, II and III.
7. The Developing Human. Clinically Oriented Embryology by Keith L. Moore, 6th Ed.
8. Wheater's Functional Histology by Young and Heath, Latest Ed.
9. Medical Histology by Prof. Laiq Hussain.
10. Neuroanatomy by Richard S. Snell 7th edition.
11. Jancquera textbook of histology
12. Colourd atlas of histology by defiero
13. Langman`s embryology
14. Clinicaly oriented *developmental anatomy by k.l.moore*

2. PHYSIOLOGY- II
CREDIT HOURS 3(2-1)

COURSE DESCRIPTION

The course is designed to study the function of the human body at the molecular, cellular, tissue and systems levels. These topics are addressed by a consideration of the cardiovascular, gastrointestinal, and endocrinological systems. The integrative nature of physiological responses in normal function and disease is stressed throughout the course

LEARNING OBJECTIVES

- Describe functions of gastrointestinal tract, endocrinology and cardiovascular system
- Describe physiology at the molecular, metabolic/cellular, tissue and systems levels
- Differentiate the physiological responses in normal function and disease stages

COURSE CONTENTS

GASTROINTESTINAL TRACT

- General function of gastrointestinal tract
- Enteric nervous system
- Control of gastrointestinal mobility and secretions
- Mastication
- Swallowing: mechanism and control
- Function, motility and secretions of stomach
- Function, motility and secretions of small intestine
- Function, motility and secretions of large intestine
- Function of GIT hormones
- Mechanism of vomiting and its control pathway
- Defecation and its control pathway
- Functions of liver
- Functions of, gallbladder and bile in digestion
- Endocrine & exocrine pancreas and functions of pancreas in digestion
- Dysphagia
- Physiological basis of acid peptic disease

CARDIOVASCULAR SYSTEM

- Heart and circulation
- Function of cardiac muscle
- Cardiac pacemaker and cardiac muscle contraction
- Cardiac cycle
- ECG: recording and interpretation
- Common arrhythmias
- Types of blood vessels and their function
- Haemodynamics of blood flow (local control systemic circulation its regulation and control). Peripheral resistance its regulation and effect on circulation
- Arterial pulse
- Blood pressure and its regulation
- Cardiac output and its control
- Heart sounds and murmurs Importance in circulation and control of venous return.
- Coronary circulation
- Splanchnic, pulmonary and cerebral circulation
- Triple response and cutaneous circulation

ENDOCRINOLOGY

- Classification of endocrine glands
- Mechanism of action
- Feedback and control of hormonal secretion
- Functions of the hypothalamus
- Hormones secreted by the anterior and posterior pituitary and their mechanism of action and function.
- Function of the thyroid gland

- Function of the parathyroid gland
- Calcium metabolism and its regulation
- Secretion and function of calcitonin
- Hormones secreted by the adrenal cortex and medulla, and their function and mechanism of action
- Endocrine functions of the pancreas and control of blood sugar
- The endocrine functions of the kidney and Physiology of growth.

LAB WORK

- Clinical significance of cardiac cycle, correlation of ECG and heart sounds
- Examination of arterial pulses
- Arterial blood pressure
- Effects of exercise and posture on blood pressure
- Cardiopulmonary resuscitation (to be coordinated with the department of medicine)

Note

The students are expected to make a sketch book. The sketch book is a collection of evidence that learning has taken place. It is a reflective record of achievements

RECOMMENDED BOOKS

1. Textbook of Physiology by Guyton and Hall, 12th Ed.
2. Review of Medical Physiology by William F. Ganong, 23rd Ed.
3. Physiology by Berne and Levy, 6th Ed.
4. Human Physiology: The Basis of Medicine by Gillian Pocock, Christopher D.Richards 4th Ed.
5. Physiological Basis of Medical Practice by John B. West and Taylor, 12th Ed.

3. GENERAL RADIOLOGY
CREDIT HOURS 3(2-1)

COURSE DESCRIPTION

Content provides the knowledge base necessary to perform standard Radiographic procedures. Consideration is given to the evaluation of optimal diagnostic images.

LEARNING OBJECTIVES

- Describe standard positioning terms.
- Demonstrate proper use of positioning aids.
- Discuss general procedural considerations for radiographic exams.
- Identify methods and barriers of communication and describe how each may be used or
- overcome effectively during patient education.
- Explain radiographic procedures to patients/family members.
- Modify directions to patients with various communication problems.
- Develop an awareness of cultural factors that necessitate adapting standard exam protocols.
- Adapt general procedural considerations to specific clinical settings.
- Identify the structures demonstrated on routine radiographic images.
- Simulate radiographic procedures on a person or phantom in a laboratory setting.
- Evaluate images for positioning, centering, appropriate anatomy and overall image quality.
- Discuss equipment and supplies necessary to complete basic radiographic procedures.
- Explain the routine and special positions/projections for all radiographic procedures.
- Apply general radiation safety and protection practices associated with radiography

COURSE CONTENTS

Terminologies; Anatomical terminology, Positioning terminology, Projection terminology Radiographic image, Image formation, Projection and view, Density & contrast, subject contrast, subjective contrast, Radiographic contrast, Magnification and distortion, Image sharpness. Digital imaging; Image acquisition and display, Networking, Image processing,

Typical PACS components and workflow; Exposure factors, Milliampere seconds, Kilovoltage, Focus to film distance, Intensifying screens, Secondary radiation grid. Radiation protection; Dose quantities, Radiation risks, Medical exposure legislation, Practical protection measure. UPPER LIMB: Position of patients in relation to table. Basic and specials projections of Hand, Fingers, Thumb, Scaphoid, Carpal tunnel, Wrist, forearm, Elbow, Humerus supracondylar fracture, shaft, neck, SHOULDER: Basic and specials projections of Outlet projections, Glenohumeral joint, Recurrent dislocation, Calcified tendon, Acromioclavicular joint, Clavicle, Sternoclavicular joints, Scapula, Coracoid process. LOWER LIMB, Basic and specials projections of Foot, Toes, Ankle joint, Calcaneum, Subtalar joints, Tibia and fibula, Proximal tibio fibular joint, Knee joint, Shaft of femur, Leg alignment, HIP, PELVIS AND SACRO ILIAC JOINTS Basic and specials projections of Anatomy, Effect of rotation and abduction of lower limb, Hip joint, upper third of femur and pelvis, Acetabulum and hip joint, Pelvis, Sacroiliac joints. VERTEBRAL COLUMN: Basic and specials projections of Vertebral curves, Vertebral level, Cervical vertebrae, Cervico thoracic junction, Thoracic vertebrae, Thoracolumbar junction, Lumbar vertebrae, Lumbosacral junction, Sacrum, Coccyx. THORAX AND UPPER AIRWAY Basic and specials projections of Pharynx and larynx, Trachea, Lungs, Heart and aorta, Bones of thorax, Lower ribs, Upper ribs, Sternum. SKULL: Radiologic terminology, Basic and specials projections of Skull nonisocentric techniques and isocentric technique. FACIAL BONES AND SINUSES Radiographic anatomy Basic and specials projections of Facial bones, Occipito metal, Zygomatic arches, Orbits, Nasal bones, Mandible, Temporo mandibular joint, Paranasal sinuses. DENTAL RADIOGRAPHY: Introduction, Radiographic anatomy, Bitewing radiography, Periapical radiography, occlusal radiography, Lateral oblique of the mandible & maxilla, Dental panoramic tomography, Cephalometry. ABDOMEN AND PELVIC CAVITY Radiographic anatomy, Basic and specials projections of Abdomen and pelvic cavity, Liver and diaphragm, Diaphragmatic movement during respiration, Urinary tract, Urinary bladder, Biliary system. WARD RADIOGRAPHY: Introduction, Radiation protection, Control of infection, Equipment. Basic and specials projections of Heart & lungs, Abdomen, Cervical spine, Fractured lower limbs, THEATRE RADIOGRAPHY: Basic and specials projections of Non trauma corrective, Orthopedic surgery, Trauma orthopedic surgery Dynamic hip screw insertion, Interventional urology, Operative cholangiography, Hysterosalpingography, Emergency peripheral vascular procedure

LAB WORK

- Demonstrations of the general radiology techniques
- Demonstrations of different radiological positioning

Note

The students are expected to make a practical note book. The book is a collection of evidence that learning has taken place. It is a reflective record of their achievements

RECOMMENDED BOOKS

1. Radiological science for technologists by Stewart C. Bushong 7th edition published by Mosby, Inc: A Harcout health company.
2. A guide to radiological procedures by Stephen Chapman & Richard Nikielny 3rd editionin by Bailliere tindall London
3. Merrill atlas of radiography positioning and radiologic procedure vol 3 by Philip W Ballinger.

4. Ultrasound teaching manual: The basics of Performing and Interpreting ultrasound Scans by Mathias Hofer.

4. ENGLISH-II (EXPOSITORY WRITING)
CREDIT HOURS 3(3-0)

This course prepares undergraduates to become successful writers and readers of English. The course helps students develop their fundamental language skills with a focus on writing so that they can gain the confidence to communicate in oral and written English outside the classroom. The course is divided into five units and takes a Project-based Learning approach. Unit themes target the development of 21st century skills and focus on self-reflection and active community engagement. The course completion will enable the students to develop communication skills as reflective and self-directed learners. They will be able to intellectually engage with different stages of writing process, and develop analytical and problem-solving skills to address various community-specific challenges.

Contents

1. Self-Reflection
    - Introduction to the basics of the writing process
    - Introduction to the steps of essay writing
    - Prewriting activities: Brainstorming, listing, clustering and freewriting
    - Practicing Outlining of the essay
2. Personalized Learning
    - Learning Process, Learning Styles, Goal Setting and Learning Plan
3. Oral Presentation
    - Structure and Significance, Content Selection and Slide Presentation, Peer Review
4. Critical Reading Skills
    - Introducing Authentic Reading (Dawn and non-specialist academic books/texts)
    - Reading Strategies and Practice: Skimming, scanning, SQW3R, Annotating, Detailed reading and note-taking, Standard Test Practice: TOEFL and IELTS, Model Review Reports and Annotated Bibliographies
5. Community Engagement
    - Student-led brainstorming on local versus global issues, Identifying research problems
    - Drafting research questions, Drafting interview/survey questions for community research (in English or L1)
    - Engaging students in Critical reading, Presenting interview/ survey information, Field work
    - Writing Community Engagement Project
6. Letter to the Editor
    - Types of letters, Format and purpose of letter to the editor, Steps in writing letter-to-editor

Recommended Texts

1. Bailey, S. (2011). Academic writing: A handbook for international students (3rd ed.). New York: Routledge.
2. Swales, J. M., & Feak, C. B. (2012). *Academic writing for graduate students: Essential tasks and skills* (3rd ed.). Ann Arbor: The University of Michigan Press.

Suggested Readings

1. Cresswell, G. (2004). *Writing for academic success*. London: SAGE.
2. Johnson-Sheehan, R. (2019). *Writing today*. Don Mills: Pearson.

Silvia, P. J. (2019). *How to write a lot: A practical guide to productive academic writing.*Washington: American Psychological Association.

URCG-5105 **Islamic Studies (Compulsory)** **2(2-0)**

Course Description

Islamic Studies engages in the study of Islam as a textual tradition inscribed in the fundamental sources ofIslam; Qur'an and Hadith, history and particular cultural contexts. The area seeks to provide an introductionto and a specialization in Islam through a large variety of expressions (literary, poetic, social, and political)and through a variety of methods (literary criticism, hermeneutics, history, sociology, and anthropology). It offers opportunities to get fully introductory foundational bases of Islam in fields that include Qur'anic studies, Hadith and Seerah of Prophet Muhammad (PBUH), Islamic philosophy, and Islamic law, culture and theology through the textual study of Qir'an and Sunnah..

Course Objectives

At the completion of this course students will be able to:

1. To make students understand the relevance and pragmatic significance of Islam in their lives.
2. To make learners comprehend the true spirit of Islam with reference to modern world.
3. To generate a sense of Islamic principles as a code of living that guarantee the effective solutions tothe current challenges of being.
4. To provide Basic information about Islamic Studies
5. To enhance understanding of the students regarding Islamic Civilization
6. To improve Students skill to perform prayers and other worships
7. To enhance the skill of the students for understanding of issues related to faith and religious life.

Course Outline

Introduction to Qur'anic Studies

1) Basic Concepts of Qur'an
2) History of Quran
3) Uloom-ul-Quran

مطالعہ قرآن (تعارف قرآن، منتخب آیات کا ترجمہ و تفسیر: سورۃ البقرہ آیات 1-5، 284-286؛ سورۃ الحجرات آیات 1-18؛، سورۃ الفرقان آیات 63-77؛ سورۃ المومنون آیات 1-11؛، سورۃ الاحزاب آیات 6، 21، 32-33؛، 40، 56-59؛ سورۃ الانعام آیات 151-153؛، سورۃ الصف آیات 1-14؛ الحشر آیات 18-20؛ آل عمران آیات 190-192؛ النحل آیات 12-14؛ لقمن آیت 20، حم السجدہ آیت 53)

Introduction to Sunnah

1) Introduction of Hadith
2) Legal Status of Hadith
3) History of the compilation of Hadith
4) Kinds of Hadith

حدیث کا تعارف، حدیث کی دینی حیثیت، حفاظت و تدوین حدیث، حدیث کی اقسام

متن، حدیث: 1 درج ذیل موضوعات پر احادیث کا مطالعہ

1۔ اعمال کا اجر نیت پر منحصر ہے۔ 2۔ بہترین انسان قرآن کا طالب علم اور اس کا معلم ہے۔ 3۔ کتاب و سنت گمراہی سے بچنے کا ذریعہ ہیں 4۔ ارکان اسلام 5۔ اسلام، ایمان، احسان اور قیامت کی نشانیاں، 6۔ بچوں کی نماز کی تلقین 7۔ دین کا گہرا فہم اللہ کی خاص عنایت ہے 8۔ حصول علم، تلاوتِ قرآن اور عمل کی اہمیت و فضیلت، 9۔ روز محشر کا محاسبہ، 10۔ حقوق اللہ

کے ساتھ ساتھ حقوق العباد کا لحاظ رکھنا بھی لازم ہے 11۔ حسن خلق کی عظمت اور فحش و بد گوئی کی مذمت 12۔ دنیا و آخرت کی بھلائی کی ضامن چار چیزیں، 13۔ ہلاک کر دینے والی سات چیزیں، 14۔ بے عمل مبلغ کا عبرت ناک انجام 15۔ ہر شخص نگران ہے اور ہر شخص مسئول

1) Sirah of the Prohet
2) Importance of the Study of Sirah
3) Character building method of the Prophet

(سیرت النبی ﷺ(مطالعہ سیرت کی ضرورت و اہمیت، تعمیر، سیرت و شخصیت کا نبوی منہاج اور عملی نمونے، اقامت دین کا نبوی طریق کار، اقامتِ دین بعہدِ خلافت راشدہ، میثاق مدینہ، خطبہ حجۃ الوداع، اخلاقی تعلیمات، تشکیل اجتماعیت اور اسوہ حسنہ، قرآن مجید میں سیرت سرور عالم کا بیان، غزواتِ نبوی ﷺ کے مقاصد و حکمتیں)

Islamic Culture & Civilization
1) Basic Concepts of Islamic Culture & Civilization
2) Historical Development of Islamic Culture & Civilization
3) Characteristics of Islamic Culture & Civilization
4) Islamic Culture & Civilization and Contemporary Issues

4. اسلامی تہذیب و تمدن (اسلامی تہذیب کا مفہوم، اسلامی کے عوامل و عناصر، اسلامی تہذیب کی خصوصیات،، اسلامی تہذیب، علمی، معاشرتی اور سماجی اثرات، تہذیبوں کے تصادم کے نظریے کا تنقیدی جائزہ، تہذیبی تصادم کے اثرات و نتائج، طبعی، حیاتیاتی اور معاشرتی علوم میں مسلمانوں کا کردار، نامور مسلمان سائنسدان)

Pre-Requisite: Nil

Recommended Books

1) Hameed ullah Muhammad, —Emergence of Islam‖ , IRI, Islamabad
2) Hameed ullah Muhammad, —Muslim Conduct of State
3) Hameed ullah Muhammad, ‗Introduction to Islam
4) Ahmad Hasan, —Principles of Islamic Jurisprudence‖ Islamic Research, Institute, International Islamic University, Islamabad (1993)
5) Dr. Muhammad Zia-ul-Haq, —Introduction to Al Sharia Al Islamia‖ Allama Iqbal Open University, Islamabad (2001)
6) Dr. MuhammadShahbaz Manj, Teleeemat-e- Islam

URCG-5126 **Religious Education/Ethics** **2(2-0)**

Course Description

Ethics is the branch of philosophy that explores and examines concepts of right and wrong, moral principles, and ethical decision-making. This course will provide students with a comprehensive understanding of ethical theories, principles, and their applications in various contexts. Ethics plays a crucial role in our personal lives, professional endeavors, and interactions within society. It helps the students to navigate complex moral dilemmas, make informed choices, and develop a strong moral compass. By studying ethics, students will explore into the fundamental questions of human behavior, values, and the principles that guide our actions.

Course Objectives

At the completion of this course students will be able to:

1. Understand the definition and scope of ethics as a branch of philosophy.
2. Identify the key components of ethical inquiry and the relevance of ethics in personal and professional life.
3. Explore the intersection between ethics and religious beliefs, science & law and relevant ethical implications and responsibilities.
4. Apply ethical theories and principles to real-life scenarios, demonstrating the ability to evaluate moral dilemmas and make ethically informed decisions.
5. Trace the origins of morality in human instinct and evolutionary development.
6. Analyze different theories moral theories and their applications in daily life.
7. Enhance communication skills to articulate ethical viewpoints effectively, engaging in respectful and persuasive discussions.
8. Explore ethical considerations for professionals, students and teachers as well as entrepreneurs

Course Outline

1. Meaning and Scope of Ethics
2. Relation of Ethics with
   - 2.1 Religion
   - 2.2 Science
   - 2.3 Law
3. Historical Development of Morality
   - 3.1 Instinctive Moral Life
   - 3.2 Customary Morality
   - 3.3 Reflective Morality
4. Moral Theories
   - 4.1 Hedonism (Mill)
   - 4.2 Intuitionism (Butler)
   - 4.3 Kant's Moral Theory
5. Moral Ethics and Society
   - 5.1 Freedom and Responsibility
   - 5.2 Tolerance
   - 5.3 Justice
   - 5.4 Punishment (Theories of Punishment)
6. Moral Teachings of Major Religions
   - 6.1 Judaism
   - 6.2 Christianity
   - 6.3 Islam
7. Professional Ethics

7.1 Medical Ethics
7.2 Ethics of Students
7.3 Ethics of Teachers
7.4 Business Ethics

Recommended Texts:

1. Lille, W. (Latest edition). An Introduction to Ethics. London: Methuen & Co.
2. Titus, H. H. (Latest edition). Ethics for Today. New York: American Book.
3. Hill, T. (Latest edition). Ethics in Theory and Practice. N.Y.: Thomas Y. Crowel.
4. Ameer A., S. (Latest edition). The Ethics of Islam. Culcutta: Noor Library Publishers.
5. Donaldson, D. M. (Latest edition). Studies in Muslim Ethics. London.
6. Sayeed, S. M. A. (Tr.) Ta'aruf-e-Akhlaqiat. Karachi: BCC&T, University of Karachi.

6. CIVICS AND COMMUNITY ENGAGEMENT
Credit Hours 2(2-0)

The Civics and Community Engagement course is designed to provide students with an understanding of the importance of civic participation, culture and cultural diversity, basic foundations of citizenship, group identities and the role of individuals in creating positive change within their communities. The course aims at developing students' knowledge, skills and attitudes necessary for active and responsible citizenship.

Learning outcomes

After completing this course, students will be able to

- Understand the concepts of civic engagement, community development, and social responsibility.
- Understand rights and responsibilities of citizenship
- Understand cultural diversity in local and global context
- Analyze the significance of civic participation in promoting social justice, equity, and
- democracy.
- Examine the historical and contemporary examples of successful civic and community engagement initiatives.
- Identify and assess community needs, assets, and challenges to develop effective strategies for community improvement.
- Explore the ethical implications and dilemmas associated with civic and community engagement.
- Develop practical skills for effective community organizing, advocacy, and leadership.
- Foster intercultural competence and respect for diversity in community engagement efforts.
- Collaborate with community organizations, stakeholders, and fellow students to design and implement community-based projects.
- Reflect on personal growth and learning through self-assessment and critical analysis of community engagement experiences.

Course Content:

Introduction to Civics & Community Engagement

- Overview of the course: Civics & Community Engagement
- Definition and importance of civics
- Key concepts in civics: citizenship, democracy, governance, and the rule of law
- Rights and responsibilities of citizens

Citizenship and Community Engagement

- Introduction to Active Citizenship: Overview of the Ideas, Concepts, Philosophy and Skills
- Approaches and Methodology for Active Citizenship

Identity, Culture, and Social Harmony

- Concept and Development of Identity, Group identities
- Components of Culture, Cultural pluralism, Multiculturalism, Cultural Ethnocentrism, Cultural relativism, Understanding cultural diversity, Globalization and Culture, Social Harmony,
- Religious Diversity (Understanding and affirmation of similarities & differences)
- Understanding Socio-Political Polarization
- Minorities, Social Inclusion, Affirmative actions

Multi-cultural society and inter-cultural dialogue

- Inter-cultural dialogue (bridging the differences, promoting harmony)
- Promoting intergroup contact/ Dialogue
- Significance of diversity and its impact
- Importance and domains of Inter-cultural dialogue

Active Citizen: Locally Active, Globally Connected

- Importance of active citizenship at national and global level

- Understanding community
- Identification of resources (human, natural and others)
- Utilization of resources for development (community participation)
- Strategic planning, for development (community linkages and mobilization)

Human rights, constitutionalism and citizens' responsibilities

- Introduction to Human Rights
- Human rights in constitution of Pakistan
- Public duties and responsibilities
- Constitutionalism and democratic process

Social Institutions, Social Groups, Formal Organizations and Bureaucracy

- Types of Groups, Group identities, Organizations
- Bureaucracy, Weber's model of Bureaucracy
- Role of political parties, interest groups, and non-governmental organizations

Civic Engagement Strategies

- Grassroots organizing and community mobilization
- Advocacy and lobbying for policy change
- Volunteerism and service-learning opportunities

Social issues/Problems of Pakistan

- Overview of major social issues of Pakistani society

Social Action Project

Recommended Texts

1. Kennedy. J. K., & Brunold, A. (2016). Regional context and Citizenship education in Asia and Europe. New Yourk: Routledge, Falmer.
2. Henslin, James M. (2018). Essentials of Sociology: A Down to Earth Approach (13th ed.). New York: Pearson Education
3. Macionis, J. J., & Gerber, M.L. (2020). Sociology. New York: Pearson Education

Suggested Readings

1. Glencoe McGraw-Hill. (n.d.). Civics Today: Citizenship, Economics, and Youth.
2. Magleby, D. B., Light, P. C., & Nemacheck, C. L. (2020). Government by the People (16th ed.). Pearson.
3. Sirianni, C., & Friedland, L. (2005). The Civic Renewal Movement: Community-Building and Democracy in the United States. Kettering Foundation Press.
4. Bloemraad, I. (2006). Becoming a Citizen: Incorporating Immigrants and Refugees in the United States and Canada. University of California Press.
5. Kuyek, J. (2007). Community Organizing: Theory and Practice. Fernwood Publishing.
6. DeKieffer, D. E. (2010). The Citizen's Guide to Lobbying Congress. TheCapitol.Net.
7. Rybacki, K. C., & Rybacki, D. J. (2021). Advocacy and Opposition: An Introduction to Argumentation (8th ed.). Routledge.
8. Kretzmann, J. P., & McKnight, J. L. (1993). Building Communities from the Inside Out: A Path Towards Finding and Mobilizing a Community's Assets. ACTA Publications.
9. Patterson, T. E. (2005). Engaging the Public: How Government and the Media Can Reinvigorate American Democracy. Oxford University Press.
10. Love, N. S., & Mattern, M. (2005). Doing Democracy: Activist Art and Cultural Politics. SUNY Press.

URCG-5127 **Seerat of the Holy Prophet (SAW)** **1(1+0)**

Seerat of the Holy Prophet مطالعہ سیرت النبی صلی اللہ علیہ وسلم

Course Code URCG-5127

Title	Description
Semester	
Nature of Course	
No. of C.Hrs.	1(1-0)
Total Teaching weeks	18
Objectives of the Course	۱۔ طلباء کو مطالعہ سیرۃ طیبہ کی ضرورت واہمیت سے آگاہ کرنا ۲۔ تعمیر شخصیت میں مطالعہ سیرۃ طیبہ کے کردار کو واضح کرنا ۳۔ بعثت نبوی کے موقع پر اقوام عالم کی عمومی صورت حال سے آگاہ کرنا ۴۔ رسول اکرم صلی اللہ علیہ وسلم کی مکی اور مدنی زندگی کا اس طرح مطالعہ کروانا کہ طلباء ان واقعات سے نتائج کا استنباط کر سکیں ۵۔ طلباء کو عہد نبوی کی معاشرت، سیاست، معیشت سے آگاہ کرنا

Course Description

S.No.	Title	Description
1	حضور صلی اللہ علیہ وسلم کے ابتدائی حالاتِ زندگی	۱۔ حضور صلی اللہ علیہ وسلم کا خاندانی حسب ونسب ۲۔ پیدائش اور ابتدائی تربیت ۳۔ لڑکپن اور جوانی کے حالات زندگی
2	بعثت نبوی کے وقت دنیا کے حالات (۱)	۱۔ بعثت نبوی کے وقت اہم تہذیبیں ۲۔ عرب، مصر، حبشہ، بازنطینی، ساسانی
3	بعثت نبوی	۱۔ مکی عہد میں دعوت اسلام
4	بعثت نبوی	۱۔ مدنی عہد میں دعوت اسلام
5	خصائص النبیؐ	آپؐ بطور پیغامبر امن
6	خصائص النبیؐ	بحیثیت استاد و معلم
7	خصائص النبیؐ	بحیثیت تاجر
8	خصائص النبیؐ	بحیثیت سربراہ ریاست
9	خصائص النبیؐ	ذاتی محاسن اور عالمگیر اثرات

ناموس رسالت	خصائص النبیؐ	10
غیر مسلموں سے تعلقات	اسوہ حسنہ اور عصر حاضر	11
اسوہ حسنہ کی روشنی میں گھریلو زندگی	اسوہ حسنہ اور عصر حاضر	12
مستشرقین اور مطالعہ سیرت	اسوہ حسنہ اور عصر حاضر	13
وطن سے محبت اور سیرت	اسوہ حسنہ اور عصر حاضر	15
مستشرقین کے اعتراضات اور ان کے جوابات	اسوہ حسنہ اور عصر حاضر	16

نصابی کتب

نمبر شمار	نام مؤلف	نام کتاب
1	ابن ہشام	السیرۃ النبویۃ
2	مولانا شبلی نعمانی، سید سلمان ندوی	سیرۃ النبی صلی اللہ علیہ وسلم
3	قاضی محمد سلیمان سلمان منصور پوری	رحمۃ للعالمین
4	مولانا سید ابوالحسن علی ندوی	نبی رحمت صلی اللہ علیہ وسلم
5	ڈاکٹر یسین مظہر صدیقی	عہد نبوی کا نظام حکومت
6	ڈاکٹر خالد علوی	انسان کامل ؐ

حوالہ جاتی کتب

نمبر شمار	نام مؤلف	نام کتاب
1	سید ابوالاعلیٰ مودودی	سیرت سرور عالم صلی اللہ علیہ وسلم
2	مولانا صفی الرحمن مبارکپوری	الرحیق المختوم
3	پیر محمد کرم شاہ الازہری	ضیاء النبی صلی اللہ علیہ وسلم
4	ڈاکٹر اکرم الضیاء العمری	السیرۃ النبویۃ الصحیحۃ
5	مولانا عبدالرؤف داناپوری	اصح السیر

THIRD SEMESTER

1. **ANATOMY-III**
2. **PHYSIOLOGY-III**
3. **MEDICAL PHYSICS**
4. **MOLECULAR BIOLOGY & GENETICS**
5. **HEALTH AND WELLNESS**
6. **QUANTITATIVE REASONING**
7. **TRANSLATION OF THE HOLY QURAN – II (Non-Credit)**

1. ANATOMY-III
CREDIT HOURS: 4(3-1)

COURSE DESCRIPTION

The focus of this course is an in-depth and comprehensive study of human anatomy with emphasis on the head and neck, face and skull. Identify anatomical structures within the thorax with emphasis on structures of thoracic wall and thoracic cavity. Dissection and identification of structures in the manikins/smart board system supplemented with the study of charts, models, prosected materials and radiographs are utilized to identify anatomical landmarks and configurations of the head and neck, face, skull and thorax.

LEARNING OBJECTIVES

- Describe and illustrate human anatomy related to head and neck, face, skull and thoracic cavity
- Identify joints, muscles, nerves, veins, arteries and other anatomical structures of head and neck, face and skull
- Identify anatomical structures of the thoracic wall and thoracic cavity

COURSE CONTENTS

THE HEAD AND THE NECK

- Muscles around the neck
- Triangles of the neck
- Main arteries of the neck
- Main veins of the neck
- Cervical part of sympathetic trunk
- Cervical plexus
- Cervical spine (vertebrae)
- Joints of neck.

THE FACE

- Sensory nerves of the face
- Bones of the face
- Muscles of the face
- Facial nerve
- Muscles of mastication
- Mandible
- Hyoid bone
- Temporomandibular joint
- Brief description of orbit and nasal cavity
- Muscles of eye

THE SKULL

- Bones of skull
- Anterior cranial fossa
- Middle cranial fossa
- Posterior cranial fossa
- Base of skull
- Structures passing through foramina

THORAX

STRUCTURES OF THE THORACIC WALL
- Dorsal spine (vertebrae)
- Sternum
- Costal Cartilages & Ribs
- Intercostal Muscles
- Intercostal Nerves
- Diaphragm
- Blood supply of thoracic wall
- Lymphatic drainage of thoracic wall
- Joints of thorax

THORACIC CAVITY
- Mediastinum
- Pleura
- Trachea
- Lungs
- Bronchopulmonary segments
- Pericardium
- Heart – Its blood supply, venous drainage & nerve supply
- Large veins of thorax, superior and inferior vena cava., pulmonary veins brachiocephalic veins
- Large Arteries – Aorta & its branches

LAB WORK

During study of Gross Anatomy, emphasis should be given on applied aspect, radiological anatomy, surface anatomy and cross-sectional anatomy of the region covered in the respective semester/year

Note

The students are expected to make a practical note book. The book is a collection of evidence that learning has taken place. It is a reflective record of their achievements

RECOMMENDED BOOKS

1. Gray's Anatomy by Prof. Susan Standring 39th Ed., Elsevier.
2. Clinical Anatomy for Medical Students by Richard S. Snell.
3. Clinically Oriented Anatomy by Keith Moore.
4. Clinical Anatomy by R. J. Last, Latest Ed.
5. Cunningham's Manual of Practical Anatomy by G. J. Romanes, 15th Ed., Vol-I, II and III.
6. The Developing Human. Clinically Oriented Embryology by Keith L. Moore, 6th Ed.
7. Wheater's Functional Histology by Young and Heath, Latest Ed.
8. Medical Histology by Prof. LaiqHussain.
9. Neuroanatomyby Richard S. Snell.

2. PHYSIOLOGY-III
CREDIT HOURS: 3(2-1)

COURSE DESCRIPTION

The course is designed to study the function of the human body with emphasis on function of human respiratory system, nervous system, reproductive system, body fluids and renal system. These topics are addressed by a consideration of clinical and applied physiology in relation to clinical modules and practice

LEARNING OBJECTIVES

- Describe major functions of the respiratory system
- Explain major functions of central and peripheral nervous
- Discuss major functions of male and female reproductive
- Describe major functions body fluids and renal system and relate this to clinical practice

COURSE CONTENTS

RESPIRATORY SYSTEM

- Function of respiratory tract
- Respiratory and non-respiratory function of the lungs
- Mechanics of breathing
- Production & function of surfactant and compliance of lungs
- Protective reflexes
- Lung volumes and capacities including dead space
- Diffusion of gases across the alveolar membrane
- Relationship between ventilation and perfusion
- Mechanism of transport of oxygen and carbon dioxide in blood
- Nervous and chemical regulation of respiration
- Abnormal breathing
- Hypoxia, its causes and effects
- Cyanosis, its causes and effects

NERVOUS SYSTEM

- General organization of the nervous system
- Classification of nerve fibers
- Properties of synaptic transmission
- Function of neurotransmitters and neuropeptides
- Type and function of sensory receptors
- Function of the spinal cord and ascending tracts
- Reflex action and reflexes
- Muscle spindle and muscle tone
- Mechanism of touch, temperature and pain
- Functions of the cerebral cortex
- Difference between the sensory and motor cortex and their functions
- Motor pathways including pyramidal and extrapyramidal
- Basal Ganglia and its functions
- Cerebellum and its function
- Control of posture and equilibrium
- Physiology of sleep
- Physiology of memory
- Mechanism and control of speech
- Function of the thalamus
- Function of the hypothalamus and limbic system
- Production of CSF
- Mechanism of temperature regulation
- Function of the autonomic nervous system and the physiological changes of aging

REPRODUCTION

- Function of the male reproductive system, Spermatogenesis
- Mechanism of erection and ejaculation
- Production and function of testosterone and Physiological changes during male puberty
- Function of the female reproductive system
- Production and function of estrogen, and progesterone
- Menstrual cycle
- Physiological changes during female puberty and menopause
- Pregnancy and the physiological changes taking place in the mother
- Function of the placenta
- Parturition and lactation
- Neonatal physiology

BODY FLUIDS AND KIDNEY

- Components and quantitative measurements of body fluids
- Fluid compartments, tissue and lymph fluid
- Structure of the kidney and nephron
- General function of the kidney
- GFR and its regulation
- Formation of urine including filtration, re-absorption and secretion
- Plasma clearance, Mechanism of concentration and dilution of urine
- Water and electrolyte balance with reference to the kidney
- Role of the kidney in blood pressure regulation
- Hormonal functions of the kidney
- Acidification of urine and its importance
- Acid base balance with reference to the kidney
- Micturition and its control

LAB WORK

RESPIRATORY SYSTEM

- Stethography
- Breath sounds
- Respiratory rate
- Lung function tests

NERVOUS SYSTEM

- Examination of superficial and deep reflexes
- Brief examination of the motor and sensory system
- Examination of the cranial nerves

Note

The students are expected to make a practical note book. The book is a collection of evidence that learning has taken place. It is a reflective record of their achievements

RECOMMENDED BOOKS

1. Textbook of Physiology by Guyton and Hall, Latest Ed.
2. Review of Medical Physiology by William F. Ganong, Latest Ed.

3. Physiology by Berne and Levy, Latest Ed.
4. Human Physiology: The Basis of Medicine by Gillian Pocock, Christopher D. Richards
5. Physiological Basis of Medical Practice by John B. West and Taylor, 12thEd.

3. MEDICAL PHYSICS
CREDIT HOURS: 2(2-0)

COURSE DESCRIPTION-

This course will cover the basic principle of physics which are applicable in medical equipment used in Radiology and Imaging Technology. It also covers the fundamentals of currents, sound waves, electromegnetic radiations and their effects & application in Radiological techniques.

LEARNING OBJCTIVES

- Describe basic principles of physics used in electromedical equipment
- Define laws of physics various aspect of physical phenomena and their interaction with human body
- Descibe basic concepts of electricity, its laws, magnetism, electro mechanics and related theories
- Explain fundamentals of low, medium and high frequency currents, heat, electromagnetic radiations and sound waves.
- Demonstrate safety skills in biomedical instruments and radiation protection

COURSE CONTENTS

ELECTRICITY AND MAGNETISM

- Structure of an atom
- Electron Theory, Conductors & Insulators
- Conduction& Convection

STATIC ELECTRICITY

- Charging by conduction and Induction
- Electrostatic Fields
- Capacitors, types of capacitors
- Arrangement of Capacitors in series and parallel
- Charging and discharging of capacitors
- Oscillating Discharge of Capacitors

CURRENT ELECTRICITY

- Ohm‘s Law
- Electrical Components and their units
- Resistance and types
- Chemical effects of a Current
- Types of Current
- Cell and Batteries
- Simple Voltage Cell
- Combination of Cells in series and parallel
- Thermal effects of current
- Electrolysis and Electrolytic burns
- Ionization of gases and Thermionic emission
- Electronic tubes
- Diodes and Triodes

ELECTROMAGNETISM

- Magnetic effect of an electric current

- Moving coil volt meter and Ammeter
- Measurement of high frequency and alternate current withmeters
- Electromagnetic induction
- Faradays law
- Mutual and self-Induction
- Eddy currents
- Transformers
- Construction and types
- Static and auto Transformer

ELECTRO MECHANICS

- Current for treatment
- Rectification
- Rectification of A.C
- Half wave and full wave Rectification
- Valve rectification circuits and metal rectifier
- Surging of current
- Vibrations and Multivibrators circuit

CLASSIFICATION OF CURRENTS (OVERVIEW)

LOW FREQUENCY CURRENT

- Sinusoidal current
- Faradic current
- Galvanic current (constant and interrupted)
- Diadynamic current TENS
- Super imposed current and their graphical representation.

MEDIUM FREQUENCY CURRENT

- Interferential current
- Russian current.

HIGH FREQUENCY CURRENT

- Valves
- Transistors
- Long waves, medium waves short waves micro waves

SOUND WAVES

- Wave motion in sound
- Infrasonic
- Normal hearing band
- Characteristics of the sound waves and their velocities
- Ultrasonic
- Reflection and refraction of sound waves
- Characteristics of tone resonance and beats
- Interference of sound waves

HEAT

- Scales of temperature and its conversion to other scales
- Nature of heat energy
- Specific heat and three modes of heat energy transfer effect of impurities on melting and boiling points

ELECTROMAGNETIC RADIATION

- Electromagnetic spectrum
- Relationship between frequency and wave length
- Laws of reflection, refraction and absorptions
- Total internal reflection
- Cosine law and inverse square law
- Concave and convex mirrors
- Lenses and prisms
- Reflectors
- Radio wave (long, medium, short, micro waves)
- Infra-red rays
- Visible rays
- Ultra violet rays
- X-rays
- Nuclear waves (alpha beta and gamma)

SAFETY IN BIOMEDICAL INSTRUMENTS

- Electrical outlets, hot, neutral and ground connections
- Pervasiveness of electricity and of electric shocks
- Causes of electric shocks and precaution
- Effect of electric current on human body
- Techniques to reduce the effect of electric shock
- Earth shocks and precaution against earth shocks

RADIATION PROTECTION

- Ionizing and non-ionizing radiations
- Quantities and associated units of radiations
- Effect of ionizing and non-ionizing radiation
- Internal and external hazards
- Main principle to control external hazard
- Distance and shielding

RECOMMENDED BOOKS

1. Clayton's Electrotherapy and actinotherapyby: P. M Scott.
2. Medical physics for physical therapists by: A. D Moore.
3. Preliminary Electricity for Physiotherapists by B. Savage.
4. Basic Electronics by Grob.
5. Principles of Bio-instrumention by Richard A. Normann.
6. Hand book of Biomedical Instrumentation by R. S. Khanpur
1. Basic Radiation Protection Technology by Gollnick

4. MOLECULAR BIOLOGY & GENETICS

CREDIT HOURS 3(3-0)

COURSE DISCRIPTION

This course covers the brief overview of the cellular & molecular biology, membrane physiology, introduction to molecular medicine and gene therapy.

This course has been designed to address a more in depth study of biology of inheritance and inheritance patterns. This course focuses on classical Mendelian genetics, the DNA molecule and molecular genetics, and population genetics. The course also covers Human genome and Molecular Pathology.

COURSE CONTENTS

BRIEF REVIEW OF CELLULAR & MOLECULAR BIOLOGY

- Structure and Functions of Cell, Nucliec Acid, Chromosomes & Proteins

INTRODUCTION TO MOLECULAR MEDICINE AND GENE THERAPY

- Introduction
- Genetic Manifestations of Molecular Medicine
- Gene Therapy and Patterns of Gene Expression
- Gene Therapy and Molecular Medicine
- Gene Therapy: Current Basic Science Issues
- Human Gene Therapy: Current Status and Basic Science

GENE THERAPY FOR NEUROLOGICAL DISORDERS:

- Introduction
- Sorting Out the Complexity of the Nervous System
- What Goes Wrong in Neurological Disorders
- Neurotophic Factors and Gene Therapy
- Neural Transplants and Stem Cells
- Clinical Neurodegenerative Conditions
- Clinical Trials Testing Genetically Modified Cells and Neurotrophic Factors for Neurodegeneration:
- Stem Cell Therapy in Spinal Cord Injuries
- Future Considerations and Issues

GENE THERAPY FOR MUSCULOSKELETAL DISORDERS

- Bone
  - Introduction:
  - Regulatory Factors in Bone Development and Regeneration:
  - Cells for Gene Therapy Strategies Directed Towards Bone Regeneration
  - In Vivo& Ex Vivo Gene Therapy Strategies for Bone
  - Clinical Trials for Bone Replacement
- Ligament and Tendon:
  - Introduction
  - Ligament and Tendon Growth Factors
  - Cells for Gene Therapy Strategies Directed Towards Ligament Regeneration
  - In Vivo &Ex VivoGene Therapy Strategies to Intact Ligament and Tendon
  - Gene Therapy Strategies for Lacerated Tendon Repair, promote Osseo-Integration of Tendon Grafts
  - Clinical Trials for Ligament and Tendon Replacement:
- Cartilage:
  - Introduction
  - Growth Factors and Cytokines for Cartilage Repair and Regeneration
  - Cells for Gene Therapy Strategies Directed Towards Cartilage Regeneration
  - Gene Delivery Strategies for Cartilage Repair and Regeneration
  - Dose Dependency Detected with Cartilage Gene Therapies
  - Therapeutic Effects by Transfected Cells on Distal Joints
  - Transfected Xenogenic Cells for Cartilage Repair
  - Cartilage Tissue Engineering and Gene Therapy
- Intervertebral Disc
  - Introduction
  - The Biology of Intervertebral Disc Degeneration
  - Application of Gene Therapy in Intervertebral Disc
  - In Vivo& Ex Vivo Gene Therapy Strategies to Intervertebral Disc
  - Clinical Trials for Intervertebral Disc

- Muscles
  - Introduction
  - The Molecular Basis of Myopathies
  - In Vivo& Ex Vivo Gene Therapy Strategies in Myopathies
  - Clinical Trials in Myopathies
  - Gene Therapy: Ethical Issues at the Policy Level

RECOMMENDED BOOKS

1. Molecular Medicine: Genomics to Personalized Healthcare, 3rdEdition by R. Trent. (Published in 2005 by Academic Press).
2. Principles of Molecular Medicine, 2ndEdition by Marschall S. Runge and Cam Patterson. (Published in 2006 by Humana Press).
3. Molecular Neuropharmacology: A Foundation for Clinical Neuroscience, 2nd Edition by Eric J. Nestler, Steven E. Hyman and Robert C. Malenka. (Published in 2008 by McGraw-Hill Professional).
4. Molecular Medicine: An Introductory Text, 3rdEdition by R. J. Trent.(Published in 2005 by Academic Press).
5. Molecular Biology of the Cell, 5thEdition by Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts and Peter Walter.(Published in 2007 by Garland Science).
6. Human Molecular Genetics, 3rdEdition by Tom Strachan and Andrew Read. (Published in 2003 by Garland Science/Taylor & Francis Group).
7. Molecular Medicine for Clinicians, 1stEdition by Barry Mendelow, Michele Ramsay, NanthakumarChettyan and Wendy Stevens.(Published in 2008 by University Press).
8. Molecular Markers, Natural History and Evolution, 2ndEdition by John C. Avise. (Published in 2004 by Sinauer Associates).
9. "Molecular Pathology: The Molecular Basis of Human Disease, 1stEdition by William B. Coleman, and Gregory J. Tsongalis.(Published in 2009 by Academic Press).
10. Additional Study Material as assigned By the tutor.
11. Genetics: A Conceptual Approach, 3rdEdition by Benjamin Pierce (Published in 2007 by W. H. Freeman).
12. Human Molecular Genetics, 3rdEdition by Tom Strachan and Andrew P Read(Published in 2003 by Garland Science/Taylor & Francis Group).
13. Genetics-From Genes to Genomes, 3rdEdition by Hartwell, Hood, Goldberg, Reynolds, Silver andVeres(Published in 2006 by McGraw-Hill).

    Additional Study Material, as assigned By the tutor

5. HEALTH AND WELLNESS

CREDIT HOURS 2(2-0)

COURSE DESCRIPTION

This course will facilitate discussion on cultural or historical significance of health practices, the role of art therapy in wellness, the theories of health and wellness, including motivational theory, locus of control, public health initiative, psycho-social, spiritual, and cultural. The course will cover health history, risks, screening, and assessment considering epidemiological principles. This will also cover risk reduction strategies for primary and secondary prevention, including programs for special populations

LEARNING OBJECTIVES

- Define Health, wellness, and fitness.
- Cultural or historical significance of health practices
- The role of art therapy in wellness
- Philosophical and ethical dimensions of health care
- Describe healthy people and role of Allied Health professionals in Health and wellness.
- Explain the key concepts of physical and mental fitness
- Explain health and wellness issues in child, adolescence and old age
- Discuss Women health issues

COURSE CONTENTS

PREVENTION PRACTICE

A HOLISTIC PERSPECTIVE FOR HEALTH

- Defining Health
- Predictions of Health Care
- Comparing Holistic Medicine and Conventional Medicine
- Distinguishing Three Types of Prevention Practice.

Cultural or historical significance of health practices

- Traditional Medicine Systems
- Medical Beliefs and Rituals
- Folk Medicine and Remedies
- Influence of Religion and Spirituality
- Medical Traditions in Different Cultures

The role of art therapy in wellness

- History of Art Therapy
- Benefits of Art Therapy
- Applications of Art Therapy
- Cultural Considerations in Art Therapy

Philosophical and ethical dimensions of health care

- Ethical Theories in Healthcare
- Patient Autonomy and Informed Consent
- Healthcare Professional-Patient Relationships
- Ethical Issues in Research and Clinical Trials
- Technological Advances in Healthcare

HEALTHY PEOPLE

- Definition of healthy people
- Health education Resources
- Allied Health professional role for a healthy community.

SCREENING FOR HEALTH, FITNESS, AND WELLNESS

- Distinguishing Screening, Evaluation &Examination
- Interviewing for Health, Fitness and Wellness
- Vital Signs, 3-minute Step Test, and Borg perceived Scale of Exertion

HEALTH, FITNESS, AND WELLNESS ISSUES DURING CHILDHOOD AND ADOLESCENCE

- Structure and Function
- Recognizing and Reporting Child abuse
- Special Concerns in Pediatrics

HEALTH, FITNESS, AND WELLNESS DURING ADULTHOOD

- Tasks of Adulthood
- Adult Health and Wellness Risks
- Screening Tools for Adulthood
- Adult Educational Materials

WOMEN'S HEALTH ISSUES: FOCUS ON PREGNANCY

- Screening for Women‘s Health
- Women‘s Heart Disease
- Female Athlete Triad
- Pre-partum and Postpartum Exercises

PREVENTION PRACTICE FOR OLDER ADULTS

- Ageism
- Anatomical and Physiological Changes with Aging
- Common Health Problems of Older Adults
- Screening Older Adult for Health Fitness and Wellness

RESOURCES TO OPTIMIZE HEALTH AND WELLNESS

- Chronic Illness
- Nutrition
- Progressive Relaxation
- Time management

HEALTH PROTECTION

- Infection Control
- Injury Prevention during Childhood
- Injury prevention during Adolescence
- Injury Prevention during Adulthood
- Injury Prevention during Older Adulthood

MARKETING HEALTH AND WELLNESS

- Definition of Marketing
- Marketing Strategies for health and wellness Centers

RECOMMENDED BOOKS

- Principles of Biomedical Ethics" by Tom L. Beauchamp and James F. Childress
- Art as Therapy" by Alain de Botton and John Armstrong
- Doing Right: A Practical Guide to Ethics for Medical Trainees and Physicians" by Philip C. Hebert

- A Physical Therapist‘s Guide to Health, Fitness, and Wellness, By Catherine R Thompson, PhD, MS, PT

6. QUANTITATIVE REASONING
CREDIT HOURS 3(3-0)

Since ancient times, numbers, quantification, statistics and mathematics has played a central role in scientific and technological development. In the 21st century, Quantitative Reasoning (QR) skills are essential for life as they help to better understand socio-economic, political, health, education, and many other issues, an individual now faces in daily life. The skills acquired by taking this course will help the students to apply QR methods in their daily life and professional activities. This course will also change student’s attitude about statistics and mathematics. It will not only polish their QR skills, but also enhance their abilities to apply these skills.

Contents

1. Introduction to quantitative reasoning
2. Overview of contributions of Mathematicians and Statisticians especially Muslim scholars.
3. Types of standard numbers
4. Proportions, rates, ratio and percentages
5. Odds and odds ratio
6. Scale of measurements
7. Number sequence and series
8. Unit analysis as a problem-solving tool
9. Data handling (small and large)
10. Data errors, absolute and relative and their applications
11. Descriptive statistics
12. Rules of counting: multiplication rule, factorial, permutation and combination
13. Probability and its application in real life
14. A graphical perspective through Venn Diagram
15. Financial indicator analysis, and money management (profit, loss, simple and compound interest)
16. Practical scenarios involving algebraic expressions: linear and quadratic

Recommended Texts

1. Akar, G. K., Zembat, İ. Ö., Arslan, S., & Thompson, P. W. (2023). Quantitative Reasoning in Mathematics and Science Education. 1st Ed., Springer, USA.
2. Peck, R., Olsen, C., & Devore, J. L. (2015). Introduction to statistics and data analysis. 5th Ed., Brooks Cole, USA.
3. Devlin, K. J. (2012). Introduction to mathematical thinking. Palo Alto, CA: Keith Devlin.

Suggested Readings

1. Triola, M. F., Goodman, W. M., Law, R., & Labute, G. (2006). Elementary statistics. Reading, MA: Pearson/Addison-Wesley.
2. Blitzer, R., & White, J. (2005). Thinking mathematically. Pearson Prentice Hall.

URCG-5111 **Translation of the Holy Quran – II** **1 (0+1)**

Translation of the Holy Quran- II

Topic	Details
Semester/Level	In some discipline 3rd semester and in some discipline 4th Semester/ ADP Program 2nd Year
Course Code	URCG-5111
Course Title	Translation of the Holy Quran – II
Credit Hours	1(0-1)
Objectives	▪ Students will come to know about the real nature, significance and relevance of the Islamic beliefs in light of the text of the Holy Quran. ▪ Students will seek knowledge of translation and transliteration of the Holy Book Quran. ▪ To familiarize the students with the concept of Ibādah (Its significance, scope and relevance) and its types in Islam. ▪ Students will learn literal and idiomatic way of translation of the Holy Book. ▪ Students will learn about the polytheism and its incompatibility in Islam highlighted by the Holy Quran. ▪ To highlight the significance of learning through using all human faculties provided by the almighty Allah and familiarize the students about condemnation of ignorance mentioned in the Quranic text. ▪ To develop Awareness among the students about rights and duties of different circles of society in the light of Holy Quran. ▪ To introduce the students to Quranic Arabic grammar in practical manner.
Course Contents:	○ ایمانیات اور عبادات اللہ پر ایمان، فرشتوں پر ایمان، رسولوں پر ایمان، آسمانی کتابوں پر ایمان یوم آخرت پر ایمان، تقدیر پر ایمان نماز، روزہ، زکوۃ، حج، جہاد ○ معاشرے کے حقوق • خاندان کی تکوین • حق مہر • رضاعت و حمل • اولاد کو قتل کرنے کے ممانعت • شوہر کی نافرمانی • طلاق • بیوہ کی عدت کے احکام • نکاح کا پیغام بھیجنا • عورت کی وراثت (اس کے شوہر کی طرف سے) • والدین کے حقوق • بیویوں اور اولاد کے بیچ عداوت ○ خاندان کے حقوق • مہمان کی عزت

	• اجازت طلب کرنے کے اصول • مجلس کے آداب • تعاون اور بھائی چارہ • گروہ بندی • محبت • لوگوں کے درمیان صلح • عفوودرگزر، غصہ پر قابو اور معاف کرنا • شعوب وقبائل • لوگوں کے بیچ اختلافات • حمایت ونگہبانی
Grammar:	• قرآنی عربی گرامر کے اصول اور انکے اطلاقات (متن قرآنی پر اطلاق سے توضیحات)
Details of Chapters and verse Numbers:	▪ منتخب آیات مع ترجمہ وتجوید ▪ البقرہ((۱۷۷،۲۳۸،۴۵،۲۷۷،۲۱۹،۱۱۰،۴۵،۱۵۳،۲۴۷،۲۰۱،۲۸۵،۳۴،۲۸۵، ۱۵،۱۲۹،۲۵۳،۹۸،۶۲،۱۲۶،۲۸۵،۲۵۶،۱۷۷،۱۳۶، ۱۸۹،۲۰۰،۱۸۴،۱۸۳،۲۱۸،۱۵۸،۲۴۱،۱۹۹،۲۲۷،۲۲۶،۲۳۷،۲۲۸،۲۲۹،۲۳۱،۲۳۷،۲۳۵،۲۳۰،۸۲،۱۸۴،۲۳۳،۱۸۲،۱۶۰،۸۳) ▪ النساء(۹۵،۹۲،۵۹،۱۳۶،۶۹،۸۰،۱۳،۶۹،۸۶،۸۰،۳۶،۱۷۶،۱۲،۳۵،۱۲۸،۳۴،۱۱،۴،۱۷۶،۲۴،۲۵،۱۱،۱۲۸،۱۹۱،۳۵،۲۰،۳۵،۱۹۱، ۶، ۱،۲۰،۱،۱۶،۱۴۶،۵۴،۱۲۸،۸۱) ▪ الانعام(۲۲،۱۳۷،۱۴،۹۲،۱۵۱،۴۸،۵۴) ▪ آل عمران(۹۷،۳۹،۸۵،۱۲۵،۸۴،۱۴۴،۱۹،۱) ▪ المائدہ(۵۴،۲،۹۲،۳۹،۱۹،۸۲،۲،۵) ▪ الاعراف(۳۵،۱۸۹،۱۸۹) ▪ التوبہ(۲۰،۷۱،۱۶) ▪ ہود(۱۲) ▪ الزمر(۶) ▪ النور(۵۴،۲۸،۵۲،۲۷،۶۰،۲۹) ▪ محمد(۳۳) ▪ انفال(۸۲،۲۰) ▪ الرعد(۳) ▪ الطلاق(۴) ▪ الحج(۵) ▪ ابراہیم((۲۳،۴۴) ▪ الاسراء(۲۳،۲۴) ▪ الاحقاف(۱۵) ▪ المومنون(۲۷) ▪ العنکبوت(۲۵،۴۸،۸) ▪ النحل (۲۲) ▪ لقمان(۱۵،۴،۱۴) ▪ الاحزاب((۳۵،۵۰،۳۸،۴۹) ▪ الشعراء(۷) ▪ الروم(۲۱) ▪ مریم(۱۴،۲۶)

▪ المجادله(۱۲،۱۱)	

FOURTH SEMESTER

1. ANATOMY-IV (Neuro Anatomy)
2. RADIATION SCIENCE AND TECHNOLOGY-I
3. BIOCHEMISTRY I
4. SCIENCE OF SOCIETY-I
5. ENTREPRENEURSHIP
6. TOOLS FOR QUANTITATIVE REASONING
7. PROFESSIONAL PRACTICE (LAWS, ETHICS AND ADMINISTRATION)

1. ANATOMY - IV (Neuro Anatomy)

CREDIT HOURS 3 (2-1)

COURSE DESCRIPTION

The purpose of the course is to provide the students an in-depth study and analysis of the regional and systemic organization of the body. Course will emphasis on structure and function of human movement. Course will cover human anatomy with emphasis on the nervous, skeletal, muscle, and circulatory systems. Course will lay down the foundation of General Anatomy, the understanding of Neuroanatomy (regional Anatomy) to be supplemented through dissection and identification of structures in the manikins/smart boards, charts, models, prosected materials and radiographs

LEARNING OBJECTIVES

- Describe regional organization of human brain & neural pathways
- Classify the nervous system
- Explain structure and function of spinal cord

COURSE CONTENTS

NEURO ANATOMY

- Central Nervous System: Disposition, Parts and Functions
- Brain stem (Pons, Medulla, and Mid Brain)
- Cerebrum
- Cerebellum
- Thalamus
- Basal ganglia
- Lymbic system
- Hypothalamus
- Internal Capsule
- Blood Supply of Brain
- Stroke and its types
- Ventricles of Brain
- CSF circulation and Hydrocephalus

- Meninges of Brain
- Neural pathways (Neural Tracts)
- Pyramidal and Extra pyramidal System (Ascending and Descending tracts)
- Functional significance of Spinal cord level
- Cranial Nerves with special emphasis upon IV, V, VII, XI, XII (their course, distribution, and palsies)
- Autonomic nervous system, its components
- Nerve receptors.

SPINAL CORD

- Gross appearance
- Structure of spinal cord
- Grey and white matter (brief description)
- Meninges of spinal cord
- Blood supply of spinal cord
- Autonomic Nervous system

LAB WORK

During study of Gross Anatomy, emphasis should be given on applied aspect, radiological anatomy, surface anatomy and cross-sectional anatomy of the region covered in the respective semester/year

Note

The students are expected to make a practical note book. The book is a collection of evidence that learning has taken place. It is a reflective record of their achievements

RECOMMENDED BOOKS

- Gray's Anatomy by Prof. Susan Standring 41th Ed., Elsevier.
- Clinical Neuroanatomy Anatomy for Medical Students by Richard S. Snell,
- Clinically Oriented Anatomy by Keith Moore.
- Clinical Anatomy by R.J. Last, Latest Ed.
- Cunningham's Manual of Practical Anatomy by G.J. Romanes, 15th Ed., Vol-I, II and III.

2. RADIATION SCIENCE AND TECHNOLOGY-I
CREDIT HOURS 3(2-1)

COURSE DESCRIPTION

This course aims to develop appreciation of how mechanical principles can be applied to understand the underlying causes of human movement. This course will also help to gain an understanding of basic theoretical concepts, principles and techniques of ergonomics as well as an introduction to fundamental ergonomic measurement tools for assessment of physical workload, posture, occupational exposure, and stress

LEARNING OBJECTIVES

- Describe biomechanical structure and function of human connective, muscular, nervous and skeletal tissues
- Explain mechanical, neural and muscular events in normal and pathological motion
- Explain mechanical and ergonomic principles are applied in understanding the human movement
- Discuss basic concepts, principles and theories of ergonomics

COURSE CONTENTS

- Concept of radiologic science
- Nature of our surroundings
- Matter & energy
- Sources of ionizing radiation

- Discovery of x rays
- Development of modern radiology
- Reports of radiation injury
- Basic radiation protection
- The diagnostic team

FUNDAMENTALS OF RADIOLOGIC SCIENCES

- Standard units of Measurements
- Mechanics
- Mathematics of radiologic science
- Terminology for radiologic science
- Numeric prefix
- Radiologic units

THE STRUCTURE OF MATTER

- Centuries of discovery30
- Greek atom
- Dalton atom
- Thomson atom
- Bohar atom
- Fundamental particles
- Atomic structure
- Atomic nomenclature
- Combinations of atoms
- Radioactivity
- Types of ionizing radiation

ELECTROMAGNETIC ENERGY

- Photons
- Electromagnetic spectrum
- Wave particle duality
- Matter & energy

ELECTRICITY , MAGNETISM , & ELECTROMAGNETISM

- Electrostatics
- Electrodynamics
- Magnetism
- Electromagnetism

THE X-RAY BEAM

- THE X-RAY IMAGING SYSTEM
- Operating console
- Autotransformer
- Adjustment of kvp
- Control of mA
- Filament transformer
- Exposure timers
- High voltage generator

THE X-RAY TUBE

- External components
- Ceiling support system
- Floor to ceiling support system31
- C-arm support system
- Protective housing
- Glass or metal enclosure
- Internal components

- Cathode
- Anode
- X-ray tube failure
- Rating charts
- Radiographic rating chart
- Anode cooling chart
- Housing cooling chart

X-RAY PRODUCTION

- Electron target interaction
- Anode heat
- Characteristic radiation
- Bremsstrahlung radiation
- X-ray emission spectrum
- Factor affecting the x-ray emission spectrum

X-RAY EMISSION

- X ray quantity
- X-ray quality

X-RAY INTERACTION WITH MATTER

- Five x-ray interaction with matter
- Coherent scattering
- Compton effect
- Photoelectric effect
- Pair production
- Photodisintegration
- Differential absorption
- Dependence on atomic number
- Dependence on mass density
- Contrast examination
- Exponential attenuation

Practical:

- Production of x_rays32
- Attenuation
- Ionizing and non-ionizing radiation
- Basic phenomenon of x-ray tube
- X_ray interaction with matter
- Completion of a Practical note book.

RECOMMENDED BOOKS

- Radiologic Science for Technologist: stewart Carlyle Bushong.
- Radiological science for technologists by Stewart C. Bushong 7th edition published by Mosby, Inc: A Harcout health company.
- A guide to radiological procedures by Stephen Chapman & Richard Nikielny 3rd editionin by Bailliere tindall London

4. BIOCHEMISTRY-I
CREDIT HOURS: 2(2-0)

COURSE DESCRIPTION

This course provides the knowledge and skills in fundamental organic chemistry and introductory biochemistry that are essential for further studies. It covers introduction to the biomolecules i.e. amino acid, proteins carbohydrates, fats, enzymes and nucleic acids. The nutritional biochemistry concludes the course

LEARNING OBJECTIVES

- Describe cell and body fluids in the context of chemistry and human biochemistry
- Discuss the properties, classification and functions of biomolecules with emphasis on amino acid, peptides, proteins, enzymes, carbohydrates, lipids and nucleic acid
- Explain importance of nutritional biochemistry with emphasis on minerals, trace elements, vitamins and balance diet

COURSE CONTENTS

CELL

- Introduction to Biochemistry
- Cell: (Biochemical Aspects)
- Cell Membrane Structure
- Membrane Proteins
- Receptors & Signal Molecules

BODY FLUIDS

- Structure and properties of Water
- Weak Acids & Bases
- Concept of pH &pK
- Buffers, their mechanism of action
- Body buffers

BIOMOLECULES

AMINO ACIDS, PEPTIDES & PROTEINS

- Amino acids: Classification
- Acid-Base Properties
- Functions & Significance
- Protein Structure, Primary, Secondary & Super secondary. &, Structural Motifs
- Tertiary & Quaternary Structures of Proteins
- Protein Domains
- Classification of Proteins
- Fibrous proteins (collagens and elastins) & Globular proteins

ENZYMES

- Introduction
- Classification & Properties of Enzymes
- Coenzymes
- Isozymes & Proenzymes
- Regulation & Inhibition of Enzyme activity & enzymes inhibitors
- Clinical Diagnostic Enzymology

CARBOHYDRATES

- Definition
- Classification
- Biochemical Functions & Significance of Carbohydrates
- Structure & Properties of Monosaccharides& Oligosaccharides
- Structure & Properties of Polysaccharides
- Bacterial cell Wall
- Heteropolysaccharides

- GAGS

LIPIDS

- Classification of Lipids
- Fatty Acids: Chemistry
- Classification occurrence & Functions
- Structure & Properties of Triacylglycerols and Complex Lipids
- Classification & Functions of Eicosanoids
- Cholesterol: Chemistry, Functions & Clinical Significance
- Bile acids/salts.

NUCLEIC ACIDS

- Structure, Functions & Biochemical Role of Nucleotides
- Structure & Functions of DNA
- Structure & Functions of RNA.

NUTRITIONAL BIOCHEMISTRY MINERALS & TRACE ELEMENTS

- Sources
- RDA
- Biochemical Functions & Clinical Significance of Calcium & Phosphorus
- Sources
- RDA
- Biochemical Functions & Clinical Significance of Sodium Potassium& Chloride
- Metabolism of Iron, Cu, Zn, Mg, Mn, Se, I,F.

VITAMINS

- Sources
- RDA
- Biochemical Functions & Clinical Significance of Fat Soluble Vitamins
- Sources
- RDA
- Biochemical Functions & Clinical Significance of Water Soluble
- Vitamins.

NUTRITION

- Dietary Importance of Carbohydrates, Lipids & Proteins
- Balanced Diet.

RECOMMENDED BOOKS

1. Harper's Biochemistry by Robbert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, Latest Ed.
2. Lippincott's Illustrated Review of Biochemistry by Pamela C. Champe and Richard A. Harvey, Latest Ed.
3. Practical Clinical Biochemistry by Varley.
4. Textbook of Biochemistry by Devlin, 5th Ed.
1. Textbook of Medical Biochemistry Vol-I and II by M.A. Hashmi. Biochemistry by Stryer, Lubert, Latest Ed.

URCG-5116 Science of Society-I 2 (2-0)

Course Description:

This course will introduce students with the subject matter of social science, its scope, nature and ways of looking at social phenomenon. It will make the participants acquaintance with the foundations of modern society, state, law, knowledge and selfhood. While retaining a focus on Pakistani state and society, students will encounter theoretical concepts and methods from numerous social science disciplines, including sociology, politics, economics anthropology and psychology and make them learn to think theoretically by drawing on examples and case studies from our own social context. Students will be introduced to the works of prominent social theorists from both western and non-western contexts. Instruction will include the use of written texts, audio-visual aids and field visits.

Learning Outcomes:

The course has following outcomes:

It will

- Introduce student with the nature of human social behavior and foundations of human group life
- Analyze the reciprocal relationship between individuals and society.
- Make student aware with the nature of societies existing in modern world
- Make students familiar with the philosophy of knowledge of social sciences
- Introduce students with the works of prominent theories explain human group behavior
- Help students to understand the foundations of society including culture, socialization, politics and economy
- Introduce students with various dimensions of social inequalities with reference to gender, race, ethnicity and religion
- Make them aware about the understanding of various themes pertains to social science in local context
- Help them recognize the difference between objective identification of empirical facts, and subjective formulation of opinionated arguments

Course Outlines:

1. Introduction to Social Sciences

- Social world, Human Social behavior, Foundations of society
- Evolution of Social sciences
- Philosophy of Science
- Scope and nature of social sciences
- Modernity and social sciences
- Branches of social science: Sociology, Anthropology, Political Science, Economics

Society and Community, Historical evolution of Society

- Types of Societies
- Foraging society, Horticultural society, Pastoralist society
- Agrarian societies, Industrial society, Postindustrial society

2. Philosophy of Knowledge in social Science and social inquiry

- Understanding social phenomenon
- Alternative ways of knowing
- Science as a source to explore social reality
- Objectivity, Value-Free research
- Positivism vs Interpretivism
- Qualitative vs Quantitative

3. Culture and Society

- Idea of Culture, Assumptions of Culture

- Types, Components, Civilization and culture
- Individual and culture. Cultural Ethnocentrism, Cultural Relativism
- Outlook of Pakistani culture
- Global Flows of culture, Homogeneity, Heterogeneity

4. Social Stratification and Social inequality

- Dimensions of inequality, Social class
- Gender, Race, Religion, Ethnicity, Caste
- Patterns of social stratification in Pakistan
- Class, caste system in agrarian society
- Ascription vs Achievement, Meritocracy
- Global stratification in modern world, Global patterns of inequality

5. Personality, Self and Socialization

- Concept of self, Personality
- Nature vs Nurture, Biological vs Social
- Development of Personality
- Socialization as a process, Agents of socialization
- Socialization and self/group identity

6. Gender and Power

- Understanding Gender
- Social construction of Patriarchy
- Feminism in Historical context, Gender Debates
- Gender and Development
- Gender issues in Pakistani society, Women Participation in politics, economy and education
- Toward a gender sensitive society, Gender mainstreaming

Pakistan: State, Society, Economy and Polity

- Colonialism, colonial legacy, National identity
- Transformation in Pakistani society: Traditionalism vs Modernism
- Economy, Informality of Economy, Modern economy and Pakistan
- Political Economy, Sociology of Economy

Recommended Textbooks and Reading Materials:

1. Giddens, A. (2018). Sociology (11th ed.). UK: Polity Press.
2. Henslin, J. M. (2018). Essentials of Sociology: A Down-to-Earth Approach.(18th Edition) Pearson Publisher.
3. Macionis, J. J. (2016). Sociology (16th ed.). New Jersey: Prentice-Hall.
4. Qadeer, M. (2006) Pakistan - Social and Cultural Transformation in a Muslim Nation.
5. Smelser, N.J. and Swedburg, R., The Handbook of Economic Sociology, Chapter 1 'Introducing Economic Sociology', Princeton University Press, Princeton.
6. Systems of Stratification | Boundless Sociology (no date). Available at: https://courses.lumenlearning.com/boundless-sociology/chapter/systems-of-stratification/

Jalal, A. (ed.) (1995) 'The colonial legacy in India and Pakistan', in Democracy and

5. ENTREPRENEURSHIP
CREDIT HOURS 2(2-0)

This course addresses the unique entrepreneurial experience of conceiving, evaluating, creating, managing, and potentially selling a business idea. The goal is to provide a solid background with practical application of important concepts applicable to the entrepreneurial environment. Entrepreneurial discussions regarding the key business areas of finance, accounting, marketing and management include the creative aspects of entrepreneurship. The course relies on classroom discussion, participation, the creation of a feasibility plan, and building a business plan to develop a comprehensive strategy for launching and managing a new venture. The core learning objectives of course are: to enhance the 'entrepreneurial intentions' of the students by improving their natural willingness to start a business; to understand the process of entrepreneurship and learn the ways to manage it by workingindividually in the class and in the form of groups outside the class to conduct field assignments; to educate the students about the practical underpinnings of the entrepreneurship with the aid ofpractical assignments and idea pitching.

Contents

1. **Background:** What is an Organization, Organizational Resources, Management Functions, Kindsof Managers, Mintzberg's Managerial Roles.
2. **Forms of Business Ownership:** The Sole proprietorship, Partnership, Joint Stock Company
3. **Entrepreneurship:** The World of the Entrepreneur, what is an entrepreneur? The Benefits of Entrepreneurship, The Potential Drawbacks of Entrepreneurship, Behind the Boom: Feeding the Entrepreneurial Fire.
4. **The Challenges of Entrepreneurship:** The Cultural Diversity in Entrepreneurship, The Power of "Small" Business, Putting Failure into Perspective, The Ten Deadly Mistakes of Entrepreneurship,How to Avoid the Pitfalls, Idea Discussions & Selection of student Projects, Islamic Ethics of Entrepreneurship.
5. **Inside the Entrepreneurial Mind:** From Ideas to Reality: Creativity, Innovation, and Entrepreneurship, Creativity – Essential to Survival, Creative Thinking, Barriers to Creativity, Howto Enhance Creativity, The Creative Process, Techniques for Improving the Creative Process, Protecting Your Ideas, Idea Discussions & Selection of student Projects.
6. Products and technology, identification opportunities
7. **Designing a Competitive Business Model and Building a Solid Strategic Plan:** Building a strategic plan, Building a Competitive Advantage, The Strategic Management Process, Formulate strategic options and select the appropriate strategies, Discussion about execution of Students' Project.
8. **Conducting a Feasibility Analysis and Crafting a Winning Business Plan:** Conducting a Feasibility Analysis, Industry and market feasibility, Porter's five forces model, Financial feasibility analysis. Why Develop a Business Plan, The Elements of a Business Plan, What Lendersand Investors Look for in a

Business Plan, Making the Business Plan Presentation.

9. **Building a Powerful Marketing Plan:** Building a Guerrilla Marketing Plan, Pinpointing the Target Market, Determining Customer Needs and Wants Through Market Research.Plotting a Guerrilla Marketing Strategy: How to Build a Competitive Edge, Feed Back & Suggestions on Student Project, Islamic Ethics for Entrepreneurial Marketing
10. **E-Commerce and the Entrepreneur:** Factors to Consider before Launching into E-Commerce, Ten Myths of E-Commerce, Strategies for E-Success, Designing a Killer Web Site, Tracking WebResults, Ensuring Web Privacy and Security, Feed Back & Suggestions on Student Project.
11. **Pricing Strategies:** Three Potent Forces: Image, Competition, and Value, Pricing Strategies and Tactics, Pricing Strategies and Methods for Retailers, The Impact of Credit on Pricing
12. **Attracting Venture Capitalist:** Projected Financial Statements, Basic Financial Statements, Ratio Analysis, Interpreting Business Ratios, Breakeven Analysis, Feed Back &Suggestions on Student Project,
13. **Idea Pitching:** Formal presentation, 5-minutes pitch, funding negotiation and launching.

Recommended Texts

1. Scarborough, N. M. (2011). *Essentials of entrepreneurship and small business management*. Publishing as Prentice Hall, One Lake Street, Upper Saddle River, New Jersey 07458..

Suggested Readings

1. Burstiner, I. (1989). S*mall business handbook*. Prentice Hall Press.

6. TOOLS FOR QUANTITATIVE REASONING
CREDIT HOURS 3(3-0)

This course is based on quantitative reasoning 1 course. It will enhance the quantitative reasoning skills learned in quantitative reasoning 1 course. Students will be introduced to more tools necessary for quantitative reasoning skills to live in the fast paced 21st century. Students will be introduced to importance of mathematical skills in different professional settings, social and natural sciences. These quantitative reasoning skills will help students to better participate in national and international issues like political and health issues. This course will prepare the students to apply quantitative reasoning tools more efficiently in their professional and daily life activities. This course will help them to better understand the information in form of numeric, graphs, tables, and functions. Students will be introduced to the above listed concepts, and they will be prepared to apply these concepts to practical life scenarios. This course will enhance their ability to deal with scenarios involving quantitative reasoning skills in a logical manner which they can face in their practical lives. It will prepare students to deal with different forms of data occurring in professional, social and natural sciences. Students will be introduced to scenarios involving functions and probability in different disciplines. This course will prepare the students to apply the quantitative reasoning skills in other disciplines. This course will provide solid foundation for students to use the quantitative reasoning skills in solving practical life problems.

Contents

1. Investigating relationships between variables. Exploring tools to find relationship between variables Resources and population growth. Dealing with Economical, environmental and social issues.
2. Graphical and analytical approaches to solve a problem. Applications of graphical & analytical approaches in social & economic problems.
3. Understanding inequalities around us. Dealing with practical problems involving inequalities in different disciplines.
4. Golden ratio in sculptures. Comparison of statements and their use in social and economic problems. Number patterns and their applications.
5. Survival in the modern World. Propositions and truth values. Applications of logic.
6. Exploring and summarizing data, misleading graphs. Finding a representative value in a data.

Measure and spread of a data, measuring degree of relationship among variables. Counting the odds.

Recommended Texts

1. Bennett, J. & Briggs, W. (2015). Using and understanding mathematics (6th Edition). Pearson Education, Limited.
2. Blitzer, R. (2014). Precalculus. (5th Edition). Pearson Education, Limited.
3. Stewart, J., Redlin, L. & Watson, S. (2011). Pre-calculus: Mathematics for Calculus (7th edition). Cengage Learning.

Suggested Readings

1. Aufmann, R., Lockwood, J., Nation, R. & Clegg, D. (2007). Mathematical thinking and reasoning. Brooks Cole.
2. Montgomery, D. C., & Runger, G. C. (2010). Applied statistics and probability for engineers. John wiley & sons.
3. DasGupta, A. (2008). Asymptotic theory of statistics and probability (Vol. 180). New York: Springer.

7. PROFESSIONAL PRACTICE (LAWS, ETHICS AND ADMINISTRATION)

CREDIT HOURS 2(2-0)

PROFESSIONAL PRACTICE IN RADIOGRAPHY AND IMAGING TECHNOLOGY (Laws, Ethics & Administration)

THE RADIOGRAPHY AND IMAGING TECHNOLOGY AS PROFESSION AND PROFESSIONAL

What does professional mean?, Preliminary definitions of profession and professional, Sociological perspective, Structural approach, Processual approach, Characteristics of professions cited in the literature, Power approach, Dimensions of occupation & profession, Autonomy, self-regulation of ethical standards, and accountability, Privileges of autonomous practice in 2020, Self-regulation of ethical standards, Accountability of professionals, Individual professionalism—professionalism without professions?, The history of a profession and Professional recognition.

History of radiography and imaging technology science, History of ethics, Classification of ethics, Principles of ethics, characteristics of professional and ethical behavior, Interpersonal relationships, Principles of confidentiality and privacy responsibility, Rights and obligations of radiography and imaging professionals, Duties and responsibilities of medical laboratory professionals, Patient's bill of rights, Medical Laboratory code of conduct, Good Laboratory Practices (GLPs).

CONTEMPORARY PRACTICE ISSUES

A vision for the future, The BS in Radiography and Imaging technology, Perspective of the profession, Perspective of the practitioner, Direct access issue, Selected curriculum requirements from evaluative criteria for Radiographic and Imaging technologists/scientists, Plan of care, Social responsibility, Career development, Radiographic and Imaging technology practice patterns, Components of a practice pattern, Important factors that affect health

THE ROLES OF THE RADIOGRAPHIC AND IMAGING TECHNOLOGISTS/SCIENTISTS

THE RADIOGRAPHIC AND IMAGING TECHNOLOGIST AS CLINICAL/DIAGNOSTIC EXPERTS

Perform diagnostic tests, supervise the technical staff working in clinical laboratory, Trouble shooting of the laboratory instrumentations, Inventory control in clinical laboratory, Quality control and quality assurance in clinical laboratory, Good communication skills, Interpersonal relationships, Ethical and legal issues, Informed consent and Managed care and fidelity, Patients and specimen data confidentiality.

THE RADIOGRAPHIC AND IMAGING TECHNOLOGIST AS CONSULTANT

Laboratory consultation, Building a consulting business, The consulting process, The skills of a good consultant, Trust in the consultant/client relationship, Ethical and legal issues in consultation and Components of a consulting agreement

THE RADIOGRAPHIC AND IMAGING TECHNOLOGIST AS CRITICAL INQUIRER

History of critical inquiry, Evidence-based Practices, Outcomes research, Whose responsibility is research? Roles of the laboratory staff in critical inquiry, Collaboration in research (Basic and Applied/Clinical), Ethical and legal issues in critical inquiry

THE RADIOGRAPHIC AND IMAGING TECHNOLOGIST AS EDUCATOR

History of Clinical laboratory education, Contemporary educational roles of the lab technologist, Teaching opportunities in continuing education, Academic teaching opportunities, Theories of teaching and learning in professional education, Ethical and legal issues in medical laboratory education

THE RADIOGRAPHIC AND IMAGING TECHNOLOGIST AS ADMINISTRATOR

History of laboratory administration, Patient/client management, First-line management, Midlevel managers and chief executive officers, Leadership and Ethical and legal issues.

PROFESSIONAL DEVELOPMENT, COMPETENCE, AND EXPERTISE

Lifelong process of skill enhancement, The professional development continuum: from competence to expertise, Activities that promote professional development, Evaluation of competence and professional development, Professional development planning, Possible evaluators of professional achievement, Career advancement and Organizational impact on professional development.

FUTURE CHALLENGES IN RADIOGRAPHIC AND IMAGING TECHNOLOGY

Radiographic and Imaging technology moral mission, The future in three realms, individual, institutional & societal, Professionalism and the laboratory technologist/scientist.

RECOMMENDED BOOKS

1. *Aamer Ikram, Rita Guenther and Benjamin Rusek. Good clinical laboratory practices in Pakistan. 2019.*
2. *AFIP. Manual of Laboratory medicine. Latest Edition.*
2. *Baker & Silverton's Introduction to Medical Laboratory Technology Seventh Edition.*
3. *Kramme, R., Hoffmann, K. P., & Pozos, R. S. (Eds.). (2011). Springer handbook of medical technology. Springer Science & Business Media.*
4. *Booth, K. A., & Mundt, L. A. (2013). Phlebotomy: a competency-based approach.*

FIFTH SEMESTER

1. PATHOLOGY & MICROBIOLOGY-I
2. PHARMACOLOGY & THERAPEUTIC-I
3. RAIOLOGICAL INSTRUMENTATION
4. GENERAL RADIOLOGICAL TECHNIQUES
5. BIOCHEMISTRY II
6. SUPERVISED CLINICAL PRACTICE I
7. TRANSLATION OF THE HOLY QURAN – III (Non-Credit)

1. PATHOLOGY & MICROBIOLOGY-I

CREDIT HOURS 2(2-0)

COURSE DESCRIPTION

The course will develop an understanding among students about the pathology of underlying clinical disease states and involving the major organ systems. Epidemiological issues will be presented and discussed.

Students will use problem-solving skills and information about pathology and Microbiology to decide when referred to another health care provider or alternative intervention is indicated

COURSE OBJECTIVES

- Discuss concepts of general pathology
- Discuss recognize signs and symptoms that are considered red flag for serious disease
- Discuss and disseminate pertinent information and findings, and ascertain the appropriate steps to follow during radiological examination

COURSE CONTENTS

GENERAL PATHOLOGY WHICH INCLUDES

CELL INJURY AND DEATH

- Causes of cell injury
- Pathogenesis of necrosis and apoptosis
- Sub cellular responses

CELL ADAPTATIONS

- Relevant examples: Hyperplasia, Hypertrophy, Atrophy, Metaplasia and intracellular accumulation

INFLAMMATION

- Acute inflammation
- Vascular events and cellular events
- Chemical mediators

CHRONIC INFLAMMATION

- General and granulomatous inflammation
- Morphologic patterns of acute and chronic inflammation

HEALING & REPAIR

- Normal controls of healing and repair.
- Repair by connective tissue
- Wound healing

HAEMODYNAMIC DISORDERS

- Edema and its types
- Hyperemia /congestion, Hemorrhage, Thrombosis, Embolism, Infarction, Shock.

DISEASES OF IMMUNITY

- General features of immunity
- Hypersensitivity reactions
- Immune deficiencies.
- Autoimmunity
- Amyloidosis

NEOPLASIA

- Nomenclature of neoplasia
- Molecular basis of neoplasia
- Carcinogenic agents of neoplasia
- Clinical aspects of neoplsia

MICROBIOLOGY

THE BACTERIA

- Bacterial cell structure, its forms and function
- Identification and classification of bacteria
- Gram stain

METHODS OF STUDYING MICRO-ORGANISM

- Culturing, inoculation and identification
- Types of medicine
- Physical states of media

MICROBIAL GROWTH

- Stages in the normal growth curve
- Microbial genetics
- Prokaryotic transcriptions and translations.
- Conjugations
- Mutation and its causes.
- Mechanism of drug resistances and its pathogenesis.
- Gateway to infection.
- Resident flora and its mechanism of invasions
- Classic stages of clinical infection
- Sterilization and disinfection.

RECOMMENDED BOOKS

1. Goodman CC & Fuller KS. Pathology: implication for the Physical Therapist. 4th ed. Elsevier:USA;2015
2. Kumar V, Abbas AK, &Aster JC. Robbins basic pathology. 9th ed. Elsevier: Philadelphia; 2013.
3. Levinson W. review of medical microbiology & immunology. 14th ed. McGraw-Hill: Canada; 2016
4. Thomson AD & Cotton RE. Lecture notes on pathology. 3rd ed. FA Davis; 1983

2. PHARMACOLOGY & THERAPEUTICS- I
CREDIT HOURS 2(2-0)

COURSE DESCRIPTION

This course deals with pharmacodynamics, pharmacokinetics, clinical/therapeutic uses and toxicology of drugs. Emphasis is given on how a drug works to anticipate when giving a drug to a patient are of paramount importance include administering drugs, calculating medication dosages based on given setting, assessing drug effects, intervening to make a drug more tolerable, and providing teaching about drugs and the drug regimen.

LEARNING OBJECTIVES

- Discuss prescription and/or over-the-counter medications used in the management of a variety of patient conditions encountered during radiological examination.

COURSE CONTENTS

GENERAL PRINCIPLES OF PHARMACOLOGY

- Various principal of pharmacology
- Introduction to pharmacokinematics
- Various drug dosage forms and pharmacological doses
- Various routes of drug administration and their advantages/ disadvantages
- Factors modifying drug absorption and distribution

- Major mechanisms responsible for drug metabolism
- Factors modifying drug metabolism
- Basic principles of drug excretion
- Factors modifying drug excretion
- Various mechanisms by which drugs exert their effects
- Various types of pharmacological graphs
- Identification of the therapeutic index and therapeutic window on a given dose response curve

DRUG USED TO TREAT PAIN AND INFLAMMATION

- Therapeutic uses of opioid analgesics.
- Classification of non-steroidal anti-inflammatory drugs on the basis of mechanism of action.
- Pharmacological management of rheumatoid and osteoarthritis.
- Patient control analgesia

PHARMACOLOGY OF CENTRAL NERVOUS SYSTEM

- Classification of the drugs, which modulate the central Nervous System according to their general principles, selectivity, specificity and mode of action.
- Pharmacokinetics, clinical uses, contraindications, adverse effects and toxicity of drugs acting on above receptor system
- Sedative, hypertonic and anxiety agents
- Drugs used to treat effective disorders depression and manic depression
- Antipsychotic and antiepileptic drugs
- Pharmacologic management of Parkinson disease
- General and local anesthetics

DRUGS AFFECTING SKELETAL MUSCLE

- Skeletal Muscle Relaxants

AUTONOMIC AND CARDIOVASCULAR PHARMACOLOGY

- Introduction to Autonomic Pharmacology
- Cholinergic, Adrenergic and Antihypertensive Drugs
- Treatment of Angina Pectoris
- Treatment of Cardiac Arrhythmias
- Treatment of Congestive Heart Failure
- Treatment of Coagulation Disorders and Hyperlipidemia

RECOMMENDED BOOKS

1. Ciccone CD. Pharmacology in rehabilitation. 5th ed. United states: Cardiopulmonary Perspectives in Rehabilitation; 2015.
2. Whalen K, Finkel R &Panavelli TA, editors. Lippincott illustrated reviews: pharmacology. 6th ed. Philadelphia: Wolters Kluwer; 2015
3. Cheema M. multi author textbook of pharmacology and therapeutics. Lahore: National Medical Publication; 2015: 1.
4. Cheema M. multi author textbook of pharmacology and therapeutics. Lahore: National Medical Publication; 2015: 2

3. RAIOLOGICAL INSTRUMENTATION

CREDIT HOURS 3(2-1)

COURSE DESCRIPTION:

This course is designed to provide general knowledge of basic instrumentations used for Radiological Examination to undergraduate students of Radiology Lab Sciences. Emphasis is placed on theoretical concepts of instruments, components, functions and their operations, calibration and troubleshooting of instruments. Getting the right diagnosis is a key aspect of health care which provides an explanation of patient's health

problem and appraises subsequent health care decisions. This interactive course covers the various chemicals used in variety of radiological procedures to obtain the information about patients in diagnosis, treatment and prevention of diseases. By the end of this course, students will be familiar with the working principle, operation, quality control and assurance, and maintenance of sate of the art instruments used in radiology department to obtain the quality results.

COURSE CONTENTS:

Different relevant Techniques used in Medical fields. The names of instruments used, based upon different Techniques for working and evaluation of different parameters in Medical fields. Normal functioning of these instruments, parts of these instruments & individual functions of these parts. Their trouble shootings and routine manipulations to obtain correct results. Maintenance of Sensitivity & Specificity of these instruments. The general study of following Medical Instruments available in Medical fields

X-Ray Machine: X-Ray tube, its structure, types and function. Portable and Mobile X-ray units: components, types and applications. Specialized X-Ray equipments: skull table, dental X-Ray equipments,

Mammography X-Ray Machine: Equipment and Technical Considerations, Mammography projections & Positioning, Composition and constituents of X-Ray film, methods of storage of films, Care and maintenance of X-Ray equipments, Significant mammographic findings & Related Pathology,

Contrast media, Purpose, Types a). Negative agents (Carbon dioxide, Air, Nitrous oxide), b) Positive agents (Barium sulfate, Iodinated).

Dosimetry: Definition and need of dosimetery, classification of dosimetery, Principle of dosimetery, its parts and functions.

Angiography and Cardiac Imaging: Basic principle of the procedure, types, Indications & Contraindications for the procedure, Patient positioning, Access method, Patient management during the exam, Contrast administration, Possible complications, Equipments, Exposure technique.

Fluoroscopy: types, image intensification, digital fluoroscopic equipments, C-arm fluoroscopic equipments. Visual Considerations, Instrumentation of Fluoroscopy, Practical Fluoroscopic Technique, Fluoroscopic Image Monitoring, Digital Fluoroscopy

Ultra Sound Machine: Principle, Components, Functions of each components, operation, advantages and disadvantages, Applications. Generation of ultrasound, Properties of ultrasound, Shape of the ultrasound beam, Spatial resolution, Echo Doppler effect, Ultrasound techniques i-e A-mode, B-mode, M-mode or TM-mode, B-scan, two-dimensional, Three- and four-dimensional techniques, B-flow.

Doppler techniques, Contrast agents, Artefacts, Adverse effects

CT Scan: Basic Principles of CT, Components, Functions of each components, operation, advantages and disadvantages, Applications. Data Acquisition, Image Reconstruction, Image Display, Methods of Data Acquisition, Image Quality, Quality Assurance, Post-Processing, Data Management

MRI: Principle, Components, Functions of each component, operation, advantages and disadvantages, Imaging weighting and contrast, Applications, MRI safety, Contrast agents in MRI, Advanced imaging techniques.

NMR: Principle, Components, Functions of each components, operation, advantages and disadvantages, Applications

Echo-Cardiography: Basic Principles of 2-D / M-Mode, Echocardiography Equipment, Construction, functions and applications, Principles of Doppler Echocardiography

Endoscopy Machine: Types, component parts, applications

Bone Densitometry: 1. Highlight different bone densitometry techniques. While focusing on Dual Energy X-Ray Absorptiometry (DEXA), also considers other densitometry methods for both axial and peripheral measurements. 2. Quality control issues and statistical interpretation of results relevant to DEXA.

Practical:

Use of PPEs, Handling and maintenance of radiology instruments, Trouble shootings of radiology instruments, Handling, Operations and Maintenance of Radiological Tools, Units of measurements and radiation dose calculation.

RECOMMENDED TEXT BOOKS:

1. *Radiologic sciences for technologists by Stewart C. bushong.*
2. *A guide to radiologic procedure by Chapman.*
3. *Merrill atlas of radiography positioning and radiologic procedure vol 3 by Philip W Ballinger.*
4. *Fluoroscopy Notes by TM series.*
5. *Ultrasound teaching manual: The basics of Performing and Interpreting ultrasound Scans by Mathias Hofer.*
6. *Colour atlas of ultrasound anatomy by Berthold Block, M.D*
7. *Echo made essay by Jaypee*
8. *Manual of cath lab Personnel invasive cardiology by Sanoy Watson .RN,BN,NFESC.*
9. *The cardiac catheterization Handbook by Mosby, Morton J.Kern.*
10. *Grossman cardiac catheterization, Angiography, Intervention by Donald s.Rain & William Grossman*
11. *Hand book of MRI Technique by Catherine Westbrook*
12. *Computed Tomography for Technologists A Comprehensive Text: by Lois Romans*
13. *Practical Gastrointestinal endoscopy by Colton PB and Williams CB in 1980 published by Oxford black well scientific*
14. *Text book of gastroteroentroloy by Bailliere tindall in London.*

4. GENERAL RADIOLOGICAL TECHNIQUES

CREDIT HOURS 3(2-1)

COURSE DESCRIPTION

This course presents basic techniques used in radiology. Students have the opportunity to develop an acquired understanding of general techniques and basic concepts of radiological positioning. Concepts are presented in lecture and practiced in the laboratory

LEARNING OBJECTIVES

- Defines & explain general radiological techniques
- Demonstrate various positioning techniques used in radiology
- Discuss strategies to develop radiological films

COURSE CONTENTS

- General Radiological Techniques
- Positioning Techniques for performing various radiographic procedures
- Radiographic positioning of bed cases; mobile/in ward radiography & operating theatre radiography, trauma radiography.
- Pediatric radiography
- Exposure, exposure factors and errors in exposure
- Detailed description of radiographic film, its processing and storage
- Film Technique: variation of films and screens with patient's thickness and an anatomical structure
- Chemicals used in film development; developing washing and fixing in dark room, drying of films
- Film development with automatic techniques
- Radiographic intensifying/fluorescent screens; purpose and methods of use
- Conventional Tomography - principles & techniques

LAB WORK

- Hands on skills on general radiological techniques

Note

The students are expected to make a record of his/her achievements in the log book. The log book is a collection of evidence that learning has taken place. It is a reflective record of achievements. The log book shall also contain a record of the procedures which student performs/observes during course of study

RECOMMENDED BOOKS

1. Radiological science for technologists by Stewart C. Bushong 7th edition published by Mosby, Inc: A Harcout health company.
2. 2. A guide to radiological procedures by Stephen Chapman & Richard Nikielny 3rd editionin by Bailliere tindall London
3. Merrill atlas of radiography positioning and radiologic procedure vol 3 by Philip W Ballinger.

5. BIOCHEMISTRY-II
CREDIT HOURS: 3(2-1)

COURSE DESCRIPTION

This course will provide the knowledge and skills in fundamental organic chemistry and introductory biochemistry that are essential for further studies. It will also cover the basic biochemical, cellular, biological and microbiological processes, basic chemical reactions in the prokaryotic and eukaryotic cells, the structure of biological molecules, introduction to the nutrients i.e. carbohydrates, fats, enzymes, nucleic acids and amino acids. The course also covers the section of nutritional biochemistry

LEARNING OBJECTIVES

- Explain biochemical description of different human tissues
- Describe respiration at cellular and molecular level
- Explain metabolism of carbohydrates, protein and lipids

COURSE CONTENTS

TISSUE BIOCHEMISTRY

- Extracellular Matrix
- Collagen
- Elastin and Extracellular Matrix Components
- Biochemistry of Proteoglycans
- Bone & Teeth
- Muscle & Cytoskeleton

METABOLISM BIOENERGETICS

- Introduction to Bioenergetics
- Biological Oxidations
- Electron Transport Chain and Oxidative Phosphorylation

METABOLISM OF CARBOHYDRATES

- Digestion & Absorption of Carbohydrates
- Glycolysis & its Regulation
- Citric Acid Cycle
- Metabolism of Glycogen
- Gluconeogenesis and regulation of blood glucose
- Pentose Phosphate Pathway & its Significance

METABOLISM OF LIPIDS

- Digestion & Absorption of Lipids
- Metabolism & Clinical Significance of Lipoproteins

- Fatty acid oxidation biosynthesis and metabolism of Triacylglycerols
- Metabolism & clinical Significance of Cholesterol
- Metabolism of Eicosanoids

METABOLISM OF PROTEINS & AMINO ACIDS

- Digestion of Proteins & Absorption of Amino Acids
- Transamination & Deamination of Amino Acids and urea cycle
- Specialized products formed from Amino Acids

LAB WORK

Section 1

Techniques of Instruments in Clinical Biochemistry with examples.

1. Visible Spectrophotometry
2. Flame photometry
3. UV & IR spectrophotometry
4. Atomic Absorption spectrophotometry
5. pH Metry
6. Chromatography and determination of Amino Acids in Urine by pape chromatography

Section 2

Clinical quantatives analysis in Biochemistry

1. Sample Collection Blood, Faces and body fluids
2. Serum Glucose Estimation
3. Glucose tolerance Test (GTT)
4. Serum Cholesterol estimation (Total, HDL and HDL cholesterol)
5. Serum Bilirubin Estimation (Total, Direct and Indirect bilirubins)
6. Serum Amylase Estimation
7. Serum AST Estimation
8. Serum ALT Estimation
9. Serum ALP Estimation
10. Serum Creatine Kinase(CK) Estimation
11. Serum Ascorbic acid Estimation
12. Serum LDH Estimation
13. Serum Proteins Estimation (Total, Albumin & Globulin)
14. Serum Total lipids Estimation
15. Serum calcium Estimation (total, ionized & unionized)
16. Serum Uric acid Estimation
17. Serum Magnesium Estimation
18. Serum Urea Estimation
19. Serum Creatinine Estimation

RECOMMENDED BOOKS

2. Harper's Biochemistry by Robbert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, Latest Ed.
3. Lippincott's Illustrated Review of Biochemistry by Pamela C. Champe and Richard A. Harvey, Latest Ed.
4. Practical Clinical Biochemistry by Varley.

5. Textbook of Biochemistry by Devlin, 5th Ed.
6. Textbook of Medical Biochemistry Vol-I and II by M. A. Hashmi. Biochemistry by Stryer, Lubert, Latest Ed.

6. SUPERVISED CLINICAL PRACTICE-I
CREDIT HOURS 3(0-3)

SEMESTER	SUPERVISION	FOCUS	WARDS	COMPETENCIES
5	Supervised by RIT Technologist	Hands -On	General Techniques, Xray, USG	As listed below

COURSE DESCRIPTION

During this supervised clinical practice, students are responsible for learning the preparation of patients for radiological techniques and operating the X-Rays and USGs. Students become familiar with performance of these skills in all settings (inpatient and outpatient) as well as on all types of patients (surgical, non-surgical, pediatric, geriatric, etc.).

CLINICAL COMPETENCIES

- Review pertinent medical records and conduct an interview which collects the following data:
- Past and current patient/client history
- Chief complaint
- Medications
- Medical/surgical history
- Operating the X-Rays
- Development of Films
- Performance of USGs

Note

It is mandatory for each student to document minimum 16 cases per semester (1 cases per week) in clinical log book duly checked and signed by clinical supervisor on weekly basis and head of institute at completion

URCG-5111 **Translation of the Holy Quran – III** **1 (0+1)**

Topic	Details
Semester/Level	In some discipline 5th semester and in some discipline 6th Semester/ BS (5th Semester intake) 1st / 2nd
Course Code	URCG-5111
Course Title	Translation of the Holy Quran - III
Credit Hours	1(0-1)
Objectives	• To introduce ethics and highlight its importance, need and relevance for individual and collective life. • To illuminate the students with the Quranic norms of Morality i.e. truthfulness, patience, gratitude, modesty, forgiving, hospitality etc. • To familiarize the students with immoral values like falsify, arrogance, immodesty, extravagance, backbiting etc. • To inculcate ethical and moral values in our youth. • To develop a balanced dynamic and wholesome personality. • To introduce the students to Quranic Arabic grammar in practical manner.
Course Contents:	○ اخلاق (تعارف، ضرورت واہمیت، اقسام، معنویت) اخلاق حسنہ: • برائی کو نیکی سے مٹانا • نیکی کے کاموں میں مسابقت • لوگوں کے درمیان صلح • عدل وانصاف • سچائی • ایثار • سلیم قلب • مہمان نوازی • لغویات سے اعراض • عاجزی وانکساری • نگاہ اور آواز کو پست رکھنا • چال میں میانہ روی • شرمگاہوں کی حفاظت • صبر • شکر • امور میں میانہ روی اخلاق سیئہ: • ظلم اور زیادتی • غرور و تکبر • نفسانی خواہشات کی پیروی • بدگمانی • جھوٹ • چغلی اور تہمت

	• تمسخر اور شیخی خوری • لہو ولعب • برے ناموں سے پکارنا • احسان جتانا اور تکلیف دینا • فضول خرچی اور حد سے بڑھنا • حسد اور تنگ دل • بے پردگی
Grammar:	• قرآنی عربی گرامر کے اصول اور انکے اطلاقات (متن قرآنی پر اطلاق سے توضیحات)
Details of Chapters and verse Numbers:	▪ منتخب آیات مع ترجمہ و تجوید ▪ البقرہ(۱۱۲، ۲۴۵، ۸۳، ۱۸۲، ۱۷۲، ۱۵۲، ۱۷۲، ۵۲، ۱۵۳، ۱۷۷، ۲۵۰، ۱۲۵، ۲۲۲، ۲۷، ۷۷، ۱۸۲، ۱۴۸، ۱۸۷، ۱۰۹، ۲۶۴، ۲۶۳، ۲۶۲، ۲۱۲، ۶۷، ۲۳۱، ۱۰، ۳۴، ۱۲۴، ۲۵۸، ۲۷، ۷۱، ۸۳، ۲۲۶، ۱۹۵، ۷۶) ▪ آل عمران(۱۵۴، ۱۴، ۲۴، ۱۸۵، ۱۳۲، ۱۴۸، ۱۳۴، ۱۴۵، ۱۷، ۲۰۰، ۱۲۵، ۱۳۳، ۱۱۴، ۱۰۴، ۱۰۴، ۲۶، ۷۸، ۱۴۱، ۱۴۷، ۱۵۹) ▪ النساء(۱۳۵، ۲۳، ۲۲، ۱۰۸، ۱۰۷، ۱۰۵، ۵۴، ۲۰، ۲۷، ۱۷۳، ۳۶، ۲۵، ۲۴، ۴۷، ۵۷، ۲۴) ▪ المائدۃ(۵۸، ۵۷، ۹۳، ۱۳، ۶، ۴۱، ۱۹) ▪ النحل(۱۲۶، ۹۰، ۱۰۵، ۱۱۳، ۳۰، ۱۲۶، ۱۲۵) ▪ الرعد(۲۵، ۲۰، ۲۴، ۲۲، ۶) ▪ الاعراف(۳۱، ۶۶، ۵۱، ۱۴۶، ۴۰، ۴، ۲۰، ۱۴۴، ۱۹۹، ۹۵، ۸۱) ▪ القصص(۵۴، ۸۴) ▪ فصلت(۳۴) ▪ الانعام(۳۲، ۷۰، ۷۰، ۱۳۰، ۱۵۵، ۱۶۰) ▪ النمل(۹۰، ۴۶) ▪ الحج(۳۰، ۵۸، ۶۰، ۸۸، ۷۷) ▪ الحجرات(۹، ۱۱، ۶، ۱۱، ۳، ۱۲، ۱۵، ۱۰) ▪ الاحزاب(۲۳، ۵۰، ۵۸، ۵۸، ۵۲، ۵۵، ۵۹، ۳۵، ۲۴، ۳۵) ▪ الحشر(۹) ▪ طہ(۷۲) ▪ الانعام(۱۶۴، ۱۴۱، ۱۱۶، ۱۵۱، ۶۳، ۱۲۷) ▪ ق(۳۴) ▪ الانفال(۲۷، ۴۶، ۶۱) ▪ الفتح(۱۵) ▪ یونس(۱۰، ۱۹، ۱۲، ۶۶، ۲۲، ۲۲) ▪ الفرقان(۶۳، ۲۱، ۶۷، ۶۳) ▪ النور(۲۳، ۶، ۴، ۳۰، ۳۱، ۳۳، ۳۳، ۶۱، ۳۱، ۲۲) ▪ لقمان(۶، ۳۳، ۱۹، ۳۲، ۱۸) ▪ الاسراء(۳۷، ۱۱۰، ۵، ۳۷) ▪ المزمل(۱۸) ▪ المدثر(۶، ۴) ▪ المدثر(۴۷) ▪ فاطر(۳۲) ▪ الفتح(۲۹)

	▪ البلد(۱۷) ▪ الزمر(۳،۱۰) ▪ الحجر(۸۵) ▪ النجم(۳۱) ▪ الرحمٰن(۶۰) ▪ ھود(۸،۱۰۲،۳) ▪ الکہف(۲،۵۶) ▪ الشوریٰ(۳۷) ▪ غافر(۲۸،۲۷) ▪ الحدید(۲۰،۲۰) ▪ مریم(۵۹) ▪ النازعات(۴۱) ▪ التوبہ(۶۵،۶۴،۷۷) ▪ الھمزہ(۱)	

SIXTH SEMESTER

1. **PATHOLOGY & MICROBIOLOGY-II**
2. **RADIATION SCIENCE AND TECHNOLOGY -II**
3. **BIOSAFETY AND BIOSECURITY**
4. **PHARMACOLOGY & THERAPEUTICS-II**
5. **COMMUNITY MEDICINE & BEHAVIORAL SCIENCES**
6. **SUPERVISED CLINICAL PRACTICE - II**

1. PATHOLOGY & MICROBIOLOGY-II

CREDIT 3(2-1)

COURSE DESCRIPTION

This course will cover the basic concepts, terminology, etiology, and characteristics of pathological processes. The course includes the diseases of the Integumentary System, Cardiovascular System, the Lymphatic System,

the Respiratory System, the Nervous System, and Pathology of the musculoskeletal System, Pathology of Aging and medical microbiology. Also help the student to provide with a working knowledge of clinical pathology lab importance in radiology.

COURSE OBJECTIVES

- Describe consequences of pathologic processes on the structure and function of the human body.
- Discuss selected disorders/diseases common to acute care in the radiology.
- Explain normal structure and function, in relation to disease processes in the radiology.

COURSE CONTENTS

THE INTEGUMENTARY SYSTEM

- Skin Lesions
- Signs and Symptoms of Skin Disease
- Aging and the Integumentary System
- Common Skin Disorders
- Skin Infections
- Skin Cancer
- Skin Disorders Associated With Immune
- Dysfunction
- Thermal Injuries
- Miscellaneous Integumentary Disorders.

THE CARDIOVASCULAR SYSTEM

- Signs and Symptoms of Cardiovascular Disease
- Aging and the Cardiovascular System
- Gender Differences and the Cardiovascular System
- Diseases Affecting the Heart Muscle
- Disease Affecting the Cardiac Nervous System
- Diseases Affecting the Heart Valves
- Diseases Affecting the Pericardium
- Diseases Affecting the Blood Vessels
- Other Cardiac Considerations.

THE LYMPHATIC SYSTEM

- Anatomy and Physiology
- Inflammation and Infection in the Lymphatic System.

THE RESPIRATORY SYSTEM

- Aging and the Pulmonary System
- Infectious and Inflammatory Diseases
- Obstructive Diseases
- Environmental and Occupational Diseases
- Near Drowning
- Congenital Disorders
- Parenchymal Disorders
- Disorders of the Pulmonary Vasculature
- Disorders of the Pleural Space

PATHOLOGY OF THE MUSCULOSKELETAL SYSTEM

INTRODUCTION TO PATHOLOGY OF THE MUSCULOSKELETAL SYSTEM

- Advances in Musculoskeletal Biotechnology
- Biologic Response to Trauma
- Aging and the Musculoskeletal System
- The Musculoskeletal System and Exercise
- Musculoskeletal System Disease.

METABOLIC DISORDERS

- Osteoporosis
- Osteomalacia
- Paget's disease.

INFECTIOUS DISEASES OF THE MUSCULOSKELETAL SYSTEM

- Osteomyelitis
- Infections of Prostheses and Implants
- Diskitis
- Infectious (Septic) Arthritis
- Infectious (Inflammatory) Muscle Disease
- Extra pulmonary tuberculosis
- Summary of Special Implications for the Therapist.

MUSCULOSKELETAL NEOPLASMS

- Primary Tumors
- Primary Benign Bone Tumours
- Primary Malignant Bone Tumours
- Multiple Myeloma
- Primary Soft Tissue Tumours
- Metastatic Tumours.

SOFT TISSUE, JOINT AND BONE DISORDERS

- Soft Tissue
- Joint
- Bone.

PATHOLOGY OF THE NERVOUS SYSTEM

INTRODUCTION TO CENTRAL NERVOUS SYSTEM DISORDERS

- Overview
- Pathogenesis
- Clinical Manifestations
- Diagnosis
- Treatment
- Prognosis.

INFECTIOUS DISORDERS OF THE CENTRAL NERVOUS SYSTEM

- Overview
- Meningitis
- Encephalitis
- Brain Abscess

- Prion Disease.

CENTRAL NERVOUS SYSTEM NEOPLASMS
- Primary Brain Tumours
- Specific Primary Brain Tumours
- Primary IntraspinalTumours
- Metastatic Tumours
- Paraneoplastic Syndromes
- Leptomeningeal Carcinomatosis
- Pediatric Tumours.

DEGENERATIVE DISEASES OF THE CENTRAL NERVOUS SYSTEM
- Amyotrophic Lateral Sclerosis
- Alzheimer's Disease, Alzheimer's Dementia, and Variants
- Dystonia
- Huntington's Disease
- Multiple Sclerosis
- Parkinsonism and Parkinson's disease

STROKE
- Stroke
- Vascular Disorders of the Spinal Cord.

MEDICAL MICROBIOLOGY

G +VE COCCI
- Staphylococci
- Streptococci.

G -VE COCCI
- Nessessia.

G +VE SPORE FORMING RODS
- Bacillies
- Clostridia
- G –ve rods (introduction to Enterics)

ACID FAST BACILLI
- Mycobacteria.

SPIROCHETES
- Introduction
- Treponemes.

BASIC VIROLOGY
- General characteristics
- Viral structure
- Nomenclature and classification.

MYCOLOGY

- Introduction to mycology.

PARASITOLOGY

- Introduction to protozoan.

PRACTICAL/ LAB WORK

- To study the microscope
- To study the calcification
- To study the osteogenic sarcoma
- To study the granulation tissue
- To study the chronic inflammation (cholecystitis)
- To study the acute inflammation (appendicitis)
- To Fibroedenoma
- To study the carcinoma of breast
- To study the actinomycosis
- To study the culture media
- To study the gram staining
- To study the Z-N staining
- To study the giant cell tumour
- Examination of urine.

RECOMMENDED BOOKS

1. *Pathology: implications for the Physical therapist* by: Catherine Cavallaro Goodman, 4th edition
2. *Basics &advanced Human Pathology* by Robbins 9th edition
3. *Lecture notes on Pathology by* Thomas and Cotton Published by Blackwell Scientific Publications, Oxford
4. *General Pathology* by Lord Horward Florey 4th edition by Lloyd-Luke (Medical Books) Ltd
5. *Medical Microbiology and Immunology* By: Levinson and Jawetz, 9th Ed., Mc Graw-Hill.

2. RADIATION SCIENCE AND TECHNOLOGY-II
CREDIT HOURS 3(2-1)

COURSE CONTENTS

The radiographs, radiographic films; Film construction, Formation of latent image, Types of film, Handling and storage of film. Processing the latent image; Film processing, Processing chemistry, Automatic processing, Alternative processing methods. Radiographic intensifying screens; Screen construction, Luminescence, Screen characteristic, Screen film combinations, Care of screens. Control of scatter radiations; Production of scatter radiations, Control of scatter radiations, Grid performance, Grid types, Grid problems, Grid selection, radiographic technique; Exposure factors, Imaging system characteristics, Patient factors, Image quality factors, Exposure technique charts, Automatic exposure technique, Magnification radiography. Image quality; Radiographic quality, Resolution, Noise, Speed, Film factors, Geometric factors, Subject factors, Tools for improved radiographic quality. Image artifacts; Exposure artifacts, Processing artifacts, Handling and storage artifacts. Quality control; Quality assurance, Quality control, Radiographic quality control, Processor quality control. Radiobiology, human biology; Human radiation response, Composition of the body, Cell theory, fundamental principles of radiology; Law of Bergonié and Tribondeau, Physical factors that effect radiosensitivity, Biologic factors that effect radiosensitivity, Radiation dose response relationships,

molecular &cellular radiology; Irradiation of macromolecules, Radiolysis of water, Direct and indirect effects, Target theory, Cell survival kinetics, Cell cycle effects, LET, RBE, OER, early and late effects of radiation, radiation protection, health physics; Radiation & health, Cardinal principles of radiation protection, Effective dose, Radiologic terrorism, designing for radiation protection; Radiographic protection features, Design of protective barrier, Radiation detection & measurement. Patient radiation dose management; Patient dose description, Reduction of unnecessary patient dose, pregnant patient, Patient dose trends. Occupational radiation dose management; Occupational radiation exposure, Radiation dose limits, Reduction of radiation exposure

Practical:

Construction of a x-ray room

Care of radiographic film and intensifying screens.38

Radiation protection measures

Image artifacts

Control of scatter radiation

Image quality factors

RECOMMENDED BOOKS

1. Radiological science for technologists by Stewart C. Bushong 7th edition published by Mosby, Inc: A Harcout health company.
2. A guide to radiological procedures by Stephen Chapman & Richard Nikielny 3rd editionin by Bailliere tindall London
3. Merrill atlas of radiography positioning and radiologic procedure vol 3 by Philip W Ballinger.
4. Ultrasound teaching manual: The basics of Performing and Interpreting ultrasound Scans by Mathias Hofer.

3. BIOSAFETY AND BIOSECURITY
CREDIT HOURS 3(2-1)

COURSE OBJECTIVE:

- This course provides an overview of the critical aspects of biosecurity, biosafety and biocontainment.
- Technologists/students will learn how to assess risks for biohazards in the radiology setting and the strategies to appropriately manage these risks.
- By the end of the course, students will be familiar with international best practices in biorisk management.

COURSE CONTENTS:

1) Introduction to Biosafety

History and incidence of hospital-acquired infections (HAI), Incidents of secondary transmission from the radiology, types of accidents leading to HAIs. Importance of biosafety and biocontainment in minimizing the risk of HAIs

2) Biosafety Concepts and Strategies

Microorganisms into risk groups, relationship between risk groups and biosafety levels. Concepts of primary and secondary barriers.

3) Biosecurity Concepts and Strategies

Relationship between biosecurity and biosafety, challenges of a biosecurity program for microorganisms. Key components of a biosecurity program (physical security, pathogen accountability, personnel reliability, transport security, information security). Emergency response plan for breaches of biosecurity

4) Risk Assessment

Risk assessment for microorganisms, factors affecting risk assessment (agent, host, environment, behavioural), risk management strategies, ideal risk assessment for laboratories handling dangerous pathogens

5) Biosafety Program Management

Structure of a biosecurity and biosafety program

6) Risk Communication

Explain what is meant by risk communication, communicating crisis information to the public, communication of laboratory accidents and breaches

7) Biocontainment Facilities

New biocontainment laboratory from conceptualization through to certification

8) Operational Biosafety Practices and Procedures

General biosafety practices and procedures applicable to all laboratories handling infectious agents, biosafety practices and procedures applicable to BSL2, BSL3 laboratories.

9) Biological Safety Cabinets

Classes and types of biological safety cabinets (BSC)

10) Disinfection and Decontamination

Define disinfection, germicide, sanitizer, virucide, sterilant and other applicable terms used to describe decontaminants

11) Waste Management

Outline the types of infectious waste generated in the laboratory, treatment methods

13) Transportation of Infectious Substances

Outline the regulatory framework governing the transportation of infectious substances, classification, packaging, labeling, documentation and shipping requirements.

14)Emergency Planning and Response

Responding to spill of infectious materials and other accidents in the laboratory

RECOMMENDED TEXTBOOKS:

1. Laboratory Biosafety Manual. World Health Organization. 2004

2. Laboratory Biosafety Guidelines. Public Health Agency of Canada. 2004

3. Guidance on Regulations for the Transport of Infectious Substances. World Health Organization. 2007

4. Infectious Substances Shipping Guidelines. International Air Transport Association 2006

4. PHARMACOLOGY & THERAPEUTICS-II

CREDITHOURS 2(2-0)

COURSE DESCRIPTION

This course is designed to acquaint the students with the study of properties, effects, and therapeutic value of the primary agents in major drug categories. The topics include pharmacology of the respiratory system, gastrointestinal system, treatments of infectious diseases, and the drugs used in iontophorosis and phonophoresis

LEARNING OBJECTIVES

- Describe theoretical background of pharmacological treatment in radiological examination.
- Explain pharmacological background for clinical treatment of patient referred to radiological examination.

- Define basic principles and drugs for respiratory system, gastrointestinal system and disorders in endocrine system.
- Discuss basic principles and drugs of anti-microbial, antiviral drugs, immunosuppressive drugs and drugs used in iontophorosis and phonophorosis

COURSE CONTENTS

RESPIRATORY AND GASTROINTESTINAL PHARMACOLOGY

- Respiratory drugs
- Gastrointestinal Drugs.

ENDOCRINE PHARMACOLOGY

- Introduction to Endocrine Pharmacology
- Adrenocorticosteroids
- Male and Female hormones
- Thyroid and Parathyroid Drugs; Agents affecting bone mineralization
- Pancreatic Hormones and the Treatment of Diabetes Mellitus.

CHEMOTHERAPY OF INFECTIOUS AND NEOPLASTIC DISEASES

- Treatment of Infections; Antibacterial Drugs
- Treatment of Infections; Antiviral Drugs
- Treatment of Infections; Antifungal and Ant parasitic drugs
- Cancer Chemotherapy
- Immunomodulating Agents

DRUGS USED IN CURRENT RADIOLOGICAL EXAMINATION

- Drugs administered by Iontophorosis and Phonophrosis
- Potential Interactions between Physical Agents and Therapeutic drugs.

RECOMMENDED BOOK

1. Pharmacology in Rehabilitation (5rd Edition-2015) By Charles D. Ciccone.
2. Pharmacology, Richard A, Harvey, 3rd Edition, Lippincott's.
3. A Textbook of Clinical Pharmacology and Therapeutics, 5th Edition by James Ritter 2012

5: COMMUNITY MEDICINE & BEHAVIORAL SCIENCES CREDIT HOURS 3(3-0)

COURSE DESCRIPTION

This course is designed for the students in order to develop strong background knowledge regarding the community health and wellbeing. It provide awareness about the problems faced by people in community at all levels and effective strategies to solve these issues. This course also increase awareness of psychosocial issues faced by individuals and their significant reference groups at various points on the continuum of health and disability. Personal and professional attitudes and values are discussed as they relate to developing therapeutic relationships. Communication skills are emphasized for effective interaction with clients, health-care professionals and others.

LEARNING OBJECTIVES

- Describe impact of environmental, biological, social and behavioral risk factors on health and disease through the epidemiologic methods.
- Discuss agent, host and environmental factors determining health and disease.
- Discuss the community health, diagnosis & to take remedial measure for improving community health
- Explain psychological and ethical factors that influence values about health promotion, wellness, illness and disability
- Demonstrate Skills to effective physical therapist-client relationship for better health care outcomes.

COURSE CONTENTS

COMMUNITY BASED MEDICINE INTRODUCTION

History of Community medicine & rehabilitation. Definition, concept of Health & illness of diseases. Natural History of diseases, levels & prevention.

ENVIRONMENTAL SANITATION & MEDICAL ENTOMOLOGY

Water, waste disposal, Environmental problems & pollution.

GENETICS: Prevention of genetic diseases, Genetic counseling.

GENERAL EPIDEMIOLOGY DESCRIPTIVE EPIDEMIOLOGY: Time, Place, Person.

ANALYTICAL EPIDEMIOLOGY: Case control, Cohort studies.

EXPERIMENTAL EPIDEMIOLOGY RANDOMIZED CONTROL TRIAL SYSTEMIC

EPIDEMIOLOGY: Vector borne diseases, Water borne diseases, Air borne diseases, Contact diseases, Diseases of major public health and its importance along with national health programs wherever Applicable

NON-COMMUNICABLE DISEASES

Diabetes, Hypertension, Heart diseases, Blindness, Accidents, Geriatric problems.

OCCUPATIONAL HEALTH PROBLEMS

M.C.H. and family welfare Programmes, Health care delivery in the community, National Health Policy, National Health programmes including, Programmes, Health Planning Organization.

STRUCTURE OF HEALTH CARE SYSTEM IN THE COUNTRY

P. H. C. district level, State level and central level. P. H. C. Organization and Function, Role of Non-Governmental Organization.

HEALTH EDUCATION: Principles of Health Promotion, Methods, approaches and media for, I. E. C (Information, Education & Communication), Medical and Health/Information system, Mental Health, Nutrition.

INTRODUCTION OF BEHAVIORAL SCIENCES: Define Behavioral Sciences, discuss its importance in health, Discuss Bio-Psycho-Social Model of Healthcare

BEHAVIOR OF INDIVIDUAL

Nature/nurture debate, Behaviorism and learning theories, Behavioral modifications

COGNITION: Cognition, cognitive development throughout lifespan

SCIENCE OF RELATIONSHIP

Define and discuss communication skills, its types, modes, barriers and factors affecting, Discuss Counseling: steps, scope, indication and contraindications in health setting. Discuss conflict management: Dealing with real life crisis and conflict situations in health settings. Discuss interviewing and its psychosocial factors in health care. Define clinician-patient / client relationship. Discuss concept of boundaries and psychological reactions in clinician – patient relationship such as transference and counter transference. Discuss Problem solving and decision making strategies in health care

STRESS MANAGEMENT

Define and classify of stress, Discuss effects of stress on health and coping strategies, Discuss Relationship of stress and stressors with illness, Define Anxiety, Discuss Psychological defense mechanisms, Adjustment and maladjustment

APPLICATION OF BEHAVIORAL PRINCIPLES IN HEALTH AND DISEASE

Importance of psychological consideration in physical therapy management of Mentally, emotionally and physically compromised patients. Terminally ill and home bound patients

ETHICS

Define ethics, medical ethics, and values, value system, virtues, mores, moral rules and morality. Discuss ethical theories. Discuss principle based approach for physical therapist in ethics such as; Non-maleficence, beneficence, autonomy, fidelity, veracity, paternalism, and Justice. Discuss code of ethics for physical therapist. Discuss ethical dimension of the physical therapist patient relationship, confidentiality, information sharing, and informed consent and ethical dilemmas.

RECOMMENDED BOOKS

1. *Textbooks of Community Medicine, by Prof. H. A. Siddique (2nd Edition).*
2. *Parks text book of preventive & social medicine –K Park.*
3. *Rana MH, Ali S & Mustafa M. A handbook of behavioral sciences for medical and dental students. 2nd ed. Lahore : university of health sciences; 2013.*
4. *Dowrick C. Medicine in society: behavioral sciences for medical students. CRC Press; 2001*

6. SUPERVISED CLINICAL PRACTICE-II

CREDIT HOURS 3(0 -3)

COURSE DESCRIPTION

During this supervised clinical practice, students are responsible for learning the preparation of patients for radiological techniques and operating the CT scan, MRI and Angiography. Students become familiar with performance of these skills in all settings (inpatient and outpatient) as well as on all types of patients (surgical, non-surgical, pediatric, geriatric, etc.).

SYSTEMS REVIEW

SEMESTER	SUPERVISION	FOCUS	WARDS	COMPETENCIE
6	SUPERVISED BY TRAINED MIT Technologist	Hands-on	CT, MRI, Angiography	LISTED BELOW

CLINICAL COMPETENCIES

- Review pertinent medical records and conduct an interview which collects the following data:
- Past and current patient/client history
- Chief complaint
- Medications
- Medical/surgical history
- Operating the CT
- Operating the MRI
- Development of Films
- Assistance in performance of Angiography

Note

It is mandatory for each student to document minimum 16 cases per semester (1 cases per week) in clinical log book duly checked and signed by clinical supervisor on weekly basis and head of institute at completion

SEVENTH SEMESTER

1. **MEDICINE - I**
2. **SURGERY - I**
3. **NUCLEAR MEDICINE**
4. **SPECIAL RADIOLOGICAL TECHNIQUES-I**

5. **RESEARCH METHODOLOGY & SCIENTIFIC INQUIRY**
6. **SUPERVISED CLINICAL PRACTICE-III**
7. **TRANSLATION OF THE HOLY QURAN – IV (*Non-Credit*)**

1. MEDICINE-I
CREDIT HOURS 3(3-0)

COURSE DESCRIPTION

- This course intends to familiarize students with medical terminology and abbreviations for efficient and effective chart reviewing and documentation. It also explores systemic diseases, focusing on epidemiology, pathology, histology, etiology, as well as primary and secondary clinical characteristics and their management.

LEARNING OBJECTIVES

- Describe medical terminologies, abbreviations, epidemiology, etiology, primary and secondary clinical characteristics of Cardiovascular, Rheumatology and bone, and Respiratory diseases.
- Explain briefly an overview of medical management of listed diseases/disorders.

COURSE CONTENTS

CARDIOVASCULAR DISEASES
CARDIAC DISEASES

- Chest pain
- Dyspnoea
- Palpitation
- Peripheral edema
- Syncope
- Cardiac failure
- Acute pulmonary edema
- Cardiogenic shock
- Systemic hypertension
- Ischemic heart disease
- Angina pectoris
- Unstable angina
- Myocardial infarction
- Rheumatic fever
- Valvular heart diseases
- Congenital heart diseases
- Ventricular septic defect
- Atrial septal defect
- pulmonary heart disease
- Pericardial disease
- Pulmonary hypertension
- Cardiac arrhythmias and heart in pregnancy.

VASCULAR DISEASES

- Arteriosclerosis
- Acute & Chronic ischemia of leg
- Aortic aneurysm
- Buerger‘s disease
- Raynaud‘s disease
- Varicose veins

- Venous thrombosis.

RHEUMATOLOGY AND BONE DISEASES: ARTHRITIS

- Osteoarthritis
- Rheumatoid arthritis
- Connective tissue diseases
- Arthritis in elderly
- Arthritis in children,
- Seronegative spondyloarthropathies
- Crystals deposition disease
- Arthritis associated with other diseases.

BACK PAIN

- Back Pain due to serious disease
- Inflammatory Back Pain
- Disc disease
- Mechanical problems
- Soft tissues problems
- Psychogenic Back Pain
- Nonspecific Back Pain
- Neck pain.

SOFT TISSUE RHEUMATISM: BONE DISEASES

- Paget‘s disease
- Infections of bones
- Neoplastic disease
- Skeletal dysplasia
- Other hereditary diseases.

RESPIRATORY DISEASES

DISEASES OF UPPER RESPIRATORY TRACT

- Common cold
- Sinusitis
- Rhinitis
- Pharangitis
- Acute laryngeo-trcheobronchitis
- Influenza
- Inhalation of the foreign bodies.

DISEASE OF LOWER RESPIRATORY TRACT

- Acute & chronic Bronchitis
- Bronchiectasis
- Cystic fibrosis
- Asthma
- Emphysema
- Pneumonias
- Tuberculosis
- Pulmonary fibrosis

- Radiation damage
- Common tumours of the lungs
- Respiratory failure
- Adult distress respiratory syndrome
- Disorders of chest wall and pleura
- Chest trauma
- Deformities of rib cage
- Dry pleurisy
- Pleural effusion
- Empyema
- Pneumothorax.

RECOMMENDED BOOKS

1. Practice of medicine by: Davidson.
2. Clinical medicine by: Parveen j Kumar & Michael Clark.
3. Short text book of medicine by: M. Inam Danish.
4. Hutchison's clinical methods by: Michael swash. 21st edition.
5. Bed side techniques.

2. SURGERY-I

CREDIT HOURS 3(3-0)

COURSE DESCRIPTION

This course intends to familiarize the students with principles of othopaedic surgery along with detail description of surgical terminologies and abbreviations for efficient and effective chart reviewing and documentation. It also explores various orthopaedic conditions needing surgical attention, focusing on epidemiology, pathology, as well as primary and secondary clinical characteristics and their surgical management.

LEARNING OBJECTIVES

- Describe in detail surgical terminologies, abbreviations, etiology, primary and secondary clinical characteristics, classifications, indications and complications for surgeries listed orthopedic conditions
- Explain briefly an overview of surgical management of the listed conditions.

COURSE CONTENTS

ORTHOPEDIC SURGERY FRACTURES

- Definition
- Classification
- Causes
- Clinical features
- Healing of fractures
- Complications
- Principles of general management of
- Fracture of the Upper Extremity
- Fracture of the Lower Extremity
- Fracture of the vertebral column, thorax and pelvis
- Basic and advanced trauma life support.

DISLOCATIONS & SUBLUXATIONS

- Definition
- Traumatic dislocation
- General description
- Principles of general description & management of traumatic dislocation/subluxation of;
    - Shoulder joint
    - Acromioclavicular joint
    - Elbow joint
    - Hip joint
    - Knee joint.

SOFT TISSUE INJURIES

- Introduction
- Anatomy & physiology general description and management of injuries of:
- Ligaments
- Tendons
- Muscles
- Fascia
- Bursae
- Detailed description of physiotherapy management of individual tissue injuries around:
- Shoulder region
- Elbow region
- Wrist and hand region
- Knee region
- Ankle region
- Muscles and tendons injuries of upper and lower limb
- Cervico-lumber injuries
- Whiplash of the cervical spine
- Crush injuries
- Spinal pain
- Degenerative and Inflammatory Conditions:
- Osteo-orthosis/Arthritis
- Spondylosis
- Spondylolysis
- Pyogenic arthritis
- Rheumatoid arthritis
- Juvenile arthritis
- Tuberculosis arthritis
- Gouty arthritis
- Haemophilic arthritis
- Neuropathic arthritis
- Ankylosing spondylitis
- Psoriatic arthritis.

GENERAL ORTHOPEDIC DISORDERS

- Carpel tunnel syndrome
- Compartment syndromes
- Muscular dystrophies
- Neuropathies
- Avascular necrosis of bone in adult and children
- Ischemic contracture

- Gangrene
- Rickets
- Osteoporosis and osteomalacia
- Shoulder pain
- Neck pain
- Knee pain
- Backache
- Painful conditions around elbow
- Detailed description of :
- Orthotics
- Prosthetics
- Splintage
- Traction
- POP

TUMOURS

- Classification
- Principles of general management
- General description of benign and malignant tumors of musculoskeletal system

DEFORMITIES AND ANOMALIES

- Definition
- Causes
- Classification
- Congenital and acquired deformities
- Physical and clinical and radiological features
- Complications
- Principles of medical and surgical management of the deformities
- General description of following deformities.

DEFORMITIES OF THE SPINE

- Torticolis
- Scoliosis
- Kyphosis
- Lordosis
- Flat back.

DEFORMITIES OF THE LOWER LIMB

- CDH
- Coxavera
- Coxavalga
- Anteversion
- Retroversion
- Genu valgum
- Genu varum
- Genu recurvatum
- CDK
- Talipescalcaneous equines, varus& valgus
- Talipescalcaneovarus

- Talipescalcaneovalgus
- Talipesequinovarus
- Pescavus
- Pesplanus
- Hallux valgus &varum,
- Hallux rigidus and hammer toe.

DEFORMITIES OF SHOULDER AND UPPER LIMB

- Sprengels shoulder
- Cubitusvarum
- Cubitusvalgum
- Deputryn‘s contracture.

RECOMMENDED BOOKS

1. Short practice of surgery by Baily and Love‘s.
2. Text Book of Surgery by Ijaz Ahsan.
3. Outline of Fractures.

3. NUCLEAR MEDICINE
CREDIT HOURS 3(2-1)

COURSE DESCRIPTION

The intention of this course of Nuclear Medicine is to provide necessary knowledge and to develop cognitive skills underlying the performance of the tasks typically required of entry level Imaging technologists in this specialized area. The course of Nuclear Medicine shall consist of two main parts theoretical teaching and Practical training which covers lab work and on patient supervised clinical hands on training. Student technologist will complete Log Book of all activities of clinical rotation under the supervision of an experienced Technologist and Nuclear Med Physician, and will Present log book to external examiner in presence of his teacher (internal Examiner). The core of this course is clinical skills to acquire Images by using patient required technology, Knowledge of safe practice, understanding of Image about normal and abnormal conditions, and professional attitude in accordance with the scope of profession

LEARNING OBJECTIVES

Candidates should demonstrate the following skills when performing the procedures:

- Discuss related physics contents
- Evaluation of requisition;
  - Patient instructions;
  - Preparation and care;
  - Selection, handling, and administration of radiopharmaceutical;
  - Equipment configuration and patient positioning;
  - Radiation safety; and
  - Image processing and evaluation.
- All procedures must be performed on patients, with the exception of thyroid therapy which may be simulated.

COURSE CONTENTS

Introduction to Nuclear Physics
Atomic and nuclear structure
Artificial and natural radioactivity
Modes of radioactive decay

Exponential decay and; Half-life and mean life of radionuclides
Radioactive decay series and equilibrium
Interaction of high energy radiation with matter
Radiation Detection and Instrumentation
Basic principles of radiation detectors and their common propertie
Gas-filled detectors and their application
Scintillation detectors
Rectilinear scanners
Non imaging probes
Scintillation counters
Dose calibrator
Scintillation camera
Multicrystal devices
Tomographic imaging technique, SPECT and PET;
Image production & display;
Image quality in nuclear medicine
Quality assurance procedures in Nuclear Medicine instrumentation
Use of computers in Nuclear Medicine-principles & applications to NM data acquisition, processing & display.
Radiation protection
Radiation quantities and units
Radioactive waste disposal
Radiation shielding and transportation of radioactive materials
Health physics instrumentation
Methods of safe Handling of Radionuclides and Pertaining Rules and Regulations
Radiochemistry and Radiopharmaceuticals
Radiopharmaceuticals
Production of radioisotopes
Radioisotope generators
Quality control and quality assurance of radiopharmaceuticals
Hot laboratory and dispensing operations
Chemical toxicity of radionuclides.
Clinical nuclear medicine imaging
Systemic Nuclear Medicine teaching including application of radiopharmaceuticals for imaging of different organs
Indications of nuclear medicine diagnostic and therapeutic procedures
Techniques of performing scintigraphy and common therapy procedures.
Acquisition protocols, image processing and quantitation on images76

PRACTICAL

Following skills are required from the students during their practical training
The techniques and methods of major nuclear medicine diagnostic and therapeutic applications
Elution of Mo-Tc generator system
Calculation of dose and preparation of radiopharmaceuticals.
Quality control of radiopharmaceuticals
Estimation of bound and free fraction.
Thyroid uptake studies.
Quality control tests for gamma camera.
Routine operational tests for SPECT.
Dynamic studies with patient.
Static and SPECT studies
Procedures:
Abscess and Infection
Skeletal
Cardiovascular

Endocrine/Exocrine
Gastrointestinal
Genitourinary
Respiratory
Central Nervous System
Tumor
SPECT
Therapeutic Procedures

RECOMMENDED BOOKS

1. Ramesh Chandra. Nuclear Medicine Physics, Lippincott Williams And Wilkins, 2014.
2. Donald R Bernier, Nuclear medicine: technology and techniques. Mosby, @2019.
3. Manual of Nuclear Medicine Procedures by Raman Mistry
4. Instructional Manual By TM Series

4. SPECIAL RADIOLOGICAL TECHNIQUES-I
CREDIT HOURS 3(2-1)

COURSE DESCRIPTION

Content provides the knowledge base necessary to perform standard mammography, CT scan, MRI Fluoroscopic and special Radiologic studies. Consideration is given to the evaluation of optimal diagnostic images. Student technologist will complete Log Book of all activities of clinical rotation under the supervision of an experienced Radiologist/Technologist

LEARNING OBJECTIVES

- Discuss general procedural considerations for radiographic exams.
- Explain procedures to patients/family members.
- Modify directions to patients with various communication problems.
- Develop an awareness of cultural factors that necessitate adapting standard exam protocols.
- Adapt general procedural considerations to specific clinical settings.
- Identify the structures demonstrated on radiographic images.
- Adapt related radiographic procedures for special considerations.
- Simulate related radiographic procedures on a person or phantom in a laboratory setting.
- Evaluate images for positioning, centering, appropriate anatomy and overall image quality.
- Discuss equipment and supplies necessary to complete related procedures.
- Explain the patient preparation necessary for various contrast and special studies.
- Apply general radiation safety and protection practices associated with Procedures

COURSE CONTENTS

MAMMOGRAPHY

- Equipment and Technical Considerations
- Anatomy & Clinical consideration
- Mammography projections & Positioning
- Significant mammographic findings & Related Pathology
- Procedural Considerations for Contrast Studies

FLUOROSCOPY

- Visual Considerations
- Instrumentation of Fluoroscopy
- Practical Fluoroscopic Technique
- Fluoroscopic Image Monitoring
- Digital Fluoroscopy

ULTRASOUND

- Application of Ultrasound for different regions and organs

ECHOCARDIOGRAPHY

- Basic Principles of 2-D / M-Mode
- Echocardiography.
- Echocardiography Equipment
- Basics
- Advances applications
- Colour Doppler
- Fundamentals of cardiac anatomy in
- relevance to echocardiography and
- Performance of Echocardiography
- Echocardiography windows
- Operational modes
- Pediatric Echocardiography
- Basic Principles
- Segmental sequential analysis
- Physiological aspects of Echocardiography
- Ventricular Function
- Diastolic Function
- Flows / Pressures / Shunts
- Advanced Echocardiography – after passing
- exam in internship

ANGIOGRAPHY & CARDIAC IMAGING

- Imaging Equipment
- Basic operation
- Digital image acquisition
- Diagnostic Cardiac Studies
- Pulmonary angiography
- Aortography
- Coronary angiography
- Internal mammary angiography
- Percutaneous Coronary Intervention
- Percutaneous Intervention
- Hemodynamics and Circulations
- Conduction System Studies
- Guidewires and Catheters
- Patient Assessment and
- Monitoring (normal and abnormal values; implication for imaging)

LAB WORK

- Ultrasound of Liver, Gallbladder, Biliary Ducts, Pancreas Adrenal Gland, Kidneys, Urinary Bladder,
- Renal Tract, Spleen and gynecological

- New Imaging Techniques, breast, thyroid
- Obstetrical
- Artifacts
- Understanding of Echocardiography equipment
- Operationalization of Echocardiography
- Doppler Machine
- Understanding of Mammography equipment
- Operationalization of Echocardiography
- Understanding of Fluoroscopy equipment
- Operationalization of Fluoroscopy

RECOMMENDED BOOKS

1. Atlas of Mammographic Positioning by Lucinda K Prue
2. Radiologic sciences for technologists by Stewart C. bushong.
3. A guide to radiologic procedure by Chapman.
4. Merrill atlas of radiography positioning and radiologic procedure vol 3 by Philip W Ballinger.
5. Fluoroscopy Notes by TM series.

5. RESEARCH METHODOLOGY & SCIENTIFIC INQUIRY
CREDIT HOURS 2(2-0)

COURSE DESCRIPTION

This course includes discussion on basic quantitative methods and designs, including concepts of reliability and validity, interpretation of inferential statistics related to research designs, co relational statistic & designs, interclass correlation coefficients, and critical appraisal of the literature.

LEARNING OBJECTIVE

- Identify the basic concepts of research and scientific inquiry and its methodologies
- Identify appropriate research topics
- Define appropriate research problem and parameters
- Construct a project proposal to undertake a research project.
- Discuss scientific Inquiry, its principle and application in medical research.
- Describe Search techniques for literature review
- Differentiate between different levels of evidence, appraisal and different studies with respect to their effectiveness in literature.

COURSE CONTENTS

RESEARCH FUNDAMENTALS

- Research in radiology and diagnostic imaging
- Role, importance, principles and application of Ethics in research.
- Basic vs applied research.
- Research Problems / Questions, and Hypotheses, Research Paradigms, Research Validity and reliability

SAMPLING

- Discuss Selection of sample: sample & population, basic considerations in sampling, determination of sample size, elimination of sampling bias and types of sampling such as: Random sampling, stratified random sampling, cluster sampling and systematic sampling.

RESEARCH DESIGN

- Describe different research designs
- Differentiate between experimental & non-experimental, qualitative and quantitative and epidemiological research designs.
- Discuss different research methodologies used in experimental, and non-experimental, qualitative and qualitative and epidemiological research designs

RESEARCH PROJECT

- Discuss various components of research synopsis and Thesis
- Develop a Research Plan while taking into account, the ethical, legal and professional obligations

INSTRUMENTATION AND DATA COLLECTION

- Discuss, objectivity and standardization, types of tests and scales, validity and reliability of an instrument, assessment of validity and reliability, development of tests/scale

DATA ANALYSIS & INTERPRETATION

- Analyze data
- Describe types of measurement scales, descriptive statistics and inferential statistic.
- Perform data entry and Analysis using statistical package for Social Sciences (SPSS)

PREPARATION OF A RESEARCH REPORT

- Use Formatting & styling, citation, references & bibliography
- Differentiate theses writing, dissertations & journal articles writing.

SCIENTIFIC INQUIRY

- Describe scientific inquiry, Evidence based approach to scientific inquiry, Principles of scientific inquiry, the application of scientific inquiry to diagnostic radiology.
- Access digital libraries and different research databases, Effective searching and reviewing literature material.
- Interpret Critical appraisal of published research in the areas of:
    - Examination and Evaluation
    - Diagnosis
    - Prognosis
    - Intervention
    - Harm
- Interpret Critical evaluation of Randomized Control Trial (RCT), Systemic review, Diagnosis and screening tests, Case reports
- Discuss how to conduct clinical research and hierarchy of evidences in clinical researches

RECOMMENDED BOOKS

1. *Essentials of clinical research* By Stephan P. Glasser.
1. Rehabilitation Research (Principles and Applications) 3rd Edition By Elizabeth Domholdt

6. SUPERVISED CLINICAL PRACTICE – III
CREDITS 3 (0-3)

SEMESTER	SUPERVISION	FOCUS	WARDS	COMPETENCIES

7	Supervised by MIT Technologist	Hands -On	Mammography, Fluoroscopy, other special radiological techniques	As listed below

COURSE DESCRIPTION

During this supervised clinical practice, students are responsible for learning the preparation of patients for radiological techniques and operating the radiological instruments. Students become familiar with performance of these skills in all settings (inpatient and outpatient) as well as on all types of patients (surgical, non-surgical, pediatric, geriatric, etc.).

CLINICAL COMPETENCIES

- Review pertinent medical records and conduct an interview which collects the following data:
- Past and current patient/client history
- Chief complaint
- Medications
- Medical/surgical history
- Operating the Radiological Instruments
- Development of Films

Note

It is mandatory for each student to document minimum 16 cases per semester (1 cases per week) in clinical log book duly checked and signed by clinical supervisor on weekly basis and head of institute at completion

URCG-5111 Translation of the Holy Quran – IV 1 (0+1)

Topic	Details
Semester/Level	In some discipline 7th semester and in some discipline 8th Semester/ BS (5th Semester intake) 3rd / 4th
Course Code	URCG-5111
Course Title	Translation of the Holy Quran – IV
Credit Hours	1(0-1)
Objectives	• To familiarize the students with commandments of trade and inheritance mentioned in the Quranic text (with the help of Urdu translation). • Students • To introduce the students to scientific facts and miracles of the Holy Quran and Quranic stress on deep study of Allah's explored universe. • To motivate the students for reading and exploring the last Holy Book revealed by Almighty Allah. • Through memorization students will develop their relation with last revelation.
Course Contents:	○ تجارت اور وراثت: • مال کی تقسیم • نادان کا مال • عوام الناس کا مال • عورتوں کا مال • یتیموں کا مال • کفار کا مال • جائز مال • معاہدے • رہن • قرض ○ سائنسی حقائق: • تخلیق کائنات • اجرام فلکی • شجر و حجر • زمین و آسمان کے اسرار • ہوائیں اور طوفان • بہائم اور مویشی • حشرات الارض • پہاڑ اور سمندر
Grammar :	• قرآنی عربی گرامر کے اصول اور انکے اطلاقات (متن قرآنی پر اطلاق سے توضیحات)
Details of	▪ منتخب آیات مع ترجمہ و تجوید

Chapters and verse Numbers:	▪ البقرہ(۲۶۱،۲۲۱۵،۲۶۵،۲۱۹،۲۶۴،۲۷۵،۱۸،۲۶۵،۱۷۷،۲۶۵،۱۶،۲۷۵،۲۸۲،۲۶۲،۲۷۴،۲۷۱،۲۷۴،۸۳،۱۷۷،۲۱۵،۲۷۶،۲۷۸،۱۶، ۲۷،۲۲۳،۲۹،۲۵۵،۱۶۴،۲۶۶،۱۶۴،۱۶۴،۶۰،۵۰،۱۶۴،۵۷،۲۱۰،۱۹،۲۶،۷۱،۹۲،۹۳) ▪ آل عمران(۱۱۷،۱۳۴،۱۳۰،۱۹۰،۲۷،۵۹) ▪ النساء(۲۹،۲،۲۹،۱۶۱) ▪ المائدہ(۸۹،۹۵،۷۵،۶۹،۶۰) ▪ التوبہ(۹۸،۲۴،۶۹،۲۴،۲۴،۶۰،۴) ▪ الاعراف(۱۷۲،۱۸۵،۵۷،۵۸،۱۶۳،۱۶۰،۴۰،۱۳۳،۱۷۶،۱۶۶) ▪ الرعد(۱۷،۴) ▪ الطور(۴۴) ▪ الانعام(۵۹،۶۳،۱۴۱،۱۴۶،۳۸) ▪ الانفال(۲۸،۳۶،۴۱) ▪ الکہف(۵۱،۱۰۹،۴۷،۳۲،۴۵،۱۷،۴۵) ▪ الجاشیہ(۵) ▪ فاطر(۲۷،۱۲،۱۳) ▪ العنکبوت(۲۰،۶۳،۴۱) ▪ الروم(۵۰) ▪ الاسراء(۷۰،۹۹) ▪ الرعد(۲) ▪ السبا(۱۰،۳،۲۲) ▪ یونس(۸۸،۱۰۱،۲۴،۲۴،۵،۲۲) ▪ یوسف(۹۴،۱۴) ▪ الفرقان(۶۲،۵۳) ▪ لقمان(۲۹،۱۶) ▪ طہ(۱۱۴،۵۳) ▪ النحل(۷۵،۱۱،۶۱،۴۹،۷۹،۶۸،۶۸،۱۱۵،۸،۸) ▪ النمل(۶۴،۶۴،۸۸،۶۰،۸۲،۱۶،۱۷،۱۸) ▪ السجدہ(۲۷) ▪ الحدید(۶) ▪ ھود(۴۳،۶) ▪ یسین(۳۷،۴۱) ▪ الروم(۳۹،۳۹،۵۰،۱۹،۲۴،۴۶) ▪ فصلت(۳۹،۳۹) ▪ الحج(۶۱،۶۵،۲۲،۷۳) ▪ الحجر(۱۹،۲۲) ▪ الانبیاء(۳۱،۳۰،۴۷) ▪ الزاریات(۴۷) ▪ الزلزلہ(۱) ▪ القصص(۷۶،۷۹،۸۰،۸۱،۸۲) ▪ النور(۳۷،۲۲،۴۰،۴۵،۴۳) ▪ الجمعہ(۱۱،۶۲،۱۰،۱۱،۵)

▪ القمر(۷) ▪ الواقعہ(۶۹) ▪ الفاطر(۱۳،۲۰) ▪ الملک(۱۹) ▪ الصف(۱۰) ▪ الجن(۱۳) ▪ الشوریٰ(۲۸) ▪ الزخرف(۱۱) ▪ الفیل(۱)	

EIGHTH SEMESTER

1. **MEDICINE - II**
2. **SURGERY - II**
3. **SPECIAL RADIOLOGICAL TECHNIQUES -II**
4. **FORENSIC SCIENCE**
5. **AI Applications in Heath Care**
6. **CAPSTONE/RESEARCH PROJECT**

1. MEDICINE-II

CREDIT HOURS 3 (3-0)

COURSE DESCRIPTION

This course intends to familiarize students with medical terminology and abbreviations for efficient and effective chart reviewing and documentation. It also explores systemic diseases, focusing on epidemiology, pathology, histology, etiology, as well as primary and secondary clinical characteristics and their management. Discusses and integrates subsequent medical and surgical management to formulate appropriate intervention indications, precautions and contraindications.

LEARNING OBJECTIVES

- Discuss history and physical examination related to dermatology, diseases of the brain and the spinal cord, renal diseases, blood and other miscellaneous conditions mentioned in the course contents.
- Identify social and psychological components of patients' medical problems.
- Discuss disease process, indications and limitations of clinical sources such as laboratory and roentgen graphic studies, consults, family input and old records to request and interpret data pertinent to problem solving.

COURSE CONTENTS

DERMATOLOGY

- Acne vulgaris
- Psoriasis
- Boils
- Carbuncles
- Alopecia
- Mycosis fungoides
- Polymorphic light eruptions
- Vitilogo
- Pityriasis
- Hyperhydrosis

DISEASES OF BRAIN AND SPINAL CORD

- Identify the common neurological symptoms including brain death, Sleep, Unconsciousness and Comma.
- Carry out general neurological examination
- Stroke, types of stroke, Parkinson's disease, Epilepsy, Multiple Sclerosis, Infective and Inflammatory diseases, Hydrocephalus, Headache, Migraine, Facial pain, Head injury, Motor neuron disease, Diseases of spinal cord, Diseases of Cranial nerves, Peripheral nerve lesions, Diseases of voluntary muscles and of neuromuscular junction
- Different types of Intracranial tumors

RENAL DISEASES

- Describe Glomerulonephritis, Acute nephritic syndrome, Nephrotic syndrome, Urinary tract infection, Renal hypertension, Renal failure,Benign enlargement of prostate gland, Prostatic carcinoma.

DISEASES OF THE BLOOD

- Describe Anaemia, Types of Anaemia, Bleeding and Coagulation, Haemophilia and Thrombosis

MISCELLANEOUS DISEASES

- Describe Diabetes Mellitus and its complications, Diabetic Neuropathy, Diabetic foot and Steroid induced Myopathy.

RECOMMENDED BOOKS

1. Practice of medicine by: Davidson.
2. Clinical medicine by: Parveen j Kumar & Michael Clark.
3. Short text book by medicine by: M. Inam Danish.
4. Hutchison's clinical methods by: Michael swash. 21st edition

2. SURGERY – II
CREDIT HOURS 2 (2-0)

COURSE DESCRIPTION

This course intends to familiarize students with principles of surgery along with familiarization with terminology and abbreviations for efficient and effective chart reviewing and documentation. It also explores various conditions needing surgical attention, focusing on epidemiology, pathology, as well as primary and secondary clinical characteristics and their surgical management

LEARNING OBJECTIVES

- Demonstrate the pre- and post-operative care of patients.
- Describe presentations of major surgical problems, establish correlations among clinical observation, surgical (operative) pathology, and the physiological alterations achieved through surgery.
- Differentiate the surgical health care delivery to both inpatients and outpatients in a variety of settings
- Describe the surgical management of disease.
- Recognize the entire treatment cycle of the surgical patient from diagnosis to operative management and through recovery.

COURSE CONTENTS

GENERAL SURGERY

- Describe the Indications for surgery, Types of incisions, Wounds, types of wounds, factors affecting wounds healing, care of wounds, Bandages and dressing, Trauma and metabolic response to trauma
- Explain chest and abdominal trauma, Hemorrhage, hemostasis and blood transfusion.
- Classification of shock, Fluid and electrolyte balance, Classification of body fluid changes, Pre, intra and post-operative fluid therapy.
- precautions for Surgery in diabetic patients
- Classify Burns, Types and degrees of Burns in pediatric and adults,
- Classify Grafts, Types of Grafts, Identify post- grafting precautions,
- Different types of tumors and their classifications.
- Discuss Preoperative assessment & preparation, Post -operative treatment, complications and their management.
- Describe the Types of anaesthesia, Local anaesthetic agents and Regional anaesthesia (spinal and epidural), Intravenous anaesthetic agents, Muscle relaxants, Inhalational anaesthetic agents, Anaesthesia and associated diseases, Complications of anaesthesia, Perioperative management, Recovery from anaesthesia.
- Review Pain management and postoperative care.
- Identify Ulcers, sinuses and fistulas
- Describe operation performed on: oesophagus, stomach, intestine gall bladder, bile duct, spleen, pancreas, liver, abdominal wall, hernias, breast, kidneys, ureters, prostate, peritoneum, mesentery and retroperitoneal space

THORACIC SURGERY

PULMONARY SURGERY

- Explain the Indications of pulmonary surgery, types of incision, types of operation, complications of pulmonary surgery, drains, and tubes.
- Describe pneumonectomy, lobectomy, thoracoplasty and Operations on pleura.
- Recognize the types of Chest injuries, Causes, management procedures.
- Describe the Diseases of chest wall and pleura, Diseases of bronchi
- Identify different types of Lung tumors and their classifications, Lung abscess, Hydatid disease of lung, pulmonary embolism, Mediastinal masses, Problems related to diaphragm

CARDIAC SURGERY

- Explain the Indications of Cardiac surgery, Special investigation procedures in cardiac surgery, Basic techniques in cardiac surgery, Types of incision, Types of operation, Complications of cardiac surgery, Lines, drains and tubes, Congenital heart diseaseAcquired heart diseases,Diseases of the pericardium
- Describe the Indications of Cardiac Transplantation, Post- Operative Complications and precautions of Transplantation.

VASCULAR SURGERY

- Describe the Indications of Vascular surgery, Investigation in vascular disease types of operation, Complication of vascular surgery, arterial occlusion, Gangrene, amputation and its types, Aneurysm, Burgers disease, Raynaud‘s disease and syndrome, Varicose veins, Superficial and deep venous thrombosis, Venous hemorrhage, Lymph edema, Lymph adenitis and lymphomas.

SURGERY OF VERTEBRAL COLUMN, SPINAL CORD AND PERIPHERAL NERVES

- Describe Dislocation and management of dislocation of vertebral column, Tumors of vertebral column
- Explain Prolapse intervertebral disc, Disc protrusion, Spondylosis and spondylolisthesis.
- Classify Spinal cord injuries and syndromes.
- Assess the level, complete and incomplete spinal cord injuries and rehabilitation potential.
- Describe the Surgical, medical Management and post- operative care of Spinal cord injuries.
- Describe Tumors of spinal cord types of operations performed on nerves, Nerve injuries and their surgical management,
- Describe the lesions of cranial and spinal nerves and their management.

RECOMMENDED BOOKS

- Short practice of surgery by Baily and Love‘s.
- Text Book of Surgery by Ijaz Ahsan.

- Outline of Fractures by davidhamblen, Hamish Simpsons.
- Outline of orthopedics. By davidhamblen, Hamish Simpsons.

3. SPECIAL RADIOLOGICAL TECHNIQUES-II
CREDIT HOURS 3(2-1)

COURSE DESCRIPTION

The intention of this course is to provide necessary knowledge and to develop cognitive skills underlying the performance of the tasks typically required of entry level CT scan and MRI technologists in this specialized area.

LEARNING OBJECTIVE

- Understands & explain fundamentals of MRI and CT
- Discuss equipment MRI and CT Hardware & imaging system.
- Explain Image formation, Pulses &sequences and applications.
- Evaluate images for appropriate anatomy and overall image quality.
- Recognizes artifacts reasons and knowledge of prevention.
- Discuss equipment and supplies necessary to complete commonly performed MRI and CT procedures.
- Explain common indications for MRI and CT test.
- Explain the MRI and CT acquisition protocol for commonly performed procedures.
- Explain indications for MRI and CT contrast media application.
- Explain the patient safety and patient education about MRI and CT Procedure.
- Discuss the patient care
- Understand and analyze MRI and CT request form and test requested.
- Perform MRI and CT Test of common regions as requested.

COURSE CONTENTS

CT Scan

- Patient Care
- Patient Communication
- Patient Preparation
- Contrast Agents
- Injection Techniques
- Radiation Dosimetry in CT

Cross-Sectional Anatomy (CT Images)

- Abdomen and Pelvis Imaging Procedures
- Musculoskeletal Imaging Procedures
- Interventional CT and CT Fluoroscopy
- PET/CT Fusion Imaging

Physics and Instrumentation

- Basic Principles of CT
- Data Acquisition
- Image Reconstruction
- Image Display
- Methods of Data Acquisition
- Image Quality
- Quality Assurance
- Post-Processing
- Data Management

Imaging Procedures and Protocols

- Neurologic Imaging Procedures
- Thoracic Imaging Procedures
- Abdomen and Pelvis Imaging Procedures
- Musculoskeletal Imaging Procedures
- Interventional CT and CT Fluoroscopy
- PET/CT Fusion Imaging

Bone Densitometry

- Highlight different bone densitometry techniques. While focusing on Dual Energy X-Ray Absorptiometry (DEXA), also considers other densitometry
- Methods for both axial and peripheral measurements.
- Quality control issues and statistical interpretation of results relevant to

MRI

- Physics & Instrumentation
- Basic Principles
- Imaging weighting and contrast
- Encoding and image Formation
- Parameters and trade-off
- Pulse sequences
- Flow phenomena
- Artefacts and their compensation
- Vascular and cardiac imaging
- Instrumentation and equipment

MRI safety

- Contrast agents in MRI
- Advanced imaging techniques
- Procedures
- Patient Care in MRI
- Patient Communication
- Patient Preparation
- Contrast Agents
- Injection Techniques

MRI EXAMINATION BY ANATOMICAL REGION:

- Head and Neck.
- Angiography
- Spine
- Thorax including CVS
- Abdomen
- Pelvis
- Lower limb and Upper limb
- Joints
- Paediatric Imaging
- CORONAL, SAGITAL AND AXIAL ANATOMY THROUGH MRI IMAGES.
- COMMON RADIOLOGICAL PATHOLOGY.

Lab Performance

- CT scan
- MRI
- Patient preparation
- Contrast Media

- Development of Films

RECOMMENDED BOOKS

1. Hand book of MRI Technique by Catherine Westbrook
2. MRI in Practice by: Catherine Westbrook, Carolyn Kaut Roth, John Talbot
3. MRI At a Glance by Catherine Westbrook
4. Patient Care in Medical Imaging
5. Instructional Manual MRI TM Series
6. Computed Tomography for Technologists A Comprehensive Text: by_ Lois Romans
7. CT Teaching Manual by Matthias Hofer
8. Computed Tomography for Radiographers 1986. By: Malcolm J. Brooker
9. All about Computed tomography A Technologist guide T.M Series

4. FORENSIC SCIENCE

CREDIT HOURS 2(2-0)

COURSE DESCRIPTION

Forensic science is the study and application of science to the investigation of criminal and civil cases in the criminal justice system. This course introduces students to the scientific method and to the use of applied science from biological and chemical disciplines to benefit legal processes and investigations.

Learning objectives

On the completion of this course, students will be able to understand the:

- The student will be able to describe the fundamental principles and functions of forensic science and its significance to human society.
- Basic knowledge about the forensic science and their applications in crime scene, death investigation and forensic toxicology.
- Molecular aspects for disorders and disease diagnosis with the clear understanding of the molecular components i.e., DNA and its profiling.

Contents:

A. Introduction to Forensic Science

a. Applying Science and the Scientific Method to Legal Investigations
b. The Role of Forensic Science in Legal Processes
c. Working with Law Enforcement
d. The History of Forensic Science
e. Ethics and Responsibilities

B. The Crime Scene

a. Crime Scene Processing
b. Legal Considerations

C. Physical Evidence

a. Common Types of Physical Evidence
b. The Significance of Physical Evidence
c. Evidence Collection and Preservation

D. Crime Scene Reconstruction and Analysis

a. Crime Scene Reconstruction
b. The Physics of Bloodstain Pattern Analysis
c. General Features of Bloodstain Formation

E. Death Investigation

a. Cause, Manner and Mechanism of Death
b. Forensic Pathology
c. Forensic Anthropology
d. Forensic Entomology
e. Forensic Odontology

F. Forensic Toxicology

a. Role of Forensic Toxicology
b. Chemistry and Toxicology
c. Alcohol and Drugs
d. Poisons
e. Tests

G. Fingerprints

a. History of Fingerprinting
b. Fundamentals of Fingerprints
c. Development of Prints
d. Print Analysis

H. Firearms, Tools and Other Impressions

a. Class Vs. Individual Characteristics
b. Types of Firearms
c. Bullet and Cartridge Comparisons
d. Firing Distance
e. Tool Mark Investigation
f. Casting and Comparison
g. Microscopic Analysis

I. DNA and Serology

a. What is DNA
b. DNA Profiling
c. Short Tandem Repeats
d. Sequencing
e. The Nature of Blood

J. Cultural and Psychological Components of Criminal Behaviour

a. The History of Profiling
b. The Limitations of Profiling
c. Cultural, Psychological, and Sociological Aspects of Crime

K. Fire Arson and Explosion Investigation

a. Forensic Investigation of Fire
b. Chemistry of Fire
c. Collection and Preservation of Arson Evidence
d. Flammable Residues
e. Explosions and Explosives

Recommended Textbooks

1. Saferstein, Richard. Criminalistics: An Introduction to Forensic Science, 12th Edition, Pearson.
2. White, P.C. Crime Scene to Court: The essentials of Forensic Science, 2nd Edition, Royal Society of Chemistry.
3. Buchanan‟s Text book of Forensic Medicine and Toxicology by Buchanan, 9th ed., Livingstone.
4. G. Principles and Practice of Forensic Medicine by Prof. Nasib R. Awan.

5. Medical Jurisprudence and Toxicology by Dr. Siddique Hussain.
6. Textbook of Forensic Medicine & Toxicology Krishan Vij (4th Edition)

5. AI Applications in Heath Care
CREDIT HOURS 2 (2-0)

COURSE DESCRIPTION

Course Outcomes:
After completion of this course students should be able to:

- Understand what is Artificial Intelligence (AI) and Machine learning (ML)
- Understand the concept of Internet of Things (IoT) and its applications in healthcare
- Analyze the healthcare data and process it using data analysis and statistical tools
- Explore the applications of AI and ML with respect to healthcare domain

Course content
Introduction to **Artificial Intelligence (AI) and Machine learning (ML)**

- Importance and Applications of AI and ML in Healthcare

Types of Machine Learning and its classification

- Decision Tree, Bayesian Classifier, Regression

Neural Networks, their types, and processing

- Neural Networks – learning Models.
- Deep Neural Network, Convolution Neural Networks & Recurrent Neural Networks
- Natural Language Processing
- Commonly Used and Advanced Neural Network architectures
- Computer Vision

Internet of Things (IoT)

- Introduction
- Process flow and Tools
- Use Cases
- Remote Patient Monitoring

Data Representation:

- Introduction to data, data frames
- Data standardization
- Dealing with noise and missing values
- Transforming and normalizing data

Data Analytics:

- Overview of tools like R, Python
- Statistical and Visualization tools

Healthcare data Analysis:

- Sources of the healthcare data
- Pre-processing of the healthcare data
- Handling of the healthcare data

- Creation of analysis-ready datasets

Healthcare datasets – Examples and Case studies
Case studies and Future trends in AI Healthcare

References:

1. Russell, S. and Norvig, N. Artificial Intelligence: A Modern Approach. Prentice Hall Series in Artificial Intelligence 3.
2. Bishop, C. M. Neural Networks for Pattern Recognition. Oxford University Press.
3. Hastie, T., Tibshirani, R. and Friedman, J. The Elements of Statistical Learning, Springer
4. Adam Gibson, Josh Patterson, Deep Learning, O'Reilly Media, Inc.
5. Guoguang Rong, Arnaldo Mendez, Elie Bou Assi, Bo Zhao, Mohamad Sawan, Artificial Intelligence in Healthcare: Review and Prediction Case Studies, Engineering, Volume 6, Issue 3, 2020, Pages 291-301, ISSN 2095-8099, https://doi.org/10.1016/j.eng.2019.08.015.

RESEARCH/ CAPSTONE PROJECT
(CREDIT HOURS 6 (0-6)

RESEARCH PROJECT

In the final Semester/year, a project will be allocated to a single or group of students, depending on available facilities. The In-charge / chairperson of the concerned department/institute shall allot a supervisor. Every student shall be evaluated keeping in view their contribution, thorough understanding of work done and comprehensive presentation. The details of the report are given below.

- Title page
- Names of students
- Students I.D number
- Supervisor's name
- Program name
- Name of the department
- Session

Abstract

A maximum of one page (200-250 words) on the work performed and your main conclusions. Abstract should be structured with subheadings background, objective, material and methods, results and conclusion.

Chapter 1. Introduction

i) Introduction (Very brief review of literature and indicate significance of study)

ii) Statement of Problem (Should include clear purpose of study)

iii) Questions/Hypothesis

iv) Outline Methodology

v) Definition of Terms

The introduction should 'set the scene' for the examiners and enable them to appreciate the relevance of your work in a particular research area.

Chapter 2. Literature Review

A literature review is an extended essay, which is based on source material. In simple terms, the merit of your literature review is proportional to the comprehensive nature and originality of your sources. Your writing should be confined to the questions/hypothesis being examined. A literature review is more than a listing of references. You should attempt to synthesize a new understanding of your topic and provide a critique of what other commentators have had to say on the subject.

Chapter 3. Methodology

i) Participant Selection (Including ethical considerations)

ii) Experimental Design

iii) Measurement Procedures

- Data collection procedures
- Rationale for selecting these procedures/questions

iv) Analysis of Data

The methodology should describe the characteristics of the subjects, award of ethical approval, and where appropriate the apparatus, calibration procedures, reliability of the methods used, experimental protocols and the statistical treatments of the data. Diagrams and photographs may be appropriate to illustrate procedures.

Chapter 4. Results

Your results should consist of tables of your findings, illustrated with graphs where appropriate. The results section should contain text, which takes the reader through your graphs and tables, pointing out the salient features. Tables should wherever possible summarize the data from several subjects in the form of means and standard deviations. You do not need to give tables of every piece of original data. If you feel it is essential to include these, put them in an appendix.

Chapter 5. Discussion

It is good practice to begin with a summary of your findings. This is your opportunity to interpret your data in the context of what is already known from existing literature. However, make every effort to explain your findings first, justifying the arguments by reference to previously published work, NOT the other way around. The discussion is the place for explanations and opinions. Link your findings with the purpose/questions/hypothesis of your project. Include critical appraisal of your own work and that of others. Address what you would do differently with hindsight?

Chapter 6. Conclusion

- Summary of main findings
- Recommendations (Impact of findings and future research)
- Conclusion

This section should summarize main findings, highlight areas where more work is needed and suggest avenues for future development of this work. An overall conclusion from the study should be included to complete the project.

References:

A list of references must be included at the end of the project document and appropriately referenced within the text according to Harvard reference style by using endnote or any other reference management tool.

Appendices: In this section, if required, include any raw data, interview transcript, computer program listings, and questionnaires, Turnitin report etc., which were not in the results section, but which may need to be consulted.