

Annexure-I

**GOVERNMENT COLLEGE UNIVERSITY, FAISALABAD,
PAKISTAN**



Scheme of Studies

BS – MEDICAL IMAGING TECHNOLOGY (MIT)

***8 Semesters/4 Years Degree Program for the year 2024
and onwards***



**College of Allied Health Professionals
Faculty of Medical Sciences**

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Scheme of Studies

| Scheme of Studies BS MIT 2024-2028 | | |
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| Semester 1 | | |
| AHP-305 | Introduction to Allied Health Sciences | 2(2-0) |
| AHP-301 | Human Anatomy | 4 (3-1) |
| AHP-303 | Medical Physiology | 4 (3-1) |
| PSY-405 | Behavioral Science | 3 (3-0) |
| ENG-321 | Functional English | 3 (3-0) |
| ISL-321 | Islamic Studies | 2(2-0) |
| ETH-302 | Ethics for Non- Muslim Students | 2(2-0) |
| MTH-321 | Algebra and Trigonometry | 3 (3-0) |
| THQ-311 (Audit Course) | Translation of Holy Quran-I | 1(1-0) |
| | Total | 21 |
| Semester 2 | | |
| QTR-421 | Quantitative Reasoning-I | 3(2-1) |
| AHP-304 | Introductory Pharmacology | 2(2-0) |
| AHP-306 | Introductory Biochemistry | 3(2-1) |
| CSI-321 | Introduction to Computing Applications | 3(2-1) |
| PST-321 | Pakistan Studies | 2 (2-0) |
| MIT-304 | Regional & Imaging Anatomy- I | 3(2-1) |
| ICP-321 | Ideology and constitution of Pakistan | 2 (2-0) |
| | Total | 18 |
| Semester 3 | | |
| AHP-302 | Pathology | 3(2-1) |
| QTR-422 | Quantitative Reasoning-II | 3(2-1) |
| ENG-322 | English Comprehensive and Composition | 3(3-0) |
| AHP-403 | Introductory Microbiology | 3(2-1) |
| MIT-401 | Regional & Imaging Anatomy-II | 3(2-1) |
| MIT-403 | Clinical Pharmacology | 2(1-1) |
| ISL-411 | Translation of Holy Quran-II | 1(1-0) |
| | Total | 17 |
| Semester 4 | | |
| ENG-422 | Technical Writing | 3(3-0) |
| MIT-402 | General Radiology | 3 (2-1) |
| MIT-404 | Medicine-I | 3 (2-1) |
| MIT-406 | Radiation Science & Technology-I | 4 (3-1) |
| BAM-422 | Entrepreneurship | 2 (2-0) |

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|--------------------|-----------------------------------|------------|
| MIT-408 | Regional & Imaging Anatomy-III | 3 (2-1) |
| | Total | 18 |
| Semester 5 | | |
| ISL-511 | Translation of Holy Quran-III | 1(1-0) |
| MIT-501 | Computed Tomography | 4 (3-1) |
| MIT-503 | Medicine-II | 3 (2-1) |
| MIT-505 | Ultrasound/Doppler | 4 (3-1) |
| MIT-507 | Radiation Science & Technology-II | 4 (3-1) |
| MIT-509 | Neuroanatomy | 3 (2-1) |
| | Total | 18 |
| Semester 6 | | |
| MIT-502 | Mammography | 3 (2-1) |
| MIT-504 | Nuclear Medicine-I | 4 (3-1) |
| MIT-506 | Echocardiography | 3 (2-1) |
| MIT-508 | Surgery-I | 3 (2-1) |
| MIT-510 | Fluoroscopy | 3 (2-1) |
| | Total | 16 |
| Semester 7 | | |
| AHP-601 | Forensic Medicine | 3 (3-0) |
| MIT-601 | Nuclear Medicine-II | 4 (3-1) |
| STA-421 | Biostatistics | 3 (2-1) |
| MIT-603 | Magnetic Resonance Imaging-I | 4 (3-1) |
| MIT-605 | Angiography & Cardiac Imaging-I | 4 (3-1) |
| ISL-611 | Translation of Holy Quran-IV. | 1(1-0) |
| | Total | 18 |
| Semester 8 | | |
| MIT-602 | Angiography & Cardiac Imaging-II | 4 (3-1) |
| MIT-604 | Surgery-II | 3 (2-1) |
| MIT-606 | Magnetic Resonance Imaging-II | 4 (3-1) |
| INT-631 | Internship | 3 (0-3) |
| Cap-630 | Capstone Project | 3 (0-3) |
| | Total | 17 |
| Grand Total | | 143 |

1ST YEAR

1st Semester

| | | |
|---------|---------------|--------|
| AHP-301 | HUMAN ANATOMY | 4(3-1) |
|---------|---------------|--------|

Contents

Theory

Introduction to human anatomy: Branches, levels of body organization & systems, anatomical position, region names, planes, sections & body cavities, Cells and its structural components. Structure and types of different body tissues & membranes. Integumentary system: structures blood supply & development. Musculoskeletal System: structure, type and function of muscles, bones & joints. Components of the axial & appendicular skeletal system. The Nervous System: Central Nervous System. Peripheral Nervous System (Autonomic & somatic). Special Senses. Reflex arc and reflex action. Cerebrospinal fluid and its circulation. Cranial and spinal nerves. The Cardiovascular System; blood, Heart, and blood vessels, Pulmonary and systemic circulation, Lymphatic system & immunity. Respiratory System; The anatomy of the respiratory passages, lungs and pleural cavity. The Digestive System; organs of digestive tract (mouth, pharynx, esophagus, stomach, pancreas, liver and gall bladder, small & large intestine) Blood supply & lymphatic drainage. Genito-Urinary System; The structure of nephron and organs of the urinary system and its relations with other organs, Structures of Male & female reproductive system. Embryonic development.

Practical:

1. Labelling of various planes , sections & regions of human body
2. Identification of bones; compact, spongy, long, short, sesamoid bones
3. Identification of various types of muscles.
4. Identification of various organs of gastrointestinal system
5. Labelling of anatomical and functional regions of nervous system
6. Drawing and labelling of structures of genito- urinary tract system
7. Differentiation between arteries, veins and capillaries

Recommended Books:

1. Waugh A, Grant A. Ross & Wilson anatomy and physiology in health and illness. Elsevier Health Sciences; 2014.
2. Principles of Human Anatomy 12th Edition by Garad J. Tortora. John Wiley & Sons, Inc.
3. General Anatomy by Laiq Hussain Siddiqui.
4. Atlas of Human Anatomy 5th edition by Frank H. Netter
5. Simbryo: An Animated tour of Human development by Phillip M. Ecker, Grant M. Ecker, Lawrence H. Mathers

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|---------|---------------------------|--------|
| PHS-303 | MEDICAL PHYSIOLOGY | 4(3-1) |
|---------|---------------------------|--------|

Contents

Introduction to the human physiology; functional organization, relationship between structure and function of the human body. Homeostasis, importance negative and positive feedback mechanism. Integumentary system; Layers of skin and types of glands, Functions of the skin, hair and glands, diseases related to skin, Body temperature , its types and its regulation

The musculoskeletal system: Physiological anatomy of muscles and their types,, Functional characteristics of skeletal muscle, smooth muscle and cardiac muscle, Properties of muscles , The events of muscle contraction and relaxation in response to an action potential in a motor neuron,, Neuromuscular junction , Distinguish between aerobic and anaerobic muscle contraction,, Muscle hypertrophy and atrophy. The nervous system; functional anatomy of nervous system, Functions of all the parts of central nervous system,, Functions of various cranial nerves,, Division of peripheral nervous system (somatic and autonomic ns), The classification and function of neurons, neuroglial cells and their components. , Resting membrane potential and an action potential,, Difference between sympathetic and para sympathetic ns, Difference between somatic and autonomic nervous system, The types and function of a synapse and reflex arc , Diseases related to nervous system. The functions of the specialized sense organs; Eye---- physiology of site, accommodation, optic nerve and optic chiasma, Ear---- functions of the internal, middle and external ear, Physiology of the hearing and balance, Smell----- physiology of olfactory nerve, Taste -----physiology of taste, Location of the taste buds, Physiology of speech. The endocrine system; Functions of the endocrine system, Chemical signals, receptors and hormones, the endocrine glands and their hormones, Other hormones. Blood; Composition of blood and plasma, Functions of blood, Formed elements , Stages of cell development, Blood grouping, Coagulation mechanism

The cardiovascular system;

Functional anatomy cardiac system,, Functions of the heart , Electrical activity of the heart origin and propagation of cardiac impulse , Phases of the cardiac cycle , Heart sounds , Regulation of heart functions--- intrinsic and extrinsic, Functions of the peripheral circulation , The physiology of circulation , Pulmonary circulation , Cardiac circulation, Systemic circulation: arteries , Veins , Local control of blood vessels , Nervous control of blood vessels , Regulation of arterial blood pressure, The function of lymphatic system, tonsils, lymph nodes, the spleen and the thymus. Respiratory system;

Functional anatomy of respiratory ns, Functions of the respiratory system beginning at the nose and ending with the alveoli., Ventilation and lung volumes , Pulmonary function tests, Gas exchange and gas transport in the blood , Diseases related to respiratory system. The digestive system; Functions of each organ of the digestive system including major salivary glands, Movements and secretions in each organ of the digestive system and their regulation, Physiology of digestion, absorption, and transport , Diseases related to digestive system. Excretory system; Functional anatomy of urinary system, Tubular system of kidney, Urine production, urine movement , Regulation of urine concentration and volume , Body fluid compartments , Regulation of extracellular fluid composition , Regulation of acid-base balance. Immunity; Define immunity,

innate immunity, adaptive immunity, Antigens and antibodies, Primary and secondary responses to an antigen, Antibody-mediated immunity and cell-mediated immunity, Role of lymphocyte in immunity regulation,

Partical;

- Determination of human pulse rate
- Determination of blood pressure (by auscultatory and palpatory method)
- The effect of exercise and posture of b.p
- Determination of visual acuity for distant vision □ Determination of visual acuity test for near vision □ Determination of abo blood group system.
- Determination of rh blood group system
- To study hemocytometer
- Count the total number of rbc/mm³ of your own blood
- Examination of cranial nerves

RECOMMENDED BOOKS

- Essentials of anatomy and physiology by seelay, stephens and tate. 4th edition □ Ross & wilson anatomy and physiology.
- Human physiology. Stuart ira fox. 7th edition
- Text book of medical physiology guyton
- Essential of medical physiology vol.i & ii by mushtaq ahmad.
- Lecture notes on human physiology by bray jj, cragg, pa macknight

BEHAVIOURAL SCIENCE (3-0)

Course Learning Objectives

Upon completing this course, students will be able to:

1. Understand fundamental concepts of Behavioral science and its application in healthcare.
2. Analyse psychological, social, and cultural factors influencing patient behaviour.
3. Develop effective communication and interpersonal skills for patient care.
4. Apply Behavioral science principles to enhance teamwork, stress management, and conflict resolution.
5. Explore ethical considerations and cultural competence in healthcare delivery.

Course Outline

| Lecture No. | Lecture Details |
|-------------|---|
| 1 | Introduction to Behavioral Science: Definition, scope, role in healthcare, relevance for allied health professionals. |
| 2 | Relationship Between Behavior and Health: Concepts of health and illness, biopsychosocial model, behavioral risk factors for diseases. |
| 3 | The Role of Psychology in Patient Care: Importance of psychological understanding, patient-centered care, and its impact on recovery. |
| 4 | Principles of Human Behavior: Motivation theories (Maslow's hierarchy), basic human needs, role of emotion in decision-making. |
| 5 | Theories of Personality: Overview of personality theories (Freud, Jung, Big Five), implications for patient-provider interaction. |
| 6 | Psychological Development Across Lifespan: Stages of development (Erikson's theory), psychological changes in childhood, adulthood, and old age. |
| 7 | Cognitive Functions: Processes of memory, types of learning, perception in interpreting health information. 10 |

Introduction to Social Psychology; Nature and scope of social psychology, Social Perception Self in Social World, Attribution. Socialization; Nature: Perspectives of Socialization, Agents of Socialization, Process of Socialization, Socialization of Gender Roles. Attitudes; Nature & Structure Formation of attitude, Attitude Change, Attitude Predicts Behavior. Persuasion; Elements of Persuasion, Resistance in persuasion. Prejudice; Nature and power of power of prejudice, Sources of prejudice. Aggression; what is aggression? Theories of aggression, Influences on aggression, How can aggression be reduced? Social relations; Conformity, Altruism

Recommended Books:

1. Fisher, R. J. (1992). Social psychology: An applied approach. New York: St Martin Press.
2. Forsyth, D. F. (1987). Social psychology. California: Brooks Publishing Company.
3. Franzoi, S. L. (2006). Social Psychology. (7th Ed.). New York: McGrawHill.
4. Myers, D. G. (2005). Exploring social psychology. (8th Ed.). New York: McGraw Hill.
5. Wayant, J. M. (1986). Applied social psychology. New York: Oxford University Press.

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|---------|---------------------------|--------|
| ENG-321 | FUNCTIONAL ENGLISH | 3(3-0) |
|---------|---------------------------|--------|

Contents

- Introducing ourselves
- Describing things
- Getting and giving information
- Recounting past events
- Talking about facts and opinions
- Agreeing and disagreeing
- Compare and Contrast
- Cause and effect
- Using your imagination
- Reporting
- Writing Essays
- Presentation skills
- Assessment

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|---------|-----------------|--------|
| ISL-321 | ISLAMIC STUDIES | 2(2-0) |
|---------|-----------------|--------|

Contents

Introduction to Quranic Studies: Basic Concepts of Quran, History of Quran, Uloom-ul -Quran

Study of Selected Text of Holly Quran

Verses of Surah Al-Baqra Related to Faith (Verse No-284-286)

Verses of Surah Al-Hujrat Related to Adab Al-Nabi (Verse No-1-18)

Verses of Surah Al-Mumanoon Related to Characteristics of faithful (Verse No-1-11)

Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77)

Verses of Surah Al-Inam Related to Ihkam (Verse No-152-154)

Verses of Surah Al-Ihzab Related to Adab al-Nabi (Verse No.6, 21, 40, 56, 57, 58.)

Verses of Surah Al-Hashar (18,19,20) Related to thinking, Day of Judgment

Verses of Surah As-Saf Related to Tafakar, Tadabar (Verse No-1,14)

Seerat of Holy Prophet (S.A.W) I: Life of Muhammad Bin Abdullah (Before Prophet Hood), Life of Holy Prophet (S.A.W) in Makkah, Important Lessons Derived from the life of Holy Prophet in Makkah

Seerat of Holy Prophet (S.A.W) II: Life of Holy Prophet (S.A.W) in Madina, Important Events of Life Holy Prophet in Madina, Important Lessons Derived from the life of Holy Prophet in Madina

Introduction to Sunnah; Basic Concepts of Hadith, History of Hadith, Kinds of Hadith, Uloom – ulHadith, Sunnah & Hadith, Legal Position of Sunnah. Selected Study from Text of Hadith

Introduction to Islamic Law & Jurisprudence: Basic Concepts of Islamic Law & Jurisprudence, History & Importance of Islamic Law & Jurisprudence, Sources of Islamic Law & Jurisprudence, Nature of Differences in Islamic Law, Islam and Sectarianism

Islamic Culture & Civilization: Basic Concepts of Islamic Culture & Civilization, Historical Development of Islamic Culture & Civilization, Characteristics of Islamic Culture & Civilization, Islamic Culture & Civilization and Contemporary Issues

Islam & Science: Basic Concepts of Islam & Science, Contributions of Muslims in the Development of Science, Quranic & Science

Islamic Economic System: Basic Concepts of Islamic Economic System, Means of Distribution of wealth in Islamic Economics, Islamic Concept of Riba, Islamic Ways of Trade & Commerce

Political System of Islam: Basic Concepts of Islamic Political System, Islamic Concept of Sovereignty, Basic Institutions of Govt. in Islam

Islamic History: Period of Khlaft-E-Rashida, Period of Ummayyads, Period of Abbasids

Social System of Islam: Basic Concepts of Social System of Islam, Elements of Family, Ethical Values of Islam

Recommended Books

1. Hameed ullah Muhammad, "Emergence of Islam" , IRI, Islamabad
2. Hussain Hamid Hassan, "An Introduction to the Study of Islamic Law" leaf Publication Islamabad, Pakistan.
3. Dr. Muhammad Zia-ul-Haq, "Introduction to Al Sharia Al Islamia" Allama Iqbal Open University, Islamabad (2001)

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| ETH-302 | Ethics for Non- Muslims | 2(2-0) |
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Relation of ethics to psychology, metaphysics and religion.

A brief review of major theories of the moral standard, The standard as law, The standard as Happiness, The standard as Perfection

Promotion of moral values in society through family& various educational and cultural institutions, concept of good and evil, freedom and responsibility, Various theories of punishment.

Ethical teachings of world religions with special reference to Hinduism, Christianity, Budhism, Judaism and Ethical teachings of Islam.

Ethical precepts from Quranic sayings of the Holy Prophet (Peace be upon him)

Islam's attitude towards minorities.

RECOMMENDED BOOKS

1. J.S Mackenzio! A Manual of Ethics.
2. Herol H.Titus! Ethics for To-day.
3. B.A Dar! Quranic Ethics.
4. Proceeding of the Islamic Colloquium, Lahore 1957.
5. Islamic state: Abu-ul-Ala Madudi.

Introduction to Allied Health Sciences (2-0)

Learning Objective

1. Understand the foundational concepts of medical and health professions, with a special focus on allied health sciences.
2. Differentiate between various health professions and their roles in the healthcare system.
3. Gain knowledge of the educational pathways and career opportunities in the health professions, including allied health fields.
4. Explore interprofessional collaboration and its importance in delivering comprehensive healthcare.
5. Appreciate the significance of medical ethics, professional communication, and emerging healthcare technologies.

Syllabus

| Lecture Number | Lecture Details/Key Points |
|----------------|--|
| Lecture 1 | Introduction to Medical & Health Professions – Overview & Importance |
| Lecture 2 | History and Evolution of Health Professions |
| Lecture 3 | Introduction to the Healthcare System: Components and Functions |
| Lecture 4 | Role of Allied Health Professionals in Healthcare |
| Lecture 5 | Medical vs. Allied Health Professions: Key Differences |
| Lecture 6 | Overview of Medical Education and Training (MBBS) |
| Lecture 7 | Overview of Dental Education and Training (BDS) |
| Lecture 8 | Nursing and Midwifery: Scope and Career Pathways |
| Lecture 9 | Surgical Technology: Roles, Responsibilities, and Career Outlook |
| Lecture 10 | Radiologic Technology and Imaging Professions |
| Lecture 11 | Medical Laboratory Technology: Roles and Functions |
| Lecture 12 | Emergency Medical Services (EMS) & Paramedics |
| Lecture 13 | Speech Therapy: Role, Responsibilities, and Career Outlook |
| Lecture 14 | Renal Dialysis Technology: Scope, Functions, and Training |
| Lecture 15 | Radiotherapy: Overview of Technology and Treatment |
| Lecture 16 | Psychological Sciences: Role in Mental Health & Well-being |
| Lecture 17 | Orthotics and Prosthetics: Career Pathways and Technologies |
| Lecture 18 | Operation Theater Technology: Roles and Key Responsibilities |
| Lecture 19 | Medical Imaging Technology: Radiology, Ultrasound, and MRI |
| Lecture 20 | Hearing Sciences: Audiology and Speech-Language Pathology |
| Lecture 21 | Dental Technology: Scope and Functions in Dental Care |
| Lecture 22 | Cardiac Perfusion: Overview of Cardiovascular Support Systems |
| Lecture 23 | Anaesthesia Technology: Role in Surgical Support and Safety |
| Lecture 24 | Medical Ethics in Health Professions |
| Lecture 25 | Legal and Ethical Issues in Healthcare |
| Lecture 26 | Interprofessional Collaboration in Healthcare |
| Lecture 27 | Healthcare Team Dynamics: Roles and Relationships |
| Lecture 28 | Communication Skills for Health Professionals |
| Lecture 29 | Patient-Centered Care: Concepts and Application |
| Lecture 30 | Leadership in Health Professions: Traits and Development |

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| MTH-321 + | ALGEBRA & TRIGNOMETRY | 3(3-0) |
|--------------|-----------------------|--------|

Preliminaries: Real-number system, complex numbers, introduction to sets, set operations, functions, types of functions. Matrices: Introduction to matrices, types, matrix inverse, determinants, system of linear equations, Cramer's rule. Quadratic Equations: Solution of quadratic equations, qualitative analysis of roots of a quadratic equations, equations reducible to quadratic equations, cube roots of unity, relation between roots and coefficients of quadratic equations. Sequences and series: Arithmetic progression, geometric progression, harmonic progression. Binomial Theorem: Introduction to mathematical induction, binomial theorem with rational and irrational indices. Trigonometry: Fundamentals of trigonometry, trigonometric identities..

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| THQ-311 (Audit Course) | Translation of holy Quran-1 | 1(1-0) |
|------------------------|-----------------------------|--------|

Translation of the Holy Quran - I Topic Details Semester/Level 1 st Semester Course Code ISL -311 Course Title Translation of the Holy Quran – I Credit Hours 1(1-0) Objectives • To familiarize the students with the keys and fundamentals of recitation of the Holy Quran. • To develop the skill of the students for the recitation of the Holy Quran. • 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 • وسیتاں اپرہ - انرظہ عم : اینبدی رعیب رگرم امس اور اے کس اقلعتمت : امس افلع ،وعفمل ،لیضفت ،ابمغل لعف اور ایکس السقم • Contents: وجتدی امیض ،اضمرع ،ارم ، یهن رحف اور ایکس السقم :رحوف تلح ،رحوف اجرہ ،ببشم ابلعفل وسیتی اپرے یک آرخی سیب وسرنیت (Memorization:) ظفح عم رتہمچ

وجمزہ اردو رتامچ رقآن انم رتہمچ رتممچ ومحض ارقلآن اشہ دبعاقلدر دولہی حتف ارقلآن حتف دمحم اجدنلربی رتہمچ ایبن ارقلآن ارشف یلع اہتونی رتہمچ رقآن دیجم دیس اوب الیلع ومدودی رتہمچ ایضء ارقلآن دمحم رکم اشہ الزربی رتہمچ رقآن احظف ذنر ادمح آسن رتہمچ ارقلآن دیس ریش ادمح انسح ایبلن ومالان دمحم وجان ژگیہ رتہمچ ایبن ارقلآن الغم روسل دیعسی آسن رتہمچ رقآن دمحم یقت امثعین فشک ارلنمچ ومالان ادمح دیعس دولہی ابصمچ ارقلآن ڈارٹک دبعارلامحن اطرہ اعمین ارقلآن دارالسلم رعافن ارقلآن ڈارٹک اطرہ اقلدری الکحم ارقلآن ومالان دمحم ریشب افروق اقدری اطمہل رقآن رکی Suggested English Translations of the Holy Quran Name
Translator The Meaning of the Glorious Koran Muhammad Marmaduke Pickthall The Holy Quran
Abdullah Yousuf Ali The Noble Qur'an Dr- Muhammad Taqiuddin Al Hilali & Dr- M Muhsin Khan The
Noble Quran Mufti Muhammad Taqi Usmani Towards Understanding the Ever Glorious Quran
Dr.Muhammad Mahmud Ghali The Study Quran Seyyed Hossein Nasr

2nd Semester

| | | |
|---------|---------------------------|--------|
| AHP-304 | INTRODUCTORY PHARMACOLOGY | 3(2-1) |
|---------|---------------------------|--------|

Introduction to Pharmacology, Pharmacokinetics: (Absorption, distribution, metabolism, excretion) Variable affecting the pharmacokinetics, Pharmacodynamics. Legal Policies and Responsibilities for Drug handling, Math Skills and Drug Calculations; (Addition, subtraction, multiplication and division), decimals, percentages, ratio, proportions. System of Measurements; metric system, international units, unit conversion, Calculations; ration system vs. formulas for drug calculations, calculation of solution strength (weight / volume and volume / volume, calculation of dosage by weight, Drug Label information; Drug identification, Rights of Medication Administration, Medicine Devices: syringes, needles, drug containers, Routes of medicine / drug administration; General Classification of drugs; Analeptics, analgesics, anesthetics, antibiotics, anticoagulants, anticonvulsants, antidiuretics, antiemetics, cardiac medications, CNS stimulants, coagulants, contrast media, diuretics, dyes, Emetics, gastric medications, Hemostatic agents, Hormones, irrigation solutions, narcotics antagonists, narcotics, neuromuscular blocking agents, obstetrical agents, ophthalmic medications, sedative / hypnotics agents and tranquilizers. Diagnostic Imaging agents

Recommended Books:

1. Lippincott's Illustrated Reviews Pharmacology 5th Edition. Lippincott's Williams & Wilkins
2. Chemical Calculations at a Glance by Paul Yates Blackwell Publishing
3. Medical Pharmacology at a Glance by Michael J. Neal. 4th Edition. Blackwell publishing

Theory:

Foundation of Biochemistry; cellular foundation, isolation of eukaryotic cell, chemical foundation, Structure and function of cell membrane, movement of materials across cell membrane Carbohydrates; classification of carbohydrates. Regulation of blood glucose level, Glycolysis, Citric acid cycle, Glycogenolysis, Glycogenoses, Gluconeogenesis. Proteins and Amino Acids; Introduction, importance, classification and properties of proteins, Entry of amino acids into cells and peptide linkage, Special sources of proteins. Lipids; Introduction, Classification and Function of lipids, Biosynthesis of fatty acids, natural fats or triglycerides, Fatty acid oxidation. Vitamins and Minerals; Introduction, classification, Deficiency effects. Enzymes; Introduction, Classification, properties, the mechanism of enzyme reactions, Factors affecting the enzyme activity, Important coenzymes and their actions, Enzyme inhibitors and Regulatory enzymes. Nutrition and Dietetics; Balanced diet, Role of carbohydrates, fats and proteins, their dietary sources and uses in the body, Quantitative and qualitative daily requirements of carbohydrates, fats, proteins, vitamins and minerals. Physiochemical Principles; Acidity & Alkalinity, Osmosis & Osmotic pressure, Hydrogen ion conc. and pH notation, Indicators & Buffer solutions, pH.

Practical:

1. Measurement of pH of various biological fluids
2. Estimation of serum albumin
3. Estimation of blood glucose
4. Measurement of serum total protein level and A / G ratio
5. Measurement of blood cholesterol
6. Measurement of Triglycerides
7. Measurement of Urea
8. Measurement of serum Creatinine

Recommended Books:

1. Harper's Illustrated Biochemistry, 30th Edition MC Graw Hill.
2. Boyer RF. Modern experimental biochemistry. Benjamin/Cummings Pub. Co. 3rd Edition 3. Harvey RA, Ferrier DR. Lippincott's illustrated reviews: Biochemistry. 6th Edition by Kluwer, New York. 2011.
4. Nelson DL, Lehninger AL, Cox MM. Lehninger principles of biochemistry. 6th Edition Macmillan;

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| CSI-321 | Introduction to Computing Applications | 3 (2-1) |
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Theory:

Generation of computer: 1st to 4th generation with their characteristics. Basic concept of computer: Introduction, different components of computer, basic design of computer. Introduction to operating system. Introduction to OS, different management (processor, memory, device, file), Processor management-Process concept, Threads, CPU Scheduling, Process scheduling, Deadlocks, Process synchronization. Memory management –Memory allocation rule, Swapping, Overlay, Paging, Demand paging, segmentation, virtual memory. Device management, File management.

Practical:

Usage of MS DOS commands: basic concept of internal & external commands, directory & file commands, copying, erasing, renaming, displaying files, introduction to pipes & filters, concept of batch file. Windows operation: Customizing the interface, windows explorer, computer upkeep & utilities. Office operation, Microsoft word:- concept of toolbar, character, paragraph& document formatting, drawing tool bar, header, footer, document editing, page setup, short cut keys, text & graphics. Microsoft excel:- concept of spread sheets, creating worksheet ,well formatted documents, concept of row, column, cell & formula bar, using function, using shortcuts, chart, conditional formatting, goal seek, validation rule. Microsoft power point: - slide presentation, slide layout & design, custom animation, image importing, slide transition.

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| PST-321 | Pakistan Studies | 2 (2-0) |
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1. *Historical Perspective*

- a. Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-e-Azam Muhammad Ali Jinnah.
- b. Factors leading to Muslim separatism
- c. People and Land
 - i. Indus Civilization
 - ii. Muslim advent
 - iii. Location and geo-physical features.

2. *Government and Politics in Pakistan*

Political and constitutional phases:

- a. 1947-58
- b. 1958-71
- c. 1971-77
- d. 1977-88
- e. 1988-99
- f. 1999 onward

3. *Contemporary Pakistan*

- a. Economic institutions and issues
- b. Society and social structure
- c. Ethnicity
- d. Foreign policy of Pakistan and challenges
- e. Futuristic outlook of Pakistan

Books Recommended

1. Akbar, S. Zaidi. *Issue in Pakistan's Economy*. Karachi: Oxford University Press, 2000.
2. S.M. Burke and Lawrence Ziring. *Pakistan's Foreign policy: An Historical analysis*. Karachi: Oxford University Press, 1993.
3. Mehmood, Safdar. *Pakistan Political Roots & Development*. Lahore, 1994.

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| ICP-321 | Ideology and constitution of Pakistan | 2 (2-0) |
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Introduction to the ideology of Pakistan: Definition and Significance of ideology, Historical context of the creation of Pakistan (with emphasis on socio-political, religious, and cultural dynamics of British India between 1857 till 1947). Contributions of founding fathers of Pakistan in the freedom movement including but not limited to Allama Muhammad Iqbal, Muhammad Ali Jinnah... etc. Contributions of women and students in the freedom movement for separate homeland for Muslims of British India. Two-Nation Theory: Evolution of the Two-Nation Theory (Urdu-Hindi controversy, Partition of Bengal, Simla deputation 1906, Allama Iqbal's Presidential Address 1930,

Congress Ministries 1937, Lahore Resolution 1940). Role of communalism and religious differences. Introduction to the Constitution of Pakistan: Definition and importance of a constitution, Ideological factors that shaped the Constitution(s) of Pakistan (Objectives Resolution 1949). Overview of constitutional development in Pakistan. Constitution and State Structure: Structure of Government (executive, legislature and judiciary). Distribution of powers between federal and provincial governments. 18th Amendment and its impact on federalism. Fundamental Rights, Principles of Policy and Responsibilities: Overview of fundamental rights guaranteed to citizens by the Constitution of Pakistan 1973 (Articles 8-28). Overview of Principles of Policy (Articles 29-40), Responsibilities of the Pakistani citizens (Article 5). Constitutional Amendments: Procedures for amending the constitution. Notable constitutional amendments and their implications.

Recommended Books:

1. "The idea of Pakistan" by Stephen P. Cohen.
2. "Ideology of Pakistan" by Javed Iqbal.
3. "The Struggle for Pakistan" by I.H. Qureshi
4. "Pakistan the Formative Phase" by Khalid Bin Sayeed.
5. "Pakistan Political Roots and Development" by Safdar Mahmood
6. "Ideology of Pakistan" by Sharif-ul-Mujahid
7. "The Struggle for Pakistan: A Muslim Homeland and Global Politics" by Ayesha Jalal.
8. "Jinnah, Pakistan and Islamic Identity: The search for saladin" by Akbar S. Ahmed.
9. "The Making of Pakistan: A Study in Nationalism" by K.K Aziz.
10. "Pakistan: A New History" by Ian Talbot.
11. "Pakistan in the Twentieth Century: A Political History" by Lawrence Ziring.
12. "The Constitution of Pakistan 1973" Original.
13. "Constitutional and Political Development of Pakistan" by Hamid Khan.
14. "The Parliament of Pakistan" by Mehmoob Hussain.
15. "Constitutional Development in Pakistan" by G. W. Choudhury
16. "Constitution Making in Pakistan: The Dynamics of Political

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| QTR-421 | Quantitative Reasoning-I | 3(2-1) |
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Fundamental numerical literacy to enable them work with numbers, understand their meaning and present data accurately

2. Understanding of fundamental mathematical and statistical concepts
3. Basic ability to interpret data presented in various formats including but not limited to tables, graphs, charts, and equations etc.

Content:

1. Numerical Literacy
 - a. Number system and basic arithmetic operations.
 - b. Units and their conversions, dimensions, area, perimeter and volume
 - c. Rates, ratios, proportions and percentages
 - d. Types and sources of data
 - e. Measurement scales
 - f. Tabular and graphical presentation of data

- g. Quantitative reasoning exercises using number knowledge.
- 2. Fundamental Mathematical Concepts
 - a. Basics of geometry (lines, angles, circles, polygons etc.)
 - b. Sets and their operations
 - c. Relations, functions, and their graphs
 - d. Exponents, factoring and simplifying algebraic expressions
 - e. Algebraic and graphical solutions of linear and quadratic equations and inequalities
 - f. Quantitative reasoning exercises using fundamental mathematical concepts.
- 3. Fundamental Statistical Concepts
 - a. Population and sample
 - b. Measures of central tendency, dispersion and data interpretation
 - c. Rules of counting (multiplicative, permutation and combination)
 - d. Basic probability theory
 - e. Introduction to random variables and their probability distributions
 - f. Quantitative reasoning exercises using fundamental statistical concepts.

RECOMMENDED BOOKS

- 1. Quantitative Reasoning: Tools for Today's Informed Citizen" by Bernard L. Madison, Lynn and Arthur Steen.
- 2. 'Quantitative Reasoning for the Information Age" by Bernard L. Madison and David M.
- 3. Bressoud.
- 4. 'Fundamentals of Mathematics" by Wade Ellis.
- 5. "Quantitative Reasoning: Thinking in Numbers" by Eric Zaslow.
- 6. "Thinking Clearly with Data: A Guide to Quantitative Reasoning and Analysis" by Ethan Bueno de Mesquita and Anthony Fowler.
- 7. "Using and Understanding Mathematics: A Quantitative Reasoning Approach" by Bennett, J. O., Briggs, W. L., & Badalamenti, A.
- 8. "Discrete Mathematics and its Applications" by Kenneth H. Rosen.
- 9. "Statistics for Technology: A Course in Applied Statistics" by Chatfield, C.
- 10. "Statistics: Unlocking the Power of Data" by Robin H. Lock, Patti Frazer Lock, Kari Lock
- 11. Morgan, and Eric F. Lock.

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| MIT-301 | Regional & Imaging Anatomy-I | 3 (2-1) |
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THORACIC WALL

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| Basic Anatomy Introduction to: Opening of the Thorax Structure of the Thoracic Wall Sternum Costal Cartilages Ribs Intercostal Spaces Intercostal Muscles Intercostal Arteries and Veins Intercostal Nerves Suprapleural Membrane Endothoracic Fascia Diaphragm Internal Thoracic Artery | Internal Thoracic Vein Levatores Costarum Serratus Posterior Superior Muscle Serratus Posterior Inferior Muscle Radiographic Anatomy Surface Anterior Chest Wall Ribs Diaphragm Nipple Apex Beat of the Heart Axillary Folds Posterior Chest Wall Lines of Orientation | Trachea Lungs Pleura Heart Thoracic Blood Vessel Mammary Gland |
|--|---|---|

THORACIC CAVITY

| | | |
|---|--|--|
| Basic Anatomy Mediastinum Superior Mediastinum Inferior Mediastinum Pleurae Nerve Supply of the Pleura Trachea Nerve supply of the Trachea Principal Bronchi Lungs Bronchopulmonary Segments Blood Supply of the Lungs Lymph Drainage and | Pericardium Heart Surfaces of the Heart Borders of the Heart Chambers of the Heart Blood Supply of the Esophagus Lymph Drainage of the Esophagus Nerve supply of the Esophagus Thymus Blood Supply Cross- | Radiographic Anatomy Posteroanterior Radiograph Right Oblique Radiograph Left Oblique Radiograph Broncography and Contrast Visualization of the Esophagus Coronary Angiography Computed Tomographic (CT) Scanning of the Thorax |
| Nerve supply of the Lungs | Sectional Anatomy of the Thorax | |

ABDOMINAL WALL

| | | |
|-------------------------------|----------------------------|-----------------------|
| Basic Anatomy | Costal Margin Italic Crest | Gallbladder |
| Introduction to | Pubic Tubercle | Spleen |
| Structure of the | | Pancreas |
| Abdominal | Symphysis Pubis Inguinal | Kidneys |
| Walls | Ligament | Stomach |
| Inguinal Canal & its contents | | Duojenum (First Part) |
| Scrotum, Testis and | Superficial inguinal | Cecum |
| | Ring | Appendix |
| Epididymides | Scrotum | Ascending Colon |
| Vagina | Linea Alba | Appendix Colon |
| Peritoneal Lining of the | Umbilicus | Descending Colon |
| Abdominal Walls | Rectus Abdominis | Urinary Bladder and |
| | Linen Semilunaris | Pregnant Uterus Aorta |
| Radiographic Anatomy | Abdominal Lines and | External Iliac Artery |
| Surface Anatomy | Plans | |
| | | |
| Surface Landmarks of | Vertical Lines | |
| the | Trannphyloric Plane | |
| Abdominal Wall | Subcostal Plane | |
| Xiphoid Process | Intercristal Plane | |
| | Intertubercular Plane | |
| | Abdominal Quadrants | |
| | Surface Landmarks of the | |
| | Abdominal Viscera | |
| | Liver | |

ABDOMINAL CAVITY

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|--|-------|--|--|
| Basic Anatomy (Location, structure, relations, blood supply, nerve supply, lymphatics) Liver Gallbladder Esophagus Stomach Small Intestine Large Intestine Pancreas Spleen Kidneys Suprarenal Glands Peritoneum Jejunum and Ileum Large Intestine Ileocecal Valve Appendix Ascending Colon | Cecum | Transverse Colon Descending Colon Differences Between the Small & Large Intestine Retroperitoneal Space Ureter Blood supply of abdominal organs Portal Vein Lymphatics on the posterior Abdominal Walls Lymph Nodes Lymph Vessels Nerve on the Posterior Abdominal Walls Lumbar Plexus Sympathetic Trunk (Abdominal Part) Aortic Plexuses | Cross-Sectional Anatomy of the Abdomen Radiographic Anatomy Radiographic Appearances of the Abdomen Radiographic Appearances of The: Gastrointestinal Tract Stomach Duodenum Jejunum and Ileum Large Intestine Radiographic Appearances of the Urinary Tract Kidneys Calyces, Renal Pelvis and Ureter |
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PELVIC WALL

| Basic Anatomy | Plexus | Radiographic Anatomy |
|---|--|--|
| The Pelvis Orientation of the Pelvis False Pelvis True Pelvis Structure of the Pelvic Walls Anterior Pelvic Wall Posterior Pelvic Wall Lateral Pelvic Wall Inferior Pelvic Wall or Pelvic Floor Pelvic Diaphragm Pelvic Fascia Parietal Pelvic Fascia Visceral Layer of Pelvic Peritoneum Joints of the Pelvis Sacroiliac Joints | Autonomic Nerves Arteries of the Pelvis Common Iliac Artery External Iliac Artery Arteries of the True Pelvis Internal Iliac Artery Veins of the Pelvis External Iliac Vein Internal Iliac Vein Lymphatics of the Pelvis Nerves of the Pelvis Sacral Plexus Branches of the Lumbar plexus | Surface Anatomy Surface Landmarks Iliac Crest Iliac Anterior Superior Spine Posterior Iliac Spine Pubic Tubercle Pubic Crest Symphysis Pubis of Spinous Processes Sacrum Sacral Hiatus Coccyx Viscera Urinary Bladder Uterus Rectal and Vaginal Examinations As a Method of palpating the Pelvis Viscera |

PELVIC CAVITY

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|--|
| Basic Anatomy |
| Cross sectional anatomy of pelvis |
| Radiological Anatomy. |
| Radiological appearances of the bony pelvis |
| Radiographic appearances of the pelvic organs. |
| Introduction, location, structure, relations, blood supply, nerve supply, lymphatic drainage of: |
| Rectum |
| Ureters |
| Urinary bladder |
| Urethra |
| Vas deferens. |
| Seminal vesicles |
| Prostate |

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| Cervix |
| Ovary |
| Uterine tubes |
| Uterus |
| Vagina |
| |

Practical:

Students must perform dissection in the museum to understand the anatomy and its relations.

Completion of a Practical note book.

Recommended Books:

Clinical Anatomy by Richard S Snell

Anatomy by BD churacia

Atlas of Human anatomy by Netter

2nd Year

3rd Semester

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| AHP-302 | Pathology | 3(2-1) |
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Theory:

Cell Injury and adaptation; Cell Injury, Reversible and Irreversible Injury, Fatty change, Pigmentation, Pathologic calcification, Necrosis and Gangrene. Cellular adaptation; Atrophy, Hypertrophy, Hyperplasia, Metaplasia, Aplasia. Inflammation; Acute inflammation --- vascular changes, Chemotaxis, Opsonization and Phagocytosis, cellular components and chemical mediators of acute inflammation, exudates and transudate, Chronic inflammation, Etiological factors, Granuloma. Cell repair and wound healing; Regeneration and Repair, Healing- steps of wound healing by first and second intention, Factors affecting healing, complications of wound healing. Hemodynamic disorders; Edema, Hemorrhage, Thrombosis, Embolism, Infarction & Hyperemia, Shock and its causes, compensatory mechanisms involved in shock, possible consequences of thrombosis, difference between arterial and venous emboli. Neoplasia; Dysplasia and Neoplasia, differences between benign and malignant neoplasms, common etiological factors for neoplasia, different modes of metastasis **Practical:**

Types of Microscope. Necrosis and its types, Histopathological techniques, Study of inflammation, acute and chronic inflammation, coagulative necrosis, diagnostic laboratory tests, Liver function tests, Renal function tests, Complete Blood counts.

Recommended Books:

Kumar V, Abbas AK, Aster JC. Robbins basic pathology. Elsevier Health Sciences; 2012.

Strasinger SK, Di Lorenzo MS. Urinalysis and body fluids. FA Davis; 2014

Rosto E, editor. Pathophysiology Made Incredibly Easy!. Lippincott Williams & Wilkins; 2009.

Goljan EF. Rapid review pathology: with student consult online access. Elsevier Health Sciences; 2013 Jun 7.

مِنَ اللَّهِ فِي شَيْءٍ إِلَّا أَنْ تَتَّقُوا مِنْهُمْ تُقَاةً وَيُخَذِّرُكُمُ اللَّهُ نَفْسَهُ وَإِلَى اللَّهِ الْمَصِيرُ 28 قُلْ إِنْ تُحِبُّوا مَا فِي صُدُورِكُمْ أَوْ تُبْذَرُوا يَتْلُمُهُ اللَّهُ وَيَعْلَمُ مَا فِي السَّمَاوَاتِ وَمَا فِي الْأَرْضِ وَاللَّهُ عَلَى كُلِّ شَيْءٍ قَدِيرٌ 29 يَوْمَ تَجِدُ كُلُّ نَفْسٍ مَا عَمِلَتْ مِنْ خَيْرٍ مُحْضَرًا وَمَا عَمِلَتْ مِنْ سُوءٍ تَوَدُّ لَوْ أَنَّ بَيْنَهَا وَبَيْنَهُ أَمَدًا بَعِيدًا وَيُخَذِّرُكُمُ اللَّهُ نَفْسَهُ وَاللَّهُ رَءُوفٌ بِالْعِبَادِ 30 قُلْ إِنْ كُنْتُمْ تُحِبُّونَ اللَّهَ فَاتَّبِعُونِي يُحْبِبْكُمُ اللَّهُ وَيَغْفِرْ لَكُمْ ذُنُوبَكُمْ وَاللَّهُ غَفُورٌ رَحِيمٌ 31 قُلْ أَطِيعُوا اللَّهَ وَالرَّسُولَ فَإِنْ تَوَلَّوْا فَإِنَّ اللَّهَ لَا يُحِبُّ الْكَافِرِينَ 32 ﴿ إِنَّ اللَّهَ اصْطَفَى آدَمَ وَنُوحًا وَآلَ إِبْرَاهِيمَ وَآلَ عِمْرَانَ عَلَى الْعَالَمِينَ 33 ذُرِّيَّتَهُ بَعْضُهَا مِنْ بَعْضٍ وَاللَّهُ سَمِيعٌ عَلِيمٌ 34 إِذْ قَالَتِ امْرَأَتُ عِمْرَانَ رَبِّ إِنِّي نَدَرْتُ لَكَ مَا فِي بَطْنِي مُحَرَّرًا فَتَقَبَّلْ مِنِّي إِنَّكَ أَنْتَ السَّمِيعُ الْعَلِيمُ 35 فَلَمَّا وَضَعَتْهَا قَالَتْ رَبِّ إِنِّي وَضَعْتُهَا أُنْثَى وَاللَّهُ أَعْلَمُ بِمَا وَضَعْتَ وَلَيْسَ الذَّكَرُ كَالْأُنْثَى وَإِنِّي سَمَّيْتُهَا مَرْيَمَ وَإِنِّي أُعِيذُهَا بِكَ وَذُرِّيَّتَهُ مِنَ الشَّيْطَانِ الرَّجِيمِ 36 فَتَقَبَّلَهَا رَبُّهَا بِقَبُولٍ حَسَنٍ وَأَنْبَتَهَا نَبَاتًا حَسَنًا وَكَفَّلَهَا زَكَرِيَّا كُلَّمَا دَخَلَ عَلَيْهَا زَكَرِيَّا الْمِحْرَابَ وَجَدَ عِنْدَهَا رِزْقًا قَالَ يَا مَرْيَمُ أَنَّى لَكَ هَذَا قَالَتْ هُوَ مِنْ عِنْدِ اللَّهِ إِنَّ اللَّهَ يَرْزُقُ مَنْ يَشَاءُ بِغَيْرِ حِسَابٍ 37 هُنَالِكَ دَعَا زَكَرِيَّا رَبَّهُ قَالَ رَبِّ هَبْ لِي مِنْ لَدُنْكَ ذُرِّيَّةً طَيِّبَةً إِنَّكَ سَمِيعُ الدُّعَاءِ 38 فَتَدَاوَتْهُ الْمَلَائِكَةُ وَهُوَ قَائِمٌ يُصَلِّي فِي الْمِحْرَابِ أَنَّ اللَّهَ يُبَشِّرُكَ بِيحْيَى مُصَدِّقًا بِكَلِمَةٍ مِنَ اللَّهِ وَسَيِّدًا وَحَصُورًا وَنَبِيًّا مِنَ الصَّالِحِينَ 39 قَالَ رَبِّ أَنَّى يَكُونُ لِي غُلَامٌ وَقَدْ بَلَغَنِيَ الْكِبَرُ وَامْرَأَتِي عَاقِرٌ قَالَ كَذَلِكَ اللَّهُ يَفْعَلُ مَا يَشَاءُ 40 قَالَ رَبِّ اجْعَلْ لِي آيَةً قَالَ آيَتُكَ أَلَّا تُكَلِّمَ النَّاسَ ثَلَاثَةَ أَيَّامٍ إِلَّا رَمْرًا وَادَّكُرَ رَبُّكَ كَثِيرًا وَسَبِّحْ بِالْعَشِيِّ وَالْإِبْكَارِ 41 وَإِذْ قَالَتِ الْمَلَائِكَةُ يَا مَرْيَمُ إِنَّ اللَّهَ اصْطَفَاكِ وَطَهَّرَكِ وَاصْطَفَاكِ عَلَى نِسَاءِ الْعَالَمِينَ 42 يَا مَرْيَمُ اقْنُتِي لِرَبِّكِ وَاسْجُدِي وَارْكَعِي مَعَ الرَّاكِعِينَ 43 ذَلِكَ مِنْ أَنْبَاءِ الْغَيْبِ نُوحِيهِ إِلَيْكَ وَمَا كُنْتَ لَدَيْهِمْ إِذْ يُلْقُونَ أَقْلَامَهُمْ أَتَاهُمْ أُنْهُمُ يُكْفَلُ مَرْيَمَ وَمَا كُنْتَ لَدَيْهِمْ إِذْ يَخْتَصِمُونَ 44 إِذْ قَالَتِ الْمَلَائِكَةُ يَا مَرْيَمُ إِنَّ اللَّهَ يُبَشِّرُكِ بِكَلِمَةٍ مِنْهُ اسْمُهُ الْمَسِيحُ عِيسَى ابْنُ مَرْيَمَ وَجِهًا فِي الدُّنْيَا وَالْآخِرَةِ وَمِنْ الْمُقَرَّبِينَ 45 وَنَبِّئْكَ أَنَّهَا حَامِلَةٌ فَنَسَبَهَا يَوْمَ ذَلِكَ فَتَوَلَّى إِلَى ظِلٍّ فَبِئْسَ الْمَكَانُ 46 قَالَتْ رَبِّ أَنَّى يَكُونُ لِي وَلَدٌ وَلَمْ يَمْسَسْنِي بَشَرٌ قَالَ كَذَلِكَ اللَّهُ يَخْلُقُ مَا يَشَاءُ إِذَا قَضَى أَمْرًا فَإِنَّمَا يَقُولُ لَهُ كُنْ فَيَكُونُ 47 وَيُعَلِّمُهُ الْكِتَابَ وَالْحِكْمَةَ وَالتَّوْرَةَ وَالْإِنْجِيلَ 48 وَرَسُولًا إِلَى بَنِي إِسْرَائِيلَ أَنِّي قَدْ جِئْتُكُمْ بِآيَةٍ مِنْ رَبِّكُمْ أَنِّي أَخْلَقْتُ لَكُمْ مِنَ الطَّيْنِ كَهَيْئَةِ الطَّيْرِ فَأَنْفُخُ فِيهِ فَيَكُونُ طَيْرًا بِإِذْنِ اللَّهِ وَأُبْرِئُ الْأَكْمَةَ وَالْأَبْرَصَ وَأُخَيِّ الْمَوْتَى بِإِذْنِ اللَّهِ وَأَنْبِئُكُمْ بِمَا تَأْكُلُونَ وَمَا تَدْخِرُونَ فِي بُيُوتِكُمْ إِنَّ فِي ذَلِكَ لَآيَةً لَكُمْ إِنْ كُنْتُمْ مُؤْمِنِينَ 49 وَمُصَدِّقًا لِمَا بَيْنَ يَدَيْ مِنَ التَّوْرَةِ وَلَاحِلٌ لَكُمْ بَعْضُ الَّذِي حُرِّمَ عَلَيْكُمْ وَجِئْتُكُمْ بِآيَةٍ مِنْ رَبِّكُمْ فَاتَّقُوا اللَّهَ وَأَطِيعُوا أَمْرًا 50 إِنَّ اللَّهَ رَبِّي وَرَبُّكُمْ فَاعْبُدُوهُ هَذَا صِرَاطٌ مُسْتَقِيمٌ 51 ﴿ فَلَمَّا أَحَسَّ عِيسَى مِنْهُمُ الْكُفْرَ قَالَ مَنْ أَنْصَارِي إِلَى اللَّهِ قَالَ الْحَوَارِيُّونَ نَحْنُ أَنْصَارُ اللَّهِ آمَنَّا بِاللَّهِ وَاشْهَدْ بِأَنَّا مُسْلِمُونَ 52 رَبَّنَا آمَنَّا بِمَا أَنْزَلْتَ وَاتَّبَعْنَا الرَّسُولَ فَاكْتُبْنَا مَعَ الشَّاهِدِينَ 53 وَمَكَرُوا مَكَرَ اللَّهِ وَاللَّهُ خَيْرُ الْمَاكِرِينَ 54 إِذْ قَالَ اللَّهُ يَا عِيسَى ابْنُ مَرْيَمَ قُمْ وَارْفَعْكَ إِلَى مَوْطِقِكَ وَارْفَعُكَ إِلَيَّ وَمُظْهَرُكَ مِنَ الَّذِينَ كَفَرُوا وَجَاعِلُ الَّذِينَ اتَّبَعُوكَ فَوْقَ الَّذِينَ كَفَرُوا إِلَى يَوْمِ الْقِيَامَةِ ثُمَّ إِلَيَّ مَرْجِعُكُمْ فَأَحْكُمُ بَيْنَكُمْ فِيمَا كُنْتُمْ فِيهِ تَخْتَلِفُونَ 55 فَآمَنَ الَّذِينَ الَّذِينَ كَفَرُوا فَأَعَذَّ اللَّهُ لَهُمْ عَذَابًا شَدِيدًا فِي الدُّنْيَا وَالْآخِرَةِ وَمَا لَهُمْ مِنْ نَاصِرِينَ 56 وَأَمَّا الَّذِينَ آمَنُوا وَعَمِلُوا الصَّالِحَاتِ فَيُوَفِّيهِمْ أُجُورَهُمْ وَاللَّهُ لَا يُحِبُّ الظَّالِمِينَ 57 ذَلِكَ نَتْلُوهُ عَلَيْكَ مِنَ الْآيَاتِ وَالذِّكْرِ الْحَكِيمِ 58 إِنَّ مَثَلَ عِيسَى عِنْدَ اللَّهِ كَمَثَلِ آدَمَ خَلَقَهُ مِنْ تُرَابٍ ثُمَّ قَالَ لَهُ كُنْ فَيَكُونُ 59 الْحَقُّ مِنْ رَبِّكَ فَلَا تَكُنْ مِنَ الْمُمْتَرِينَ 60 فَمَنْ حَاجَّكَ فِيهِ مِنْ بَعْدِ مَا جَاءَكَ مِنَ الْعِلْمِ فَقُلْ تَعَالَوْا نَدْعُ آبَاءَنَا وَأَبْنَاؤَكُمْ وَنِسَاءَنَا وَأَنْفُسَكُمْ وَأَنْفُسَكُمْ ثُمَّ نَبْتَهِلْ فَنَجْعَلْ لَعْنَتَ اللَّهِ عَلَى الْكَافِرِينَ 61 إِنَّ هَذَا لَهُوَ الْقَصَصُ الْحَقُّ وَمَا مِنْ إِلَهٍ إِلَّا اللَّهُ وَإِنَّ اللَّهَ لَهُوَ الْعَزِيزُ الْحَكِيمُ 62 فَإِنْ تَوَلَّوْا فَإِنَّ اللَّهَ عَلِيمٌ بِالْمُفْسِدِينَ 63 قُلْ يَا أَهْلَ الْكِتَابِ تَعَالَوْا إِلَى كَلِمَةٍ سَوَاءٍ بَيْنَنَا وَبَيْنَكُمْ أَلَّا نَعْبُدَ إِلَّا اللَّهَ وَلَا نُشْرِكَ بِهِ شَيْئًا وَلَا يَتَّخِذَ بَعْضُنَا بَعْضًا أَرْبَابًا مِنْ دُونِ اللَّهِ فَإِنْ تَوَلَّوْا فَقُولُوا اشْهَدُوا بِأَنَّا مُسْلِمُونَ 64 يَا أَهْلَ الْكِتَابِ لِمَ تَحَاجُّونَ فِي إِبْرَاهِيمَ وَمَا أَنْزَلْنَا مِنَ التَّوْرَةِ وَالْإِنْجِيلِ إِلَّا مِنْ بَعْدِهِ أَفَلَا تَعْقِلُونَ 65 هَا أَنْتُمْ هُنَا لِمَ تَحَاجُّونَ فِيهِمَا لَكُمْ بِهِ عِلْمٌ فَلِمَ تَحَاجُّونَ فِيهِمَا لَيْسَ لَكُمْ بِهِ عِلْمٌ وَاللَّهُ يَعْلَمُ وَأَنْتُمْ لَا تَعْلَمُونَ 66 مَا كَانَ إِبْرَاهِيمَ يَهُودِيًّا وَلَا نَصْرَانِيًّا وَلَكِنْ كَانَ حَنِيفًا مُسْلِمًا وَمَا كَانَ مِنَ الْمُشْرِكِينَ 67 إِنَّ أَوَّلَى النَّاسِ بِإِبْرَاهِيمَ لِلَّذِينَ اتَّبَعُوهُ وَهَذَا النَّبِيُّ وَالَّذِينَ آمَنُوا وَاللَّهُ وَلِيُّ الْمُؤْمِنِينَ 68 وَدَّتْ طَائِفَةٌ مِنْ أَهْلِ الْكِتَابِ لَوْ يُضِلُّوكُمْ وَمَا يُضِلُّونَ إِلَّا أَنْفُسَهُمْ وَمَا يَشْعُرُونَ 69 يَا أَهْلَ الْكِتَابِ لِمَ تَكْفُرُونَ بِآيَاتِ اللَّهِ وَأَنْتُمْ تَشْهَدُونَ 70 يَا أَهْلَ الْكِتَابِ لِمَ تَلْبِسُونَ الْحَقَّ بِالْبَاطِلِ وَتَكْتُمُونَ الْحَقَّ وَأَنْتُمْ تَعْلَمُونَ 71 وَقَالَتْ طَائِفَةٌ مِنْ أَهْلِ الْكِتَابِ آمِنُوا بِالَّذِي أُنْزِلَ عَلَى الَّذِينَ آمَنُوا وَجْهَ النَّهَارِ وَاكْفُرُوا آخِرَهُ لَعَلَّهُمْ يَرْجِعُونَ 72 وَلَا تُؤْمِنُوا إِلَّا لِمَنْ تَبِعَ دِينَكُمْ قُلْ إِنَّ الْهُدَى هَدَى اللَّهُ أَنْ يُوَظَّيَّ أَحَدٌ مِثْلَ مَا أُوتِيتُمْ أَوْ يُحَاجُّوكُمْ عِنْدَ رَبِّكُمْ قُلْ إِنَّ الْفَضْلَ بِيَدِ اللَّهِ يُؤْتِيهِ مَنْ يَشَاءُ وَاللَّهُ وَاسِعٌ عَلِيمٌ 73 يَخْتَصُّ بِرَحْمَتِهِ مَنْ يَشَاءُ وَاللَّهُ ذُو الْفَضْلِ الْعَظِيمِ 74 ﴿ وَمِنْ أَهْلِ الْكِتَابِ مَنْ إِنْ تَأْمَنَهُ بِقُنْطَارٍ يُؤَدِّهِ إِلَيْكَ وَمِنْهُمْ مَنْ إِنْ تَأْمَنَهُ بِدِينَارٍ لَا يُؤَدِّهِ إِلَيْكَ إِلَّا مَا دُمْتَ عَلَيْهِ قَائِمًا ذَلِكَ بِأَنَّهُمْ قَالُوا لَيْسَ عَلَيْنَا فِي الْأُمِّيَّاتِ سَبِيلٌ وَيَقُولُونَ عَلَى اللَّهِ الْكَذِبَ وَهُمْ يَعْلَمُونَ 75 بَلَى مَنْ أَوْفَى بِعَهْدِهِ وَاتَّقَى فَإِنَّ اللَّهَ يُحِبُّ الْمُتَّقِينَ 76 إِنَّ الَّذِينَ يَشْتَرُونَ بِعَهْدِ اللَّهِ وَأَيْمَانِهِمْ ثَمَنًا قَلِيلًا أُولَئِكَ لَا خَلَاقَ لَهُمْ فِي الْآخِرَةِ وَلَا يَكْلَمُهُمُ اللَّهُ وَلَا يَنْظُرُ إِلَيْهِمْ يَوْمَ الْقِيَامَةِ وَلَا يُزَكِّيهِمْ وَلَهُمْ عَذَابٌ أَلِيمٌ 77 وَإِنَّ مِنْهُمْ لَفَرِيقًا يَلُودُونَ أَلْسِنَتَهُمْ بِالْكِتَابِ لِتَحْسَبُوهُ مِنَ الْكِتَابِ وَمَا هُوَ مِنَ عِنْدِ اللَّهِ وَمَا هُوَ مِنَ عِنْدِ اللَّهِ وَيَقُولُونَ عَلَى اللَّهِ الْكَذِبَ وَهُمْ يَعْلَمُونَ 78 مَا كَانَ لِبَشَرٍ أَنْ يُؤْتِيَهُ اللَّهُ الْكِتَابَ وَالْحُكْمَ وَالنُّبُوَّةَ ثُمَّ يَقُولَ لِلنَّاسِ كُونُوا عِبَادًا لِي مِنْ دُونِ اللَّهِ وَلَكِنْ كُونُوا رَبَّانِيِّينَ بِمَا كُنْتُمْ تَعْلَمُونَ الْكِتَابَ وَبِمَا كُنْتُمْ تَدْرُسُونَ 79 وَلَا يَأْمُرُكُمْ أَنْ تَتَّخِذُوا الْمَلَائِكَةَ وَالنَّبِيِّينَ أَرْبَابًا أَيَأْمُرُكُمْ بِالْكُفْرِ بَعْدَ إِذْ أَنْتُمْ مُسْلِمُونَ 80 وَإِذْ أَخَذَ اللَّهُ مِيثَاقَ النَّبِيِّينَ لَمَا آتَيْنَكُمْ مِنْ كِتَابٍ وَحِكْمَةٍ ثُمَّ جَاءَكُمْ رَسُولٌ مُصَدِّقٌ لِمَا مَعَكُمْ لَتُؤْمِنُنَّ بِهِ وَلَتَنْصُرُنَّهُ قَالَ أَأَقْرَضُكُمْ وَأَخَذْتُكُمْ عَلَى ذَلِكَ إِبْرَاهِيمَ قَالُوا أَفَرَرْنَا قَالَ فَاشْهَدُوا وَأَنَا مَعَكُمْ مِنَ الشَّاهِدِينَ 81 فَمَنْ تَوَلَّى بَعْدَ ذَلِكَ فَأُولَئِكَ هُمُ الْفَاسِقُونَ 82 أَفَعَزَّ دِينَ اللَّهِ يَتَّبِعُونَ وَلَهُ أَسْلَمَ مَنْ فِي السَّمَاوَاتِ وَالْأَرْضِ طَوْعًا وَكَرْهًا وَإِلَيْهِ يُرْجَعُونَ 83 قُلْ آمَنَّا بِاللَّهِ وَمَا أُنْزِلَ عَلَيْنَا وَمَا أُنْزِلَ عَلَى

إِبْرَاهِيمَ وَإِسْمَاعِيلَ وَإِسْحَاقَ وَيَعْقُوبَ وَالْأَسْبَاطَ وَمَا أُوتِيَ مُوسَى وَعِيسَى وَالنَّبِيُّونَ مِنْ رَبِّهِمْ لَا نُفَرِّقُ بَيْنَ أَحَدٍ مِنْهُمْ وَنَحْنُ لَهُ مُسْلِمُونَ 84 وَمَنْ يَبْتَغِ غَيْرَ الْإِسْلَامِ دِينًا فَلَنْ يُقْبَلَ مِنْهُ وَهُوَ فِي الْآخِرَةِ مِنَ الْخَاسِرِينَ 85 كَيْفَ يَهْدِي اللَّهُ قَوْمًا كَفَرُوا بَعْدَ إِيمَانِهِمْ وَشَهِدُوا أَنَّ الرَّسُولَ حَقٌّ وَجَاءَهُمُ الْبَيِّنَاتُ ۚ وَاللَّهُ لَا يَهْدِي الْقَوْمَ الظَّالِمِينَ 86 أُولَئِكَ جَزَاؤُهُمْ أَنَّ عَلَيْهِمْ لَعْنَةَ اللَّهِ وَالْمَلَائِكَةِ وَالنَّاسِ أَجْمَعِينَ 87 خَالِدِينَ فِيهَا لَا يُخَفَّفُ عَنْهُمْ الْعَذَابُ وَلَا هُمْ يُنْظَرُونَ 88 إِلَّا الَّذِينَ تَابُوا مِنْ بَعْدِ ذَلِكَ وَأَصْلَحُوا فَإِنَّ اللَّهَ غَفُورٌ رَحِيمٌ 89 إِنَّ الَّذِينَ كَفَرُوا بَعْدَ إِيمَانِهِمْ ثُمَّ أَزْدَادُوا كُفْرًا لَنْ نُقْبَلَ تَوْبَتَهُمْ وَأُولَئِكَ هُمُ الظَّالِمُونَ 90 إِنَّ الَّذِينَ كَفَرُوا وَمَاتُوا وَهُمْ كُفَّارٌ فَلَنْ يُقْبَلَ مِنْ أَحَدِهِمْ مِلءُ الْأَرْضِ ذَهَبًا وَلَوْ افْتَذَى بِهِ ۚ أُولَئِكَ لَهُمْ عَذَابٌ أَلِيمٌ وَمَا لَهُمْ مِنْ نَاصِرِينَ 91 لَنْ تَنَالُوا الْبِرَّ حَتَّى تُنْفِقُوا مِمَّا تُحِبُّونَ ۚ وَمَا تُنْفِقُوا مِنْ شَيْءٍ فَإِنَّ اللَّهَ بِهِ عَلِيمٌ 92 ۞ كُلُّ الطَّعَامِ كَانَ حِلالًا لِبَنِي إِسْرَائِيلَ إِلَّا مَا حَرَّمَ إِسْرَائِيلُ عَلَى نَفْسِهِ مِنْ قَبْلِ أَنْ تُنَزَّلَ التَّوْرَةُ ۚ قُلْ فَأْتُوا بِالتَّوْرَةِ فَاتْلُوهَا إِنْ كُنْتُمْ صَادِقِينَ 93 فَمَنْ افْتَرَى عَلَى اللَّهِ الْكَذِبَ مِنْ بَعْدِ ذَلِكَ فَأُولَئِكَ هُمُ الظَّالِمُونَ 94 قُلْ صَدَقَ اللَّهُ ۚ فَاتَّبِعُوا مِلَّةَ إِبْرَاهِيمَ حَنِيفًا وَمَا كَانَ مِنَ الْمُشْرِكِينَ 95 إِنَّ أَوَّلَ بَيْتٍ وُضِعَ لِلنَّاسِ لَلَّذِي بِبَكَّةَ مُبَارَكًا وَهُدًى لِلْعَالَمِينَ 96 فِيهِ آيَاتٌ بَيِّنَاتٌ مَقَامُ إِبْرَاهِيمَ وَمَنْ دَخَلَهُ كَانَ آمِنًا ۚ وَلِلَّهِ عَلَى النَّاسِ حُجُّ الْبَيْتِ حَيْثُ اتَّيَّعَ مِنَ اسْتَطَاعَ إِلَيْهِ سَبِيلًا ۚ وَمَنْ كَفَرَ فَإِنَّ اللَّهَ غَنِيٌّ عَنِ الْعَالَمِينَ 97 قُلْ يَا أَهْلَ الْكِتَابِ لِمَ تَكْفُرُونَ بِآيَاتِ اللَّهِ وَاللَّهُ شَهِيدٌ عَلَى مَا تَعْمَلُونَ 98 قُلْ يَا أَهْلَ الْكِتَابِ لِمَ تُصَدِّقُونَ عَنِ سَبِيلِ اللَّهِ مَنْ آمَنَ تَبِعُونَهَا عَوَاجًا وَأَنْتُمْ شُهَدَاءُ ۚ وَمَا اللَّهُ بِغَافِلٍ عَمَّا تَعْمَلُونَ 99 يَا أَيُّهَا الَّذِينَ آمَنُوا إِنْ تُطِيعُوا فَرِيقًا مِنَ الَّذِينَ أُوتُوا الْكِتَابَ يَرُدُّوكُمْ بَعْدَ إِيمَانِكُمْ كَافِرِينَ 100 وَكَيْفَ تَكْفُرُونَ وَأَنْتُمْ تَعْلَمُونَ 101 يَا أَيُّهَا الَّذِينَ آمَنُوا اتَّقُوا اللَّهَ حَقَّ تَقَاتِهِ وَلَا تَمُوتُنَّ إِلَّا وَأَنْتُمْ مُسْلِمُونَ 102 وَاعْتَصِمُوا بِحَبْلِ اللَّهِ جَمِيعًا وَلَا تَفَرَّقُوا ۚ وَادْكُرُوا نِعْمَتَ اللَّهِ عَلَيْكُمْ إِذْ كُنْتُمْ أَعْدَاءً فَأَلَّفَ بَيْنَ فُلُوبِكُمْ فَأَصْبَحْتُمْ بِنِعْمَتِهِ إِخْوَانًا وَكُنْتُمْ عَلَى سَفَا حُفْرَةٍ مِنَ النَّارِ فَأَنْقَذَكُمْ مِنْهَا ۚ كَذَلِكَ يُبَيِّنُ اللَّهُ لَكُمْ آيَاتِهِ لَعَلَّكُمْ تَهْتَدُونَ 103 وَلِتَكُنْ مِنْكُمْ أُمَّةٌ يَدْعُونَ إِلَى الْخَيْرِ وَيَأْمُرُونَ بِالْمَعْرُوفِ وَيَنْهَوْنَ عَنِ الْمُنْكَرِ ۚ وَأُولَئِكَ هُمُ الْمُفْلِحُونَ 104 وَلَا تَكُونُوا كَالَّذِينَ تَفَرَّقُوا وَاخْتَلَفُوا مِنْ بَعْدِ مَا جَاءَهُمُ الْبَيِّنَاتُ ۚ وَأُولَئِكَ لَهُمْ عَذَابٌ عَظِيمٌ 105 يَوْمَ تَبْيَضُّ وُجُوهٌ وَتَسْوَدُّ وُجُوهٌ ۚ فَأَمَّا الَّذِينَ اسْوَدَّتْ وُجُوهُهُمْ أَكْفَرْتُمْ بَعْدَ إِيمَانِكُمْ فَدُوفُوا الْعَذَابَ بِمَا كُنْتُمْ تَكْفُرُونَ 106 وَأَمَّا الَّذِينَ ابْيَضَّتْ وُجُوهُهُمْ فَفِي رَحْمَةِ اللَّهِ هُمْ فِيهَا خَالِدُونَ 107 تِلْكَ آيَاتُ اللَّهِ تَتْلُوهَا عَلَيْكَ بِالْحَقِّ ۚ وَمَا اللَّهُ يُرِيدُ ظُلْمًا لِلْعَالَمِينَ 108 وَلِلَّهِ مَا فِي السَّمَاوَاتِ وَمَا فِي الْأَرْضِ ۚ وَإِلَى اللَّهِ تُرْجَعُ الْأُمُورُ 109 كُنْتُمْ خَيْرَ أُمَّةٍ أُخْرِجَتْ لِلنَّاسِ تَأْمُرُونَ بِالْمَعْرُوفِ وَتَنْهَوْنَ عَنِ الْمُنْكَرِ وَتُؤْمِنُونَ بِاللَّهِ ۚ وَلَوْ آمَنَ أَهْلُ الْكِتَابِ لَكَانَ خَيْرًا لَهُمْ مِنْهُمْ الْمُؤْمِنُونَ وَأَكْثَرُهُمُ الْفَاسِقُونَ 110 لَنْ يَضُرَّوكُمْ إِلَّا أَذًى ۚ وَإِنْ يُقَاتِلُوكُمْ يُؤَلُّوكُمُ الْأَذْيَارُ ثُمَّ لَا يُنْصَرُونَ 111 ضَرَبْتَ عَلَيْهِمُ الدَّلَّةَ أَيْنَ مَا تُقِفُوا إِلَّا بِحَبْلِ مِنَ اللَّهِ وَحَبْلِ مِنَ النَّاسِ وَتَاءُوا بِغَضَبٍ مِنَ اللَّهِ وَضَرَبْتَ عَلَيْهِمُ الْمَسْكَنَةَ ۚ ذَلِكَ بِأَنَّهُمْ كَانُوا يَكْفُرُونَ بِآيَاتِ اللَّهِ وَيَقْتُلُونَ الْأَنْبِيَاءَ بِغَيْرِ حَقٍّ ۚ ذَلِكَ بِمَا عَصَوْا وَكَانُوا يَعْتَدُونَ 112 ۞ لَيْسُوا سَوَاءً ۚ مِنْ أَهْلِ الْكِتَابِ أُمَّةٌ قَائِمَةٌ يَتْلُونَ آيَاتِ اللَّهِ آنَاءَ اللَّيْلِ وَهُمْ يَسْجُدُونَ 113 يُؤْمِنُونَ بِاللَّهِ وَالْيَوْمِ الْآخِرِ وَيَأْمُرُونَ بِالْمَعْرُوفِ وَيَنْهَوْنَ عَنِ الْمُنْكَرِ وَيُسَارِعُونَ فِي الْخَيْرَاتِ وَأُولَئِكَ مِنَ الصَّالِحِينَ 114 وَمَا يَفْعَلُوا مِنْ خَيْرٍ فَلَنْ يُكْفَرُوهُ ۚ وَاللَّهُ عَلِيمٌ بِالْمُتَّقِينَ 115 إِنَّ الَّذِينَ كَفَرُوا لَنْ تُغْنِيَ عَنْهُمْ أَمْوَالُهُمْ وَلَا أَوْلَادُهُمْ مِنَ اللَّهِ شَيْئًا ۚ وَأُولَئِكَ أَصْحَابُ النَّارِ ۚ هُمْ فِيهَا خَالِدُونَ 116 مَثَلٌ مَا يَنْفِقُونَ فِي هَذِهِ الْحَيَاةِ الدُّنْيَا كَمَثَلِ رِيحٍ فِيهَا صِرٌّ أَصَابَتْ حَرْثَ قَوْمٍ ظَلَمُوا أَنْفُسَهُمْ فَأَهْلَكْتَهُ ۚ وَمَا ظَلَمَهُمُ اللَّهُ وَلَكِنْ أَنْفُسُهُمْ يَظْلِمُونَ 117 يَا أَيُّهَا الَّذِينَ آمَنُوا لَا تَتَّخِذُوا بَطَانَةً مِنْ دُونِكُمْ لَا يَأْمُرُوكُمْ حَبَالًا وَذُوا مَا عَيْنُكُمْ قَدْ بَدَتْ الْبَغْضَاءُ مِنْ أَفْوَاهِهِمْ وَمَا تُخْفِي صُدُورُهُمْ أَكْبَرُ ۚ قَدْ بَيَّنَّا لَكُمْ الْآيَاتِ إِنْ كُنْتُمْ تَعْقِلُونَ 118 هَا أَنْتُمْ أَوْلَاءُ تُحِبُّونَهُمْ وَلَا يُحِبُّونَكُمْ وَتُؤْمِنُونَ بِالْكِتَابِ كُلِّهِ وَإِذَا لَقُوكُمْ قَالُوا آمَنَّا وَإِذَا خَلَوْا عَصَوْا عَلَيْكُمْ الْكَاذِبِينَ مِنَ الْغَيْظِ ۚ قُلْ مُؤْتُوا بِغَيْرِكُمْ ۚ إِنَّ اللَّهَ عَلِيمٌ بِذَاتِ الصُّدُورِ 119 إِنْ تَمَسَسْتُمْ حَسَنَةً تَسُوهُمْ وَإِنْ تَصَبَّيْتُمْ سَيِّئَةً يَفْرَحُوا بِهَا ۚ وَإِنْ تَصْبِرُوا وَتَتَّقُوا لَا يَضُرَّكُمْ كَيْدُهُمْ شَيْئًا ۚ إِنَّ اللَّهَ بِمَا يَعْمَلُونَ مُحِيطٌ 120 وَإِذْ عَدُوَّتْ مِنْ أَهْلِكَ تَبَوَّأَ الْمُؤْمِنِينَ مَقَاعِدَ لِلْقِتَالِ ۚ وَاللَّهُ سَمِيعٌ عَلِيمٌ 121 إِذْ هَمَّتْ طَائِفَتَانِ مِنْكُمْ أَنْ تَفْشَلَا وَاللَّهُ وَلِيُّهُمَا ۚ وَعَلَى اللَّهِ فَلْيَتَوَكَّلِ الْمُؤْمِنُونَ 122 وَلَقَدْ 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يَمَسُّكُمْ قَرْحٌ فَقَدْ مَسَّ الْقَوْمَ قَرْحٌ مِثْلُهُ وَتِلْكَ الْأَيَّامُ نُدَاوِلُهَا بَيْنَ النَّاسِ وَلِيَعْلَمَ اللَّهُ الَّذِينَ آمَنُوا وَيَتَّخِذَ مِنْكُمْ شُهَدَاءَ ۚ وَاللَّهُ لَا يُحِبُّ الظَّالِمِينَ 140 وَلِيُمَحِّصَ اللَّهُ الَّذِينَ آمَنُوا وَيَمْحَقَ الْكَافِرِينَ 141 أَمْ حَسِبْتُمْ أَنْ تُدْخَلُوا الْجَنَّةَ وَلَمَّا يَعْلَمِ اللَّهُ الَّذِينَ جَاهَدُوا مِنْكُمْ وَيَعْلَمَ الصَّابِرِينَ 142 وَلَقَدْ كُنْتُمْ تَمَنَّوْنَ الْمَوْتَ

مِنْ قَبْلِ أَنْ تَلْقَوْهُ فَقَدْ رَأَيْتُمُوهُ وَأَنْتُمْ تَنْظُرُونَ 143 وَمَا مُحَمَّدٌ إِلَّا رَسُولٌ قَدْ خَلَتْ مِنْ قَبْلِهِ الرُّسُلُ أَفَإِنْ مَاتَ أَوْ قُتِلَ انْقَلَبْتُمْ عَلَى أَعْقَابِكُمْ وَمَنْ يَنْقَلِبْ عَلَى عَقْبَيْهِ فَلَنْ يَصُرَ اللَّهُ شَيْئًا وَسَيَجْزِي اللَّهُ الشَّاكِرِينَ 144 وَمَا كَانَ لِنَفْسٍ أَنْ يَمُوتَ إِلَّا بِإِذْنِ اللَّهِ كِتَابًا مُؤَجَّلًا وَمَنْ يُرِدْ ثَوَابَ الدُّنْيَا نُؤْتِهِ مِنْهَا وَمَنْ يُرِدْ ثَوَابَ الْآخِرَةِ نُؤْتِهِ مِنْهَا وَسَيَجْزِي اللَّهُ الشَّاكِرِينَ 145 وَكَأَيِّنْ مِنْ نَبِيِّ قَاتَلَ مَعَهُ رَبِّيُونَ كَثِيرٌ فَمَا وَهَنُوا لِمَا أَصَابَهُمْ فِي سَبِيلِ اللَّهِ وَمَا ضَعُفُوا وَمَا اسْتَكَانُوا وَاللَّهُ يُحِبُّ الصَّابِرِينَ 146 وَمَا كَانَ قَوْلُهُمْ إِلَّا أَنْ قَالُوا رَبَّنَا اغْفِرْ لَنَا ذُنُوبَنَا وَإِسْرَافَنَا فِي أَمْرِنَا وَثَبِّتْ أَقْدَامَنَا وَانصُرْنَا عَلَى الْقَوْمِ الْكَافِرِينَ 147 فَأَتَاهُمُ اللَّهُ ثَوَابَ الدُّنْيَا وَحَسُنَ ثَوَابُ الْآخِرَةِ وَاللَّهُ يُحِبُّ الْمُحْسِنِينَ 148 يَا أَيُّهَا الَّذِينَ آمَنُوا إِنْ نُطِيعُوا الَّذِينَ كَفَرُوا يَزِدُّوكُمْ عَلَى عِقَابِكُمْ فَتَقْلِبُوا خَاسِرِينَ 149 بَلِ اللَّهُ مَوْلَاكُمْ وَهُوَ خَيْرُ النَّاصِرِينَ 150 سَنُلْقِي فِي قُلُوبِ الَّذِينَ كَفَرُوا الرُّعْبَ بِمَا أَشْرَكُوا بِاللَّهِ مَا لَمْ يُكُنْ بِهِ سُلْطَانًا وَمَا وَاهُمُ النَّارُ وَبِئْسَ مَثْوَى الظَّالِمِينَ 151 وَلَقَدْ صَدَقَكُمُ اللَّهُ وَعْدَهُ إِذْ تَحُسُّونَهُمْ بِإِذْنِهِ حَتَّى إِذَا فَشِلْتُمْ وَتَنَارَعْتُمْ فِي الْأَمْرِ وَعَصَيْتُمْ مِنْ بَعْدِ مَا أَرَاكُمْ مَا تُحِبُّونَ مِنْكُمْ مَنْ يُرِيدُ الدُّنْيَا وَمِنْكُمْ مَنْ يُرِيدُ الْآخِرَةَ ثُمَّ صَرَفَكُمْ عَنْهُمْ لِيَبْتَلِيَكُمْ وَلَقَدْ عَفَا عَنْكُمْ وَاللَّهُ ذُو فَضْلٍ عَلَى الْمُؤْمِنِينَ 152 إِذْ تَضِعُّونَ وَلَا تَلْوُونَ عَلَى أَحَدٍ وَالرَّسُولُ يَدْعُوكُمْ فِي أُحْرَاكُمْ فَأَتَابَكُمْ غَمًّا بِغَمٍّ لِكَيْلَا تَحْزَنُوا عَلَى مَا فَاتَكُمْ وَلَا مَا أَصَابَكُمْ وَاللَّهُ خَبِيرٌ بِمَا تَعْمَلُونَ 153 ثُمَّ أُنْزِلَ عَلَيْكُمْ مِنْ بَعْدِ الْغَمِّ أَمْنَةً نَاعَسًا يَغْشَى طَائِفَةً مِنْكُمْ وَطَائِفَةٌ قَدْ أَهَمَّتْهُمْ أَنْفُسُهُمْ يَظُنُّونَ بِاللَّهِ غَيْرَ الْحَقِّ ظَنَّ الْجَاهِلِيَّةِ يَقُولُونَ هَلْ لَنَا مِنَ الْأَمْرِ مِنْ شَيْءٍ قُلْ إِنْ الْأَمْرُ كُلُّهُ لِلَّهِ يُخْفُونَ فِي أَنْفُسِهِمْ مَا لَا يَبْدُونَ لَكَ يَقُولُونَ لَوْ كَانَ لَنَا مِنَ الْأَمْرِ شَيْءٌ مَا قُتِلْنَا هَاهُنَا قُلْ لَوْ كُنْتُمْ فِي بُيُوتِكُمْ لَبَرَزَ الَّذِينَ كَتَبَ عَلَيْهِمُ الْقَتْلُ إِلَى مَضَاجِعِهِمْ وَلِيَبْتَلِيَ اللَّهُ مَا فِي صُدُورِكُمْ وَلِيُمَحَّصَ مَا فِي قُلُوبِكُمْ وَاللَّهُ عَلِيمٌ بِذَاتِ الصُّدُورِ 154 إِنَّ الَّذِينَ تَوَلَّوْا مِنْكُمْ يَوْمَ الْتَقَى الْجَمْعَانِ إِنَّمَا اسْتَزَلَّهُمُ الشَّيْطَانُ بِبَعْضِ مَا كَسَبُوا وَلَقَدْ عَفَا اللَّهُ عَنْهُمْ إِنَّ اللَّهَ غَفُورٌ حَلِيمٌ 155 يَا أَيُّهَا الَّذِينَ آمَنُوا لَا تَكُونُوا كَالَّذِينَ كَفَرُوا وَقَالُوا لِإِخْوَانِهِمْ إِذَا ضَرَبُوا فِي الْأَرْضِ أَوْ كَانُوا غُرَى لَوْ كَانُوا عِنْدَنَا مَا مَاتُوا وَمَا قُتِلُوا لِيَجْعَلَ اللَّهُ ذَلِكَ حَسْرَةً فِي قُلُوبِهِمْ وَاللَّهُ يُخَيِّبُ وَيُمِيتُ وَاللَّهُ بِمَا تَعْمَلُونَ بَصِيرٌ 156 وَلَئِنْ قُتِلْتُمْ فِي سَبِيلِ اللَّهِ أَوْ مِتُّمْ لَمَغْفِرَةٌ مِنَ اللَّهِ وَرَحْمَةٌ خَيْرٌ مِمَّا يَجْمَعُونَ 157 وَلَئِنْ مِتُّمْ أَوْ قُتِلْتُمْ إِلَى اللَّهِ تُحْشَرُونَ 158 فَبِمَا رَحْمَةٍ مِنَ اللَّهِ لَنْتُمْ لَهُمْ وَلَوْ كُنْتُمْ قَطًّا غَلِيظَ الْقَلْبِ لَأَنْفَضْتُمْ مِنْ حَوْلِكَ فَاعْفُ عَنْهُمْ وَاسْتَغْفِرْ لَهُمْ وَشَاوِرْهُمْ فِي الْأَمْرِ فَإِذَا عَزَمْتَ فَتَوَكَّلْ عَلَى اللَّهِ إِنَّ اللَّهَ يُحِبُّ الْمُتَوَكِّلِينَ 159 إِنْ يَنْصُرْكُمْ اللَّهُ فَلَا غَالِبَ لَكُمْ وَإِنْ يَخْذَلْكُمْ فَمَنْ ذَا الَّذِي يَنْصُرُكُمْ مِنْ بَعْدِهِ وَعَلَى اللَّهِ فَلْيَتَوَكَّلِ الْمُؤْمِنُونَ 160 وَمَا كَانَ لِنَبِيٍّ أَنْ يَغُلَّ وَمَنْ يَغْلُلْ يَأْتِ بِمَا غَلَّ يَوْمَ الْقِيَامَةِ ثُمَّ تَوَفَّى كُلُّ نَفْسٍ مَا كَسَبَتْ وَهُمْ لَا يُظْلَمُونَ 161 أَفَمَنْ اتَّبَعَ رِضْوَانُ اللَّهِ كَمَنْ بَاءَ بِسَخَطٍ مِنَ اللَّهِ وَمَا وَاهُ جَهَنَّمَ وَبِئْسَ الْمَصِيرُ 162 هُمْ ذَرَجَاتُ عِنْدَ اللَّهِ وَاللَّهُ بَصِيرٌ بِمَا تَعْمَلُونَ 163 لَقَدْ مَنَّ اللَّهُ عَلَى الْمُؤْمِنِينَ إِذْ بَعَثَ فِيهِمْ رَسُولًا مِنْ أَنْفُسِهِمْ يَتْلُو عَلَيْهِمْ آيَاتِهِ وَيُزَكِّيهِمْ وَيُعَلِّمُهُمُ الْكِتَابَ وَالْحِكْمَةَ وَإِنْ كَانُوا مِنْ قَبْلُ لَفِي ضَلَالٍ مُبِينٍ 164 أَوَلَمَّْا أَصَابَكُمُ مَصِيبَةٌ قَدْ أَصَبْتُمْ مِثْلَيْهَا قُلْتُمْ أَنَّى هَذَا قُلْ هُوَ مِنْ عِنْدِ أَنْفُسِكُمْ إِنَّ اللَّهَ عَلَى كُلِّ شَيْءٍ قَدِيرٌ 165 وَمَا أَصَابَكُمْ يَوْمَ الْتَقَى الْجَمْعَانِ فِئَاذُ اللَّهِ وَلِيَعْلَمَ الْمُؤْمِنِينَ 166 وَلِيَعْلَمَ الَّذِينَ نَافَقُوا وَقِيلَ لَهُمْ تَعَالَوْا قَاتِلُوا فِي سَبِيلِ اللَّهِ أَوْ ادْفَعُوا قَالُوا لَوْ نَعْلَمُ لَاتَّبَعْنَاكُمْ هُمْ لِلْكَفَرِ يَوْمَئِذٍ أَقْرَبُ مِنْهُمْ لِلْإِيمَانِ يَقُولُونَ بِأَفْوَاهِهِمْ مَا لَيْسَ فِي قُلُوبِهِمْ وَاللَّهُ أَعْلَمُ بِمَا يَكْتُمُونَ 167 الَّذِينَ قَالُوا لِإِخْوَانِهِمْ وَقَعَدُوا لَوْ أَطَاعُونَا مَا قُتِلُوا قُلْ فَادْرَءُوا عَنْ أَنْفُسِكُمُ الْمَوْتَ إِنْ كُنْتُمْ صَادِقِينَ 168 وَلَا تَحْسَبَنَّ الَّذِينَ قُتِلُوا فِي سَبِيلِ اللَّهِ أَمْوَاتًا بَلْ أَحْيَاءُ عِنْدَ رَبِّهِمْ يُرْفَعُونَ 169 فَرِحِينَ بِمَا آتَاهُمُ اللَّهُ مِنْ فَضْلِهِ وَيَسْتَبْشِرُونَ بِالَّذِينَ لَمْ يَلْحَقُوا بِهِمْ مِنْ خَلْفِهِمْ أَلَّا خَوْفٌ عَلَيْهِمْ وَلَا هُمْ يَحْزَنُونَ 170 سَيَسْتَشِيرُونَ بِنِعْمَةٍ مِنَ اللَّهِ وَفَضْلٍ وَأَنَّ اللَّهَ لَا يُضِيعُ أَجْرَ الْمُؤْمِنِينَ 171 الَّذِينَ اسْتَجَابُوا لِلَّهِ وَالرَّسُولِ مِنْ بَعْدِ مَا أَصَابَهُمُ الْقَرْحُ لِلَّذِينَ أَحْسَنُوا مِنْهُمْ وَاتَّقُوا أَجْرٌ عَظِيمٌ 172 الَّذِينَ قَالُوا لَهُمُ النَّاسُ إِنَّ النَّاسَ قَدْ جَمَعُوا لَكُمْ فَاخْشَوْهُمْ فَزَادَهُمْ إِيمَانًا وَقَالُوا حَسْبُنَا اللَّهُ وَنِعْمَ الْوَكِيلُ 173 فَأَنْقَلَبُوا بِنِعْمَةٍ مِنَ اللَّهِ وَفَضْلٍ لَمْ يَمْسَسْهُمْ سُوءٌ وَاتَّبَعُوا رِضْوَانُ اللَّهِ وَاللَّهُ ذُو فَضْلٍ عَظِيمٍ 174 إِنَّمَا ذَلِكَ الشَّيْطَانُ يَخَوْفُ أَوْلِيَاءَهُ فَلَا تَخَافُوهُمْ وَخَافُوا اللَّهَ إِنْ كُنْتُمْ مُؤْمِنِينَ 175 وَلَا يَحْزَنُكَ الَّذِينَ يُسَارِعُونَ فِي الْكُفْرِ إِنَّهُمْ لَنْ يَصُرُوا اللَّهُ شَيْئًا يُرِيدُ اللَّهُ أَلَّا يَجْعَلَ لَهُمْ حِطًّا فِي الْآخِرَةِ وَلَهُمْ عَذَابٌ عَظِيمٌ 176 إِنَّ الَّذِينَ اشْتَرُوا الْكُفْرَ بِالْإِيمَانِ لَنْ يَصُرُوا اللَّهُ شَيْئًا وَلَهُمْ عَذَابٌ أَلِيمٌ 177 وَلَا يَحْسَبَنَّ الَّذِينَ كَفَرُوا أَنَّ مِثْلَ لَهُمْ خَيْرٌ لِأَنْفُسِهِمْ إِنَّهُمْ لَنِمْلِي لَهُمْ لِيَزْدَادُوا إِثْمًا وَلَهُمْ عَذَابٌ مُهِينٌ 178 مَا كَانَ اللَّهُ لِيَذَرَ الْمُؤْمِنِينَ عَلَى مَا أَنْتُمْ عَلَيْهِ حَتَّى يَمِيزَ الْخَبِيثَ مِنَ الطَّيِّبِ وَمَا كَانَ اللَّهُ لِيُظْلِعَكُمْ عَلَى الْغَيْبِ وَلَكِنَّ اللَّهَ يَجْتَبِي مَنْ رُسُلِهِ مِنْ نِشَاءٍ فَمَا مَنُوا بِاللَّهِ وَرُسُلِهِ وَإِنْ تُؤْمِنُوا وَتَتَّقُوا فَلَكُمْ أَجْرٌ عَظِيمٌ 179 وَلَا يَحْسَبَنَّ الَّذِينَ يَبْخُلُونَ بِمَا آتَاهُمُ اللَّهُ مِنْ فَضْلِهِ هُوَ خَيْرًا لَهُمْ بَلْ هُوَ شَرٌّ لَهُمْ سَيُطَوَّقُونَ مَا بَخُلُوا بِهِ يَوْمَ الْقِيَامَةِ وَلِلَّهِ مِيرَاثُ السَّمَاوَاتِ وَالْأَرْضِ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ 180 لَقَدْ سَمِعَ اللَّهُ قَوْلَ الَّذِينَ قَالُوا إِنَّ اللَّهَ فَقِيرٌ وَنَحْنُ أَغْنِيَاءُ سَنَكْتُبُ مَا قَالُوا وَقَتْلَهُمُ الْأَنْبِيَاءَ بِغَيْرِ حَقٍّ وَقَوْلُ دُفَعُوا عَذَابَ الْخَرِيقِ 181 ذَلِكَ بِمَا قَدَّمْتُمْ أَيْدِيَكُمْ وَأَنَّ اللَّهَ لَيْسَ بِظَلَّامٍ لِلْعَبِيدِ 182 الَّذِينَ قَالُوا إِنَّ اللَّهَ عَهْدُ إِلَيْنَا أَلَّا نُؤْمِنَ لِرَسُولٍ حَتَّى يَأْتِيَنَا بِقُرْبَانٍ تَأْكُلُهُ النَّارُ قُلْ قَدْ جَاءَكُمْ رَسُولٌ مِنْ قَبْلِي بِالْبَيِّنَاتِ وَبِالَّذِي فَلْتُمْ فَلَمْ قَتَلْتُمُوهُمْ إِنْ كُنْتُمْ صَادِقِينَ 183 فَإِنْ كَذَّبُوكَ فَقَدْ كَذَّبَ رَسُولٌ مِنْ قَبْلِكَ جَاءُوا بِالْبَيِّنَاتِ وَالزُّبُرِ وَالْكِتَابِ الْمُنِيرِ 184 كُلُّ نَفْسٍ ذَائِقَةُ الْمَوْتِ وَإِنَّمَا تُوَفَّقُونَ أُجُورَكُمْ يَوْمَ الْقِيَامَةِ فَمَنْ رُحِحَ عَنْ النَّارِ وَأُدْخِلَ الْجَنَّةَ فَقَدْ فَازَ وَمَا الْحَيَاةُ الدُّنْيَا إِلَّا مَتَاعُ الْغُرُورِ 185 لَتَبْلُغُنَّ فِي أَمْوَالِكُمْ وَأَنْفُسِكُمْ وَلَتَسْمَعُنَّ مِنَ الَّذِينَ أُوتُوا الْكِتَابَ مِنْ قَبْلِكُمْ وَمِنَ الَّذِينَ أَشْرَكُوا أَدَى كَثِيرًا وَإِنْ تَصْبِرُوا وَتَتَّقُوا فَإِنَّ ذَلِكَ مِنْ عَزْمِ الْأُمُورِ 186 وَإِذْ أَخَذَ اللَّهُ مِيثَاقَ الَّذِينَ أُوتُوا الْكِتَابَ لَتُبَيِّنُنَّهُ لِلنَّاسِ وَلَا تَكْتُمُونَهُ فَنَبَذُوهُ وَرَاءَ ظُهُورِهِمْ وَاشْتَرَوْا بِهِ ثَمَنًا قَلِيلًا فَبُيِّنَ مَا يَشْتَرُونَ 187 لَا تَحْسَبَنَّ الَّذِينَ يَفْرَحُونَ بِمَا أَتَوْا وَيُجِبُّونَ أَنْ يُخْمَدُوا بِمَا لَمْ يَفْعَلُوا فَلَا تَحْسَبَنْهُمْ بِمَفَازَةٍ مِنَ الْعَذَابِ وَلَهُمْ عَذَابٌ أَلِيمٌ 188 وَلِلَّهِ مُلْكُ السَّمَاوَاتِ وَالْأَرْضِ وَاللَّهُ عَلَى كُلِّ شَيْءٍ

قَدِيرٌ 189 إِنَّ فِي خَلْقِ السَّمَاوَاتِ وَالْأَرْضِ وَالاختلافِ اللَّيْلِ وَالنَّهَارِ لآيَاتٍ لِأُولِي الْأَلْبَابِ 190 الَّذِينَ يَذْكُرُونَ اللَّهَ قِيَامًا وَقُعُودًا وَعَلَى جُنُوبِهِمْ وَيَتَفَكَّرُونَ فِي خَلْقِ السَّمَاوَاتِ وَالْأَرْضِ رَبَّنَا مَا خَلَقْتَ هَذَا بَاطِلًا سُبْحَانَكَ فَقِنَا عَذَابَ النَّارِ 191 رَبَّنَا إِنَّكَ مَنْ تَدْخُلِ النَّارَ فَقَدْ أَخْرَجْتَهُ ۖ وَمَا لِلظَّالِمِينَ مِنْ أَنْصَارٍ 192 رَبَّنَا إِنَّنَا سَمِعْنَا مُنَادِيًا يُنَادِي لِلْإِيمَانِ أَنْ آمِنُوا بِرَبِّكُمْ فَآمَنَّا ۖ رَبَّنَا فَاغْفِرْ لَنَا ذُنُوبَنَا وَكَفِّرْ عَنَّا سَيِّئَاتِنَا وَتَوَفَّنَا مَعَ الْأَبْرَارِ 193 رَبَّنَا وَآتِنَا مَا وَعَدْتَنَا عَلَى رُسُلِكَ وَلَا تُخْزِنَا يَوْمَ الْقِيَامَةِ ۚ إِنَّكَ لَا تُخْلِفُ الْمِيعَادَ 194 فَاسْتَجَابَ لَهُمْ رَبُّهُمْ أَنِّي لَا أَضِيعُ عَمَلٌ غَامِلٍ مِنْكُمْ مِنْ ذَكَرٍ أَوْ أُنْثَىٰ ۖ بَعْضُكُمْ مِنْ بَعْضٍ ۚ فَالَّذِينَ هَاجَرُوا وَأُخْرِجُوا مِنْ دِيَارِهِمْ وَأُودُوا فِي سَبِيلِي وَقَاتَلُوا وَقُتِلُوا لَأُكَفِّرَنَّ عَنْهُمْ سَيِّئَاتِهِمْ وَلَأُدْخِلَنَّهُمْ جَنَّاتٍ تَجْرِي مِنْ تَحْتِهَا الْأَنْهَارُ تَوَابًا مِنْ عِنْدِ اللَّهِ ۚ وَاللَّهُ عِنْدَهُ حُسْنُ الثَّوَابِ 195 لَا يَغْرَنَكَ تَقَلُّبُ الَّذِينَ كَفَرُوا فِي الْبِلَادِ 196 مَتَاعٌ قَلِيلٌ ثُمَّ مَأْوَاهُمْ جَهَنَّمُ ۖ وَبِئْسَ الْمِهَادُ 197 لَكِنَّ الَّذِينَ اتَّقَوْا رَبَّهُمْ لَهُمْ جَنَّاتٌ تَجْرِي مِنْ تَحْتِهَا الْأَنْهَارُ خَالِدِينَ فِيهَا نُزُلًا مِنْ عِنْدِ اللَّهِ ۚ وَمَا عِنْدَ اللَّهِ خَيْرٌ لِلْأَبْرَارِ 198 وَإِنَّ مِنْ أَهْلِ الْكِتَابِ لَمَنْ يُؤْمِنُ بِاللَّهِ وَمَا أُنْزِلَ إِلَيْكُمْ وَمَا أُنْزِلَ إِلَيْهِمْ خَاشِعِينَ لِلَّهِ لَا يَشَتُّونَ بِآيَاتِ اللَّهِ تَمَنَّا قَلِيلًا ۚ أُولَٰئِكَ لَهُمْ أَجْرُهُمْ عِنْدَ رَبِّهِمْ ۚ إِنَّ اللَّهَ سَرِيعُ الْحِسَابِ 199 يَا أَيُّهَا الَّذِينَ آمَنُوا اصْبِرُوا وَصَابِرُوا وَرَابِطُوا وَاتَّقُوا اللَّهَ لَعَلَّكُمْ تُفْلِحُونَ

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| AHP-403 | INTRODUCTORY MICROBIOLOGY | 3 (2-1) |
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Theory:

Fundamentals of microbiology. Microorganisms and their respective place in the living world. Differentiation between eukaryotic and prokaryotic cells, Historical development of Microbiology and its scope. Microscopy: An outline of the principles and applications of light and electron microscope. Morphology, arrangement and detailed anatomy of bacterial cell. Bacterial taxonomy and nomenclature, basis of classification of bacteria. Growth, nutrition (physical and nutritional requirement and nutritional types; sources of energy, C, N, H, O, S, P, trace elements, growth factors) and reproduction. General methods of studying microorganisms: cultivation, isolation, purification and characterization. Control of microorganisms by physical and chemical methods. Chemotherapeutic agents and antibiotics. Modes of action of antibiotics on microorganisms. Basic properties of fungi, Sterilization and disinfection; physical methods– (sunlight, Drying, Dry heat, moist heat, filtration, Radiation, Ultrasonic and sonic vibration). Chemical- (Alcohols, Aldehydes, Dyes, Halogens, Phenols, Gases).

Practical:

Laboratory safety: Containment and decontamination. Equipment / Materials / Glassware etc. used in microbiology, Inoculation techniques. Pour plate, spread plate & streak plate methods, An introduction to microscopy, Gram stain technique, Acid fast staining, Study of motility of bacteria, Hanging drop preparation. Preparation and use of different culture media; Blood Agar, Chocolate Agar, MacConkey Agar, Mannitol Salt Agar, TCBS Agar, SDA Agar, Antibiotic Susceptibility testing by disc diffusion method, Estimation of minimum inhibitor concentration (MIC) by broth and agar dilution methods, Anaerobic culture methods.

Recommended Books:

1. Kathleen P. T., and Arthur, T. 2001. Foundations in Microbiology: Basic Principles McGrawHill Companies
2. Tortora, G. J., Christine, L. Case, C. L., Funke, B. R., Funke, B., Case, C., 2006. Microbiology: An Introduction, Publisher: Pearson Education.
3. Alcamo, I. E., 2001. Fundamentals of Microbiology published by Jones and Bartlett Publishers, USA.
4. Black, J. G., 2005. Microbiology: principles and explorations, by 6th Edition, J. Wiley & Sons,
5. USA.

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| QTR-422 | Quantitative Reasoning-II | 3(2-1) |
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Logic, Logical and Critical Reasoning: Introduction and importance of logic; Inductive, deductive and abductive approaches of reasoning; Propositions, arguments (valid; invalid), logical connectives, truth tables and propositional equivalences; Logical fallacies; Venn Diagrams, Predicates and quantifiers; Quantitative reasoning exercises using logical reasoning concepts and techniques. Mathematical Modeling and Analyses: Introduction to deterministic models; Use of linear functions for modeling in real-world situations; Modeling with the system of linear equations and their solutions; Elementary introduction to derivatives in mathematical modeling; Linear and exponential growth and decay models; Quantitative reasoning exercises using mathematical modeling. Statistical Modeling and Analyses: Introduction to probabilistic models, Bivariate analysis, scatter plots; Simple linear regression model and correlation analysis; Basics of estimation and confidence interval; Testing of hypothesis (z-test; t-test); Statistical inference in decision making; Quantitative reasoning exercises using statistical modeling. Recommended Books:

1. "Using and Understanding Mathematics: A Quantitative Reasoning Approach" by Bennett, J O., Briggs, W. L., & Badalamenti, A.
2. "Discrete Mathematics and its Applications" by Kenneth H. Rosen.
3. "Discrete Mathematics with Applications" by Susanna S. Epp.
4. "Applied Mathematics for Business, Economics and Social Sciences" by Frank S Budnick.
5. "Elementary Statistics: A Step by Step Approach" by Allan Bluman.
6. "Introductory Statistics" by Prem S. Mann.
7. "Applied Statistical Modeling" by Salvatore Babones.
8. "Barrons SAT" by Sharvon Weiner Green, M.A and Ira K.Wolf.

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| ENG-322 | ENGLISH COMPREHENSIVE AND COMPOSITION | 3(3-0) |
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Reading Comprehension Skills; identifying main idea/topic sentences, find specific information quickly, distinguishing between relevant and irrelevant information according to purpose for reading, recognizing and interpreting cohesive devices, distinguishing between fact and opinion. Reading techniques; applying Skimming, Scanning, SQ3R, SPRE. Vocabulary Building Skills; guessing the meanings of unfamiliar words using context clues, using word formation rules for enhancing vocabulary, using the dictionary for finding out meanings and use of unfamiliar words. Pre-writing Techniques; Brainstorming, making a list,

Mind mapping. Writing Techniques; Plan writing: identify audience, purpose and message, Collect information in various forms such as mind maps, tables, charts, lists. Order information such as: Chronology for a narrative, Stages of a process, from general to specific and vice versa, From most important to least important, Advantages and disadvantages, Comparison and contrast, Problem solution pattern, write argumentative and descriptive forms of writing using different methods of developing ideas like listing, comparison, and contrast, cause and effect, for and against. Paragraph Writing: Structure & Development of Paragraph, Write and Identify good topic and supporting sentences and effective conclusions, Use appropriate cohesive devices such as reference words and signal markers. Types of Writing; Narrative, Descriptive: describing a place, character description, Expository, Argumentative. Essay writing techniques; Structure and outline of an essay, Writing Introductions and conclusions of an essay, Unity and coherence in an essay. Paraphrasing: What is Paraphrase? Paraphrasing Techniques and how to apply. Précis writing; What is Précis? Uses of précis writing, Essentials of a good précis, Method of procedure, How to find the title, Précis of a phrase or clause, Précis of a Sentence, Précis of a Paragraph, Summarizing an article, Writing an assignment summary. Expansion; Expansion of a sentence into paragraph, Method of Expansion.

Suggested Books:

1. Exploring the World of English by Saadat Ali Shah
2. College Writing: From paragraph to Essay: Zemach & Rumisek
3. Reading. Upper Intermediate. Brain Tomlinson and Rod Ellis.
4. Oxford Supplementary Skills. Third Impression 1992.
5. Glencoe Writer's Choice: Grammar and Composition. McGraw Hill Glencoe
6. College writing skills by John Langan. McGraw Hill Publishers, 2004
7. Reading upper intermediate. Brain Tomlinson and Rod Ellis. Oxford supplementary skills. Third impression 1992

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| MIT-403 | CLINICAL PHARMACOLOGY | 2 (1-1) |
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CARDIOVASCULAR DISORDERS.

Drugs used in hypertension, Drugs used in treatment of angina pectoris, Drugs used in Heart failure, Anti-arrhythmic drugs, Diuretic drugs

ENDOCRINE DISORDERS

Hypothalamic and pituitary hormones, thyroid and anti-thyroid drugs, corticosteroids and antagonist, gonadal hormones and inhibitors, pancreatic hormones, anti-diabetic agents and glucagon

DRUGS WITH IMPORTANT ACTIONS ON SMOOTH MUSCLE

Histamine, serotonin and the ergot alkaloid, vasoactive peptide

DRUGS WITH IMPORTANT ACTIONS ON BLOOD, INFLAMMATION AND GOUT.

Drugs used in coagulation disorders, drugs use in the treatment of hyperlipidemias, NSAIDS, Acetaminophen and used in Rheumatoid Arthritis and Gout.

DRUGS USED IN GASTROINTESTINAL DISORDERS:

Anti-Emetic Drugs

- Pathophysiology:
 - Causes of nausea and vomiting (e.g., chemotherapy-induced, motion sickness, pregnancy).
- Drug Classes:
 - 5-HT₃ Receptor Antagonists:
 - Mechanism of action (blocking serotonin receptors in the CTZ and gut).
 - Examples: Ondansetron, granisetron.
 - Dopamine Antagonists:
 - Examples: Metoclopramide, prochlorperazine.
 - NK₁ Receptor Antagonists: Examples: Aprepitant, fosaprepitant.
 - Antihistamines: Examples: Diphenhydramine, meclizine.
 - Anticholinergics: Examples: Scopolamine.

Drugs for Acid-Related Disorders

- Pathophysiology:
 - Acid secretion and regulation.
 - Gastroesophageal reflux disease (GERD), peptic ulcer disease (PUD), and Zollinger-Ellison syndrome.

- **Drug Classes:**

- Antacids:
 - Mechanism of action (neutralization of gastric acid). Examples: Aluminum hydroxide, magnesium hydroxide, calcium carbonate.
- H2 Receptor Antagonists:
 - Mechanism of action (inhibition of histamine-mediated acid secretion). Examples: Ranitidine, famotidine, cimetidine.
- Proton Pump Inhibitors (PPIs):
 - Mechanism of action (inhibition of H⁺/K⁺ ATPase). Examples: Omeprazole, pantoprazole, esomeprazole.
- Cytoprotective Agents:
 - Mechanism of action (mucosal protection). Examples: Sucralfate, misoprostol, bismuth compounds.

PRACTICAL

- 📖 Learning the WHO Essential Medicines List and its application in healthcare.
- 📖 Understanding cost-effective prescribing.
- 📖 Basics of designing clinical trials and informed consent.
- 📖 Understanding randomization, blinding, and placebo use.
- 📖 Using simulation models for skill-building (e.g., administering IV fluids, CPR with medication).
- 📖 Exposure to clinical settings for real-time learning

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| MIT-403 | REGIONAL AND IMAGING ANATOMY-II | 3 (2-1) |
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LOWER LIMB

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| Organization of Lower limb The Gluteal Region The Skin of the Buttock Fascia of the Buttock Bones of the Gluteal Region Ligaments of the Gluteal Region Foramina of the Gluteal Regions Nerves of the Lower Limb Nerves of the Gluteal Region Arteries of the Gluteal Region The front and Medical Aspects of the Thigh Skin of the Thigh Superficial Fascia of the Thigh (Fascia Lata) Deep Fascia of the Thigh | Popliteus Muscle Popliteal Artery Popliteal Vein Arterial Anastomosis Around the Knee Joint Popliteal Lymph Nodes Tibial Nerve Common Peroneal Nerve Posterior Cutaneous Nerve of the Thigh Obturator Nerve Fascial Compartments of the leg The front of the Leg Skin Contents of the Anterior Fascial Compartment of the Leg Contents of the Lateral Fascial Compartment of the Leg The Back of the Leg | Skin Dorsal Venous Arch (or Network) Muscles of the Dorsum of the Foot Artery of the Dorsum of the Foot Nerve Supply of the Dorsum of the Foot Joints of the Lower Limb Knee Joint Proximal Tibiofibular Joint Distal Tibiofibular Joint Ankle Joint Tarsal Joint Tarsometatarsal and Intermetatarsal Joints Metatarsophalangeal and Interphalangeal Joints The Foot as a Functional Unit |
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| UPPER LIMB The Pectoral region and the axilla The Breasts Hones of the Shoulder Girdle and Ann The Axilla Walls of the Axilla Contents of the Axilla The Superficial Part of the Back and the Scapular Region Skin Muscles Rotator Cuff Nerves Arterial Anastomosis Around | Radiographic Anatomy Radiographic Appearance of the Upper Limb Radiographic Appearance of the Shoulder Region Radiographic Appearance of the Elbow Region Radiographic Appearance of the Wrist the Hand Surface Anatomy Anterior Surface of the chest Suprasternal Notch Contests of the Anterior Fascia] Compartments of the Upper Arm Content of the Posterior Fascial | The Carpal Tunnel Thumb Pa I m Nerves of the Palm Fascial Space of the Palm Pulp Space of the Fingers The Dorsum of the Hand Skin Dorsal Venous Arch Insertion of the Long Extensor Tendons The Radial Artery on the Dorsum of the Hand Joints of the Upper Limb Sternal Angle (Angle of Louis) Xiphisternal Joint |
| the Shoulder Joint Sternoclavicular Joint Acromioclavicular Joint Shoulder Joint The Scapular-Humeral Mechanism Muscles: Nerve Supply and Action Elbow Joint Proximal Radioulnar Joint Distal Radioulnar Joint Wrist Joint (Radiocarpal Joint) Joints of the Hands and Fingers The Hand As a Functional Unit | Compartments of (lie Upper Arm Muscles: Nerve Supply and action The Cubital Fossa Bones of the Forearm Bones of the Hand Fascia! Compartments of the Forearm Interosseous Membrane Flexor and Extensor of the Forearm Contents of the Lateral Fascia! Compartments of the Forearm Contents of the Posterior Fascial Compartments of the Forearm Muscles: Nerves Supply and Action The Region of the Wrist Structures on the Anterior Aspect of the Wrist | Costal Margin Clavicle Ribs Deltopectoral Triangles Axillary Folds Axilla The Breast The Elbow Region The Wrist and Hand Important Structures lying on the lateral Side of the wrist Important Structures lying in the palm Important Structures lying on the dorsum of the Hand |

Practical:

Students must perform dissection in the museum to understand the anatomy and its relations.

Completion of a Practical note book.

Recommended Books:

Clinical Anatomy by Richard S Snell

Anatomy by BD churacia

Atlas of Human anatomy by Netter

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| RIT-406 | Radiation Science & Technology-I | 4 (3-1) |
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RADIOLOGIC PHYSICS

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 discovery
 - 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 system
 - 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-rays , Attenuation, Ionizing and non-ionizing radiation, Basic phenomenon of x-ray tube. Hands on training in radiology department.

Recommended BOOKS

Radiologic Science for Technologist: Stewart Carlyle Bushong.

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| RIT-404 | Medicine-I | 3 (2-1) |
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Cardiovascular system; Investigation of cardiovascular system, Examination of cardiovascular system, cardiac failure, acute pulmonary edema, ischemic heart disease Angina pectoris, unstable angina, Myocardial infarction, Mitral stenosis, Mitral regurgitation

Mitral valve prolapse, Aortic stenosis, Aortic regurgitation, Tricuspid stenosis, Tricuspid regurgitation, pulmonary stenosis, pulmonary regurgitation, congenital heart disease, ventricular septal defect, atrial septal defect, Patent ductus arteriosus, coarctation of aorta Fallot tetralogy, Cardiac tumors, Heart block, Atrial flutter, atrial fibrillation, Ventricular tachycardia, Ventricular fibrillation, Cardiopulmonary resuscitation (CPR).

Gastroenterology; Examination of abdomen, gastrointestinal diseases, Dysphagia, Gastroesophageal reflux disease, Carcinoma of esophagus, Peptic ulcers, Achalasia, Carcinoma of stomach, Gastric lymphoma, Intestinal lymphoma, Carcinoid tumors, vomiting Dyspepsia, Constipation, Diarrhea, intestinal obstruction, acute appendicitis, acute cholecystitis, Perforation of esophagus. Liver and biliary diseases; Normal liver function, Liver function test, Liver biopsy, Signs and symptoms of liver diseases, Hepatitis A, B, C, D,E

Chronic hepatitis, Cirrhosis of liver, Ascites, portal hypertension, Hepatic encephalopathy, Jaundice, Hepatomegaly, Splenomegaly, Liver abscess and hepatic nodules, Hepatocellular carcinoma, Gallstones, Carcinoma of gallbladder, fibroblastic disease

Practical:

Hands on training in medicine department

History taking in medicine department

CPR practice

Different techniques of injections: intramuscular, intravenous. Intradermal

Students must know different sizes of a cannula, technique of cannula insertion

How to catheterize the patient

How to take the blood pressure

How to take the electrocardiogram and its interpretations

Management of a emergency patient/ how to take emergency measures

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| ENG-422 | Technical Writing | 3 (3-0) |
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PART I:

Introduction; principles of effective writing, Crafting better sentences and paragraphs, Orthography and Punctuation, Correct Spelling, Spell Checkers, Consistent Spelling: American English versus British English, Punctuation, Proper use of punctuation marks. Parentheses and Brackets, Apostrophes in Contractions, Nonbreaking Spaces and Hyphens, Shortened Word Forms in Scientific Writing, Sentence formation: Grammar, the Tenses in Scientific Reporting, Joining Statements, Nonparallel Verbs, Subject-Verb Agreement, Using the Correct Verb Forms.

Organization; and streamlining the writing process.

PART II:

The format of an original manuscript, reviews, commentaries, and opinion. Writing a scientific paper; selection of title for the paper, writing the abstract, key words, Introduction, Methods, Results, Discussion, Conclusion, and Acknowledgement. References (Citation and Bibliography), different citation styles. Dissertation/thesis writing. The publication process, Issues in scientific writing (plagiarism, authorship, reproducible research). Reference management softwares.

EndNote.

Recommended Books:

1. Taylor R. Clinician's guide to medical writing. Springer Science & Business Media; 2006.
2. Lebrun JL. Scientific writing: a reader and writer's guide. World Scientific; 2007.
3. Matthews JR, Matthews RW. Successful scientific writing: a step-by-step guide for the biological and medical sciences. Cambridge University Press; 2014.
4. Fathalla MF, Fathalla MM. A practical guide for health researchers. World Health Organization, Regional Office for the Eastern Mediterranean; 2004.
5. Taylor RB. Medical writing: a guide for clinicians, educators, and researchers. Springer Science; 2011.
6. Hartley J. Academic writing and publishing: A practical handbook. Routledge; 2008.

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| RIT-402 | General Radiology | 3(2-1) |
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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,

PRACTICAL: Hands on training in radiology department.

Introduction to Head and Neck

- Overview of the region.
- General features of the skull and cervical vertebrae.

Osteology

- Detailed description of the bones of the skull:
 - Frontal bone, parietal bone, occipital bone, temporal bone, sphenoid, and ethmoid.
 - Facial bones: maxilla, mandible, zygomatic, nasal, lacrimal, palatine, and vomer.
 - Hyoid bone and its significance.
- Skull foramina and their contents.
- Base of the skull.

. Scalp and Face

- Layers of the scalp.
- Muscles of facial expression.
- Sensory and motor innervation of the face.
- Blood supply and lymphatic drainage.

Temporal and Infratemporal Regions

- Boundaries and contents.
- Temporomandibular joint (TMJ).
- Muscles of mastication.
- Maxillary artery and its branches.
- Pterygoid venous plexus.

Orbit

- Boundaries of the orbit.
- Extraocular muscles.
- Contents of the orbit (eyeball, optic nerve, blood vessels, and lacrimal apparatus).

Neck

- Triangles of the neck:
 - Anterior and posterior triangles.
 - Subdivisions and contents.
- Cervical fascia.
- Muscles of the neck (sternocleidomastoid, trapezius, suprahyoid, infrahyoid, and deep muscles).
- Thyroid and parathyroid glands.

7. Cranial Cavity

- Layers of the meninges.
- Dural folds and venous sinuses.
- Cranial nerves and their nuclei.
- Circle of Willis and blood supply to the brain.

Pharynx

- Nasopharynx, oropharynx, and laryngopharynx.
- Muscles of the pharynx.
- Tonsils and their clinical relevance.

Larynx

- Cartilages of the larynx.
- Muscles of the larynx and their innervation.
- Mechanism of phonation.
- Blood supply and lymphatic drainage.

Oral Cavity

- Structure of the lips, cheeks, tongue, and palate.
- Salivary glands.
- Nerves and blood supply.

Nose and Paranasal Sinuses

- External and internal nose.
- Nasal septum and lateral wall.
- Paranasal sinuses (frontal, maxillary, ethmoid, and sphenoid).

Ear

- External, middle, and inner ear.
- Ossicles and auditory pathways.
- Vestibular apparatus.

Blood Vessels and Lymphatics

- Arteries:
 - Common carotid artery and its branches (internal and external carotid arteries).
- Veins:
 - Internal and external jugular veins.
- Lymph nodes and drainage pathways.

Clinical Anatomy

- Clinical correlations for important topics like:
 - Bell's palsy.
 - Trigeminal neuralgia.
 - Goiter and thyroid disorders.
 - Sinusitis.
 - TMJ disorders.

Introduction to the Back

- General overview of the back.
- Functional and structural significance.
- Anatomical landmarks of the back.

2. Osteology

- Vertebral column:
 - General features of a vertebra.
 - Regional differences in vertebrae (cervical, thoracic, lumbar, sacral, and coccygeal).
 - Typical and atypical vertebrae.
 - Structure of the intervertebral disc.
 - Curvatures of the vertebral column (primary and secondary curvatures).
 - Sacrum and coccyx.

3. Joints of the Back

- Intervertebral joints:
 - Structure and ligaments.

- Zygapophyseal (facet) joints.
 - Atlanto-occipital and atlanto-axial joints:
 - Ligaments and movements.
 - Lumbosacral and sacroiliac joints.
 - Movements of the vertebral column.
-

4. Muscles of the Back

- **Superficial Group:**
 - Trapezius.
 - Latissimus dorsi.
 - Levator scapulae.
 - Rhomboid major and minor.
 - **Intermediate Group:**
 - Serratus posterior superior and inferior.
 - **Deep Group (Intrinsic Muscles):**
 - Erector spinae group (iliocostalis, longissimus, spinalis).
 - Transversospinalis group (semispinalis, multifidus, rotatores).
 - Interspinales, intertransversarii, and levatores costarum.
 - Splenius capitis and cervicis.
-

5. Fascia and Spaces

- Thoracolumbar fascia:
 - Layers and its clinical significance.
 - Deep fascia of the back.
-

6. Nerves of the Back

- Spinal nerves:
 - Formation and distribution.
 - Dorsal and ventral rami.
 - Cutaneous innervation of the back.
 - Nerves supplying the muscles of the back.
 - Sympathetic innervation related to the back.
-

7. Blood Supply

- Arteries:
 - Segmental arteries (posterior intercostal, lumbar, sacral arteries).
 - Vertebral artery and its relevance in the cervical region.
 - Veins:
 - Venous drainage of the back (e.g., azygos system, vertebral venous plexus).
 - Clinical relevance of the vertebral venous plexus in metastasis.
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8. Lymphatic Drainage

- Superficial and deep lymph nodes:
 - Cervical, thoracic, and lumbar lymph nodes.
 - Drainage patterns.
-

9. Spinal Cord and Associated Structures

- Anatomy of the spinal cord:
 - Segments and enlargements.
 - Gray and white matter.
 - Meninges: dura mater, arachnoid mater, pia mater.
 - Spaces: epidural, subdural, and subarachnoid.
 - Cerebrospinal fluid (CSF) and lumbar puncture.
 - Nerve roots and cauda equina.
 - Blood supply of the spinal cord.
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10. Vertebral Canal

- Contents of the vertebral canal.
 - Relationships between the spinal cord and vertebral structures.
-

11. Surface Anatomy of the Back

- Identification of key landmarks:
 - Spinous processes.
 - Vertebral levels associated with important structures (e.g., C7, T3, T7, L4, S2).
 - Triangle of auscultation.
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12. Development of the Vertebral Column

- Embryological development:
 - Formation of vertebrae from somites.
 - Developmental anomalies (e.g., spina bifida, scoliosis, kyphosis, lordosis).
-

13. Clinical Anatomy of the Back

- Common clinical conditions:
 - Prolapsed intervertebral disc (slipped disc).
 - Spinal stenosis.
 - Vertebral fractures.
 - Spondylolisthesis.
 - Scoliosis, kyphosis, and lordosis.
 - Back pain syndromes.
 - Lumbar puncture and epidural anesthesia.
 - Ankylosing spondylitis.

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| BAM-422 | Entrepreneurship | 2(2-0) |
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Course Description: Welcome to Entrepreneurship! The paper is an introductory course intended to provide students with knowledge of entrepreneurship. Entrepreneurship has been found to be a vital part of the economy; and management gurus believe that a good focus on this would perhaps get us out of many economic and social crises. This course is intended to inculcate in students the spirit of innovation and creativity and provide them with an environment where they can exhibit their entrepreneurial ideas in a practical way. The pragmatic approach of the course endeavors to deal with various facets of entrepreneurship and is meant to meet the requirements of management students. To achieve this, this course focuses on the creation of new ventures, the skills necessary for success in an entrepreneurial venture, and factors associated with new venture success. Entrepreneurship is interdisciplinary so this paper provides students with the opportunity to draw together elements of other papers such as finance, economics, management, marketing, production and so forth, showing how these must fit together to create a whole organization, rather than viewing these as a series of unrelated components. This paper will help students determine if they want to start their own ventures or if they prefer to operate as corporate entrepreneurs working within an existing organization. Companies increasingly want and need employees who can identify problems and opportunities, exercise initiative and develop creative solutions, and build support while implementing their ideas. The concepts and skills emphasized in this paper should be useful whether starting a new business or innovating within an existing organization

Course Objectives: After completing this course, the participants should be able to: 1. develop an idea for a new venture 2. research its potential and understand the risks associated 3. undertake marketing, positioning, and customer development 4. prepare an analysis of the financial requirements and build a financial strategy for the new venture, including incremental appreciation of the equity base; 5. identify and prepare legal documents, IP policy, contracts, etc. and 6. develop a comprehensive business plan for their venture;

Course Outcomes: Upon the completion of this course students will achieve basic competence in: • understanding the concepts of entrepreneurship, innovation, intrapreneurship and small business management • be familiar with a variety of behavioral and personality issues in new venture creation. • thinking and design thinking to develop new venture ideas • how to use the business model canvas to operationalize new venture ideas how to evaluate growth opportunities • how to write a business plan

Assignment requirements: This course will involve the following work and assignments: Team Project: Group preparation and presentation of the selected project using available current technology. Reading and writing assignments for each session: Class Format & Weekly Work Plan: Active involvement of students is needed in class discussions to understand this course. Our weekly class Instructions and discussions will follow this format: 1 st Week Introduction to Business: What is Business? Role of business in Economic Progress of the country. Initial ethical and legal issues facing a new firm, obtaining business licenses and permits. Forms of business Organizations. Formation of partnership firm, formation of Company. 2 nd Week Introduction to Entrepreneurship: What is entrepreneurship? Why become an entrepreneur? Types of entrepreneurs, approaches to entrepreneurship, Types of start- up firms, economic impact of entrepreneurial firms, Entrepreneurial firms' impact on society, Entrepreneurial firms' impact on larger firms, The entrepreneurial process Conduct an interview of a local businessman related to entrepreneurial behavior and personality traits. 3 rd Week Islamic perspective of Entrepreneurship, Entrepreneurship in Pakistan, SMEs and Entrepreneurship, Entrepreneurship Vs. Intrapreneurship, Creativity and the Business Idea, Innovation, Invention & Creativity. 4 th Week Recognizing Opportunities

and Generating Ideas: Identifying and recognizing opportunities, finding gaps in the marketplace, techniques for generating ideas, encouraging and protecting new ideas, Innovation and the entrepreneur, The innovation process. 5 th -6th Week Feasibility Analysis: Defining feasibility, Product/Service Feasibility Analysis, Industry/Target Market Feasibility Analysis, Organizational Feasibility Analysis, Financial Feasibility Analysis 7 th- 8 th Week Writing a Business Plan: Business Model Canvas, Reasons for Writing a Business Plan, Who Reads the Business Plan, Guidelines for Writing a Business Plan, Exploring Each Section of the Plan, Presenting the Business Plan, How to pitch your idea? Mid Semester Examination 10th Week Case Study I FAVARR.COM: Launching an online platform Effectuation Theory of Entrepreneurship 11th Week Industry and Competitor Analysis: Studying Industry Trends, The Five Forces Model, Industry Types and the Opportunities They Offer, Identifying Competitors, Sources of Competitive Intelligence, Completing a Competitive Analysis Grid 12th Week Intellectual Property Rights Protection : International protections for intellectual property, Patents, Copyrights, Trademarks, Trade secrets 13th Week Getting Financing or Funding: The importance of getting financing or funding, sources of equity funding, sources of debt financing, creative sources of financing and funding, Crowdsourcing and crowdfunding Guy Clapperton: Why Successful Crowdfunding Requires a Social-Media Mind-Set. Harvard Business Review, December 03, 2012. HBSP 14th Week Going Global: How Entrepreneurial Ventures Go Global? o Import o Export o Licensing o Franchising o Strategic Alliance o Joint Venture o Foreign Subsidiary Understanding the Global Environment 15th Week Class Discussion on: • Entrepreneurship in Pakistan as tool of Economic Development • Importance of SMEs for the economic development of a country. 16th Week Final Project Submission & Presentations Weekly Course Objectives WEEK TOPIC COURSE CONTENTS 1 Introduction to Business • What is Business? • Role of business in Economic Progress of the country. • Initial ethical and legal issues facing a new firm • Obtaining business licenses and permits. • Forms of business Organizations. • Formation of partnership firm, • Formation of Company. 2 Introduction to Entrepreneurship • Explain entrepreneurship and discuss its importance. • Describe corporate entrepreneurship and its use in established firms. • Discuss three main reasons people decide to become entrepreneurs. • Identify four main characteristics of successful entrepreneurs. • Explain the five common myths regarding entrepreneurship. • Explain how entrepreneurial firms differ from salarysubstitute and lifestyle firms. • Discuss the changing demographics of entrepreneurs • Discuss the impact of entrepreneurial firms on economies and societies. • Identify ways in which large firms benefit from the presence of smaller entrepreneurial firms. • Explain the entrepreneurial process. • Behavior and Personality Traits of Entrepreneurs: Conduct an interview of a local businessman Reading assignment 3 Introduction to Entrepreneurship • Islamic perspective of Entrepreneurship, • Entrepreneurship in Pakistan, • SMEs and Entrepreneurship, • Entrepreneurship Vs. Intrapreneurship, • Creativity and the Business Idea, • Innovation, Invention & Creativity • Discuss external enablers of entrepreneurship, • Explain the entrepreneurship during times of crisis. 4 Recognizing Opportunities and Generating Ideas • Explain why it's important to start a new firm when its "window of opportunity" is open. • Explain the difference between an opportunity and an idea. • Describe the three general approaches entrepreneurs use to identify opportunities. • Identify the four environmental trends that are most instrumental in creating business opportunities. • List the personal characteristics that make some people better at recognizing business opportunities than others. • Identify the five steps in the creative process. • Describe the purpose of brainstorming and its use as an idea generator. • Describe how to use library and Internet research to generate new business ideas. • Explain the purpose of maintaining an idea bank. • Describe three steps for protecting ideas from being lost or stolen. Class Activity 5 & 6 Feasibility Analysis • Explain what a feasibility

analysis is and why it's important. • Discuss the proper time to complete a feasibility analysis when developing an entrepreneurial venture. • Describe the purpose of a product/service feasibility analysis and the two primary issues that a proposed business should consider in this area. • Explain a concept statement and its contents. • Describe the purpose of industry/market feasibility analysis and the two primary issues to consider in this area. • Discuss the characteristics of an attractive industry. • Describe the purpose of organizational feasibility analysis and list the two primary issues to consider in this area. • Explain the importance of financial feasibility analysis and list the most critical issues to consider in this area. Quiz-I

7&8 Writing a Business Plan • Business Model Canvas • Reasons for Writing a Business Plan • Who Reads the Business Plan • Guidelines for Writing a Business Plan • Exploring Each Section of the Plan • Presenting the Business Plan • How to pitch your idea? Class activity of pitching your idea Mid-Term Examination 10 Case Study • FAVARR.COM: Launching an online platform 11 Industry and Competitor Analysis • Explain the purpose of an industry analysis. • Identify the five competitive forces that determine industry profitability. • Explain the role of "barriers to entry" in creating disincentives for firms to enter an industry. • Identify the nontraditional barriers to entry that are especially associated with entrepreneurial firms. • List the four industry-related questions to ask before pursuing the idea for a firm. • Identify the five primary industry types and the opportunities they offer. • Explain the purpose of a competitor analysis. • Identify the three groups of competitors a new firm will face. • Describe ways a firm can ethically obtain information about its competitors. • Describe the reasons for completing a competitive analysis grid. Class Activity 12 Intellectual Property Rights • . • Discuss the four major forms of intellectual property: patents, trademarks, • copyrights, and trade secrets • Describe the six-step process for obtaining a patent. • Identify the four types of trademarks. • Identify the types of material that are eligible for copyright protection. • Discuss the legal environment that facilitates trade secret protection. .Guest Lecture by an Entrepreneur 13 Getting Financing or Funding • Explain why most entrepreneurial ventures need to raise money during their early life. • Identify the three sources of personal financing available to entrepreneurs. • Provide examples of how entrepreneurs bootstrap to raise money or cut costs. • Identify the three steps involved in properly preparing to raise debt or equity financing. • Discuss the difference between equity funding and debt financing. • Explain the role of an elevator speech in attracting financing for an entrepreneurial venture. • Describe the difference between a business angel and a venture capitalist. • Explain why an initial public offering (IPO) is an important milestone in an entrepreneurial venture. • Describe the concept of ICO (Initial Coin Offerings) • Explain the advantages of leasing for an entrepreneurial venture. Class Activity: Why Successful Crowdfunding Requires a Social-Media Mind-Set. Harvard Business Review, December 03, 2012. HBSP 14 Going Global • How Entrepreneurial Ventures Go Global? • Import • Export • Licensing • Franchising • Strategic Alliance • Joint Venture • Foreign Subsidiary • Understanding the Global Environment 15& 16 Class Discussion • Entrepreneurship in Pakistan as tool of Economic Development • Women entrepreneurship development in Pakistan • Importance of SMEs for the economic development of a country Final Project Submission & Presentations END TERM EXAMINATION Make-up Class, if needed / Revision Session Required Learning Source Text Book(s): (Title, Author, Edition, Publisher) Bruce R Barringer and R Duane Ireland, Entrepreneurship Successfully Launching New Venture, 4th Edition. Pearson. Or Entrepreneurship – Theory Process Practice by Donald F. Kuratko and Howard H. Frederick, Asia Pacific Edition, Thomson. Additional material provided by the class teacher Reference Book(s): (Title, Author, Edition, Publisher) 1. Robert D. Hisrich, Michael P. Peters, And Dean A. Shepherd, Entrepreneurship 10th edition 2. William Bygrave and Andrew Zacharakis, Entrepreneurship, second edition 3. Entrepreneurship and Innovation: Global Insights from 24 Leaders, Rothman Institute of Entrepreneurship

Journals/Periodicals: (Title, Publisher) Davidsson, P., Recker, J., & von Briel, F. (2021). COVID-19 as External Enabler of entrepreneurship practice and research. *BRQ Business Research Quarterly*, 24(3), 214-223. Feng ZhuMarco Iansiti: Why Some Platforms Thrive and Others Don't. *Harvard Business Review*, January–February 2019 Issue. HBSP Roger L. Martin and Sally R. Osberg: How Social Entrepreneurs Make Change Happen. *Harvard Business Review*, October 14, 2015. HBSP Guy Clapperton: Why Successful Crowdfunding Requires a Social-Media Mind-Set. *Harvard Business Review*, December 03, 2012. HBSP. Diane Mulcahy. Universities should be preparing students for the gig economy. *Harvard Business Review*, October 03, 2019. HBSP Facilities Required for Teaching and Learning • White Board • Multimedia • Zoom online (If online classes) Pedagogies • Oral Lecture • Guest Lecture • Group discussions • Class Activities No. Week Assigned Week Due Two surprise quiz tests will be conducted during the semester for better preparation of the student

3rd Year

5th Semester

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| MIT-406 | Medicine-II | 3 (2-1) |
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Respiratory system; Examination of respiratory system, investigation of respiratory system, clubbing, cyanosis, pulmonary function test, cough, Hemoptysis, dyspnea, Chronic obstructive pulmonary disease (COPD), bronchial asthma, Bronchiectasis, pneumonia, pulmonary tuberculosis, Extrapulmonary tuberculosis, Bronchogenic carcinoma, pleurisy, pleural effusion, pneumothorax, pulmonary embolism, Tumors of mediastinum, Solitary radiographic pulmonary lesion, x-rays finding of common diseases caused by organic and inorganic dust. Endocrine diseases; Investigations, Pituitary tumors, diabetes mellitus, diabetes insipidus, diabetic foot, diabetic nephropathy, Hypothyroidism, Hyperthyroidism, solitary thyroid nodule, gynecomastia, hypocalcemia, hyperlipidemia, polycystic ovary syndrome. Renal diseases; Renal function test, renal biopsy, polyuria, proteinuria, hematuria, Acute renal failure, urinary retention, Polycystic kidney disease, Urinary tract infection, Urinary tract obstruction, Renal stones and nephrocalcinosis, Renal cell carcinoma, benign prostatic hypertrophy, prostatic carcinoma, testicular carcinoma, bladder cancer. Rheumatology and bone diseases; Examination of joints, investigations, Rheumatoid arthritis, Osteoarthritis, infective arthritis, osteomyelitis, osteoporosis, Rickets and osteomalacia, Paget's disease, bone tumors, back pain and neck pain, osteogenesis imperfecta, Joint pain, gout, Kawasaki disease. Neurological disorders; Examination of nervous system, Neurological investigations, Meningitis, Acute bacterial meningitis, tuberculous meningitis, lumbar puncture, Stroke, Rabies, poliomyelitis, brain abscess, Cranial nerve lesion, Multiple sclerosis, intracranial tumors, hydrocephalus, Migraine, cerebellar dysfunction, spinal cord compression, spinal cord infraction, cerebrovascular disease, paraneoplastic neurological disease. Blood disorders; Investigations, splenomegaly, iron deficiency anemia, Thalassemia, sickle cell anemia, Bleeding disorders, Hemophilia, Leukemias. Clinical; Hands on training for students in a medicine department. Final practical exam should include OSPE, long case- 1, short case-2, Table Viva- instruments, pathology, specimens, x-rays. Drugs and general discussion

Practical:

Hands on training in medicine department, Examination of respiratory system, Interpretation of a chest x-ray, Signs and symptoms of COPD cases, Examination of joints and its investigations, Examinations of Neurological disorders and its investigations, Examination of endocrine disorder and its investigations

Recommended books

Medicine by Inam danish

| | | |
|---------|--|---------|
| MIT-507 | Radiation Science & Technology-II | 4 (3-1) |
|---------|--|---------|

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.

Radiation protection measures , Image artifacts , Control of scatter radiation , Image quality factors

Recommended Books

Radiologic Science For technologist by Stewart Carlyle Bushong

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|---------|--------------|--------|
| MIT-509 | Neuroanatomy | 3(2-1) |
|---------|--------------|--------|

NEUROANATOMY

THE CEREBRUM

Sub divisions of the cerebrum

Diencephalon

INTRODUCTION OF A NERVOUS SYSTEM

Central and peripheral nervous system major

division of the central nervous system major

division of the peripheral nervous system

THE NEUROBIOLOGY OF THE NEURON AND THE NEUROGLIA

varieties of neuron

Definitions of the neuron, structure of the

neuron definition of neuroglia astrocytes

oligodendrocytes microglia

ependyma

extracellular space

THE SPINAL CORD AND THE ASCENDING AND DESCENDING TRACTS

Brief review of the vertebral

column Gross appearance of the

spinal cord structure of the spinal

cord the ascending tracts of the

spinal cord Functions of the

ascending tracts

Desending tracts of the spinal cord

Functions of the desecding tracts

Corticospinal tract

Tectospinal tract

Rubrospinal tract

Vestibulospinal tract

Olivospinal tract

Desending autonomic fibres

Reflex arc

THE BRAIN STEM

Review of the skull cranial cavity

introduction to the brain stem Gross

appearance of the medulla oblangata

internal structures Gross appearance of

the pons internal structure of the pons

Gross appearance of the mid brain

internal structure of the mid brain

THE CEREBELLUM AND ITS CONNECTIONS Gross

appearance of the cerebellum structure of the

cerebellum cerebellar cortical mechanismfunctions of

the cerebellum Gerbal appearance of the cerebral

hemisphere main sulci lobes of the cerebral

hemisphere **THE BASAL NUCLEI** corpus striatm

Amagdalanucleus

Clastrum

Connection of the corpus striatum and globus

pallidus connections of the corpus striatum

functions of the basal nuclei

THE THALAMUS AND ITS

CONNECTIONS General appearance

of the thalamus subdivisions of the

thalamus Connections of the

thalamus functions of the thalamus

MENINGS OF THE BRAIN AND SPINAL CORD

Menings of the brain

Menings of the spinal cord

Recommended Books

Neuroanatomy by Richard S Snell.

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| MIT-503 | COMPUTED TOMOGRAPHY | 4 (3-1) |
|---------|---------------------|---------|

Introduction to Computed Tomography

- History and evolution of CT technology.
 - Basic principles of X-ray imaging.
 - Overview of CT scan applications.
-

2. Physics of Computed Tomography

- X-ray production and properties.
 - Interaction of X-rays with matter.
 - Principles of attenuation and its role in image formation.
 - Concepts of Hounsfield Units (HU).
-

3. CT Equipment and Technology

- Components of a CT scanner:
 - X-ray tube.
 - Detectors.
 - Gantry.
 - Table and positioning system.
 - Types of CT scanners:
 - Single-slice CT.
 - Multi-slice CT (MDCT).
 - Cone Beam CT (CBCT).
 - Helical and spiral CT technology.
-

4. Image Acquisition and Reconstruction

- Data acquisition methods.
- Image formation process:
 - Projections and sinograms.
 - Filtered back projection (FBP).
 - Iterative reconstruction techniques.

- Image quality parameters:
 - Spatial resolution.
 - Contrast resolution.
 - Noise and artifacts.
-

5. CT Protocols and Techniques

- Patient preparation and positioning.
 - Scan parameters:
 - kVp, mAs, slice thickness, pitch.
 - Contrast media usage:
 - Types of contrast agents.
 - Techniques for administration.
 - Patient safety and contraindications.
 - Special imaging protocols for different anatomical regions:
 - Head.
 - Chest.
 - Abdomen and pelvis.
 - Musculoskeletal system.
 - Cardiovascular CT (e.g., coronary CT angiography).
-

6. Radiation Dose in CT

- Radiation safety and ALARA (As Low As Reasonably Achievable) principles.
 - Dose measurement units: CTDI, DLP, and effective dose.
 - Techniques for dose optimization:
 - Tube current modulation.
 - Iterative reconstruction.
 - Shielding.
-

7. Image Post-Processing

- 2D and 3D reconstruction techniques.
- Multiplanar reconstruction (MPR).

- Volume rendering (VR).
 - Maximum intensity projection (MIP).
 - Surface rendering.
-

8. Quality Control in CT

- Quality assurance tests and standards.
 - Equipment calibration and maintenance.
 - Evaluation of image quality.
-

9. Advanced CT Applications

- Dual-energy and spectral CT.
 - Functional imaging (e.g., CT perfusion studies).
 - Hybrid imaging systems (e.g., PET/CT, SPECT/CT).
 - Interventional CT (e.g., biopsy guidance, ablation).
-

10. Clinical Applications and Case Studies

- Diagnostic applications across various systems:
 - Neurology, oncology, cardiovascular, trauma.
 - Challenges and limitations of CT imaging.
 - Interpretation of CT images.
-

11. Ethical and Legal Considerations

- Patient consent and privacy.
 - Reporting and documentation standards.
 - Handling medico-legal cases involving CT imaging.
-

12. Emerging Trends in CT

- AI and machine learning in CT.
- Ultra-low-dose CT technology.
- Photon-counting CT detectors.
- Developments in portable CT systems.

Practical Training (If Applicable)

- Hands-on experience with CT scanners.
- Patient case studies and imaging protocols.
- Image analysis and reporting practice.

PRACTICAL:

Hands on training in Radiology department.

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|---------|---------------------|---------|
| MIT-505 | ULTRASOUND/ DOPPLER | 4 (3-1) |
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Introduction to Ultrasound

- History and evolution of ultrasound technology.
- Basic principles of sound waves.
- Differences between diagnostic ultrasound and other imaging modalities.

2. Physics of Ultrasound

- Properties of sound waves:
 - Frequency, wavelength, amplitude, and speed.
- Acoustic impedance and its role in imaging.
- Reflection, refraction, scattering, and absorption of sound waves.
- Ultrasound beam formation:
 - Pulse-echo principle.
 - Transducer design and functionality.

3. Ultrasound Equipment and Technology

- Types of ultrasound transducers:
 - Linear, curvilinear, phased array, and intravascular.
- Components of an ultrasound machine:

- Transducer, console, and display.
 - Modes of ultrasound imaging:
 - A-mode (Amplitude).
 - B-mode (Brightness).
 - M-mode (Motion).
 - 3D and 4D ultrasound.
 - Doppler modes:
 - Continuous wave Doppler.
 - Pulsed wave Doppler.
 - Color Doppler.
 - Power Doppler.
-

4. Image Acquisition and Optimization

- Image acquisition techniques:
 - Patient positioning and preparation.
 - Application of coupling gel.
 - Image quality parameters:
 - Gain, depth, focus, and time gain compensation (TGC).
 - Recognizing and addressing imaging artifacts:
 - Acoustic shadowing, reverberation, enhancement, etc.
-

5. Principles of Doppler Ultrasound

- Doppler effect and its application in imaging.
- Measurement of blood flow velocity.
- Interpretation of Doppler waveforms.
- Spectral Doppler analysis.

6. Clinical Applications of Ultrasound

- **Abdominal Ultrasound:**
 - Liver, gallbladder, pancreas, kidneys, and spleen imaging.
- **Obstetric and Gynecological Ultrasound:**
 - Fetal imaging and biometry.
 - Placenta and amniotic fluid assessment.
 - Ovarian and uterine evaluation.
- **Vascular Ultrasound:**
 - Evaluation of arterial and venous systems.
 - Carotid artery imaging.
 - Peripheral vascular studies.
- **Musculoskeletal Ultrasound:**
 - Imaging of tendons, ligaments, and joints.
 - Soft tissue masses.
- **Echocardiography:**
 - Assessment of cardiac chambers and valves.
 - Wall motion and ejection fraction.
- **Small Parts Ultrasound:**
 - Thyroid, breast, scrotal, and salivary gland imaging.

7. Advanced Doppler Applications

- Tissue Doppler imaging.
- Contrast-enhanced ultrasound (CEUS).
- Elastography for tissue stiffness evaluation.
- Transcranial Doppler (TCD) for cerebral blood flow.

8. Ultrasound Safety and Bioeffects

- Acoustic output and thermal effects.
- Mechanical index (MI) and thermal index (TI).
- Guidelines for safe ultrasound use.

9. Quality Control and Maintenance

- Calibration and performance testing of ultrasound machines.
- Routine maintenance and transducer care.
- Evaluating image quality standards.

10. Ethical and Legal Considerations

- Patient consent and communication during procedures.
- Reporting and documentation standards.
- Handling medico-legal cases involving ultrasound imaging.

11. Emerging Trends in Ultrasound

- Artificial intelligence and machine learning in ultrasound.
- Portable and handheld ultrasound systems.
- Point-of-care ultrasound (POCUS) applications.
- Advanced software for 3D/4D imaging.

12. Practical Training

- Hands-on experience with ultrasound machines, Protocols for imaging various anatomical regions.
- Case-based learning and reporting practice, Doppler studies of arterial and venous systems.

ربائی وک یکین ےس: (اللق بنسح o) اللق (اعترف، رضورت واتیمه، اسقم، ونعمتی Contents o: السیم اللق و آداب Course
امہمن ونازی، میلس بلق، اثیر، اچسی، دعل واصلف، ولوگ ےک درایمن حلص، یکین ےک اکومس نیم اسمتقب، ائمان
ربص، رشاموبس یک افحتظ، اچل نیم ایمہن روی، اگنہ اور آوازوک تسپ رانہک، اعزجی و اسکتری، وغلایت ےس ارعاض،
دبامگین، اسفنین وخالشہت یک ریپوی، رغور و ربکت، ملظ اور زایدیت: اخسوت اللق ہیئس، اوامر نیم ایمہن روی، رکش،
وضفل، السحن اتجان اور فیلکت دانی، رے انومس ےس اکہران، وبل و بعل، رخسمت اور یخیش وخری، یلغج اور تمہت، وھجٹ،
ودعہ الخیف، وچریو ڈاہک، وسدوخری، رشاب وخری، انپ وتل نیم یمکاور ایختن، دسح اور گنت دل، رخیج اور دح ےس ژبانہ
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غ۔وم۔ذل۔ك۔ب۔ر۔ن۔إ۔و۔ت۔ل۔و۔ث۔أ۔ل۔م۔ھ۔ل۔ب۔ق۔م۔ن۔ت۔ل۔خ۔د۔ق۔ق۔و۔ن۔س۔ح۔ال۔ل۔ب۔ق۔ئ۔ی۔الس۔بنسح
ع۔اء۔:۔ب۔ك۔ون۔ول۔ج۔ع۔ت۔س۔ی۔و۔ئ۔ظ۔ل۔س۔ع۔ا۔ل۔ن۔ق۔ل۔ف۔ر۔و۔د۔ی۔د۔ش۔ل۔ك۔ب۔ر۔ن۔إ۔و۔م۔ھ۔ل۔ب۔ا۔ع۔ق۔ال۔/الرعد6
ر۔الس۔و۔ء۔ر۔ا۔ال۔ض۔ن۔ء۔س۔آ۔ب۔م۔د۔واق۔ال۔ق۔ا۔و۔ف۔ی۔ع۔ت۔ح۔ر۔ن۔س۔ح۔ا۔ل۔ئ۔ی۔الس۔ان۔ك۔ام۔ن۔ل۔د۔ب
ة۔او۔د۔ع۔ھ۔ن۔ی۔ب۔و۔ك۔ن۔ہ۔ی۔ذ۔ی۔ب۔ا۔:۔م۔ون۔و۔ر۔ع۔ش۔ی۔ل۔م۔ھ۔و۔ة۔ت۔غ۔ب۔م۔وا۔ن۔ذ۔خ۔أ۔ف۔/العراف95
ال۔ذ۔ا۔ف۔ن۔س۔ح۔أ۔ھ۔ی۔ی۔ت۔ال۔ب۔ع۔ف۔ء۔اد۔ة۔ئ۔ی۔الس۔ل۔و۔ة۔ن۔س۔ح۔ی۔ال۔و۔ت۔س۔ت۔ل۔و۔م۔م۔ح۔ی۔و۔ھ۔ن
ی۔ا۔ون۔و۔ع۔د۔ی۔ة۔م۔أ۔م۔ك۔م۔ن۔ك۔ت۔ل۔و۔ر۔ی۔خ۔ال۔ون۔ل۔ج۔ف۔أ۔ل۔م۔ھ۔ك۔ئ۔أ۔ول۔أ۔و۔ر۔ك۔:۔أ۔/فصلت43
وا۔ل۔ع۔ا۔ف۔و۔م۔ك۔ب۔وار۔د۔ب۔اع۔:۔ن۔أ۔ل۔ن۔ع۔ن۔و۔ھ۔ن۔ی۔و۔ف۔و۔ر۔ع۔أ۔ل۔ب۔ون۔و۔م۔أ۔ی۔و۔آ۔ل۔عمران410
و۔واق۔ب۔:۔واو۔د۔ج۔اس۔و۔واو۔ع۔ك۔وا۔ار۔ن۔آ۔م۔ذ۔ین۔ا۔ال۔ھ۔و۔ی۔ا۔ی۔ر۔ی۔خ۔ال۔ون۔ل۔ج۔ف۔ت۔م۔ك۔ل۔ع۔ل۔/الحج77
ت۔اس۔أ۔ف۔م۔ل۔و۔م۔و۔ھ۔ة۔ھ۔ج۔و۔ل۔ل۔ا۔ت۔ك۔ر۔ی۔خ۔ال۔د۔یر۔ع۔ق۔ی۔ر۔ی۔ل۔و۔ئ۔ل۔ع۔ل۔م۔ن۔أ۔إ۔م۔م۔ج۔م۔ل۔و۔م۔ك۔ت۔ب
ون۔م۔ع۔ار۔س۔ی۔و۔ر۔ك۔ن۔أ۔ل۔ن۔ع۔ن۔و۔ھ۔ن۔ی۔و۔ف۔و۔ر۔ع۔أ۔ل۔ب۔:۔أ۔وا۔ی۔ون۔ك۔ا۔ت۔م۔ن۔ی۔/البقرة814:۔فی
ن۔ل۔و۔ن۔و۔م۔أ۔ی۔و۔ر۔خ۔ال۔م۔و۔م۔ال۔و۔آ۔ل۔ب۔ون۔م۔ن۔و۔ی۔ا۔ت۔م۔ر۔ی۔خ۔ال۔ل۔ح۔ین۔ا۔الص۔م۔ن۔ك۔ئ۔أ۔ول۔و۔/آل عمر
ون۔م۔ن۔ا۔ت۔ف۔ا۔ئ۔ط۔غ۔ب۔ر۔یت۔ت۔وا۔ال۔مل۔ا۔ت۔ق۔س۔ی۔ف۔ر۔خ۔و۔ن۔ال۔ل۔ع۔م۔وا۔د۔د۔ج۔ا۔ت۔غ۔ب۔ن۔ا۔ف۔م۔ھ۔ن۔ی۔و۔ا
ب۔ل۔ج۔ص۔أ۔واف۔ل۔ت۔ت۔ا۔ق۔ین۔م۔ن۔و۔أ۔ل۔ع۔ل۔م۔ر۔م۔أ۔ی۔س۔ا۔ف۔ی۔ت۔ی۔ت۔ی۔ح۔ل۔د۔ع۔ال۔ب۔م۔ھ۔ن۔ی۔و۔ا۔ب۔ل۔ج
م۔م۔ث۔ا۔و۔ا۔ف۔ن۔ص۔ج۔و۔:۔ص۔أ۔ف۔ت۔ء۔ف۔ن۔إ۔ف۔س۔ط۔ین۔ق۔أ۔ل۔ح۔ب۔ی۔ط۔ل۔م۔ن۔و۔ا۔ل۔وسط۔ھ۔ق۔أ۔و۔الحجرات:9

مهم •: من افـخـنـمـ فـحـلـ صـ اـ فـ طـلـ عـنـ هـ اـ مـ لـ عـ مـ ثـ اـ لـ فـ مـ وـ هـ نـ يـ بـ حـ مـ رـ وـ رـ فـ غـ /البقرة 218
 وا •: لـ عـ اـ لـ مـ مـ مـ عـ السـ وـ وـ هـ وـ هـ نـ عـ اـ يـ طـ لـ عـ لـ عـ وـ تـ اـ وـ هـ لـ حـ نـ اـ جـ مـ فـ لـ لـ سـ وـ اـ لـ حـ نـ جـ مـ نـ اـ وـ /النفال 16
 ونـ وـ اـ كـ نـ اـ مـ ذـ يـ نـ اـ لـ هـ يـ اـ اـ يـ مـ يـ نـ اـ وـ قـ قـ فـ وـ اـ اـ عـ مـ نـ غـ نـ وـ كـ يـ نـ اـ يـ نـ بـ رـ قـ هـ اـ لـ وـ نـ يـ رـ دـ اـ لـ وـ اـ لـ وـ
 اـ مـ وـ سـ كـ وـ فـ نـ اـ يـ لـ عـ وـ لـ رـ وـ عـ لـ لـ عـ اـ دـ هـ وـ طـ شـ قـ سـ هـ aـ لـ بـ اـ لـ عـ اـ فـ يـ رـ اـ تـ مـ بـ aـ nـ رـ طـ لـ عـ نـ اـ وـ اـ فـ ضـ رـ عـ وـ تـ
 وـ وـ aـ اـ وـ لـ رـ تـ nـ اـ وـ aـ وـ مـ دـ لـ عـ رـ Tـ nـ يـ اـ وـ هـ وـ aـ lـ مـ Eـ Bـ Tـ Lـ اـ Fـ Mـ هـ Bـ Tـ Rـ وـ aـ iـ Rـ Bـ Rـ خـ وـ nـ Lـ Mـ Eـ
 اـ يـ طـ لـ عـ nـ اـ Lـ Mـ وـ Kـ عـ ظـ يـ يـ غـ Bـ aـ lـ وـ Rـ nـ Kـ aـ lـ Eـ aـ oـ Sـ Hـ Cـ Fـ aـ lـ nـ iـ Eـ hـ nـ yـ وـ Bـ Rـ e •: النساء 513/
 لـ طـ وـ قـ Sـ hـ aـ lـ Bـ aـ Eـ Dـ e •: قـ: اـ يـ ذـ يـ aـ lـ يـ Tـ iـ nـ وـ aـ Sـ Hـ Cـ aـ lـ Lـ وـ Dـ Eـ aـ lـ Bـ Rـ oـ Mـ وـ nـ وـ Rـ eـ Kـ ذـ Tـ Mـ وـ Kـ Eـ Lـ Eـ /النحل 90
 هـ وـ هـ شـ aـ lـ Lـ nـ Mـ iـ aـ oـ aـ qـ Mـ oـ nـ Mـ oـ aـ Kـ Mـ oـ nـ Mـ aـ nـ Mـ Dـ iـ aـ lـ hـ eـ yـ aـ aـ iـ yـ وـ eـ qـ Lـ Tـ Lـ Bـ Rـ eـ qـ aـ oـ aـ hـ eـ وـ Dـ Lـ Eـ aـ cـ
 وـ وـ Dـ Lـ Eـ Cـ Tـ Eـ Lـ nـ aـ lـ Eـ Cـ Mـ وـ Qـ nـ Mـ aـ nـ Sـ hـ Mـ Kـ Eـ nـ Mـ Rـ eـ Mـ iـ nـ Eـ oـ Lـ Mـ Eـ aـ Tـ Mـ Bـ Rـ eـ Mـ Bـ Rـ xـ hـ aـ lـ lـ Eـ a

نـ اـ وـ nـ Mـ nـ aـ Tـ Fـ aـ iـ طـ Gـ Bـ Rـ iـ Tـ Eـ aـ lـ Mـ aـ Tـ Qـ iـ Rـ iـ Fـ Rـ eـ xـ Mـ aـ lـ Eـ aـ Cـ Mـ oـ aـ Dـ Mـ Cـ Iـ eـ Tـ Gـ Bـ Mـ nـ aـ Fـ Mـ oـ hـ e •
 نـ يـ وـ aـ Bـ Lـ iـ Cـ Vـ aـ oـ aـ Fـ nـ Vـ iـ s • Bـ Lـ iـ Cـ Vـ aـ oـ Fـ Tـ aـ Fـ nـ Iـ Fـ Sـ Pـ iـ nـ Qـ iـ aـ lـ Hـ bـ iـ Mـ iـ Tـ iـ Eـ Tـ iـ Eـ Tـ iـ Cـ Lـ Eـ Dـ Eـ aـ lـ Bـ Mـ oـ hـ eـ nـ yـ وـ a
 اـ Mـ eـ Tـ iـ oـ aـ aـ Fـ nـ Vـ iـ s • Bـ Lـ iـ Cـ Vـ aـ oـ Fـ Tـ aـ Fـ nـ Iـ Fـ Sـ Pـ iـ nـ Qـ iـ aـ lـ Hـ bـ iـ Mـ iـ Tـ iـ Eـ Tـ iـ Cـ Lـ Eـ Dـ Eـ aـ lـ Bـ Mـ oـ hـ eـ nـ yـ وـ a
 جـ وـ Mـ Mـ nـ aـ Fـ xـ nـ Mـ Fـ Cـ Lـ Vـ nـ aـ Fـ طـ Lـ Eـ nـ hـ aـ Mـ Lـ Eـ Cـ Mـ Tـ aـ Lـ Fـ Mـ oـ hـ eـ nـ yـ Bـ Hـ Mـ Rـ oـ Rـ Fـ Gـ /البقرة 218
 مـ مـ Lـ Eـ aـ lـ Mـ Mـ eـ Cـ sـ sـ وـ وـ hـ eـ nـ Eـ aـ iـ Tـ Lـ Eـ Lـ Eـ Cـ Lـ Eـ oـ Tـ aـ oـ hـ eـ Lـ Hـ nـ aـ Jـ Mـ Fـ Lـ Lـ Sـ oـ aـ lـ Hـ nـ Jـ Mـ nـ aـ oـ /النفال 16 •
 وـ aـ oـ nـ وـ aـ Kـ nـ aـ Mـ Dـ iـ nـ aـ lـ hـ eـ yـ aـ aـ iـ yـ Mـ iـ nـ aـ oـ Qـ iـ Cـ Fـ oـ aـ aـ Eـ Mـ nـ Gـ nـ oـ Kـ yـ nـ aـ iـ nـ Bـ Rـ eـ qـ hـ aـ lـ oـ nـ yـ Rـ Dـ aـ lـ oـ •
 aـ lـ oـ aـ Mـ oـ Sـ Kـ oـ Fـ nـ aـ iـ Lـ Eـ Cـ oـ Lـ Rـ oـ Eـ Lـ Lـ Eـ aـ Dـ hـ eـ Wـ Tـ Sـ hـ Qـ Sـ hـ aـ lـ Bـ aـ Lـ Eـ aـ Fـ iـ Rـ aـ Tـ Mـ Bـ aـ nـ Rـ Tـ Lـ Eـ nـ aـ oـ aـ Fـ ضـ Rـ Eـ Cـ
 Tـ oـ oـ aـ aـ oـ Lـ Rـ Tـ nـ aـ oـ aـ oـ Mـ Dـ Lـ Eـ Cـ Tـ nـ yـ aـ oـ hـ eـ oـ aـ lـ Mـ Eـ Bـ Tـ Lـ aـ Fـ Mـ hـ Bـ Tـ Rـ oـ aـ iـ Rـ Bـ Rـ xـ oـ nـ Lـ Mـ Eـ
 اـ يـ طـ Lـ Eـ nـ aـ Lـ Mـ oـ Kـ Eـ ظـ يـ يـ Gـ Bـ aـ lـ oـ Rـ nـ Kـ aـ lـ Eـ aـ oـ Sـ Hـ Cـ Fـ aـ lـ nـ iـ Eـ hـ nـ yـ وـ Bـ Rـ e •: النساء 513/
 لـ طـ وـ Qـ Sـ hـ aـ lـ Bـ aـ Eـ Dـ e •: قـ: اـ يـ ذـ يـ aـ lـ يـ Tـ iـ nـ وـ aـ Sـ Hـ Cـ aـ lـ Lـ وـ Dـ Eـ aـ lـ Bـ Rـ oـ Mـ وـ nـ وـ Rـ eـ Kـ ذـ Tـ Mـ oـ Kـ Eـ Lـ Eـ /النحل 90
 هـ وـ هـ شـ aـ lـ Lـ nـ Mـ iـ aـ oـ aـ qـ Mـ oـ nـ Mـ oـ aـ Kـ Mـ oـ nـ Mـ aـ nـ Mـ Dـ iـ aـ lـ hـ eـ yـ aـ aـ iـ yـ وـ eـ qـ Lـ Tـ Lـ Bـ Rـ eـ qـ aـ oـ aـ hـ eـ وـ Dـ Lـ Eـ aـ cـ
 وـ وـ Dـ Lـ Eـ Cـ Tـ Eـ Lـ nـ aـ lـ Eـ Cـ Mـ وـ Qـ nـ Mـ aـ nـ Sـ hـ Mـ Kـ Eـ nـ Mـ Rـ eـ Mـ iـ nـ Eـ oـ Lـ Mـ Eـ aـ Tـ Mـ Bـ Rـ eـ Mـ Bـ Rـ xـ hـ aـ lـ lـ Eـ a

اردو رتامج رقان انم رتهمج رتممج ومحض ارقلان اشه دبعاقلدر دولی حتف ارقلان List of Translations of the Holy Quran
 حتف دمحم اجدنلر بی رتهمج ابین ارقلان ارشف یلع اهتونی رتهمج رقان دیجم دیس اوب الیلع ومدودی رتهمج ایضء ارقلان دمحم کم
 اشه الزر بی رتهمج رقان احظف ذنر ادمح آاسن رتهمج ارقلان دیس رییش ادمح انسح ایبلن ومالان دمحم وجان ژگیه رتهمج ایبتن
 ارقلان الغم روسل دیعیس آاسن رتهمج رقان دمحم یقت امثعین فشک ارلنمج ومالان ادمح دیعیس دولی ابصمح ارقلان ڈارٹک
 دبعارلامحن اطره اعمین ارقلان دارالاسلم رعافن ارقلان ڈارٹک اطره اقلدری الکحم ارقلان ومالان دمحم رییش افروق اقدری اطمهعل
 English Translations of the Holy Quran Name Translator The Meaning of the Glorious Koran Muhammad Marmaduke Pickthall The Holy Quran Abdullah Yousuf Ali The
 Noble Qur'an Dr- Muhammad Taqiuddin Al Hilali & Dr- M Muhsin Khan The Noble Quran Mufti
 Muhammad Taqi Usmani Towards Understanding the Ever Glorious Quran Dr.Muhammad Mahmud Ghali
 The Study Quran Seyyed Hossein Nasr

6th Semester

| | | |
|---------|-------------|---------|
| MIT-502 | MAMMOGRAPHY | 3 (2-1) |
|---------|-------------|---------|

Principles & instruments of Mammography Basis for Mammography, Image Receptors, Positioning & Techniques, Clinical Application of Mammography, Clinical Practice of Mammography, Patient dose. Soft tissue radiography. Basis for mammography; Breast anatomy, Risk of breast cancers, Types of mammography, Baseline mammogram, Magnification mammography. Mammography imaging system; High voltage generation, Target composition, Focal spot, Filtration, Heel effect, Compression, Grids, Automatic exposure control, screen film mammography. Digital radiography; Scanned projection radiography, Charge couple device, Cesium iodide/ charge coupled device, Cesium iodide / amorphous silicon, Amorphous selenium, Digital mammography. Mammography quality control; Quality control team, Radiologist, Medical physicist, Mammographic technologist, Quality control program, Daily, Weekly, Monthly, Quarterly tasks, Semiannual tasks and Non-routine tasks. Radiation protection.

Practical:

Understanding of mammography machine

Positioning of a patient

Interpretation of a mammogram

Hands on training in mammography units

Recommended books

Radiologic Science for Technologist Stewart Cartyle Bushong

- You probably don't need a dedicated mammography text. Nothing, or the BI-RADS manual is just fine. If you feel a hankering for further study, Breast Imaging (The Core Curriculum Series) is a high-quality resource.
- For case review, Breast Imaging: Case Review Series is well done overall.
- For those interested in mammo, Kopan's Breast Imaging is the next step.

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|----------|-----------|---------|
| MIT -508 | Surgery-I | 3 (2-1) |
|----------|-----------|---------|

PRINCIPLES wound tissue

repair and scars. Surgical

infections

PRINCIPLES OF PEDIATRIC SURGERY

Paediatric trauma

Common paediatric Surgical Conditions

Inguinal hernia

Hydrocele

Abnormalities of the penis **Congenital**

malformation

Oesophageal atresia

Intestinal malrotation

Biliary atresia

Hirschsprung disease

Alimentary tract duplication

DIAGNOSTIC IMAGING

Introduction

Interpreting images

Hazards of imaging

Hazards of ionizing radiation

Current legislation

Diagnostic imaging

Imaging in orthopedic surgery

Imaging in major trauma

Imaging in abdominal surgery

Imaging in oncology

Imaging in hepatobiliary system

VASCULAR

Arterial disorder

Ischemia of lower limb

Gangrene

Abdominal aortic aneurysm

Venous disorders

Venous incompetence- varicose veins

Venous Thrombosis

Deep vein Thrombosis (DVT)

Venous ulcers

Lymphatic Disorder

Lymphangitis

Acute, chronic

ELECTIVE ORTHOPEDICS

Description of dislocation and fracture

Fracture Healing

Fracture diagnosis

Complication of fractures

Fractures and Dislocation of Upper limb Frozen Shoulder

Injuries of shoulder Girdle

Acromoclavicular dislocation

Fractures of humerus

Fracture of proximal humerus

Fractures of shaft of humerus

Supracondylar Fracture of humerus

Injuries of Elbow

Types of elbow injury

Fractures of olecranon

Fractures of forearm bones

Classification

Colles's fracture

Fractures and dislocation of lower limb

Fractures of pelvis

Dislocation of hip joint

Fractures of shaft of femur

Fracture and dislocation of Patella

Fractures of leg bones (Tibia and fibula)

Fractures of shaft of Tibia and Fibula

Infectious diseases of bones and joints

Rheumatoid Arthritis tuberculous

arthritis Osteomyelitis

MUSCULOSKELETAL TUMOURS

Bone tumours

Metastasis

Hematopoietic tumors

Osteogenic tumors

Chondrogenic Tumors

Soft tissue tumors: history, examination, investigation and diagnosis.

THE SPINE

Investigation

Injuries of vertebral column

Prolapse of intervertebral disc

Tumors of the Spine

Spinal Deformity

Congenital Scoliosis

Neuromuscular Scoliosis

Idiopathic Scoliosis

Scheuermann's Kyphosis

Developmental Abnormalities

Spinal dysraphism

Syringomyelia

Arnold- Chiari malformation

EXTREMITY TRAUMA

Diagnosis, description and Classification of injury

The bony injury

Bony injury in adults

Soft tissue injury

Growth plate injuries

Principles of fracture Management

HEAD INJURY

Classification of head injury

Clinical features: History, Examination

Management of mild and moderate head injury

Surgical management of head injury

Extradural hematoma

Acute subdural hematoma

Subarachnoid hemorrhage

Chronic subdural hematoma cerebral contusions

surgical management of raised intracranial

pressure

ELECTIVE NEUROSURGERY

Hydrocephalous

Intracranial Tumors

World health Organization of brain tumors

Gliomas

Cerebral metastases

Meningiomas

Pituitary tumors

Acoustic neuroma

Vascular neurosurgery

Aneurysmal subarachnoid hemorrhage.

BREAST

Investigations of breast

The nipple

Benign breast disease

Carcinoma of the breast Prognosis

of breast cancer treatment of

cancer of breast

Practical

Hands on training in surgery department

Recommended books

Short practice of surgery by Baily and love. Volume 1 and Volume 2

Surgery by Shamium

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|----------|---------------------------|---------|
| MIT -504 | Nuclear Medicine-I | 4 (3-1) |
|----------|---------------------------|---------|

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 properties, Gas filled detectors and their application, Scintillation detectors, Rectilinear scanners, Non imaging probes, Scintillation counters, Dose calibrator, Scintillation camera, Multi crystal devices, Tomographic imaging technique SPECT and PET, Image production and display, Image quality in nuclear medicine, Quality assurance procedures in nuclear medicine instrumentation, Use of computers in NM principles and application, NM data acquisition processing and display. Radiation protection; Radiations quantities and units, Radioactive waste disposal, Radiation shielding and transportation of radioactive material, Health physics instrumentation, Methods of safe handling of radionuclides and pertaining rules and regulations

Practical : History taking , Patient preparation, Hands on training in nuclear medicine department

Recommended Books

Nuclear medicine physics by Ramesh Chandra

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|----------|--------------------|--------|
| RIT -510 | Fluoroscopy | 3(2-1) |
|----------|--------------------|--------|

Intravascular contrast media; What is contrast media, high osmolar low osmolar contrast media, Prophylaxis for adverse contrast medium reactions, indications for use of low osmolar contrast media. Gastrointestinal tract; Barium swallow, Barium meal, Barium follow through, Barium enema, Sinogram, loopogram. Liver, biliary tract and pancreas; Oral cholecystography, post-operative (T-tube) cholangiography, Endoscopic retrograde cholangiopancreatography, percutaneous trans-hepatic-cholangiography. Genitourinary system; Excretion urography, Micturating Cysto-urography, Hysterosalpingography. Spine; Cervical myelography, lumbar myelography, thoracic myelography, cervical myelography by lumbar injection. Salivary glands; Methods of imaging the salivary glands, Sialography. Bones and joints; Arthrography- general points, Double contrast knee arthrography, Double contrast shoulder arthrography, Elbow arthrography, Wrist arthrography, radiocarpal joint, midcarpal joint, temporomandibular joint arthrography.

Practical training

Hands on training on fluoroscopy unit

Recommended books

- [Mayo Clinic Gastrointestinal Imaging Review](#) has every body modality but is the only fluoro resource you need assuming people will teach you the protocols.
- The cheaper solution is [Genitourinary Radiology: The Requisites](#). The [Textbook of Uroradiology](#) is pricier but quite nice.

ووهملّ يـنـ أـطـيـعـ رـتـ سـيـ لـ وـ أـعـيـ لـ ضـ مـ جـ رـنـ فـ يـ لـ وـ جـ اـ رـ وـنـ وـ كـ يـ مـ لـ مـنـ إـخـفـ مـ وـكـ الـ رـجـ
 عـرـمـنـ نـ يـ يـدـهـ وـاـشـ مـدـهـ يـ لـ رـيـ وـ رـخـ هـاـ لـ مـ وـاـهـ دـمـجـ لـ رـكـ ذـوتـ اـ فـ مـ وـاـهـ دـمـجـ إـضـلّـ رـتـ نـ إـءـ أـدـهـ
 الشـمـنـ نـ وـضـ رـتـ نـ مـمـ اـ رـمـ وـلـ وـاـ وـعـ وـاـ دـاـ مـ ذـ إـءـ دـهـ وـاـ الشـ بـ أـمـ أـسـنـ تـ دـرـ أـقـ وـاـ دـهـ لـشـ
 لـ مـ وـهـ قـ أـرـ وـطـ لـاـ دـعـنـ وـطـ سـنـ قـ أـمـ وـكـ لـ هـنـ ذـ لـ جـ أـئـ لـ لـ إـءـ يـ رـ بـ كـ وـ أـأـغـيـرـ صـ وـوـهـ بـ وـتـ كـ رـتـ نـ وـاـ ءـة
 اـرـجـ تـ وـنـ وـكـ رـتـ نـ أـعـلـ وـاـ وـابـ رـتـ رـتـ عـلـ أـنـ كـ رـتـ عـلـ أـءـ اـ حـ نـ وـجـ مـ وـكـ يـ لـ سـ عـ يـ لـ فـ مـ وـكـ نـ يـ اـ
 بـ هـ وـنـ وـيـرـ وـتـ ءـةـ ضـرـ اـ حـ وـاـ وـلـ عـ يـ رـتـ مـنـ إـءـ وـيـدـ هـ وـشـ لـ وـبـ اـ تـ كـ ءـ اـ رـ ضـ وـيـ لـ وـمـ وـتـ عـ اـ يـ بـ اـ تـ ذـ
 وـاـ إـوـدـ هـ وـشـ أـ وـوـهـ بـ وـتـ مـيـمـ لـ يـ عـ يـ رـشـ لـ وـكـ بـ طـلاـ وـوـطـلاـ وـمـ وـكـ مـ لـ عـ وـيـ وـ وـاـ لـاـ وـقـ ءـ اـ تـ عـ وـمـ وـكـ بـ وـقـ
 سـ وـفـ وـهـ نـ إـ فـ /البقرة 2

الـ اـ بـ الـ لـ مـ يـ مـ يـ بـ اـ الـ مـ نـ وـاـ إـ وـاـ لـ قـ مـ وـهـ نـ أـ بـ بـ اـ الـ لـ طـلاـ وـحـ أـ وـمـ وـوـيـ طـلاـ وـلـ إـءـ وـرـهـ مـ أـ وـفـ
 لـ اـ فـ مـ وـهـ لـ رـفـ يـ هـ رـتـ اـ نـ هـ فـ بـ رـمـنـ ءـةـ عـظـ وـمـ وـهـ ءـ جـ نـ مـ اـ فـ بـ الـ رـمـ رـحـ وـعـ يـ اـ بـ حـ مـ أـ كـ
 مـ تـ اـ وـوـهـ مـ وـتـ فـ رـتـ اـ قـ الـ وـمـ أـ وـمـ وـكـ • ئـ وـلـ وـأـ فـ اـ دـ عـ نـ وـنـ وـدـ الـ اـ خـ فـ يـ هـ مـ هـ اـ رـ ءـ النـ /البقرة 527
 تـ شـيـرـ عـ وـمـ وـكـ وـاـ جـ وـزـ أـ وـمـ وـكـ وـاـ نـ وـمـخـ إـ وـمـ وـكـ وـاـ ءـ نـ بـ أـ وـمـ وـكـ وـاـ ءـ اـ بـ اـ نـ كـ مـنـ إـ لـ وـقـ مـكـنـ اـ سـ مـ اـ وـهـ
 اـ دـ سـنـ كـ نـ وـشـ ءـ خـ تـ ءـةـ اـ رـ جـ هـ وـلـ فـ رـ وـطـلاـ وـمـنـ مـ وـكـ يـ لـ لـ إـ بـ حـ اـ أـ هـ نـ وـضـ رـتـ مـ وـقـ مـديـ الـ هـ
 يـ لـ طـلاـ وـهـ وـرـهـ مـ أـ بـ يـ طـلاـ وـتـ أـ يـ يـ ءـ وـاـ حـ صـ ءـ بـ رـتـ رـهـ فـ يـ لـ بـ يـ فـ اـ دـ فـ جـهـ وـ /فـقـيـنـ اـ يـ الـ
 عـ فـ رـ وـتـ نـ أـ طـلاـ وـنـ وـيـتـ أـ يـ مـلـ فـيـبـ اـ صـ أـ لـ وـ وـدـ وـغـ الـ اـ بـ فـ يـ هـ مـ وـهـ لـ وـحـ بـ سـ يـ وـهـ مـ اـ • :التوبة 42
 اـ فـ فـ يـ هـ مـ وـكـ ذـ وـيـ وـ 36 طـلاـ وـرـ ذـ كـ نـ عـ مـ عـ يـ بـ لـ وـةـ اـ رـ جـ تـ مـ يـ هـ هـ لـ وـتـ لـ الـ سـجـ رـ اـ رـ صـ بـ ءـ أـ لـ وـ وـبـ
 اـ رـ • لـ وـقـ هـالـ فـيـ بـ ءـ لـ قـ تـ اـ تـ مـ وـيـ وـنـ وـاـ فـ خـ ءـ يـ اـ كـ ءـ الزـ يـ تـ إـ ءـ وـلـ الصـ اـ مـ قـ إـ وـ /النور 36-37: يـضـ
 تـ نـ عـ ءـةـ اـ رـ جـ تـ وـنـ وـكـ رـتـ نـ أـ عـ لـ طـلـ إـ اـ بـ الـ Bـ مـ وـكـ نـ يـ Bـ مـ وـكـ الـ وـهـ وـاـ أـ وـلـ وـكـ ءـ اـ تـ وـاـ لـ وـنـ
 آمـ ذـيـنـ ءـ الـ هـ وـيـ اـ يـ ءـ مـ وـكـ سـ يـ نـ وـاـ أـ وـلـ تـ

تـ اـ وـ وـهـ مـ تـ تـ فـ رـ رـ تـ اـ قـ الـ وـ مـ اـ وـ مـ اـ وـ مـ كـ تـ تـ شـيـرـ عـ وـ مـ Kـ كـ اـ جـ وـ •
 زـ اـ اـ وـ Mـ Kـ اـ نـ وـ وـ خـ إـ وـ Mـ Kـ اـ وـ نـ Bـ aـ وـ Mـ Kـ aـ وـ Bـ aـ nـ Kـ اـ nـ Iـ nـ
 قـ iـ Kـ nـ sـ مـ aـ وـ هـ aـ dـ sـ Kـ nـ وـ وـ شـ خـ تـ ءـ اـ rـ جـ iـ هـ وـلـ فـ rـ rـ وـ وـ lـ lـ aـ
 مـ nـ Mـ Kـ iـ lـ iـ bـ hـ aـ aـ hـ eـ nـ وـ وـضـ رـ tـ Mـ وـ وـ قـ iـ dـ iـ aـ lـ hـ eـ yـ eـ lـ lـ aـ
 ءـ وـ rـ rـ Mـ aـ bـ iـ lـ lـ aـ tـ tـ aـ yـ iـ tـ وـ aـ hـ vـ tـ rـ tـ iـ hـ eـ fـ yـ lـ tـ
 عـ fـ rـ rـ tـ nـ aـ lـ lـ aـ tـ tـ iـ dـ nـ وـ iـ tـ aـ • :بـ يـ فـ اـ دـ فـ جـهـ وـ /فـقـيـنـ اـ يـ iـ الـ التوبة 42
 يـ iـ lـ fـ iـ bـ aـ vـ nـ أـ lـ وـ وـ وـ dـ وـغـ aـ lـ iـ bـ iـ fـ iـ hـ eـ lـ iـ hـ bـ sـ nـ iـ hـ eـ mـ aـ fـ iـ hـ eـ rـ
 Kـ nـ zـ iـ yـ وـ 36 iـ lـ lـ aـ rـ rـ iـ dـ nـ Eـ eـ yـ iـ bـ eـ lـ وـ وـ ءـ aـ rـ jـ tـ iـ hـ eـ
 lـ tـ eـ lـ aـ lـ iـ jـ rـ aـ rـ vـ nـ Bـ aـ lـ وـ وـبـ lـ قـ iـ hـ aـ lـ fـ iـ bـ eـ lـ qـ tـ aـ tـ Mـ وـ yـ
 aـ rـ • وـnـ اـ fـ xـ ءـ yـ aـ Kـ ءـ الزـ يـ tـ iـ iـ qـ oـ lـ الصـ aـ mـ qـ iـ وـ /النور 36-37: يـضـ
 تـ nـ Eـ eـ aـ rـ jـ tـ وـnـ Kـ tـ nـ aـ lـ iـ bـ iـ lـ iـ bـ iـ lـ Mـ Kـ nـ iـ yـ iـ aـ lـ iـ yـ iـ Mـ Kـ sـ
 Kـ aـ lـ وـ Mـ وـaـ lـ Kـ aـ tـ وـaـ lـ nـ آمـ ذـيـنـ aـ lـ hـ eـ yـ iـ aـ lـ iـ yـ iـ Mـ Kـ sـ
 yـ nـ وـaـ lـ tـ qـ tـ eـ lـ وـ Mـ Kـ iـ mـ nـ lـ lـ aـ tـ tـ iـ nـ iـ /iـ hـ iـ mـ rـ rـ Mـ Kـ bـ
 اـ nـ Kـ nـ sـ aـ 9

4th Year

7th Semester

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| AHP-601 | Forensic Medicine | 3 (3-0) |
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Introduction to forensic toxicology; Medical Jurisprudence, Legal prudence, Inquest, Courts, Procedure in court, Role of Consent in medical practice

Death: definition, phases of death, Signs of death; cadaveric lividity, Rigor Mortis, Putrefaction, Saponification, Mummification, Cadaveric spasm, Manners of death; Natural (causes of sudden natural death), accidental, suicidal, Intraoperative, homicidal & undetermined. Factors used in estimating time of death.

Evidence; Evidence and type of evidence, Dying declaration and dying deposition, Physical evidence & types, recovery and preservation of physical evidence, procedure for collection of biological and non-biological evidences. Asphyxia; suffocation, strangulation, chemical asphyxiant & neck holds

Injuries & Wounds; blunt force, sharps, gunshot, burns,

Autopsy; External and Internal examination; microscopic examination, findings, opinion & reporting

Forensic Toxicology: Poison & their Classification, Routes of Administration and Elimination of Poison, Factors modifying the effects/action of poison, Diagnosis, tissue & specimen collection, routine testing, drug screening; methods of analysis.

Recommended books:

1. DiMaio VJ, Dana SE. Handbook of forensic pathology. CRC Press; 2006.
2. Adelman HC. Forensic Medicine. Infobase Publishing; 2007.
3. Sharma RK. Concise textbook of forensic medicine and toxicology. Global Education Consultants. 2005
4. McLay WD. Clinical forensic medicine. Cambridge University Press; 2009 Mar 12.

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| STAT-421 | Biostatistics | 3 (2-1) |
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Introduction to Biostatistics and its scope in Microbiology. Collection of Primary and Secondary data. Editing of data. Presentation of data: Tabulation, Classification, Visual Presentation (Diagrams and Graphs). Measures of Central Tendency: Arithmetic Mean by direct and short-cut method, Geometric Mean, Harmonic Mean, Mode, Median, ED (LD in detail), Quantile. Measures

of Dispersion: Range, Quartile Deviation, Mean Deviation, Standard Deviation by direct and shortcut method, Variance, and their Coefficient. Correlation: Simple Correlation Table, Rank Correlation, Partial and Multiple Correlations. Regression and method of least square. Probability: Concept of Probability, Laws of Probability. Permutation and Combination. Probability distributions: Binomial distribution, Poisson distribution and their fitting to observed data, Normal distribution. Sampling and Basic Design. Hypothesis Testing. Chi-square test, Student's ttest, Analysis of variance. Laboratory Experiments pertaining to the course.

Recommended Books:

1. Stanton, A.G., 2001. Primer of Biostatistics. McGraw Hill.
2. Jekel, J., Elmore, J.G., Katz, D.L., 2001. Epidemiology, biostatistics and preventive medicine. W. B. Saunders.
3. Quinn, G., 2002. Experimental Design and Data Analysis for Biologists. CMICROridge University Press.
4. Fernholz, L.T, Morgenhaler, S., Stahel, W., 2000. Statistics in Genetics and in Environmental Sciences, Birkhauser Verlag.
5. Kuzma, J. W. and Bohnenblust, S. E. 2001, Basis Statistics for the Health Sciences, McGraw-Hill International Education.

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|---------|------------------------------|---------|
| MIT-603 | MAGNETIC RESONANCE IMAGING-I | 4 (3-1) |
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Theory:

Part I: Fundamentals; an Overview of Magnetic Resonance Imaging, Electricity and Magnetism, Nuclear Magnetism, Equilibrium-Saturation

Part II: The Magnetic Resonance Image; Radiofrequency Pulse Sequences, Magnetic Resonance Imaging Tissue Parameters, Manipulating Magnetic Resonance Image Contrast, Fourier Transforms in Magnetic Resonance Imaging

Part III: The Imaging System; Magnetic Resonance Imaging Hardware, Primary Magnetic Resonance Imaging Magnets, Secondary Magnetic Resonance Imaging Magnets

Part IV: Image Formation; Digital Imaging, Walk Through the Spatial Frequency Domain, the Musical Score, Magnetic Resonance Images

Practical:

Hands on training in radiology department in MRI unit.

Different planes of study.

Students must be able to interpret the MR anatomy.

Recommended books

Magnetic resonance Imaging by Stewart C. Bushong

Musculoskeletal MRI (Helms strikes again) is the book to read to gain a foundation in MSK MRI.

- **Arthritis in Black and White** is the most beloved breakdown of what is often considered a difficult topic.

Helm's classic **Fundamentals of Skeletal Radiology** is very similar to his chapters in B&H and isn't really necessary to have in addition. And, like his B&H chapters, the MRI sections are comically short. The nice resident-level text is **Musculoskeletal Imaging: The Requisites**. A very pricey text that you could borrow would be **Orthopedic Imaging: A Practical Approach**

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| MIT-605 | Angiography & Cardiac Imaging-I | 4 (3-1) |
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Theory:

Indication for cardiac catheterization, contraindication, complication and risk, Preparation of the patient, equipment in the catheterization laboratory, environment safety in the catheterization laboratory

Arterial and venous access.

Percutaneous femoral approach, Arm approach, use of heparin during cardiac catheterization, problems of vascular access

Hemodynamic Data

pressure waves in the heart, Right and left sided heart catheterization, computation for hemodynamic measurements, computation for valve areas from pressure gradients and cardiac output, Examples of Aortic and mitral valve area calculations, use of valve resistance for aortic stenosis, Measurement of cardiac output, Fick oxygen consumption method, Equipment used for hemodynamic study, Hemodynamic recording technique, components of the electrocardiogram **Angiographic data**

coronary arteriography, problems and solution in the interpretation of angiograms, ventriculography, Ascending Aortography, Abdominal Aortography, Pulmonary angiography, Peripheral vascular angiography, X-ray image, Digital angiography, Radiation safety, injectors and contrast materials, Angiographic catheters, Medications used in coronary angiography, Pacemakers

Practical

History taking ,Patient preparation , Hands on training on a angiographic unit

Recommended book

- [Cardiac Imaging \(RadCases\)](#) covers the essentials nicely.
- The concise reference is [Handbook of Interventional Radiologic Procedures](#).
- The textbook, for those so inclined, is [Requisites](#). For the fellowship-bound, [Abrams' Angiography](#) is a common favorite.
- You probably don't need to buy anything for IR if you don't like IR.

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| RIT-601 | Nuclear Medicine-II | 4 (3-1) |
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Theory:

Radiochemistry and radiopharmaceuticals, Radiopharmaceuticals, Production of radioisotopes, Radioisotopes 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, Static bone imaging, Dynamic bone imaging, Lung perfusion imaging, Lung ventilation imaging, Renal imaging, Myocardial imaging, MUGA, Cardiac, Hepatobiliary, Liver, Spleen, Gastrointestinal, Esophageal, Thyroid, Parathyroid, Salivary gland and whole body imaging. Indications of nuclear medicine diagnostic and therapeutic procedure. Techniques of performing scintigraphy and common therapy procedure. Acquisition protocols image processing and quantitation on images.

Practical:

- 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 radiopharmaceutical
- 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

Recommended books

Metter's Essentials of Nuclear Medicine Imaging is excellent.

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| RIT-602 | Angiography & Cardiac Imaging-II | 3 (2-1) |
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Electrophysiological studies and ablation techniques:

Technical aspects, procedures, utility of electrophysiological study for specific diagnosis, catheter ablation

Specific techniques

Trans-septal heart cauterization, direct transthoracic left ventricular puncture, endomyocardial biopsy, coronary sinus catheterization, pericardiocentesis, intravascular foreign body retrieval

High risk cardiac catheterization

High risk patient, incidence of complications in the high risk patient, Management of Arrhythmias in high risk patients, Cardiac support devices

Interventional techniques

Percutaneous coronary interventions, valvuloplasty

Recommended books

- RecoThe concise reference is Handbook of Interventional Radiologic Procedures.
- The textbook, for those so inclined, is Requisites. For the fellowship-bound, Abrams Angiography is a common favorite.
- You probably don't need to buy anything for IR if you don't like IR.

PRACTICAL: Hands on training in angiography

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| MIT-606 | MAGNETIC RESONANCE IMAGING-II | 4 (3-1) |
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Theory:

Part I: Pulse Sequences; Spin Echo Imaging, Chemical Shift and Magnetization Transfer, Steady State Gradient Echo Imaging, Hybrid Fast Imaging Techniques, Echo Planar Imaging

Part II: Applications; Nuclear Magnetic Resonance Spectroscopy, Partially Parallel Magnetic Resonance Imaging, Magnetic Resonance Angiography, Perfusion Imaging, Diffusion Imaging, Cardiac Magnetic Resonance Imaging

Part III: Safety ; Contrast Agents and Magnetic Resonance Imaging, Magnetic Resonance Imaging Artifacts, Biological Effects of Magnetic Resonance Imaging, Managing a Magnetic Resonance Imaging System

Practical:

Hands on training in radiology department MRI unit., Study of Different planes

Students must be able to interpret the anatomy and pathologies of different regions.

Recommended books.

- **Musculoskeletal MRI** (Helms strikes again) is the book to read to gain a foundation in MSK MRI.
- **Arthritis in Black and White** is the most beloved breakdown of what is often considered a difficult topic.
- Helm's classic **Fundamentals of Skeletal Radiology** is very similar to his chapters in B&H and isn't really necessary to have in addition. And, like his B&H chapters, the MRI sections are comically short. The nice resident-level text is **Musculoskeletal**. A very pricey text that you could borrow would be **Orthopedic Imaging: A Practical Approach**.

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| MIT-604 | Surgery-II | 3 (2-1) |
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ESOPHAGUS

Investigations

Congenital abnormalities

Gastroesophageal reflux disease

Perforation

Corrosive injury to the esophagus

Foreign bodies in the Esophagus

STOMACH AND DUODENUM

Investigation of stomach and duodenum

Hypertrophic pyloric Stenosis of infants

Peptic ulcers

Gastric outlet obstruction

Carcinoma of Stomach

Gastrointestinal Stromal tumors

Duodenal tumors

LIVER

Methods of investigating the liver (lab as well as imaging)

Acute and Chronic liver disease

Liver abcess

Liver tauma

Chronic liver condition

Portal hypertension

Liver tumors

SPLEEN

Investigation of Spleen

Splenic artery aneurysm, infarct and rupture.

Splenomegaly and hypersplenism

Splenectomy

Idiopathic Thrombocytopenic Purpura (ITP)

Hemolytic Anemias

THE GALL BLADDER AND BILE DUCTS.

Radiological investigations of biliary tract.

Congenital abnormalities of gall bladder and bile ducts.

Cholilithiasis.

Cholecystitis

Choledocholithiasis

Benign bile duct strictures

THE PANCREAS

Investigations

Injuries to the pancreas.

Pancreatitis

Carcinoma of the pancreas.

THE SMALL AND THE LARGE INTESTINE.

Functional abnormalities

Vascular anomalies (angiodysplasia)

Diverticular diseases

Hirsch sprung disease.

Ulcerative colitis

Gastrointestinal fistulas

Tumors of small intestine Familial

adenomatous polyposis

Colostomy.

INTESTINAL OBSTRUCTION

Intestinal obstruction (acute and chronic)

Acute intussusception

Volvulus

Paralytic Ileus

THE VERMIFORM APPENDIX.

Acute appendicitis

Special features according to position of appendix

Complication of appendectomy

Per-appendicular phlegmon (appendix mass)

Appendix abcess

Neoplasm of the appendix.

THE RECTUM.

Rectal Prolapse (Partial and complete prolapse)

Carcinomas

Benign tumors.

THE ANUS AND ANAL CANAL.

Anal Fissure. (Fissure in anon)

Hemorrhoids.

Anorectal abscess.

Fistula in ano.

Nonmalignant strictures

Malignant tumors

URINARY SYMPTOMS AND INVESTIGATIONS.

Investigation of urinary tract

Congenital abnormalities of the kidney.

Congenital abnormalities of the renal pelvis and the ureter.

Hydronephrosis.

Renal calculi

Ureteric calculi

Idiopathic retroperitoneal Fibrosis

Neoplasm of the kidney.

THE URINARY BLADDER.

Congenital defects of the bladder.

Bladder trauma

Retention of urine

Incontinence of urine.

Bladder stones

Lower urinary tract infection.

Carcinoma of the Bladder. (Clinical features, investigation. treatment)

THE PROSTATE

Benign prostatic hyperplasia.

Prostatitis Carcinoma of
the prostate.

URETHRA AND PENIS.

Male Congenital abnormalities.

Urethral stricture.

Female urethral abnormalities.

Carcinoma **TESTIS**

AND SCROTUM

Torsion of testis.

Varicocele.

Hydrocele.

Malignant neoplasm of the testis.

CLINICAL TRAINING.

Hands on training in surgical department.

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| INT-631 | INTERNSHIP | 3 (0-3) |
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| Cap-630 | Capstone Project | 3 (0-3) |
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