UNIVERSITY MEDICAL
& DENTAL COLLEGE

MBBS YEAR 01

2026

Study Guide

Modular Integrated Curriculum

Department of Medical Edu

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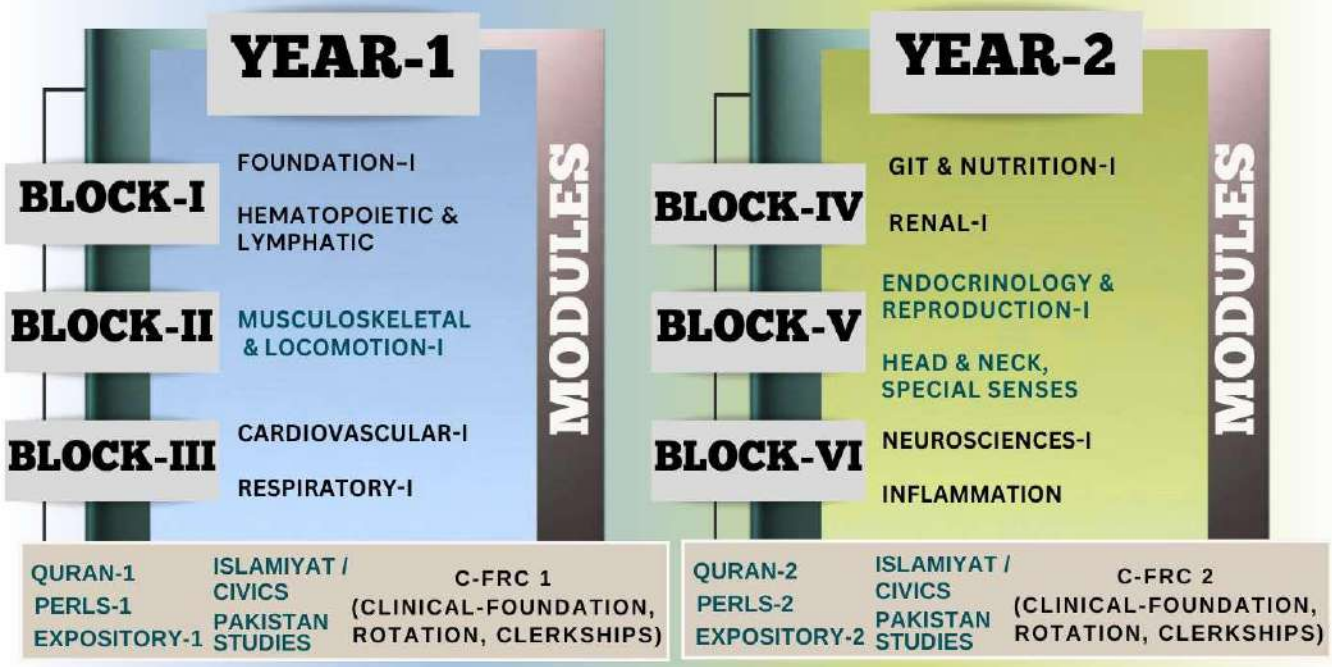
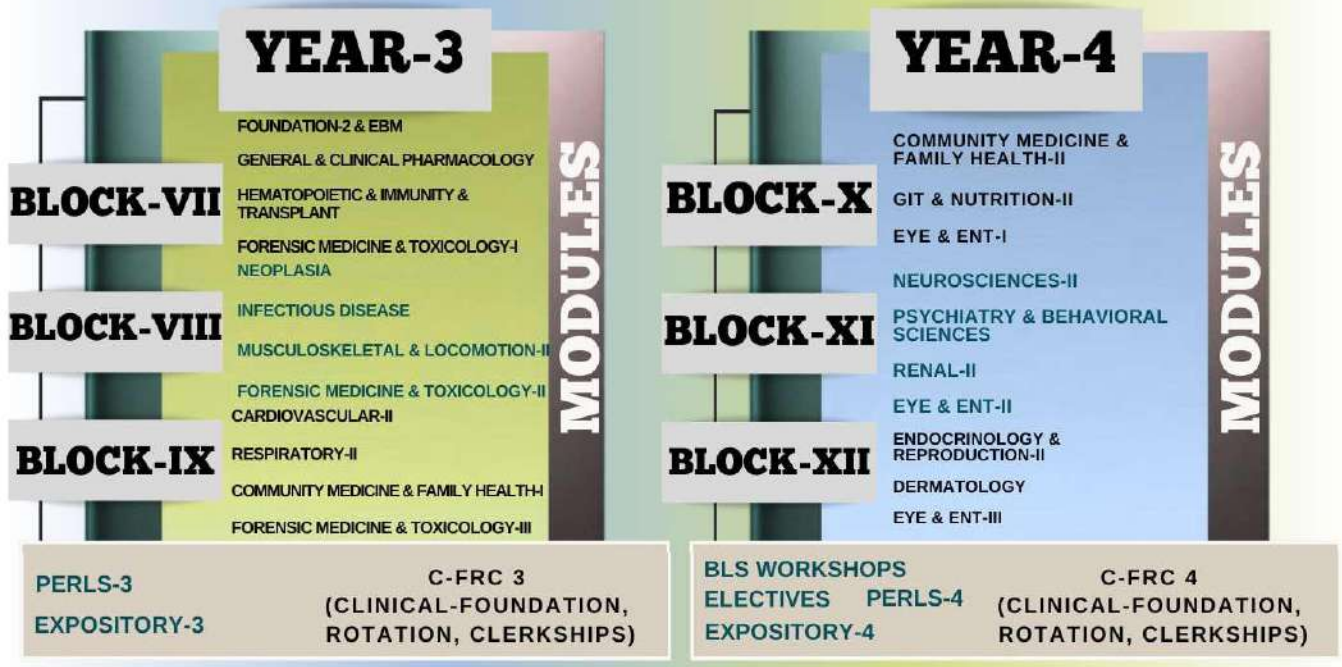
Curriculum Framework

Modular Integrated Curriculum 2K23 Framework





List of Abbreviation

LIST OF ABBREVIATIONS

Abbreviations	Subjects
A	Anatomy
ABCDE	Airway, Breathing, Circulation, Disability, Exposure
ABG	Arterial Blood Gas
ACS	Acute Coronary Syndromes
Ag	Aging
AKI	Acute Kidney Injury
ALT	Alanine Transaminase
AMI	Acute Myocardial Infarction
AMP	Adenosine Monophosphate
ANA	Antinuclear Antibody
ANCA	Antineutrophil Cytoplasmic Antibodies
ANS	Autonomic Nervous System
AO	Association of Osteosynthesis
APTT	Activated Partial Thromboplastin Clotting Time
ARDS	Acute Respiratory Distress Syndrome
ARVC	Arrhythmogenic Right Ventricular Cardiomyopathy
ASD	Atrial Septal Defect
AST	Aspartate Aminotransferase
ATLS	Advanced Trauma Life Support
Au	Autopsy
AUC	Area Under The Curve
AV	Atrioventricular
B	Biochemistry
BhS	Behavioral Sciences
BHU	Basic Health Unit
BSL	Biological Safety Level
C	Civics
C-FRC	Clinical-Foundation Rotation Clerkship
C. burnetii	*Coxiella burnetii*
C. neoformans	Cryptococcus neoformans
C. pneumoniae	*Chlamydia pneumoniae*
C. psittaci	*Chlamydia psittaci*

C. trachomatis	*Chlamydia trachomatis*
CA	Cancer
CABG	Coronary Artery Bypass Grafting
CAD	Coronary Artery Disease
CBC	Complete Blood Count
CCR5	Cysteine-Cysteine Chemokine Receptor 5
CD31	Cluster of Differentiation 31
CD34	Cluster of Differentiation 34
CD4	Clusters of Differentiation 4
CF	Cystic Fibrosis
CK	Creatine Kinase
CK	Creatine Kinase
CLED	Cystine Lactose Electrolyte Deficient
CLL	Chronic Lymphocytic Leukemia
CM	Community Medicine
CML	Chronic Myelogenous Leukemia
CMV	Cytomegalovirus
CNS	Central Nervous System
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CODIS	Combined Dna Index System
COPD	Chronic Obstructive Pulmonary Disease
COVID-19	Corona Virus Disease 2019
COX	Cyclooxygenase
CPR	Cardio Pulmonary Resuscitation
CR	Clinical Rotation
CRP	C- Reactive Protein
CSF	Cerebrospinal Fluid
CT	Computed Tomography
CT	Computerized Tomography
CV	Cardiovascular
CVA	Cerebral Vascular Accident
CVDs	Cardiovascular Diseases
CVS	Cardiovascular System
D. medinensis	Dracunculus Medinensis
DALY	Disability-Adjusted Life Year

DCIS	Ductal Carcinoma *in situ*
DCM	Dilated Cardiomyopathy
DCMLS	Dorsal Column Medial Lemniscus System
DLC	Differential Leukocyte Count
DMARDs	Disease-modifying antirheumatic drugs
DNA	Deoxy Ribonucleic Acid
DOTS	Directly Observed Treatment Short-course
DTP	Diphtheria, Tetanus, Pertussis
DVI	Disaster Victim Identification
DVT	Deep Vein Thrombosis
E. coli	*Escherichia coli*
ECF	Extra Cellular Fluid
ECG	Electrocardiography
ECG	Electocardiogram
ECP	Emergency contraceptive pills
ED50	Median Effective Dose
EEG	Electroencephalogram
EIA	Enzyme Immunoassay
ELISA	Enzyme Linked Immunosorbent Assay
EnR	Endocrinology & Reproduction
ENT	Ear Nose Throat
EPI	Expanded Programme on Immunization
ER	Emergency Room
F	Foundation
FAST	Focused Assessment with Sonography in Trauma
FEV1	Forced Expiratory Volume 1
FM	Family Medicine
For	Forensics Medicine
FPIA	Fluorescent Polarization Immunoassay
FS	Forensic Serology
FSc	Forensic Science
FVC	Forced Vital Capacity
GCS	Glasgow Coma Scale
GFR	Glomerular Filtration Rate
GIT	Gastrointestinal tract
GL-MS	Gas Liquid Mass Spectrometry

GLC	Gas Liquid Chromatography
GLP	Good Laboratory Practice
GMP	Guanosine Monophosphate
GO	Gynecology and Obstetrics
GP	General Practitioner
GPE	General Physical Examination
GTO	Golgi Tendon Organ
Gynae & Obs	Gynecology and Obstetrics
H & E	Hematoxylin and Eosin
H. influenzae	*Haemophilus influenzae*
H. pylori	*Helicobacter pylori*
HAI	Healthcare Associated Infections
HbC	Hemoglobin C
HbS	Sickle Hemoglobin
HbSC	Hemoglobin Sickle C Disease
HCL	Hydrochloric Acid
HCM	Hypertrophic Cardiomyopathy
HHV	Human Herpesvirus
HIT	Hematopoietic, Immunity and Transplant
HIV	Human Immunodeficiency Virus
HL	Hematopoietic & Lymphatic
HLA	Human Leukocyte Antigen
HMP	Hexose Monophosphate
HNSS	Head & Neck and Special Senses
HPLC	High Pressure Liquid Chromatography
ICF	Intra Cellular Fluid
ID	Infectious Diseases
IE	Infective Endocarditis
IL	Interleukin
ILD	Interstitial Lung Disease
IN	Inflammation
INR	International Normalized Ratio
INSTIs	Integrase Strand Transfer Inhibitors
IPV	Inactivated Poliovirus Vaccine
IUD	Intrauterine Device
IUGR	Intra Uterine Growth Restriction

JVP	Jugular Venous Pulse
L	Law
LD50	Median Lethal Dose
LDH	Lactate Dehydrogenase
LSD	Lysergic acid diethylamide
M	General Medicine
MALT	Mucosa Associated Lymphoid Tissue
MBBS	Bachelor of Medicine, Bachelor of Surgery
MCH	Mean corpuscular hemoglobin
MCHC	Mean Corpuscular Hemoglobin Concentration
MCV	Mean Corpuscular Volume
MHO 2001	Mental Health Ordinance 2001
MoA	Mechanism of action
MRI	Magnetic resonance imaging
MS	Musculoskeletal
MSD	Musculoskeletal disorders
MSDS	Minimum Service Delivery Standards
MSK	Musculoskeletal
N	Neoplasia
NEAA	Non-Essential Amino Acids
NK cells	Natural Killer Cells
NMJ	Neuro Muscular Junction
NNRTIs	Non-nucleoside Reverse Transcriptase Inhibitors
NRTIs	Nucleoside Reverse Transcriptase Inhibitors
NS	Neurosciences
NSAIDs	Non-steroidal Anti-Inflammatory Drugs
O	Ophthalmology
OA	Osteoarthritis
OPC	Organophosphate
OPV	Oral poliovirus vaccine
Or	Orientation
Orth	Orthopaedic
P	Physiology
P. jiroveci	*Pneumocystis jiroveci*
Pa	Pathology
PAD	Peripheral Artery Disease

PAF	Platelet Activating Factor
PBL	Problem Based Learning
PCI	Percutaneous Coronary Intervention
PCR	Polymerase Chain Reaction
PDA	Patent Ductus Arteriosus
PDGF	Platelet Derived Growth Factor
Pe	Pediatrics
PEM	Protein Energy Malnutrition
PERLs	Professionalism, Ethics, Research, Leadership
PET	Positron Emission Tomography
Ph	Pharmacology
pH	potential Hydrogen
PI	Personal Identity
PID	Pelvic inflammatory disease
PIs	Protease inhibitors
PMC	Pakistan Medical Commission
PMDC	Pakistan Medical and Dental Council
PMI	Post-Mortem Interval
PNS	Peripheral Nervous System
PPD	Paraphenylenediamine
PPE	Personal Protective Equipment
Psy	Psychiatry
PT	Prothrombin Time
PVC	Premature Ventricular Contraction
PVD	Peripheral Vascular Diseases
QALY	Quality-Adjusted Life Year
QI	Quran and Islamiyat
R	Renal
Ra	Radiology
RA	Rheumatoid Arthritis
RBCs	Red Blood cells
RCM	Restrictive Cardiomyopathy
RDA	Recommended Dietary Allowance
Re	Respiratory
RF	Rheumatoid factor
RFLP	Restriction Fragment Length Polymorphism

Rh	Rheumatology
RHC	Rural Health Center
RIA	Radioimmunoassay
RMP	Resting Membrane Potential
RNA	Ribonucleic Acid
RTA	Road Traffic Accident
S	General Surgery
S. pneumonia	*Streptococcus pneumoniae*
SA	Sinoatrial
SCC	Squamous-cell carcinoma
Se	Sexology
Sec	Section
SIDS	Sudden Infant Death Syndrome
SLE	Systemic Lupus Erythematosus
SOP	Standard Operating Procedure
TB	Tuberculosis
TBI	Traumatic Brain Injury
TCA	Tricarboxylic acid cycle
TCBS	Thiosulphate Citrate Bile salts Sucrose
TD50	Median Toxic Dose
TGA	Transposition of the Great Arteries
Th	Thanatology
TLC	Thin Layer Chromatography
TNF	Tumor Necrotic Factor
TNM	Tumour, Node, Metastasis
TOF	Tetralogy of Fallot
Tox	Toxicology
Tr	Traumatology
TSI	Triple Sugar Iron
USG	Ultrasonography
UTI	Urinary Tract Infections
UV	Ultraviolet
VAP	Ventilator-Associated Pneumonia
Vd	Volume of Distribution
VEGF	Vascular Endothelial Growth Factor
VSD	Ventricular Septal Defect

W. bancroft	*Wuchereria bancroft*
WBCs	White Blood Cells
WHO	World Health Organization
ZN Staining	Ziehl-Neelsen Staining

Block 1

Module 1

Foundation 1

MODULE RATIONALE

Tomorrow's doctor is required to acquire competencies, which could align his knowledge base and skill set for his professional practices. The foundation of knowledge needs to commence from 'The Cell'. The cell is a structural and functional unit of life and has a role in normal homeostasis ensuring appropriate cellular functions. Hence, this module has been designed to introduce a blend of molecular, genetic, anatomical, physiological, and psychosocial information essential for developing a perspective on the function of the human body in health and disease. Besides, an initial orientation to pharmacology and pathology subject has been provided so that students are able to use this information in the coming modules.

MODULE OUTCOMES

- Describe the microscopic features of nerve cells, muscle cells, general features of epithelia of the body.
- Appraise the functional characteristics of various components of cell membrane and organelles of cell.
- Differentiate between the dynamics of various transport mechanisms along the cell membrane.
- Compare the functional differences between RBCs, WBCs and blood groups.
- Explain the significance of homeostatic mechanisms in keeping body's internal environment nearly constant.
- Appraise the formation and functions of autonomic nervous system.
- Correlate the structural design of each organ to its function.
- Acquire information about the different fascial planes in the different regions of the body & their surgical importance.
- Use descriptive anatomical terms of position to describe the different body structures in relation to each other.
- Describe the movements of body using proper anatomical terms of movement.
- Describe and demonstrate the various bony landmarks.
- Describe the types of joints and correlate them to the mechanisms of movement.
- Classify the bone, joints and muscles based on the structure, function, phylogenetic origin.
- Describe the structures associated with muscles and explain their functional correlations.
- Classify and describe the cardiovascular system and correlate it functionally.
- Amplify the anatomical basis for radiological, cross-sectional, anatomy.
- Correlate clinicopathologically the apoptosis in health & diseases.

THEMES
• Cell structure • Cell transport and signaling • Cell chemistry • Homeostasis and blood • Autonomic nervous system • Body movement • Muscles • Growth and development

IMPLEMENTATION TORs

- The time calculation for completion of modules and blocks is based on 35 hours per week. Total hours of teaching, learning and formative/summative internal assessment to be completed in a year are 1200.
- The hours mentioned within each module are the mandatory minimum required. The rest of the hours are left to the discretion of the institution that can be used in teaching, learning and assessment as per decision of the institutional academic council.
- The content and the intended learning outcomes written are mandatory, to be taught, at the level required, as the end year assessment will be based on these.
- However, the level of cognition can be kept at a higher level by the institution.
- The Table of Specifications provided will be used for the three papers of the first professional examination. The same table of specifications should be used for the respective three block exams for internal assessment.

Syllabus

THEORY

THEORY			
DAY-01			
CODE	**SPECIFIC LEARNING OUTCOMES**	**TOTAL HOURS = 01+02+04**	
		DISCIPLINE	**TOPIC**
F-Or-001	Analyze the societal expectations, impact and role of physicians. Meet with doctors in various leadership roles to gain insights into the multifaceted responsibilities in the medical field. Define and explain the concept of a "Seven-Star Doctor."	Foundation orientation	Understanding the Medical Profession and the Physician's Role
F-Or-002	Comprehend the values and mission of the institution. Familiarize themselves with the college campus, its facilities (educational psychologist, career counseling, and research department etc.), faculty, and administrative framework. Comprehend the medical facilities available to the student.	Foundation orientation	Exploring the Academic Environment

F-Or-003	Examine and differentiate various teaching methodologies, assessing their applicability and effectiveness. Develop and maintain professional portfolios and logbooks to reflect on their educational progression. Understand the assessment strategies of the program, considering their types and influence on learning. Practice the PBL (Problem Based Learning) mock to understand its process, including problem identification, teamwork, research, and presentation skills.	Foundation orientation	Acquainting with the MBBS Program
DAY-02			
CODE	**SPECIFIC LEARNING OUTCOMES**	**TOTAL HOURS = 02+05**	
		DISCIPLINE	**TOPIC**
F-Or-004	Describe and understand the structure of Pakistan's Healthcare System (primary, secondary, and tertiary), recognizing the roles of different sectors and key health policies. Identify and comprehend cultural and ethical aspects unique to the Pakistani Healthcare context. Describe the principles of family practice within the Healthcare System.	Foundation orientation	Delving into the Healthcare System and Delivery

F-Or-005	Use the IT and library facilities such as eBooks', Year planners, access to scientific journals etc. Effectively use the university's learning management system and other online educational tools. Demonstrate proficiency in essential academic software tools such as Microsoft office such as (word, spreadsheets, and presentation software. Recognize and adhere to ethical practices in the use of digital resources, focusing on digital literacy and academic integrity.	Foundation orientation	Integrating Information Technology in Learning
DAY-03			
CODE	**SPECIFIC LEARNING OUTCOMES**	**TOTAL HOURS = 05+04**	
		DISCIPLINE	**TOPIC**
F-Or-006	Articulate the structure and requirements of their MBBS program, including core and elective subjects. Understand the significance of interdisciplinary studies and the interconnection of various courses. Identify opportunities for experiential learning, research, and career advancement within the curriculum.	Foundation orientation	Understanding the Curriculum Structure
F-Or-007	Apply various metacognition strategies for learning. Apply digital tools effectively to organize and synthesize information for their academic projects. Create a personal action plan integrating stress management techniques and personal development strategies to enhance their academic and personal life.	Foundation orientation	Self-Directed Learning

NORMAL NSTRUCTURENORMAL STRUCTURE			
GROSS ANATOMY			
CODE	**SPECIFIC LEARNING OUTCOMES**	**TOTAL HOURS = 15**	
		DISCIPLINE	**TOPIC**
F-A-001	Briefly describe the applied branches of anatomy Describe the "Anatomical Position" Describe the anatomical planes of body. Describe the terms of relationship, commonly used in Anatomy. Describe the anatomical terms used specifically for Limbs. Describe the terms related to movements.	General Anatomy **C1**	Introduction to General Anatomy
F-A-002	Describe, identify, and exemplify the general morphological features of bones. Describe the developmental classification of bones. Describe the regional classification of bones. Describe the morphological classification of bones. Describe and exemplify Sesamoid, Pneumatic, Wormian and Heterotopic bones. Describe the general features of adult typical long bone. Describe the types of epiphyses Discuss the general concept of ossification (primary and secondary centers and rule of ossification) Describe the relationship of growing end of bones with the direction of nutrient foramen Describe the blood supply of various types of bones Describe the salient features of common types of fractures and basic concept of healing of fracture.	General Anatomy **C1,C2,**	Bones (Osteology)
F-A-003	Describe the general features of cartilage and its importance in gross anatomy. Describe the subtypes and gross features of Hyaline, elastic and fibro Cartilage. Differentiate the three types of cartilages	General Anatomy **C1-C2**	Cartilage (Chondrology)

F-A-004	Describe and exemplify the structural classification of Joints (synovial, cartilaginous & fibrous) along with their sub-classification. Describe the components and characteristic features of a Synovial Joints. Describe the blood supply, innervation of Synovial Joints, cartilaginous joints, and fibrous joints. List the factors stabilizing a synovial joint. Define common joint injuries and diseases	General Anatomy	Joints (Arthrology)
F-A-005	Describe the structure and function of Skin on the basis of its two layers; Epidermis and Dermis Describe the structure of Hair as an appendage of skin. Describe the structure of Nail as an appendage of skin. Describe the structure of Sweat and Sebaceous Glands Describe the structure and function of Superficial Fascia Describe the structure, function, and modifications of Deep Fascia Describe important clinical correlates of skin (skin infections, sebaceous cyst, skin burns and skin grafting)	General Anatomy C1,C2,	Integumentary System
F-A-006	Classify and describe Muscle Tissue based on Structure, Function and Development Describe Somatic and Visceral Muscles Describe and differentiate the Red and White Variety of Skeletal Muscles	General Anatomy C1,C2,	Muscle Tissue (Myology)
	Classify and describe the skeletal muscles based on architecture. Classify skeletal muscle based on action. Describe the parts of a skeletal muscle. Describe and differentiate the basic organization of innervation to skeletal, smooth, and cardiac muscle. Describe the structure of Synovial Bursae Comprehend the meaning of Hypertrophy, Hemiplegia, quadriplegia, paraplegia, hemiparesis	General Anatomy C1,C2,	

F-A-007	Classify the types of blood circulation. Classify and exemplify various types of blood vessels. Describe and exemplify various types of anastomoses. Explain the importance of End Arteries Describe the general organization of Lymphatic Circulation Define the terms: Lymphoid Tissue, Tissue Fluid, Lymphatic, Capillaries, Lymph and Lymphatic Vessels Define the terms; Lymphangitis, Lymphadenitis.	General Anatomy C1-C2	Vascular System (Angiology)
F-A-008	Define neuron. Describe the anatomical structure of a neuron. Classify neurons based on morphology with examples.	General Anatomy C1-C2	Nervous Tissue (Neurology)
	Classify neurons based on function. Describe the components of the central nervous system. Describe the components of the peripheral nervous system. Name the supporting cells (neuroglia) of the central nervous system. Describe the structure and functions of the neuroglia of the central nervous system. Enumerate the supporting cells (neuroglia) of the peripheral nervous system. Describe the structure and functions of the neuroglia of the peripheral nervous system. Enlist the cranial nerves I to XII Describe the types of nerve fibers carried by and distribution of the cranial nerves. Describe the formation, types of modalities carried by, and distribution of the spinal nerves. Explain Dermatome (s) Explain Myotome (s) Describe the formation of Plexuses. Differentiate between Somatic and Visceral nervous system. Define Receptors Describe the functions of receptors.	General Anatomy C1-C2	

	Classify sensory receptors based on modality (with location) Define Effectors Describe the functions of effectors. Describe ANS (Autonomic Nervous System) and differentiate between sympathetic and parasympathetic nervous system		
F-A-009	Identify displacement of fracture segments of the bone Identify dislocation of joints	Integrate with Radiology	Imaging in Anatomy
CODE	**EMBRYOLOGY & POST-NATAL DEVELOPMENT**	**TOTAL HOURS = 25**	
	SPECIFIC LEARNING OUTCOMES	**DISCIPLINE**	**TOPIC**
F-A-010	Define Chromosome Theory of inheritance Enlist different stages of Mitosis and Meiosis Compare and contrast Mitosis and Meiosis Enlist the numerical chromosomal anomalies Describe the anatomical basis for numerical chromosomal abnormalities. Describe the clinical presentation of numerical chromosomal abnormalities & justify them embryologically Describe the clinical presentation of structural chromosomal abnormalities and justify them embryologically. Describe the embryological basis for mosaicism Describe the embryological basis for teratoma Describe Concept of Gene Mutation. Enlist common diagnostic techniques for identifying genetic abnormalities.	Embryology **C1-C2**	Cell division and Chromosomal abnormalities
F-A-011	Describe the Process of spermatogenesis and spermiogenesis Describe the embryological basis for Abnormal gametes	Embryology **C1-C2**	Gametogenesis Spermatogenesis
F-A-012	Describe the Prenatal and postnatal maturation of oocyte	Integrate with Gynecology	Gametogenesis Oogenesis

F-A-013	Describe the significance of arrested development of oocyte	C1,C2 Embryology C2	Gametogenesis Oogenesis
F-A-014	Compare and contrast oogenesis and spermatogenesis		Gametogenesis
F-A-015	Describe the hormonal control of female reproductive cycles Enumerate and describe the steps of the ovarian cycle Describe the process of ovulation Describe the formation, function and fate of corpus luteum Define Mittelschmerz pain Define menstrual cycle Describe the phases of menstrual cycle	Integrate with Gynecology C1-C2	Female Reproductive Cycle
F-A-016	Describe the transportation of Oocyte	Embryology C1-C2	Transportation of gametes
F-A-017	Describe Capacitation & Acrosomal Reaction Define fertilization Describe the phases of fertilization Draw and label a diagram illustrating the phases of fertilization Enumerate and describe the results of fertilization		Fertilization
F-A-018	Define contraception Explain the mechanisms of following contraceptive techniques: 1. Barrier methods 2. Hormonal methods 3. Intrauterine device (IUD) 4. Emergency contraceptive pills (ECPs) 1. Male and female sterilization	Integrate with physiology C1,C3	Contraception
F-A-019	Describe the anatomical and physiological basis of male and female infertility Define assisted reproductive techniques Describe the mechanisms of In vitro fertilization (IVF) & embryo transfer Explain the correlation of multiple births with assisted reproductive techniques	Integrate with Gynecology C1,C2	Infertility & assisted reproductive techniques

F-A-020	Describe the process of cleavage of embryo and blastocyst formation Describe the origin and uses of embryonic stem cells and the techniques of obtaining these cells from the embryo (reproductive cloning & therapeutic cloning) Explain the embryological basis of spontaneous abortion.	Embryology **C1,C2,C3**	Cleavage, blastocyst formation
	Compare and contrast the villi.	Integrate with Gynecology **C2**	
	Describe the process of Compaction. Describe the Formation of morula (division into inner and outer cell mass)	Embryology **C1,C2**	
F-A-021	Describe the Uterus at the time of implantation (decidua reaction) Illustrate the concept of Implantation. Describe the Abnormal implantation/ extra uterine implantations. Define the Molar pregnancy. Describe the formation of amniotic cavity, embryonic disc, and umbilical vesicle Describe the formation of chorionic sac.	Embryology **C1,C2**	Implantation Week 2 of Development
F-A-022	Describe the Establishment of uteroplacental circulation.		Utero-Placental circulation
F-A-023	Describe the Formation & fate of primitive streak. Draw a concept map highlighting the sequence of events responsible for transformation of bilaminar germ disc into trilaminar germ disc. Describe the embryology behind sacrococcygeal teratoma and justify its clinical picture.	Embryology Integrate with Gynaecology **C1,C2**	Gastrulation
F-A-024	Describe the Invagination and movement of prenotochordal cells Describe the Notochordal plate formation Describe the Neuroenteric canal formation Describe the fate of the notochord Describe the Establishment of body axis	Embryology **C1,C2**	Formation of notochord

	Draw and label the fate map establishment Describe the Fate map establishment.	C1,C2	
	Describe the role of notochord as an inducer Describe the embryological basis for situs inversus, Sirenomelia, holoprosencephaly Describe the development of trophoblast and chorionic villi during 3rd week of development		
F-A-025	Describe the Formation of neural tube from neural plate. Justify embryologically the clinical picture seen in various neural tube defects Describe the process of Migration of neural crest cells Enlist the Derivatives of neural tube and describe the fate of each Enlist the Derivatives of neural crest cells Enlist the ectodermal derivatives Describe important Neural tube defects	Embryology C1,C2,C3	Derivatives of ectoderm
F-A-026	Describe the Differentiation of mesoderm into its constituting components Describe the Somite formation and its fate Describe the Estimation of age by somites Describe the formation of intra-embryonic coelom	Integrate with pediatrics C1-C2	Mesodermal derivatives
F-A-027	Describe the processes of vasculogenesis & angiogenesis Explain the features of primordial cardiovascular system Describe the anatomical justification for Capillary hemangiomas	Integrate with Cardiology C1,C2,C3	Early development of CVS
F-A-028	Describe the Cephalo-caudal folding Describe the Lateral folding	Integrate with Gynaecology C1,C2	Folding of embryo
F-A-029	Enlist the derivatives of germ layers Enlist and Describe the Derivatives of intermediate and lateral plate mesoderm Enlist & Describe the Derivatives of endoderm	Embryology C1,C2	Germ layer derivatives

	Enlist & describe the derivatives of ectoderm	Integrate with Gynaecology/ Pediatrics **C1,C2**	
F-A-030	Enlist the characteristic features of the embryo during 2nd month Describe the criteria for estimating the developmental staging in human embryos Explain the estimation of gestational & embryonic age		Folding of Embryo Embryonic period
F-A-031	Explain the measurement and characteristics of fetus/Key events during Embryonic Period. Describe the Overview of External appearance of fetus during fetal period. Enlist developmental horizons during fetal life event. Describe Viability of fetuses and low birth weight babies Explain the factors influencing fetal growth Describe the clinical problems encountered by babies born with IUGR (Intra Uterine Growth Restriction)	**C1,C2** Embryology	Fetal Period
F-A-032	Tabulate the criteria for estimating fertilization age during the fetal period Describe the procedures for assessing fetal status Describe the clinical picture of IUGR & factors resulting in IUGR (Intra Uterine Growth Restriction) Define Pre-eclampsia	Integrate with Gynaecology **C2,C3**	Fetal Status
F-A-033	List the fetal membranes Describe the macroscopic & microscopic features of Decidua Enlist the various parts of decidua Functionally correlate the parts of the decidua with its structure Describe the Changes in the trophoblast leading to the development of placenta Describe the Structure (macroscopic & microscopic) of placenta	Integrate with Gynaecology **C1,C2,C3**	Placenta
	Enlist & correlate the Functions of placenta with its structure		

	Describe the Microscopic anatomy of Placental membrane Describe the Placental circulation (fetal & maternal) Embryologically justify the hemolytic disease of the neonate (Erythroblastosis fetalis) Describe the functions of placenta	**C1,C2,C3**	
F-A-034	Describe the Formation & fate of Umbilical cord Describe the Cord abnormalities Justify embryologically the clinical features observed in Absence of umbilical artery Describe the formation and circulation of Amniotic fluid Describe the Procedure of diagnostic amniocentesis Explain the significance of amniotic fluid Describe the factors responsible for Polyhydramnios and oligohydramnios Describe the consequences of oligohydramnios and polyhydramnios Define Amniotic Bands Explain the formation and fate of umbilical vesicle (yolk sac) Define Physiological Umbilical Hernia	Integrate with Gynecology **C1,C2,C3**	Fetal membranes
F-A-035	Describe the development of Dizygotic twins Describe the development of Monozygotic twins Describe the fetal membranes in twin pregnancy Describe Fetus Papyraceous Explain the zygosity of the twins Describe the characteristics of various types of conjoined monozygotic twins	**C1,C2,C3**	Multiple pregnancies
F-A-036	Define preterm Birth Describe parturition & three stages of Labor. Describe the Various methods of prenatal diagnosis Describe the Fetal therapy Describe Maternal serum Screening Corelate levels of Alpha feto protein levels and fetal anomalies Describe stem cell transplantation and gene therapy	Embryology **C1,C2,C3**	Prenatal diagnosis and fetal therapy

F-A-037	Define teratology and causes of birth defects Define genomic imprinting Define human disorders associated with genetic mutations Describe birth defects caused by genetic factors: numerical and structural anomalies Define and enlist the teratogens Describe the role of following in causing teratogenicity in humans: 1. Drugs 2. Environmental agents 3. Chemicals & heavy metals 4. Infectious agents 5. Radiation 6. Hormones 7. Maternal diseases Describe the basis for male-mediated teratogens Describe prevention of birth defects		Teratogenicity
CODE	**MICROSCOPIC ANATOMY (HISTOLOGY AND PATHOLOGY)**	**TOTAL HOURS = 08**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
F-A-038	Describe different types of microscopies Describe Staining methods and their significance	Basic technique in Histology **C1**	Introduction to microscopy & Basic staining technique
F-A-039	Describe the electron microscopic structure and fluid mosaic model of plasma membrane Draw the fluid mosaic model of plasma membrane Describe the structure of glycocalyx coat and lipid raft and correlate it with function Describe different types of membrane proteins and their functions	Basic Histology **C1,C2,**	Cell membrane
	Explain different modes of transport across the cell membrane	Integrate with Pathology	

F-A-040	List the membranous and non-membranous cellular organelles Describe the structure of the following cellular organelles and correlate with their function: 1. Ribosomes 2. Endoplasmic reticulum (rough & smooth) 3. Golgi apparatus 4. Lysosomes 5. Proteasomes 6. Mitochondria 1. Peroxisomes	C1,C2,C3	Cell organelles
	Describe the structural components of cytoskeleton, and correlate them with their functions Explain the histological basis of immotile cilia syndrome	C2,C3	
	Describe the histological features of cytoplasmic inclusions	Integrate with Pathology C2	
	Describe the structure of nuclear envelope and nuclear pores		
F-A-041	Describe the structure of chromatin Describe the structure of chromosome Describe the structure of nucleolus Describe the structure and types of DNA (Deoxy Ribonucleic Acid) and RNA (Ribonucleic Acid) Describe the histological basis for apoptosis and necrosis	Histology	Cell nucleus
	Describe structure of different types of cell junctions Describe the cell cycle & cell division Define important clinicopathological terms: Atresia, Hypertrophy, Atrophy, Hyperplasia, Metaplasia, Anaplasia, Neoplasia, Inflammation, Metastasis	Integrate with Pathology C1,C2	
F-A-042	Describe the histological structure and function of basement membrane (light and electron)	Histology	Epithelium

	Draw and label a diagram illustrating the electron microscopic structure of basement membrane Describe the basal surface modifications of epithelia Describe the electron microscopic structure and functions of intercellular junctions (lateral surface modifications) and give their locations	**C1,C2**	
	Describe the Biochemical composition of the basolateral modifications		
	Describe the electron microscopic structure & functions of the following apical cell surface specializations: 1. Microvilli 2. Stereocilia 1. Cilia	Integrate with Biochemistry **C1,C2**	
	Classify and exemplify the epithelia with their histological structure, locations and functions	Integrate with Pathology **C1,C2**	
	Describe the structure of exocrine glands Explain the mechanism of transport across the epithelia Describe the classification of exocrine glands on the basis of: 1. Shape of secretory portions and ducts 2. Mode of secretion 3.Type of secretion	Histology **C2,C3**	
F-A-043	Describe the composition and list the constituents of connective tissue Classify the connective tissue with examples Describe the composition of ground substance of connective tissue Describe the composition, distribution, and function of glycosaminoglycans in connective tissue Describe connective tissue fibers, cells. Define Fibrosis	Histology **C2,C3**	Connective tissue

	Describe the structure, distribution, and functions of the cells of macrophage mononuclear phagocytic system	Integrate with Biochemistry/ Physiology **C2**	
	Describe the role of macrophages in innate immunity & formation of foreign body Giant cell Describe the structure & functions of Mast cells. Role of Mast cells in immediate hypersensitivity reactions. Describe structure of Plasma cells and their role in antibody formation.	**C2,C3**	
	Describe the types of adipose tissue (white & brown), their histogenesis, locations and function	Histology **C2**	
	Describe lipid storage and mobilization in and from adipocytes and compare the brown and white adipose tissue	Integrate with Pathology **C2,**	

NORMAL FUNCTION			
MEDICAL PHYSIOLOGY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 40**	
		DISCIPLINE	**TOPIC**
F-P-001	Define Homeostasis Explain control system of body by giving examples Differentiate between Extracellular and Intracellular Fluids Explain the positive and negative feedback mechanisms with examples Explain the significance of feed forward/ adaptive control/delayed negative feedback mechanisms	**C1,C2,C3**	Cell Biology
	Define normal body temperature, mechanism of heat production and heat loss. Describe regulation of body temperature (role of hypothalamus) Explain abnormalities of body temperature regulation.		
	Explain the structure of cell membrane Enlist the types of cell membrane proteins Enumerate the functions of membrane proteins Define and enumerate the functions of cell Glycocalyx	Medical Physiology **C1,C2**	
	Enlist membranous and non-membranous organelles Enlist the self-replicative organelles Differentiate between the functions of smooth and rough endoplasmic reticulum Explain the functions of Golgi apparatus Enlist the enzymes of lysosomes Explain the functions of lysosomes Enlist the enzymes of peroxisomes Explain the functions of peroxisomes		

	Enumerate the components and functions of cytoskeleton Define and enlist types of endocytosis Explain the mechanism of pinocytosis Classify different transport mechanisms Compare the composition of Na (Sodium), K (Potassium) and Cl (Chloride) in extracellular and intracellular fluid Define and enlist different types of diffusion Explain the process of facilitated diffusion with the aid of diagram Define and classify different types of active transport Describe primary and secondary active transport with examples Explain voltage and ligand gated channels with examples Name Na, K channel Blockers. Discuss functions and significance of Na/K ATPase pump.	C1,C2	
F-P-002	Enumerate the functions of blood Explain the composition of blood Enumerate the plasma proteins Discuss functions of plasma proteins Describe the pathophysiology of edema	C1,C2 Medical Physiology	Blood
F-P-003	Discuss the characteristics of red blood cells Explain different types of Bone marrows Enumerate the different sites of erythropoiesis at different ages Explain the stages of erythropoiesis Enumerate factors that regulate erythropoiesis Discuss the site and role of erythropoietin in red blood cell production Explain the significance of vitamin B12 and folic acid in maturation of red blood cell		Red Blood Cells
F-P-004	Enumerate the types of normal hemoglobin in different ages of life	Medical Physiology	Hemoglobin

	Explain the role of Iron in Hemoglobin formation. Define blood indices, give their normal values & enumerate the conditions in which these values are disturbed (corelate with anemias). Enlist the abnormal types of hemoglobin	**C2,C3**	
F-P-005	Enumerate the types of white blood cells Describe the characteristics and functions of Neutrophils Explain the process of defense against invading agent by neutrophils Define leukocytosis and leukopenia Explain the effects of leukemia on body Explain the process of defense against invading agent by macrophages Discuss different lines of defense during inflammation	**C1,C2**	White Blood Cells
	Explain the functions of neutrophils and macrophages in spread of inflammation (walling off effect) Define the Reticuloendothelial system Enlist the different components of Reticuloendothelial system Explain the characteristics and functions of basophils Explain the characteristics and functions of eosinophils and enlist conditions in which these cells are raised.	**C1,C2**	
F-P-006	Enumerate different blood group types. Explain the basis of ABO and Rh blood system Explain the Landsteiner law	Medical Physiology **C1,C2**	Blood Types

MEDICAL BIOCHEMISTRY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 36**	
		DISCIPLINE	**TOPIC**
F-B-001	Explain the concept of organization of cells to tissue, tissues to organ, organs to system. Differentiate between the eukaryotic and prokaryotic cells.		Structure of cell
F-B-002	Describe the composition and structure of cell on biochemical basis and justify it as fluid mosaic model. Describe the structure and function of cell membrane with particular reference to the role of 1. Lipids 2. Carbohydrates 3. Proteins Explain why the cell membrane is called fluid mosaic model	**C2,C3**	Cell Membrane
F-B-003	Discuss the various ways of cell-to-cell communication and to the environment. Describe cell to cell communications. Cell signaling pathways (only G protein signaling I e. Gs, Gi and Gq) Describe cell to cell adhesion.	Biochemistry Cell Biology **C2**	Signal transduction
F-B-004	Explain the biochemical markers and importance of subcellular organelles and their inherited disorders especially: 1. I cell disease 2. Refsum disease 3. Parkinsonism 1. Progeria	**C3**	Subcellular organelles
F-B-005	Describe the chemistry of purines and pyrimidines and their linkage in nucleic acid synthesis.	**C2**	Chemistry of purine and pyrimidines
F-B-006	Discuss the organization of DNA with special reference to Watson and crick model, composition, structure, role of Pairing	**C2**	DNA (Deoxy Ribonucleic Acid)

	Describe the structural forms of DNA		
F-B-007	Discuss the structure of different types of RNAs with special reference to composition, linkage, functions of RNA, micro-RNA Illustrate the structure and functions of various types of RNAs Describe the functions of various small RNAs present in cell	Biochemistry Cell Biology C2	RNA (Ribonucleic Acid)
F-B-008	Explain the structure and nomenclature of nucleotides, biomedical importance of natural and synthetic analogues	C1,C2	Nucleotides
F-B-009	Explain the higher organization of DNA. Difference between DNA, chromatid and chromosome	=	Chromosome
F-B-010	Describe enzymes with reference to: 1. Active sites 2. Specificity 3. Catalytic efficiency 4. Cofactor 5. Coenzyme 6. Holoenzyme 7. Apoenzyme 8. Prosthetic group 9. Zymogens 1. Location	Biochemistry Cell Biology C2	Enzymes
	Classify enzymes according to the reaction they catalyze and their nomenclature	C2	
	Explain the mechanism of enzyme action from reactants to products (catalysis).		

	Discuss the effect of various factors on enzymatic activity: 1. Substrate concentration 2. Temperature 3. PH 1. Enzyme concentration	**C2,C3**	
	Explain the regulation of enzymatic activity (Michaelis Menten and Line weaver Burk's equation). Discuss inhibitors of enzymatic activity (with special reference to Km/V max) 1. Competitive 2. Non competitive 1. Uncompetitive Explain the application of enzyme in clinical diagnosis and therapeutic use	**C2,C3**	
F-B-011	Classify amino acids based on polarity, nutritional importance and glucogenic/Ketogenic properties Explain the structure, physical, chemical properties of amino acids and their biomedical importance	Biochemistry Cell Biology **C2**	Amino acids
F-B-012	Classify proteins on the basis of functions, solubility and physicochemical properties and their biomedical importance. Explain the structural levels of proteins 1. Differentiate between alpha helix and beta pleated protein structures 1. Identify bonding at different levels of proteins	**C2,C3**	Protein

	Describe the role of chaperons in protein folding 1. Interpret disorders related to protein misfolding on basis of given data 1. Describe the biochemical basis of Alzheimer's disease/ prion disease	**C3**	
F-B-013	Classify and explain the bio-chemical role of each class of plasma proteins	**C2**	Plasma proteins
F-B-014	Explain the structure and biochemical role of immunoglobulins 1. Describe the production, structure and functions of B cells, plasma cells, and antibodies (IgA, IgD, IgE, IgG, and IgM). 2. Discuss the functions of the cytokines (Interleukins (ILs), Tumor Necrosis Factor (TNFs), IFs, Platelet derived growth factor (PDGF), and Platelet activating factor (PAF)). 3. Interpret multiple myeloma on basis of given data	Biochemistry Cell Biology **C2**	Immunoglobulins

PATHOLOGY			
CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 6+6=12	
		DISCIPLINE	TOPIC
F-Pa-001	Discuss the significance of pathology. Discuss the causes of cell injury. Identify the types of cell injury. Describe the mechanism of cell injury. Identify the types of cell death. Define necrosis and apoptosis. Describe different types of necrosis and mechanism of apoptosis. Compare apoptosis with necrosis. Define different types and mechanism of cellular adaptations (Hypertrophy, Atrophy, Hyperplasia and Metaplasia) Define dysplasia and Neoplasia. Discuss the mechanism and types of intracellular accumulations and pathological calcifications	General Pathology C1,C2	Cell Injury
F-Pa-002	Describe the basic structure of bacteria and virus. Enlist medically important microbes causing infectious diseases. Differentiate cell walls of gram positive and gram-negative bacteria. Compare the structure of bacterial cell and virus Discuss the growth curve of bacteria and virus. Enlist steps of viral replication Enlist stages of infectious diseases Enlist stages of bacterial pathogenesis Discuss the determinants of bacterial pathogenesis	General Microbiology C1,C2	Introduction to Microorganisms
F-Pa-003	Define sterilization and disinfection. Describe the principles of sterilization and disinfection.		Sterilization & Disinfection

	Describe clinical uses of common disinfectants and their mode of sterilization. Discuss physical and chemical agents of sterilization	C1,C2	
PHARMACOLOGY AND THERAPEUTICS			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 04**	
		DISCIPLINE	**TOPIC**
F-Ph-001	Define Basic terms of General Pharmacology: Drug, Pro-Drug, Placebo, Prototype drug, Orphan Drug, Essential drug, Pharmacology, First Pass effect, Volume of Distribution, Pharmacokinetics, Absorption, Distribution, Metabolism, Elimination, Excretion, Biotransformation.	General Pharmacology C1	Pharmacokinetics
F-Ph-002	Define the following terms: Pharmacodynamics, Receptor, Potency, Efficacy, Affinity, Agonist, Partial Agonist, Inverse Agonist, Antagonist.	General Pharmacology C1	Pharmacodynamics
F-Ph-003	Classify types of autonomic receptor (adrenergic and cholinergic) along with their location, actions and post-receptor mechanism		Autonomic System
COMMUNITY MEDICINE & PUBLIC HEALTH			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 08**	
		DISCIPLINE	**TOPIC**
F-CM-001	Describe the changing concepts and new philosophy of health Explain responsibility for health	C1,C2	Concept of Health
F-CM-002	Explain dimensions and determinants of health and their role in achieving positive health Discuss concept of health and wellbeing Describe the Physical quality of Life Index & Human Development Index	Community Medicine and Public Health	Positive Health Dimensions, Health Determinants
F-CM-003	Describe the importance of health indicators Classify health indicators Define Morbidity and Mortality Describe Disability indicators Compare indicators among countries	C1,C2	Health indicators
F-CM-004	Conceptualize disease causation and natural history of disease	Community Medicine and Public	Disease causation

	Explain Germ theory & multifactorial causation Describe Epidemiological Triad Discuss Web of disease causation Describe Gradient of infection	Health **C1,C2**	
F-CM-005	Describe principles of prevention and control on prevalent diseases Explain difference between elimination and eradication Describe disease surveillance, types and cycle Explain Primary, secondary, & tertiary prevention Describe five levels of interventions	Community Medicine and Public Health **C1,C2**	Disease Prevention

IMPACT (EPIDEMIOLOGY, SOCIOLOGY/SOCIETY, COMMUNITY MEDICINE, BEHAVIORAL SCIENCE, & PUBLIC HEALTH)			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 08**	
		DISCIPLINE	**TOPIC**
F-BhS-001	Identify the Biological Basis of human behavior and discuss social behavior Describe processes such as neurobiology of memory, emotions, sleep, learning, motivation, sex, arousal, reward and punishment	**C2,C3**	Biological Basis of Behavior
F-BhS-002	Identify the burden of mental illness on the person, family and society Describe Intellectual disability, Mental Disorders and Personality Disorders	Behavioral Sciences **C1,C2**	Psychological Disorders
F-BhS-003	Identify the role of psychosocial factors in various illnesses Describe psychosocial aspects of various system diseases such as Cardio-vascular system (CVS), Central Nervous System (CNS), Gastro Intestinal Tract (GIT), Respiration, renal, endocrine and Cancer		Psychology and Disease
F-BhS-004	Identify the behavioral factors associated with pharmacological treatment of diseases		Behavioral Factors & Pharmacological Treatment

	Discuss Health belief model, treatment compliance and its psychosocial factors, social factors in drugs prescription and drug resistance		
F-BhS-005	Identify the rehabilitation work for patients on dialysis and any kind of physical disability Discuss the care requirements in chronic debilitating conditions like Diabetes, Multi-infarcts Dementia, chronic renal disease, limb amputation	**C2,C3** Behavioral Sciences **C2**	Palliative Care
F-BhS-006	Identify the various physiological effects of stress Explain ANS response to stress, Describe Behavioural manifestations of stress, Stress Related multiple sclerosis and autoimmune diseases		Stress

AGING			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 01**	
		DISCIPLINE	**TOPIC**
F-Ag-001	Discuss telomeres and telomerase and their clinical significance in aging.	Geriatrics Integrate with Biochemistry **C2**	Process of Aging

PRACTICAL

PRACTICAL

ANATOMY

CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 03	
		DISCIPLINE	TOPIC
F-A-044	Demonstrate the anatomical terms of position and movement, in particular on limbs. Demonstrate various anatomical movements of body Identify various elevations and anatomical landmarks on bones. Identify and interpret normal radiographs of various body regions Identify and interpret joint dislocations and displaced fracture bone segments radiographically.	Anatomy	Osteology Imaging and cross-sectional Anatomy Arthrology
CODE	**EMBRYOLOGY**	**TOTAL HOURS = 05**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
F-A-045	Calculate fertilization age, gestational age, embryonic/fetal age and expected date of delivery. On models, charts, aborted embryos and fetal specimens, identify the events of embryonic period, i.e., cleavage, morula and blastula formation, yolk sac, amniotic cavity, connecting stalk, Placenta and it's positional & Implatational variations, umbilical cord and its contents Describe the USG (Ultrasonography) report for the: Fetal features, fetal age estimation, placental attachment with variations, fetal membranes and multiple pregnancies	Anatomy	Embryology

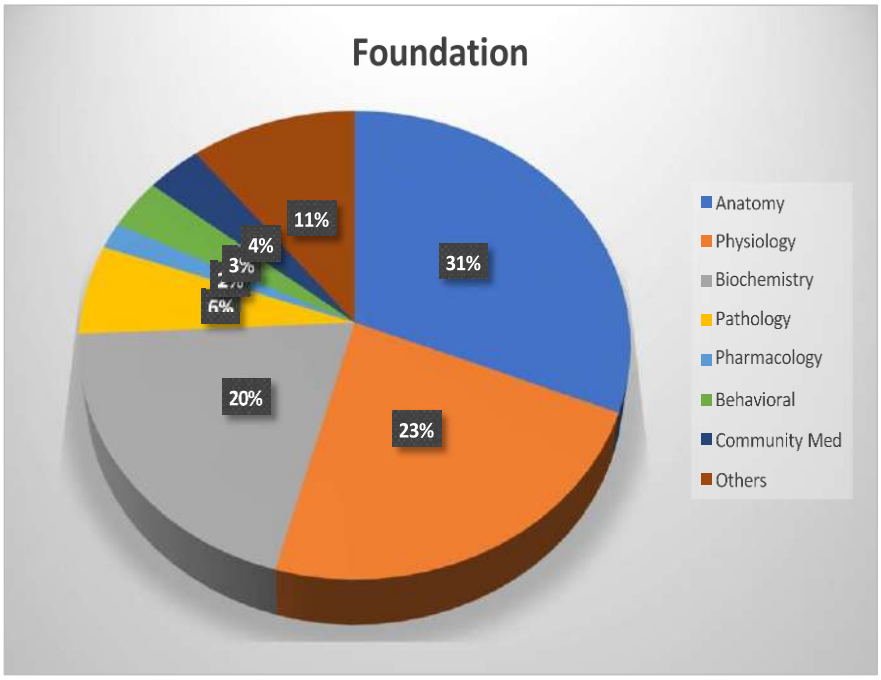
	Gastrulation (notochord & primitive streak, three germ layers and their parts/derivatives), angiogenesis, neurulation, somites and embryonic age determination based on it, chorionic villi (primary, secondary & tertiary), developmental defects (sacrococcygeal teratoma, neural tube defects). Fetal features during fetal period. Determine age of fetus based on these features.		
CODE	**HISTOLOGY**	**TOTAL HOURS = 14**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
F-A-046	Describe different types of staining techniques and their significance with special emphasis on H&E (Hematoxylin and Eosin) staining	Microscopic Anatomy	Staining techniques
F-A-047	Enlist important features of different parts of light microscope		Microscope
F-A-048	Identify and draw & label different cell shapes under the microscope		Cell shape
F-A-049	Identify under light microscope and Draw & Label the following types of epithelia: i. Simple squamous ii. Simple cuboidal iii. Simple columnar (ciliated & non-ciliated) iv. Pseudostratified columnar (ciliated & non-ciliated) v. Stratified squamous (keratinized & non keratinized) vi. Stratified cuboidal vii. Stratified columnar viii. Transitional		Epithelium
F-A-050	Identify under light microscope and Draw & Label serous & mucous secreting glands under light microscope	Microscopic Anatomy	Epithelium
F-A-051	Identify under light microscope and Draw & Label the various types of connective tissue		Connective tissue

PHYSIOLOGY			
CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 12	
		DISCIPLINE	TOPIC
F-P-007	Explain laboratory/clinical procedure to the subject. Obtain verbal consent from subject before starting a procedure. Reassure the subject after the procedure.	Medical Physiology	Consent
F-P-008	Determine Erythrocyte Sedimentation Rate and packed cell volume		RBCs (Red Blood Cells)
F-P-009	Determination of blood group		Blood Group
F-P-010	Identify various types of WBCs in a prepared DLC (Differential Leukocyte Count)		WBCs (White Blood Cells)
BIOCHEMISTRY			
CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 09	
		DISCIPLINE	TOPIC
F-B-015	Demonstrate the step taken to prevent or rectify the Laboratory Hazards	Biochemistry	Lab hazards
F-B-016	Identify the methods of isolation of cell organelles'		Cell organelles
F-B-017	Identify the different parts of equipment i.e., centrifuge, Microlab, Electrophoresis, Hot Oven, water bath		Equipment
F-B-018	Detect amino acids by paper chromatography		Chromatography Solutions
	Prepare different types of solution Molar, Molal, Normal and %		
PATHOLOGY			
CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 02	
		DISCIPLINE	TOPIC
F-Pa-004	Identify the salient morphological features of: Caseous necrosis (Gross & microscopic features), Coagulative necrosis (Gross), Fat necrosis (microscopic)	Pathology	Cell Injury

	Identify the salient morphological features of Dystrophic calcification. Identify the salient microscopic features of the following: Intestinal metaplasia, Squamous metaplasia, Hyperplasia Identify the salient microscopic and gross features of Anthracosis		

PHARMACOLOGY AND THERAPEUTICS			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 03**	
		DISCIPLINE	**TOPIC**
F-Ph-004	Identify Sources of drugs through pictures: Animal, Plant, Microbiological, Minerals, Synthetic and genetically engineered sources. **Plant sources:** Atropa Belladona, Pilocarpus microphyllus, Papaver somniferum / Opium poppy, Erythroxylum coca, Cinchona bark, Digitalis Purpurae / Fox glove plant, Rawulfia serpentine, Ephedra vulgaris, Curare, Catharanthus roseus, Podophyllum, Nux Vomica **Animal sources:** Heparin (Pig/ Bovine), Insulin (Cow/Pig), Thyroxin (Sheep/Pig), Estrogen, Progesterone, Testosterone, Vitamin A, D (Cod liver), Vaccines **Microbiological sources:** Penicillins, Cephalosporins, Tetracyclines, Streptomycin, Streptokinase, Cyclosporine **Mineral sources:** Iron, Magnesium, Zinc, Copper, Silver nitrate, Arsenic, Gold salts, Bismuth salts, Sulfur, Iodine, Calcium salts **Recombinant / Genetically engineered drugs:** Human insulin, Erythropoietin, Growth hormone, Alteplase	Pharmacology	Sources of drugs

	Synthetic: Sulfonamides**,** Anti-histamines**,** Benzodiazepines**,** Anti-epileptics		
F-Ph- 005	Identify and define the following Active Principles of drugs (alkaloids, glycosides, volatile oils, fixed oils) through pictures. **Alkaloids:** Atropine, Caffeine, Morphine, Nicotine, Quinine, Reserpine, Codeine, Tubocurarine **Glycosides**: Digoxin, Senna, Cascara **Volatile oils:** Clove oil , Peppermint oil, Coriander oil, Dill oil**,** Ginger oil **Fixed oils:** Coconut oil, Mustard oil, Olive oil, Castor oil, Cod liver oil	Pharmacology	Active Principles of drugs
F-Ph- 006	Identify different dosage forms of drugs along with examples. Tablet, Capsule, Syrup, Suspension, Inhaler, Injection, Infusion, Ointment, Cream, Lotion, Lozenges, Suppository, Enema.	Pharmacology	Dosage
F-Ph- 007	Identify the types of transmembrane receptors (diagram) and give example.	Pharmacology	Types of receptors



Module week	Recommended minimum hours
08	225

Module 2
Hematopoietic & Lymphatic 1

MODULE RATIONALE

"Blood is Life". Unlike any other organ, components of blood and immunity reflect/reveal disease processes in other organs as well. Therefore, studying blood is like opening a book to all aspects of medicine. Hence, this module has been designed to enable students to have a basic understanding about the normal structure, function and biochemistry of blood, immune and Lymphatic systems. Not only that, but students would also learn, when normal physiology and composition of blood and immune system is disturbed, what disorders result in our community. Emphasis has been given to incorporate deranged laboratory findings into the clinical problem solving.

MODULE OUTCOMES

- Explain the function of all the organs / structures involved in this system and the mechanisms controlling them. (Spleen, lymph nodes, thymus, bone marrow, RBC's, WBCs and platelets
- Explain the etiology and pathogenesis of common blood & lymphatic diseases, particularly those of importance in Pakistan.
- Explain the rationale for the use of common therapeutic agents for the diseases related to Blood and immunity.
- Describe the role of immunity in the body
- Discuss the working & uses of laboratory instruments in diagnostic lab visit
- Relate red cell indices with health and disease
- Recognize ABO/RH blood grouping system
- Describe the role of Reticuloendothelial system in the body
- Describe the events of hemostasis
- Extrapolate the biochemical aspects of plasma proteins
- Discuss the pharmacological treatment of iron deficiency anemia
- Discuss Blood composition and function
- Discuss the role of liver in hemolytic anemia
- Practice history taking of a patient presented with blood disorders

THEMES

- Red blood cell
- Platelets
- White blood cell

CLINICAL RELEVANCE

- Aplastic anemia
- Hemolytic anemia
- Blood loss anemia
- Nutritional anemia
- Polycythemia
- Hemoglobinopathies
- Jaundice
- Acute and chronic lymphocytic and myelogenous Leukemia
- Allergy (Type I, Type II & Type III)

IMPLEMENTATION TORs

- The time calculation for completion of modules and blocks is based on 35 hours per week. Total hours of teaching, learning and formative/summative internal assessment to be completed in a year are 1200.
- The hours mentioned within each module are the mandatory minimum required. The rest of the hours are left to the discretion of the institution that can be used in teaching, learning and assessment as per decision of the institutional academic council.
- The content and the intended learning outcomes written are mandatory, to be taught, at the level required, as the end year assessment will be based on these.
- However, the level of cognition can be kept at a higher level by the institution.
- The Table of Specifications provided will be used for the three papers of the first professional examination. The same table of specifications should be used for the respective three block exams for internal assessment.


UMDC
THEORY

NORMAL STRUCTURE			
GROSS ANATOMY			
CODE	**SPECIFIC LEARNING OUTCOMES**	**TOTAL HOURS = 02**	
		DISCIPLINE	**TOPIC**
HL-A-001	Identify and describe the components of the Hematopoietic & Lymphoid Tissue and their function Describe the location, coverings, relations of Spleen Describe the origin, course branches and distribution of Splenic artery Describe the venous drainage of Spleen, Portal vein formation, tributaries, and area of drainage. Describe the location and relations of Thymus. Age related changes in Thymus	Human Anatomy **C1,C2**	Hematopoietic & Lymphoid Tissue
CODE	**EMBRYOLOGY & POST-NATAL DEVELOPMENT**	**TOTAL HOURS = 01**	
	SPECIFIC LEARNING OUTCOMES	**DISCIPLINE**	**TOPIC**
HL-A-002	Describe the Intrauterine Development of spleen	Embryology **C2**	Developmental Anatomy of Spleen
NORMAL FUNCTION			
MEDICAL PHYSIOLOGY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 20**	
		DISCIPLINE	**TOPIC**
HL-P-001	Define, classify and explain anemia on the basis of morphology and cause Discuss the effects of anemia on the body	**C1,C2** Medical Physiology **C1,C2**	Anemia
HL-P-002	Define polycythemia Explain types of polycythemias Discuss the effects of polycythemia on the body		Polycythemia

HL-P-003	Define hemostasis Describe the mechanisms by which hemostasis is secured	**C1,C2**	Hemostasis
HL-P-004	Discuss the characteristics and functions of platelets Explain the mechanism of formation of platelet plug	**C2**	Platelets
HL-P-005	Enlist the clotting factors in blood Explain the conversion of Prothrombin to Thrombin & formation of Fibrin Fibers Explain the Intrinsic & extrinsic clotting pathway. Name & explain the mechanism of anticoagulants used in laboratory. Explain the factors that prevent intravascular coagulation Explain the role of Calcium ions in Intrinsic and Extrinsic pathways Enlist the vitamin K dependent clotting factors Explain the prothrombin time, International Normalized Ratio (INR), and its clinical significance.	**C1,C2**	Coagulation factors
HL-P-006	Enlist and explain the conditions that cause excessive bleeding	**C1,C2**	Coagulation disorders
	Define thrombocytopenia Enlist the causes and consequences of Thrombocytopenia	Integrated with Medicine **C1,C2**	
HL-P-007	Define immunity Classify immunity Explain humoral immunity Explain Innate immunity. Elaborate cell mediated immunity. Describe the structure of antigen and immunoglobulin Describe the role of Helper T-cells in cell mediated immunity	Integrated with microbiology **C1,C2**	Immunity

	Enlist the types of Immunoglobulins along with their functions		
	Explain the role of memory cells in enhancing antibody response (secondary response)		
	Describe the mechanism of action of antibodies		
	Elaborate the complement system.		
HL-P-008	Elaborate Immune tolerance Explain the process of clone selection during T cell processing Discuss the failure of tolerance mechanism	Integrated with pathology **C1,C2**	Tolerance
HL-P-009	Discuss immunization.	Integrate with microbiology **C1,C2,C3**	Immunization
	Define passive Immunity		Immunization
	Explain features and physiological basis of delayed reaction allergy.		
	Explain features and physiological basis of Atopic Allergy		
	Explain features and physiological basis of Anaphylaxis, urticaria and Hay fever.		
HL-P-010	Discuss the pathophysiology, features and treatment of ABO and RH incompatibility. Enlist the changes that take place in the stored Blood.	Medical Physiology **C2,C3**	Blood group Incompatibility
HL-P-011	Discuss the features and complications of mismatched blood transfusion reaction Describe the Hazards of blood transfusion.	Integrate with Pathology **C2,C3**	Blood mismatch Transfusion reactions
	Elaborate the Transplantation of Tissues and Organs		
HL-P-012	Explain the process of tissue typing	Integrate with pathology **C2,C3**	Transplantation of tissues
	Explain the prevention of Graft Rejection by suppressing immune system		
MEDICAL BIOCHEMISTRY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 19**	
		DISCIPLINE	**TOPIC**

HL-B-001	Explain the steps of synthesis of heme Interpret porphyrias on the basis of sign, symptoms and data. Discuss the biochemical role and types of hemoglobin 1. Differentiate Hemoglobin and myoglobin 2. Explain oxygen dissociation curve of hemoglobin and myoglobin 3. Enlist the factors regulating oxygen dissociation curve of hemoglobin and myoglobin 4. Interpret Carbon monoxide (CO) toxicity on the basis of sign and symptoms 5. Explain the role of 2,3 Bisphosphoglycerate (2,3 BPG) in fetal circulation	Medical Biochemistry **C2,C3**	Hemoglobin and its types/ RBCs
HL-B-002	Discuss haemoglobinopathies and their biochemical and genetic basis with special emphasis on sickle cell anemia, Thalassemia and methemoglobinemia a) Discuss the following types of anemia on the basis of signs and symptoms and laboratory data: 1. Hypochromic microcytic 2. Normochromic microcytic 3. Normochromic normocytic 4. Macrocytic (megaloblastic)	Medical Biochemistry Integrate with Pathology **C2,C3**	Hemoglobino pathies/ RBCs/ Homeostasis
HL-B-003	Explain the iron metabolism with mechanism of absorption and factors affecting it. 1. Interpret iron deficiency anemia on basis of given data and microscopic findings 2. Interpret folic acid and cobalamin in relation to anemias on given data and microscopic findings 3. Discuss biochemical role of pyridoxine and vitamin C & K in microcytic anemia	Medical Biochemistry Integrate with medicine **C2,C3**	Iron Metabolism/ RBCs
HL-B-004	Discuss the degradation of heme in macrophages of reticuloendothelial system 1. Describe the formation of bile pigments, their types and transport 2. Discuss the fate of bilirubin	Medical Biochemistry	Heme Degradation/ RBCs

HL-B-005	Discuss hyperbilirubinemias and their biochemical basis 1. Differentiate types of jaundice on basis of sign/symptoms and data 2. Evaluate the genetic basis of jaundice on the basis of lab investigations	C2,C3	Hyperbilirubinemias / RBCs/ Blood Groups
HL-B-006	Explain and interpret pedigree of single gene defect i.e. sickle cell anemia (Autosomal recessive) and Beta Thalassemia (X linked recessive)	C2,C3	Genetics
PATHOPHYSIOLOGY AND PHARMACOTHERAPEUTICS			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 2+5=07**	
		DISCIPLINE	**TOPIC**
HL-Ph-001	Describe the oral and parenteral iron preparations including their pharmacokinetics, uses, adverse effects and Iron Antidotes Describe Vitamin B12 preparations	Pharmacology & Therapeutics C1,C2	Anemia
HL-Pa-001	Define the terms: Hematopoietic growth factors, their name, mechanism of actions, uses and adverse effects Define and classify anemias according to underlying mechanism and Mean Corpuscular Volume/ Mean Corpuscular Hemoglobin (MCV/MCH) Discuss the causes and investigations of iron deficiency anemia and megaloblastic anemia Classify the benign and malignant disorders of WBCs Discuss the causes leading to reactive leukocytosis Interpretation of anemias on the basis of peripheral blood smear and bone marrow findings Classify bleeding disorders	Pathology C1,C2,C3	Blood Cells, Platelets and Blood Group

	Discuss first line laboratory investigations for bleeding disorders Describe the basic concept of blood grouping and acute hemolytic transfusion reaction		
DISEASE PREVENTION AND IMPACT			
CODE	**COMMUNITY MEDICINE & BEHAVIORAL SCIENCE**	**TOTAL HOURS = 05**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
HL-CM-01	Describe the nutritional aspects of iron deficiency anemia and psychological aspects of diseases	**C1,C2** Community Medicine and Public Health **C1,C2**	Anemia
HL-CM-02	Enlist most common blood borne diseases in Pakistan Describe the routes of spread of blood borne diseases		communicable diseases
HL-CM-03	Genetic counseling of parents		Genetic diseases
HL-BhS-01	Psychological Counselling of patients and their families	Behavioral Sciences **C3**	Counselling, informational care
HL-BhS-02	Identify and deal with the various psychosocial aspects of Hematopoietic System disorders (such as Sickle Cell Disease, Hemophilia, and Conditions of the Blood) on Individual, Family and Society.		Personal, Psychosocial and vocational issues
AGING			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 01**	
		DISCIPLINE	**TOPIC**
HL-Ag-01	Discuss the role of platelets in Platelet-Rich Plasma (PRP) treatment in old age (for skin, hairs and joints)	Biochemistry /Dermatology **C2,C3**	Platelet Rich Plasma Therapy
HL-Ag-02	Explain the role of glutathione in skin whitening		Glutathione

PRACTICAL

PRACTICAL

HISTOLOGY

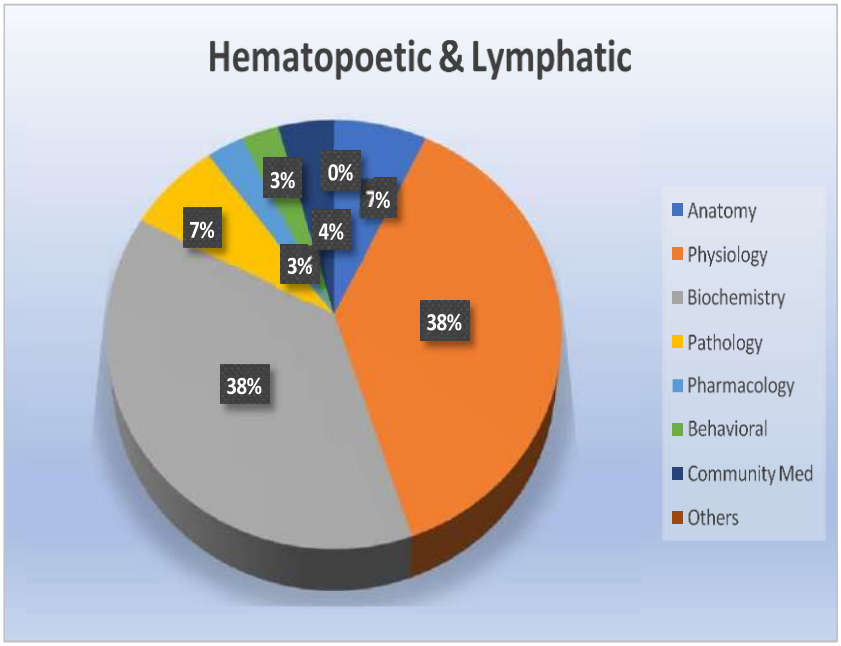
CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 02	
		DISCIPLINE	TOPIC
HL-A-003	Describe the light microscopic structure of Spleen, thymus, Lymph nodes, tonsils and Mucosa Associated Lymphoid Tissue (MALT) including appendix.	Histology	Histological features of lymph node, spleen & thymus

PHYSIOLOGY

CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 6	
		DISCIPLINE	TOPIC
HL-P-013	Interpret the report of Red Blood Cell Count, Hemoglobin concentration, Hematocrit and RBC Indices by Automated Cell Counter	Medical Physiology	Jaundice & Anemias/ RBCs/ Homeostasis
	Interpret the report of Total Leucocyte Count, Differential Leucocyte Count, & Platelet Count by Automated Cell Counter.		
HL-P-014	Determine Bleeding Time. Determine Clotting Time.		Bleeding/ Clotting time

BIOCHEMISTRY

CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 6	
		DISCIPLINE	TOPIC
HL-B-007	Estimate serum bilirubin and interpret types of jaundice on the basis of data.	Medical Biochemistry	Jaundice & Anemias
	Estimate serum ALP level		
	Estimate serum AST level		
	Estimate serum ALT level		



Module week	Recommended minimum hours
03	69

BLOCK 2

MODULE 3

MUSCULOSKELETAL & LOCOMOTION 1

MODULE RATIONALE

The musculoskeletal system comprises the bones, muscles, cartilage, tendons, ligaments, and other connective tissues that provide the framework, support, and movement of the body. The initial learning activities will help in understanding the normal structure, development, and normal physiological mechanisms of the organs of the system. This will help in better understanding the possible pathological conditions of the system, including common injuries, diseases, and disorders that affect it, followed by discussion on some important group of drugs used for treatment and/or prevention of these conditions (administration route, mechanism of action and side effects). The impact of musculoskeletal diseases on society and the effect of ageing on occurrence of musculoskeletal diseases will be discussed. Emphasis has been given to incorporate deranged laboratory and imaging findings into the clinical problem solving.

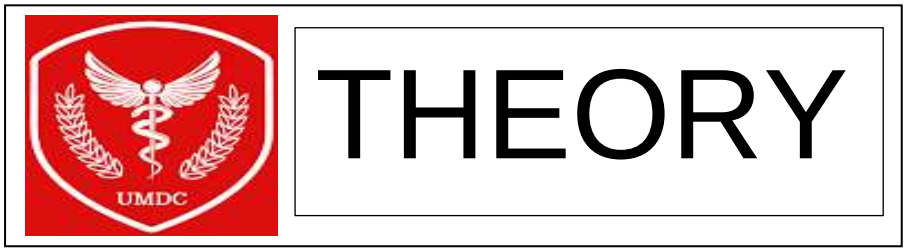
MODULE OUTCOMES

- Develop an understanding of the fundamental components of the musculoskeletal system.
- Explain the development of the structure & function of the musculoskeletal components of limbs, back & correlate it with organization and gross congenital anomalies of the limbs.
- Identify the anatomical features of bones, muscles & neurovascular components of the limbs with clinical correlation.
- Describe how injury and disease alter the Musculoskeletal structure & function.
- Integrate concepts relating to various metabolic processes, their disorders and relevant lab investigations in the study of human Musculoskeletal system.
- Describe the role of the limbs (upper/lower) in musculoskeletal support, stability, and movements.
- Describe the types, formation, stability, function & clinical significance of joints of the upper and lower limb.
- Describe the basic histology of muscle fibers including their molecular structure (Sarcomere).
- Explain the mechanism of excitation and contraction of skeletal and smooth muscles.
- Discuss the psychosocial impact of musculoskeletal diseases in society.

THEMES
• Pectoral Region & Axilla • Upper limb • Pelvic Girdle • Lower Limb
CLINICAL RELEVANCE
• Congenital anomalies of limb • Joint Dislocation • Fracture • Multiple Sclerosis, Astrocytoma, Alzheimer's Disease • Myopathy, Muscular Dystrophy

IMPLEMENTATION TORs

- The time calculation for completion of modules and blocks is based on 35 hours per week. Total hours of teaching, learning and formative/summative internal assessment to be completed in a year are 1200.
- The hours mentioned within each module are the mandatory minimum required. The rest of the hours are left to the discretion of the institution that can be used in teaching, learning and assessment as per decision of the institutional academic council.
- The content and the intended learning outcomes written are mandatory, to be taught, at the level required, as the end year assessment will be based on these.
- However, the level of cognition can be kept at a higher level by the institution.
- The Table of Specifications provided will be used for the three papers of the first professional examination. The same table of specifications should be used for the respective three block exams for internal assessment.


UMDC
THEORY

NORMAL STRUCTURE			
GROSS ANATOMY			
CODE	**SPECIFIC LEARNING OUTCOMES**	**TOTAL HOURS = 105**	
		DISCIPLINE	**TOPIC**
UPPER LIMB			
MS-A-001	Describe the topographical anatomy of Pectoral Region	Human Anatomy **C1,C2**	Pectoral Region
	Perform dissection of the Pectoral Region or use models to identify the key structures		
	Describe muscles of the Pectoral Region with their origin, insertion, nerve supply and actions.		
MS-A-002	Describe the cutaneous nerves. and Superficial veins of the Upper Limb.	Human Anatomy **C1,C2**	Dermatomes and cutaneious innervation of Upper Limb
	Describe the extent, attachments, and structures passing through Clavipectoral Fascia	Human Anatomy **C1,C2**	
MS-A-003	Define the boundaries of auscultation and state its clinical significance	Integrate with Medicine **C3**	Pectoral region & Back
	Describe the osteology of the bones in pectoral region. Enumerate the superficial muscles of back, connecting shoulder girdle with vertebral column. Describe the 1. Attachments 2. Nerve supply Actions of Trapezius, Latissimus Dorsi, Rhomboid major and minor. Mention the neurovascular supply of pectoral region and Correlate with important clinical conditions. Describe superficial muscles of the back with them origin, insertion, nerve supply and actions.	Human Anatomy **C1,C2,C3**	
MS-A-004	Describe the Osteology of Clavicle		

	(Morphological features, side determination, attachments, ossification)	Human Anatomy C1,C2,C3	Bones of Upper Limb: Clavicle & Scapula
	Describe the correlates functions of Clavicle (clavicle fracture, its role in terms of weight transmission of upper limb, compression of neurovascular structures)		
	Describe the Osteology of Scapula (morphological features, attachments, ossification)		
	Determine the side and identify the landmarks of scapula		
	Describe the movements of Scapula associated with movements of Shoulder Girdle		
	Tabulate the muscles of scapular region and give their attachments, nerve supply and action		
	Tabulate the attachments, origin, insertion, innervation, and actions of Anterior Axio-appendicular Muscles		
MS-A-005	Describe the Sternoclavicular Joint in terms of articulating surfaces, ligaments, articular disc, nerve supply.	Human Anatomy C1,C2	Bones of thorax, Joints of Upper Limb: Sternoclavicular Joint
MS-A-006	Develop clear concepts of the topographical anatomy of Axilla and its contents	Human Anatomy C2,C3	Axila
	Describe the boundaries of Axilla. (Identification of muscles forming the boundaries of axilla)		
	List the contents of Axilla		
	Perform dissection/ Identify the Axilla and its contents		
	Describe Axillary Artery with reference to its 3 parts – their relations, branches, and anastomoses		
	Describe the formation, tributaries, and drainage of Axillary Vein	Human Anatomy C1,C2,C3	
	Identify and demonstrate the course/ relation and branches/tributaries of axillary vessels		
	Describe the Axillary Lymph Nodes in terms of location, grouping, areas of drainage and clinical significance		

	Describe the course, relations, root value and distribution of Axillary nerve. Describe the boundaries and contents of quadrangular space.		
MS-A-007	Describe the Osteology of Humerus (Side Determination, morphological features, attachments, ossification)	Human Anatomy **C2,C3**	Bones of upper limb: Humerus
MS-A-008	Describe the Shoulder Joint under the following headings: Articulation, Type/ Variety, Capsule, Ligaments, Innervation, Blood supply, Movements.		Joints of Upper Limb: Shoulder Joint
	Describe the 3 parts of Deltoid Muscle and correlate them with its unique functions. Explain its role in abduction of shoulder joint. Explain mechanism of Abduction of arm		
	Identify and demonstrate the movements of scapula and shoulder joint.		
	Draw and label the arterial anastomosis around shoulder joint		
	Describe, in detail, the Scapula-Humeral Mechanism in relation to movement of abduction. Discuss important clinical conditions		
MS-A-009	Describe Rotator Cuff Muscles, state their Anatomical significance and explain Rotator Cuff Tendinitis	Human Anatomy **C2,C3**	Rotator Cuff
	Clinical correlates of shoulder joint. (shoulder joint stability, dislocation and shoulder pain)	Integrate with Surgery **C3**	
MS-A-010	Describe the formation of Brachial Plexus; Infra and Supraclavicular parts. Discuss Brachial plexus injuries	Human Anatomy **C2,C3**	Nerves of Upper Limb
	Demonstrate and identify the formation of brachial plexus and its branches		
	List the branches of brachial plexus and give their areas of distribution and muscles they innervate		

	Enlist and tabulate the muscles of anterior compartment of arm with their attachments, nerve supply and action. Identify & Describe Musculocutaneous Nerve in terms of its Origin, Course, Termination, Relations, Branches, and distribution. Describe and illustrate the cutaneous innervation of the arm.		
MS-A-011	Describe the Brachial Artery in terms of its course, relations, branches, and distribution	Human Anatomy **C2,C3**	Blood supply of arm
	Tabulate the attachments, innervation, and actions of Triceps brachii as a muscle of Posterior Fascial Compartment of Arm		
	Identify & Describe the Profunda Brachii Artery giving its course, relations, branches, and distribution		
MS-A-012	Describe Cubital Fossa with emphasis on its boundaries, contents, and clinical significance		Muscles of Arm
	Demonstrate surface marking of superficial veins of arm and forearm for IV (Intra venous) injections		
	Demonstrate biceps brachi reflex, triceps reflex and brachioradialis reflex		
MS-A-013	Determine the side and identify the landmarks of radius and ulna. Describe the Osteology of Radius (Side Determination, morphological features, attachments).	Human Anatomy **C1,C2**	Bones of Forearm
	Describe the Osteology of Ulna (Side Determination, morphological features, attachments).		
MS-A-014	Describe osseofascial compartment of forearm. Tabulate flexor and pronators muscles of forearm, their attachments, actions and nerve supply. Describe the action of paradox with examples	Human Anatomy **C1,C2**	Muscle of Anterior/Flexor Compartment of Forearm
MS-A-015	Tabulate the attachments, innervation, and actions of Extensor Muscles of the Forearm		Muscle of Lateral and Posterior/ Extensor
	Tabulate the attachments, innervation, and actions of Lateral Muscles of the Forearm		

			Compartment of Forearm
MS-A-016	Identify the muscles and nerves of flexor and extensor compartments of forearm		Nerves of Forearm
	Describe and illustrate the cutaneous innervation of the Forearm		
	Describe ulnar, median and radial nerves in fore arm.		
MS-A-017	Describe the Origin, Course, Relations, and branches of Ulnar and radial Artery in Forearm Describe the Origin, Course, Relations and list the tributaries of veins of Forearm. Surface marking of Brachial artery, Cephalic, Median cubital, Basilic Vein, Radial & Ulnar arteries, anterior &posterior interosseous artery		Blood supply of forearm
MS-A-018	Identify the Extensor & Flexor Retinacula and describe their attachments and relations	Human Anatomy C1,C2	Retinacula of Forearm
MS-A-019	Demonstrate the formation of carpal tunnel and identify the contents Describe Carpel Tunnel Syndrome	Human Anatomy- Integrate with surgery C2,C3	Carpal tunnel syndrome
	Describe the features, attachments, relations and structures passing under Flexor Retinaculum		
MS-A-020	Describe the Origin, Course, Relations, and branches of Ulnar Artery in Forearm	Human Anatomy C1,C2	Forearm: Blood supply and Venous drainage
	Describe the Origin, Course, Relations and list the tributaries of veins of Forearm		
	Surface marking of Brachial artery, Cephalic, Median cubital, Basilic Vein, Radial & Ulnar arteries, anterior &posterior interosseous artery		
	Describe the Elbow Joint in terms of articular surfaces, type, variety, ligaments, muscles producing movements, blood supply {Anastomosis around elbow joint}, nerve supply and radiological imaging.	Human Anatomy C1,C2	Joints of Upper Limbs: Elbow Joint

MS-A-021	Describe Carrying Angle and justify its importance in limb movement	Integrate with Surgery C2	
MS-A-022	Describe the Radioulnar Joints in terms of articular surfaces, type, variety, ligaments, muscles producing movements, nerve supply and radiological imaging. Describe the wrist joint in terms of articular surfaces, type, variety, ligaments, muscles producing movements, nerve supply and radiological imaging. Demonstrate mechanisms of movements of Pronation & Supination	Human Anatomy C2,C3	Joints of Upper Limbs: Radioulnar Joint
MS-A-023	Describe the features of Interosseous Membrane with structures that pierce through it	Human Anatomy C2	Interosseous membrane
MS-A-024	Describe the features and explain the importance of Fibrous Flexor Sheaths, synovial flexor sheaths and extensor expansion	Human Anatomy C2	Fascia & Muscles of Hand
MS-A-025	Demonstrate the attachments and actions of the muscles of hand Identify the muscles and neurovasculature of palm. Explain the morphology and tabulate the attachments, innervation and actions of intrinsic muscles of hand. Explain the fascial spaces of palm and pulp space of fingers Describe Dupuytren contracture, mallet finger and buttonaire deformity. Describe hand as a functional unit. (position of hand, movement of thumb and fingers while performing different functions) Discuss cupping of hand and fist formation.	Human Anatomy C1,C2,C3	Hand & Actions of Muscles of Upper Limb as a Functional Unit
MS-A-026	Draw the Radial Artery course, relation and termination in hand with its clinical significance in the region	Human Anatomy C2,C3	Blood vessels of forearm and hand

	Describe the Ulnar Artery's Course, relation and termination in hand with its clinical significance in the region		
	Describe the formation, branches, and areas of distribution of Superficial and Deep Palmar Arch		
MS-A-027	Describe the course, relations and branches of Ulnar, Median and Radial Nerves in the Hand	Human Anatomy **C2**	Nerves of forearm and hand
MS-A-028	Describe the First Carpometacarpal Joint in terms of; Type, Variety, Articular Surfaces, Ligaments, Relations, Blood Supply, Innervation, movements.	Human Anatomy **C2**	Joints of Hands
	Demonstrate the movements of the 1st carpometacarpal joint		
	Describe the Metacarpophalangeal & interpharyngeal Joints in terms of; Type, Variety, Articular Surfaces, Ligaments, Relations, Blood Supply, Innervation & Movements		
MS-A-029	Palpate the arteries of the upper limb on a subject	Integrate with Medicine **C2**	Skills
	Identify the topographical features of upper limb in a cross-sectional model/ specimen.	Integrate with Radiology **C1,C2**	
	Demonstrate and identify the anatomical landmarks of upper limb on radiographs/ CT (Computed tomography)/ MRI (Magnetic resonance imaging)		
	Mark the anatomical landmarks and surface marking on a subject/ simulated model	Human Anatomy **C1,C2**	
LOWER LIMB			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
MS-A-030	Draw and label the Parts of the hip bone, with its attachments.	Human Anatomy	Hip Bone
	Describe the parts, attachments of hip bone		
	Identify the parts and bony features of the hip bone, with its attachments, important relations		
	Demonstrate the side determination of hip bone, its bony features, attachments		

MS-A-031	Describe the parts, attachments, side determination of femur	C1,C2 Human Anatomy C3	Femur
	Identify the parts and bony features of the femur, with its attachments.		
	Demonstrate the side determination of femur, its bony features, attachments, and important relations (correlate these with fractures)		
	Describe coxa Vara and coxa valga and their clinical significance		
MS-A-032	Describe the extent, attachments, and modifications of Fascia Lata	Human Anatomy C1,C2	Fascia Lata
	Demonstrate the attachment of fascia Lata, iliotibial tract		
MS-A-033	Describe the cutaneous nerves and vessels of thigh	Human Anatomy C1,C2,C3	Neurovascular Supply of thigh
	Draw and label the cutaneous nerve supply of thigh and lumbar plexus.		
	Describe the formation, course, relations, tributaries, and termination of the superficial veins		
	Explain the anatomical justification of venesection, varicose veins, and saphenous venous grafts		
	Describe the lymphatic drainage of the region with special emphasis on afferent and efferent of inguinal lymph nodes		
	Identify the superficial and deep lymph nodes		
	Explain the anatomical justification for enlargement of inguinal lymph nodes		
MS-A-034	Describe and identify the Boundaries and contents of femoral triangle	Human Anatomy C1,C2	Femoral Triangle & Canal
	Draw and label the Boundaries and contents of femoral triangle		
	Identify the femoral sheath with its compartments		
	Describe the formation of femoral sheath and its significance		

	Describe the formation of femoral canal and its contents and significance		
	Describe the formation and significance of femoral ring		
	Compare and contrast the anatomical features of femoral and inguinal hernias	Integrate with Surgery **C3**	
MS-A-035	Tabulate the muscles of anterior compartment of thigh with their attachments, nerve supply and actions	Human Anatomy **C1,C2**	Muscles of Anterior Compartment of Thigh
	Demonstrate and identify the muscles of anterior compartment of thigh with their proximal and distal attachments		
	Demonstrate the actions of muscles of anterior compartment of thigh		
	Explain the anatomical basis of psoas abscess	Integrate with Surgery **C2**	
MS-A-036	Identify and demonstrate the nerves and vessels of anterior compartment of thigh along with their branches	Human Anatomy **C1,C2**	Neurovascular supply of Anterior Compartment of Thigh
	Describe the origin, course, relations, branches, distribution, and termination of femoral artery		
	Describe the origin, course, relations, tributaries, area of drainage and termination of femoral vein		
	Describe the origin, course, relations, branches, distribution, and termination of femoral nerve		
	Tabulate the muscles of anterior compartment of thigh with their attachments, nerve supply and actions.		
MS-A-037	Describe the formation, boundaries, contents of adductor canal	Human Anatomy **C1,C2**	Adductor Canal
	Identify and demonstrate the boundaries and contents of adductor canal		
MS-A-038	Describe Muscles of medial compartment of thigh with their proximal and distal attachments, innervation and actions		Muscles of Medial Compartment of Thigh

	Identify the muscles of medial compartment of thigh with their proximal and distal attachments		
	Demonstrate the actions of the muscles of the compartment on self/ subject		
MS-A-039	Describe the origin, course, relations, branches/ tributaries, distribution, and termination of neurovascular structures of medial compartment of thigh		Neurovascular supply of Medial Compartment of Thigh
	Identify the nerves and vessels of medial compartment of thigh along with their branches		
	Describe and identify the lumbar and sacral plexus and its branches supplying the lower limb		
	Describe the cutaneous nerve supply and lymphatics of the region		
MS-A-040	List the structures passing through the greater and lesser sciatic foramen.	Human Anatomy **C1,C2**	Gluteal Region
	Describe the muscles of gluteal region with their proximal and distal attachments, innervation, and actions		
	Identify the muscles of gluteal region with their proximal and distal attachments		
	Describe the origin, course, relations, branches/ tributaries, distribution, and termination of neurovascular structures of gluteal region		
	Demonstrate the actions of the muscles of gluteal region		
	Explain the anatomical basis of the consequences of wrongly placed gluteal intramuscular injections Damage to Gluteus medius & minimus due to poliomyelitis	Integrate with Medicine **C1,C2**	
	Demonstrate and identify the origin, course, relations, branches/tributaries and termination of nerves and vessels of gluteal region	Human Anatomy **C1,C2**	
MS-A-041	Describe the Attachments of muscles of posterior compartment of thigh with the innervation and action	Human Anatomy	Muscles of Posterior

	Identify the muscles of posterior compartment of thigh with their proximal and distal attachments	**C1,C2**	Compartment of Thigh
	Demonstrate the actions of muscles of posterior compartment of thigh		
	Describe the anatomical basis of signs and symptoms of sciatica.	Integrate with Surgery **C3**	
MS-A-042	Describe the origin, course, relations, branches, distribution, and termination of Profunda femoris artery	Human Anatomy **C1,C2**	Blood supply of Posterior compartment thigh
	Describe blood supply on back of thigh		
MS-A-043	Describe the origin, course, relations, branches, distribution, and termination of sciatic nerve	Human Anatomy **C1,C2**	Sciatic Nerve
	Describe the anatomical basis, signs and symptoms of compression of or injury to sciatic nerve	Integrate with Surgery **C2**	
MS-A-044	Describe the hip joint with its type, articulations, ligaments, stabilizing factors		Hip Joint
	Movements, and neuro-vascular supply with clinical significance.	Human Anatomy **C2,C3**	
	Perform the movements of hip joint at various angles and be able to describe the muscles producing the movement. Discuss important associated clinical conditions (Hip dislocation, Arthritis, Hip joint stability and Trendelenburg sign) movements, and neuro- vascular supply with clinical significance.		
MS-A-045	Describe the Boundaries and contents of popliteal fossa. Discuss clinical correlates (Popliteal aneurysm, Palpation of Popliteal artery, semi membranous bursa swelling and Baker's cyst	Human Anatomy **C1,C2**	Popliteal Fossa
	Draw and label boundaries and contents of popliteal fossa		
	Identify the boundaries and contents of popliteal fossa		

	Describe the origin, course, relations, branches/tributaries, distribution and termination of popliteal artery and vein		
MS-A-046	Describe parts of tibia and fibula, with their attachments, important relations and side determination	Human Anatomy C1,C2	Knee Joint
	Identify the parts and bony features of the tibia & fibula, their bony features, attachments, important relations.		
	Draw and label Parts of patella with its attachments		
	Describe features of patella, and name the factor responsible for stabilizing Patella		
	Describe the knee joint with its type, articulations, ligaments, movements, and neuro-vascular supply		
	Explain the mechanism of locking and unlocking of knee joint with the foot on ground and off the ground Describe the attachments and role of popliteus in locking and unlocking of the knee joint		
	Describe the factors responsible for stability of knee joint. Discuss important associated clinical conditions.		
MS-A-047	Describe the Muscles of anterior, lateral, and posterior compartments of leg with their proximal & distal attachments, innervation, and actions	Human Anatomy C1,C2,C3	Muscles of leg
	Identify the muscles of anterior, lateral, and posterior compartments of leg with their proximal and distal attachments		Neurovascular supply of Leg
MS-A-048	Describe the origin, course, relations, branches/tributaries and termination of nerves and vessels of anterior, lateral, and posterior compartments of leg- Compartment Syndrome, Foot Drop		Neurovascular supply of Leg
	Describe the cutaneous nerves and veins of leg.		

	Draw and label the cutaneous nerve supply and dermatomes of leg		
MS-A-049	Identify the extensor, flexor, and peroneal retinacula and demonstrate the structures related to them		Flexor, Extensor, and peroneal Reticula
	Describe the attachments, relations, and structures passing under cover of, extensor, peroneal, and flexor retinacula		
	Identify and demonstrate the nerves and vessels of anterior, lateral, and posterior compartments of leg along with their branches		
	Describe the formation of noncalcareous (Achilles tendon)		
MS-A-050	Describe the articulations, muscles and nerve supply and movements at Tibiofibular joints	Human Anatomy **C2**	Tibio-fibular Joint
MS-A-051	Describe the ankle joint with its type, articulations, ligaments, movements, and nerve supply	Human Anatomy **C1,C2**	Ankle Joint
	Describe the factors stabilizing the ankle joint. Discuss important associated clinical conditions.		
	Identify and demonstrate the articulating surfaces and ligaments of ankle joint		
MS-A-052	Describe the formation, attachments, and clinical significance of plantar aponeurosis	Human AnatomY **C3**	Plantar Fascia
	Explain the anatomical basis of the signs and symptoms of plantar fasciitis.	Integrate with Orthopedics **C3**	
MS-A-053	Identify the parts and bony features, attachments, and important relations of the articulated foot	Human Anatomy **C2**	Muscles of foot
	Describe the muscles of the dorsum and sole of foot with their proximal & distal attachments, innervation and actions emphasizing the role of interossei and lumbricals.		
	Draw and label the muscles of the layers of sole of Foot. Demonstrate and identify the muscles and tendons with their proximal and distal attachments in the sole		

MS-A-054	Describe the interphalangeal, subtalar and midtarsal joints with their types, articulation, movements, ligaments.	Human Anatomy **C2**	Small joints of foot
MS-A-055	Describe the formation, components, stabilizing and maintaining factors of the arches of foot	Integrate with Orthopedics **C3**	Arches of foot
	Describe the clinical significance of arches of foot with respect to flat foot, claw foot.		
MS-A-056	Describe the fibrous flexor sheaths, extensor expansions and synovial flexor sheaths	Human Anatomy **C2**	Retinacula of foot
MS-A-057	Describe the origin, course, relations, branches/tributaries, distribution, and termination of plantar vessels	Human Anatomy **C1,C2,C3**	Neurovascular supply of foot
	Identify the nerves and vessels on the foot along with their branches		
	Describe the cutaneous nerves of foot		
	Draw and label the cutaneous nerve supply and dermatomes of foot		
	Identify the nerves and vessels in the sole of foot along with their branches		
	Describe the palpation of dorsalis pedis artery &explain the clinical significance of dorsalis pedis artery		
MS-A-058	Describe the surface anatomy, course, relations, tributaries, and communications of the superficial veins of the lower limb	Human Anatomy **C2**	Arterial and Venous drainage of lower limb
	Draw a concept map of the superficial veins of lower limb		
	List the factors favoring venous return of the lower limb		
MS-A-059	Explain the anatomical basis of the formation, and signs and symptoms of deep venous thrombosis	Integrate with Surgery **C3**	Human Gait
	Discuss Clinical correlations of Lower Limb Arteries (palpation of femoral, popliteal, posterior tibial &	Integrate with Medicine **C3**	

	dorsalis pedis arteries, collateral circulation, intermittent claudication, occlusive arterial disease)		
MS-A-060	Draw a concept map of the lymphatic drainage of lower limb	Human Anatomy **C2**	Lymphatic drainage of lower limb
MS-A-061	Draw and label the cutaneous nerves & dermatomes of the lower limb Discuss clinical correlates of Lower limb nerves (Femoral nerve injury, Sciatic Nerve injury, Common fibular, tibial & obturator nerve injury) Describe the anatomical basis of knee jerk, ankle jerk, and plantar reflex	Human Anatomy **C1,C2**	Cutaneous dermatomes & nerve supply of lower limb
MS-A-062	Demonstrate the surface marking of nerves and vessels of lower limb		Topographical and radiological anatomy of lower limb
	Demonstrate the surface marking of bony landmarks of lower limb		
	Identify the topographical features of lower limb in a cross-sectional model		
	Demonstrate and identify the features of bones and joints of lower limb on radiograph/ CT scan/ MRI	Integrate with Radiology **C1,C2**	
MS-A-063	Describe the common fractures of the following bone with the risk factors, clinical presentations, and management: 1. Clavicle 2. Humerus 3. Radius 4. Ulna 5. Small bones of hand 6. Hip bone 7. Femur 8. Tibia 9. Fibula 10. Small bones of foot	Orthopedics and trauma **C3**	Bone Fracture

MS-A-064	Describe the dislocations of the following joints with the risk factors and clinical presentations, and brief management: Shoulder joint 1. Elbow joint 2. Interphalangeal joint of hand 3. Hip joint 4. Knee joint 5.Ankle joint	Orthopedics and trauma **C3**	Joint Dislocation
EMBRYOLOGY & POST-NATAL DEVELOPMENT			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 06**	
		DISCIPLINE	**TOPIC**
MS-A-065	Describe the development of skeletal muscle and innervation of axial skeletal Muscles-developmental basis of myotome Briefly discuss the development of cardiac and smooth muscle (Detail to be covered in respective modules later).	Human Embryology **C1,C2**	Development of Muscles
MS-A-066	Describe the process of limb development and limb growth	Human Embryology **C1,C2**	Development of Limb
MS-A-067	Describe the embryological basis of cutaneous innervation of limb Describe the embryological basis of blood supply of limbs and concept of axial artery	Human Embryology **C1C,2**	Development of Nerve supply of limbs
MS-A-068	Describe the embryological basis of congenital anomalies related to muscular system. Describe the clinical presentations and embryological basis of; i. Amelia ii. Meromelia iii. Phocomelia	Human Embryology **C1,C2** Integrate with Paedriatics **C3**	Congenital anomalies of limbs

	iv. Cleft Hand and Foot v. Polydactyly, Brachydactyly, Syndactyly i. Congenital club foot		
MS-A-069	Describe the developmental process of cartilage and bone Describe the process of histogenesis of cartilage and bone	Human Embryology **C2**	Development of Cartilage
MICROSCOPIC ANATOMY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 06**	
		DISCIPLINE	**TOPIC**
MS-A-070	Describe the microscopic structure and ultramicroscopic structure of skeletal muscle	Histology **C2**	Histology of Muscles
	Explain the basis of myasthenia gravis.	Integrate with Medicine **C2**	
	Describe the microscopic and ultramicroscopic structure of cardiac muscle	Histology **C1,C2**	
	Describe the microscopic and ultramicroscopic structure of smooth muscle		
	Compare and contrast the histological features of three types of muscle tissue		
MS-A-071	Describe Myosatellite Cells & their role in regeneration of muscle, hyperplasia, and hypertrophy of muscle fiber	Histology/ Integrate with Pathology **C2**	Functional Histology
	Explain the histopathological basis of leiomyoma	Histopathology **C2**	
MS-A-072	Describe the light and electron microscopic structure of bone cells Describe the light and electron microscopic structure of compact and spongy bone	Histology **C1,C2**	Histology of Osseous tissue
	Describe the histological justification for osteoporosis, Osteopetrosis	Integrate with Pathology **C3**	
	Describe the histological basis for bone repair after fractures.		

MS-A-073	Compare and contrast the microscopic features of compact and spongy bone	Histology **C1,C2**	Histology of Bone
	Explain the characteristic features of ossification (Intramembranous & Endochondral ossification)		
	Describe the zones seen in an epiphyseal growth plate		
MS-A-074	Describe the metabolic role of bone -	Integrate with Medicine **C2**	Functional Histology of Bone
	Describe the clinical presentation of osteoporosis, osteopenia	Integrate with Orthopedics **C3**	
MS-A-075	Describe the microscopic and ultramicroscopic structure of all types of cartilage	Histology **C1,C2**	Histology of Cartilage
	Compare and contrast the structure of cartilage and bone matrix		
	Tabulate the differences between three types of cartilage		
MS-A-076	Describe the histological basis for bone & Cartilage growth and repair	Histology **C2**	Mechanism of Bone growth

NORMAL FUNCTION

MEDICAL PHYSIOLOGY

CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 32	
		DISCIPLINE	TOPIC
MS-P-001	Explain the Physiological basis of membrane potential	Medical Physiology **C1,C2**	Diffusion / Equilibrium Potentials
	Explain diffusion potentials of Na & K		
MS-P-002	Define Nernst potential		Nernst potential
	Explain Physiological Basis of Nernst potential		
	Write the Nernst equation.		
	Calculate Nernst potential for Na & K		
	Explain the effects of altering the concentration of Na+, K+, Ca on the equilibrium potential for that ion		
MS-P-003	Describe the normal distribution of Na+, K+, Ca and Cl- across the cell membrane		Goldman Equation

	Explain physiological basis of Goldman equation		
	Clarify the role of Goldman equation in generation of Resting Membrane Potential (RMP).		
MS-P-004	Describe the Physiological basis of generation of RMP.		Resting Membrane Potential in Neurons
	Explain the effects of hyperkalemia and Hypokalemia on the Resting Membrane Potential (RMP)		
	Name the membrane stabilizers		
	Explain the physiological basis of action of Local Anesthetics.	Medical Physiology Integrate with Anesthesiology **C2**	
MS-P-005	Describe the Physiological anatomy of Neurons	Medical Physiology C**1,C2**	Neurons
	Discuss the axonal transport		
	Enlist & give functions of Neuroglial cells		
	Explain process of myelination in Central Nervous System (CNS) & Peripheral Nervous System (PNS)		
MS-P-006	Classify neurons functionally.		Classification of Neurons & Fibers
	Classify nerve fibers according to Erlanger & Gasser Classification		
	Enlist properties of nerve fibers.		
MS-P-007	Discuss Components of ANS (Autonomic nervous system) Explain the physiological anatomy of sympathetic and parasympathetic nervous system Describe the types of adrenergic and cholinergic receptors and their functions Explain the effects of sympathetic and parasympathetic on various organs/ system of body		Autonomic nervous system
MS-P-008	Define Action Potential		Action Potential of Neurons
	Enlist the properties of action potential		
	Describe the ionic basis of an action potential.		
	Explain the phases of action potential.		
	Explain the effects of hyperkalemia and Hypokalemia on the action potential.		

	Draw monophasic action potential.		
	Explain absolute and relative refractory period		
MS-P-009	Explain the role of other ions in action potential.		Role of other ions in action potential
	Elaborate the effect of hypocalcemia on neuron excitability.		
MS-P-010	Explain Physiological basis& properties of Graded potential		Local / Graded potentials
	Draw & explain Physiological basis & properties of compound action potential.		
	Contrast between action potential and graded potential		
	Describe the ionic basis of excitatory Post Synaptic Potential (EPSP), Inhibitory Post Synaptic Potential (IPSP), End Plate Potential (EPP).	Medical Physiology C1,C2	
MS-P-011	Classify and explain Physiological basis of different types of synapses		Synapse
	Elaborate how signal transmission takes place across chemical synapse		
MS-P-012	Explain the mechanism of conduction of Nerve impulse in myelinated and unmyelinated nerve fibers.		Conduction of Nerve Impulse
	Elaborate significance of saltatory conduction		
MS-P-013	Enlist the types of nerve injury		Nerve Degeneration
	Explain Wallerian degeneration.		
	Describe the process of regeneration of nerve fiber.		
	Describe the causes, features & pathophysiology of Multiple sclerosis, GB syndrome.	Medical Physiology Integrate with Medicine C3	
MS-P-014	Discuss the physiological anatomy of skeletal muscles.	Medical Physiology C 1,C2	Skeletal muscle
	Discuss the physiological anatomy of skeletal, smooth, and cardiac muscles.		
	Describe the structure of Sarcomere		
MS-P-015	Differentiate between isometric and isotonic contraction by giving examples.		

	Compare the fast and slow muscle fibers.		Characteristics of whole muscle contraction
MS-P-016	Explain the mechanism of summation and Tetanization.	Medical Physiology **C3**	Mechanics of muscle contraction
	Describe staircase effect/Treppe phenomena		
	Discuss the mechanism of skeletal muscle fatigue.		
	Explain the remodeling of skeletal muscle to match the function. Describe the development of macro motor units in poliomyelitis.		
	Explain the physiological basis of rigor mortis	Medical Physiology Integrate with Forensic Medicine **C3**	
MS-P-017	Describe the physiological anatomy of Neuro Muscular Junction (NMJ)	Medical Physiology **C1,C2**	Neuromuscular junction
	Mechanism of Neuromuscular transmission & generation of End Plate Potential		
	Explain features, pathophysiology & treatment of myasthenia Gravis	Medical Physiology Integrate with Medicine **C3**	
	Describe the enhancers or blockers of neuromuscular transmission at the neuromuscular junction.	Medical Physiology **C2**	
	Discuss the steps/ events of excitation contraction coupling in skeletal muscle.	Medical Physiology **C2**	
MS-P-018	Differentiate between types of smooth muscles.	Medical Physiology **C1,C2**	Smooth Muscle
	Describe mechanism of smooth muscle contraction in comparison to skeletal muscle.		
	Explain the physiological anatomy of neuromuscular junction of smooth muscle		
	Explain the excitatory and inhibitory transmitters secreted at Neuro Muscular Junction (NMJ) of smooth muscles.		
	Explain the depolarization of multiunit smooth muscles without action potentials.		

	Explain the local tissue factors and hormones that can cause smooth muscle contraction without action potential.		
	Explain the regulation of smooth muscle contraction by calcium ions.		
	Explain membrane potential and action potentials in smooth muscles.		
	Explain the phenomena of stress relaxation and reverse stress relaxation in smooth muscles.		
	Explain the LATCH mechanism		
	Describe the significance of LATCH mechanism.		
	Explain the nervous and hormonal control of Smooth Muscle Contraction.		
MEDICAL BIOCHEMISTRY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 30**	
		DISCIPLINE	**TOPIC**
MS-B-001	Classify carbohydrates along with the structure and biomedical importance of each class	Biochemistry **C1,C2**	Classification carbohydrates
MS-B-002	Explain the isomerization of carbohydrates	Biochemistry **C1,C2**	Carbohydrates
MS-B-003	Describe the physical and chemical properties of carbohydrates	Biochemistry **C1,C2**	Extracellular matrix
	Differentiate between proteoglycan and glycoproteins		
	Describe the components of extracellular matrix: 1. Describe structure, functions and clinical significance of glycosaminoglycans 2. Discuss structure and functions of Fibrous proteins (collagen and Elastin) 3. Interpret diseases associated with them on basis of sign/symptoms and data 4. Interpret the importance of vitamin C in collagen synthesis 5. Describe sources, active form, functions and deficiency diseases of vitamin C	Biochemistry **C1,C2**	

	1. Identify the defects in collagen synthesis based on given data (Ostegenesis Imperfecta)		
	Interpret genetic basis of Duchene muscular dystrophy	Biochemistry C1,C2	
	Explain the transport and uptake of glucose in cells, steps of glycolysis and citric acid cycle along with enzymes, co enzymes and cofactors involved		
MS-B-004	Discuss the provision of energy to the muscles and cells through glycolytic pathway and TCA cycle	Biochemistry C2	Glycolysis and Tricarboxylic acid cycle (TCA)
MS-B-005	Describe the digestion and absorption of proteins Discuss the uptake of amino acids by cells Define amino acid pool and nitrogen balance. Explain ATP -dependent & ATP independent systems of protein degradation.	Biochemistry C1,C2	Protein Digestion & Transport across cell
MS-B-006	Explain following reactions with enzymes involved in it: 1. Transamination 2. Deamination decarboxylation 3. Deamidation 4. Trans deamination. 1. Oxidative deamination.	Biochemistry C1,C2	Reactions involve in catabolism
MS-B-007	Explain the role of pyridoxal phosphate, glutamate, glutamine, alanine and discuss the mechanism of transport of ammonia to liver	Biochemistry C1,C2	Transportation of ammonia to liver
MS-B-008	Illustrate steps of urea cycle with enzymes and its importance Discuss ammonia intoxication	Biochemistry C3	Urea cycle
MS-B-009	Interpret different types of hyperammonemia on basis of sign symptoms and data		
MS-B-010	Discuss the metabolism of aliphatic, aromatic, branched chain, sulfur containing, hydroxyl group containing amino acids with the products formed and enzymes and vitamins involved in them	Biochemistry	Protein metabolism

MS-B-011	Interpret the following on basis of given data: 1. Phenylketonuria 2. Tyrosinemia 3. Albinism 4. Homocystinuria 5. Maple syrup urine disease 1. Alkaptonuria	Biochemistry **C3**	Inborn errors of amino acid metabolism
PATHOPHYSIOLOGY AND PHARMACOTHERAPEUTICS			
THEORY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 4+7=11**	
		DISCIPLINE	**TOPIC**
MS-Ph-001	Explain the mechanism by which drugs can stimulate NMJ.	Pharmacology & Therapeutics **C1,C2,C3**	Drugs acting on Neuromuscular Junction (NMJ)
	Explain the mechanism by which drugs can block NMJ.		
MS-Ph-002	Discuss briefly the therapeutic effect of drugs used in myasthenia gravis.		Drugs in Myasthenia Gravis
MS-Ph-003	Discuss briefly the therapeutic effect of drugs used as local anesthetics.		Local Anesthetics
MS-Pa-001	Describe the hyperplasia, hypertrophy, and atrophy of muscle fiber	Pathology **C1,C2,C3**	Muscle remodeling
	Explain the histopathological basis of leiomyoma		
MS-Pa-002	Describe the histological basis of Duchenne Muscular Dystrophy.		Diseases of Muscle
MS-Pa-003	Describe the clinical presentation and histological justification for osteoporosis, osteopetrosis		Diseases of Bone
	Briefly enlist the steps of repair.		
MS-Pa-004	Describe the histological basis for bone repair after fracture and cartilage growth and repair		Disease of Cartilage
AGING			
THEORY			
CODE	**SPECIFIC LEARNING OUTCOMES**	**TOTAL HOURS = 04**	

		DISCIPLINE	TOPIC
MS-Ag-01	Discuss the effect of age on bone fragility and its implications with management.	Geriatrics/ Medicine/ Biochemistry C1,C2,C3	Bone
MS-Ag-02	Discuss the effect of age on loss of cartilage resilience and its implications and management		Cartilage
MS-Ag-03	Discuss the effect of age on Muscular strength and its implications and management		Muscle
MS-Ag-04	Explain the protective effect of estrogen (female sex hormone) on bone mineral density and relate it to increased prevalence of postmenopausal fractures in women.		Effect of estrogen on BMD
DISEASE PREVENTION AND IMPACT			
CODE	**COMMUNITY MEDICINE & BEHAVIORAL SCIENCE**	**TOTAL HOURS = 14+3=17**	
	SPECIFIC LEARNING OUTCOMES	**DISCIPLINE**	**TOPIC**
MS-CM-001	Explain causes of low back pain	Community Medicine and Public Health C2,C3	Back Pain
	Describe prevention of low back pain		
MS-CM-002	Describe work related musculoskeletal disorders addition with its burden/epidemiology		Work related Musculoskeletal disorders
	Identify risk factors of Musculoskeletal disorders MSD at workplace		
	Describe prevention of exposure to risk factors related to workplace		
MS-CM-003	Describe MSD related to mobile addition with its burden/epidemiology	Community Medicine and Public Health C2,C3	MSD related to mobile usage
	Describe MSD related to mobile usage (Text neck, Trigger thumb, DeQuervain Syndrome, Carpel Tunnel Syndrome) Identify risk factors related to MSD due to excessive mobile usage.		
	Describe the preventive strategies for mobile addiction-related MSD.		

MS-CM-004	Describe the application of ergonomics in MSD related to the above disorders.	Community Medicine and Public Health C2,C3	Ergonomics
MS-CM-005	Describe the concept of non-communicable Musculoskeletal diseases		Noncommunicable disease
MS-CM-006	Identify the risk factors in the community for Osteoporosis		Risk factor assessment of Musculoskeletal diseases
	Learn and apply interventions to prevent the risk factors for various musculoskeletal diseases in the community.		
MS-BhS-001	Identify and deal with the various psychosocial aspects of Musculoskeletal conditions (such as Osteoarthritis, Osteomyelitis, Rheumatoid arthritis, Gout, chronic back pain, psychosomatic complaints) and Neuromuscular conditions (Muscular dystrophy, Myasthenia Gravis, Sclerosis) on Individual, Family and Society	Behavioral Sciences C1,C2,C3	Psychosocial factors influencing chronic illnesses
MS-BhS-002	Identify the psychosocial risk factors as mediating factors between illness and its effect.		Psychosocial Impact of Disease and its management
	Discuss the role of psychological variables like coping, social support, and other health cognitions in mediating between illness and its effect.		

PRACTICAL

PRACTICAL

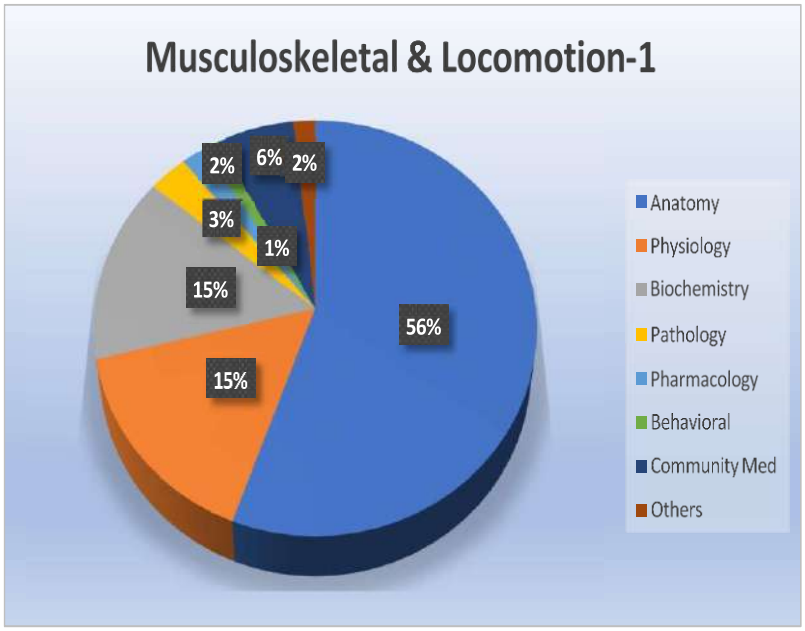
HISTOLOGY

CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 08	
		DISCIPLINE	TOPIC
MS-A-077	Draw and label the histology of skeletal muscle	Histology	Histology of Muscles
	Draw and label the histology of smooth muscle		
	Draw and label the histology of cardiac muscle		
MS-A-078	Draw and label the histological picture of compact bone	Histology	Histology of Bones
	Draw and label the histological picture of spongy bone		
MS-A-079	Draw and label the microscopic structure of hyaline cartilage	Histology	Histology of Cartilage
	Draw and label the microscopic structure of elastic cartilage		
	Draw and label the microscopic structure of fibro cartilage		

PHYSIOLOGY

CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS=02	
		DISCIPLINE	TOPIC
MS-P-019	Demonstrate and categorize the following movements: Pushing against the wall, Biceps curls, squats, yoga chair pose, standing on toes, running on an inclined treadmill, yoga tree pose, deadlift as isotonic and isometric skeletal muscle contraction.	Physiology	Locomotion
MS-P-020	Interpret the graph of local/action potential/compound action potential from the recording of nerve fibers, & nerve trunk.	Physiology	Nerve Fibers

MS-P-021	Interpret the graph of local/action potential from the recording of skeletal, & smooth muscles.	Physiology	Muscles
MS-P-022	Interpret the graph of frequency summation and tetanization	Physiology	
BIOCHEMISTRY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS=04**	
		DISCIPLINE	**TOPIC**
MS-B-012	Estimate total proteins by kit method.	Biochemistry	Total proteins
MS-B-013	Estimate serum albumin level. Calculate serum globulin level.		Albumin/ globulin
PHARMACOLOGY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS=03**	
		DISCIPLINE	**TOPIC**
MS-Ph-004	Label the diagram of the neuromuscular junction showing non depolarizing/depolarizing blockage.	Pharmacolo gy	NMJ Blockers
	Enumerate drugs for Myasthenia Gravis. Label the diagram to show the effect of Neostigmine in the treatment of Myasthenia Gravis		
	Identify Ampules of neuromuscular blocking agents (e.g., Succinylcholine and Atracurium) and local anesthetics (or their pictures) with their MOA, clinical uses and adverse effects.		
PATHOLOGY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS=02**	
		DISCIPLINE	**TOPIC**
MS-Pa-005	Identify the salient gross and microscopic features of Leiomyoma.	Pathology	Leiomyoma
MS-Pa-006	Identify the salient gross and microscopic features of steps of bone healing (Pictorial) with factors and complications affecting bone healing.		Bone healing



Module week	Recommended minimum hours
08	225

BLOCK 3

MODULE 4
CARDIOVASCULAR

MODULE RATIONALE

The Cardiovascular system comprises the study of the heart & circulatory system. The initial learning activities will help in understanding the normal structure & development of the organs of the system. Understanding of anatomical details of each component of Cardiovascular System (CVS) will be accompanied by study of normal physiological mechanisms. This will help in better understanding the possible pathological conditions of the system, including some of the most prevalent conditions in society like ischemic heart disease, hypertension, shock, heart block, heart failure. This will be followed by discussion on some important group of drugs used for treatment and/or prevention of these conditions (administration route, mechanism of action and side effects). The impact of cardiovascular diseases on society and the effect of ageing on cardiovascular system will be discussed.

MODULE OUTCOMES

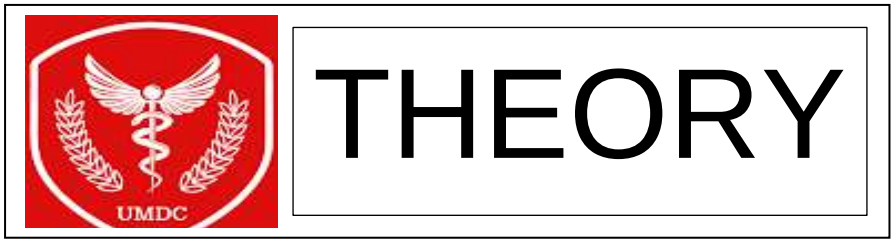
- Describe the normal structure of heart including development, topographical anatomy, neurovascular supply, and histology.
- Review the arrangement of circulatory system (arteries, veins, lymphatics).
- Define the congenital anomalies of cardiovascular system with reference to normal development and early circulation.
- Define functions of cardiac muscle along with its properties
- Interpret pressure changes during cardiac cycle along with regulation of cardiac pumping.
- Interpret normal & abnormal Electrocardiogram (ECG), ST-T changes, and its abnormalities.
- Identify the risk factors and role of lipids in coronary blockage and atherosclerosis (hyperlipidemia/ dyslipidemia).
- Define cardiac output and its modulating/controlling factors.
- Differentiate left and right sided heart failure and correlate it with the importance of pressure differences.
- Enumerate different types of arrhythmias and describe the electrical events that produce them.
- Discuss the psychosocial impact of cardiovascular diseases in society.

THEMES

- Heart
- Circulation

CLINICAL RELEVANCE
• Cardiac Failure • Arrhythmias • Atherosclerosis and Ischemic heart diseases • Hypertension • Shock • Congenital Heart diseases • Peripheral arterial diseases

IMPLEMENTATION TORs
• The time calculation for completion of modules and blocks is based on 35 hours per week. Total hours of teaching, learning and formative/summative internal assessment to be completed in a year are 1200. • The hours mentioned within each module are the mandatory minimum required. The rest of the hours are left to the discretion of the institution that can be used in teaching, learning and assessment as per decision of the institutional academic council. • The content and the intended learning outcomes written are mandatory, to be taught, at the level required, as the end year assessment will be based on these. • However, the level of cognition can be kept at a higher level by the institution. • The Table of Specifications provided will be used for the three papers of the first professional examination. The same table of specifications should be used for the respective three block exams for internal assessment.


UMDC
THEORY

NORMAL STRUCTURE			
GROSS ANATOMY			
CODE	**SPECIFIC LEARNING OUTCOMES**	**TOTAL HOURS = 10**	
		DISCIPLINE	**TOPIC**
CV-A-001	Define mediastinum giving its boundaries and compartments. List the contents of its various compartments.	Human Anatomy **C1,C2**	Mediastinum
	Describe the formation, tributaries, and termination of superior vena cava		
	Describe the formation, branches, and relations of ascending aorta, aortic arch and descending thoracic aorta.		
	Discuss the distribution of ascending aorta, aortic arch and descending thoracic aorta in reference to their branches		
	Describe formation, course and tributaries of azygous, hemizygous and accessory hemizygous veins.		
	Describe the course, relations, and distribution of vagus and thoracic splanchnic nerves in relation to nerve supply of heart.		
C CV-A-002	Describe Pericardium and its parts with emphasis on their nerve supply.	Human Anatomy **C1,C2**	Pericardium
	Describe the pericardial cavity mentioning transverse and oblique sinuses. Discuss their clinical significance		
	Describe the anatomical correlates of various pericardial conditions like pericardial rub, pericardial pain, pericarditis, pericardial effusion, and cardiac tamponade.	Integrate with Medicine **C1,C2**	
	Describe the anatomical basis for Paracentesis /pericardiocentesis.		
CV-A-003	Describe the external features of heart.	Human Anatomy **C1,C2**	Heart
	List various chambers of heart mentioning their salient features and openings.		

	Describe the arterial supply of heart: coronary arteries and their distribution with special emphasis on collaterals established during ischemia.		
	Describe the sites of anastomosis between right and left coronary arteries with the participating vessels.		
	Discuss the anatomical correlates of cardiac arterial supply	Integrate with cardiology/ Medicine **C2**	
	Describe the anatomical correlates of electrocardiography, cardiac referred pain.	Integrate with Cardiology/ Medicine **C2,**	
	Describe the anatomical basis for angioplasty, and coronary grafts.		
	Describe the features of angina pectoris and myocardial infarction and correlate them anatomically	Human Anatomy **C1,C2**	
	Describe the venous drainage of heart.		
	Describe the alternative venous routes to the heart		
	Identify the vessels supplying the heart with their origins/terminations.		
	Describe the formation, relations, and distribution of cardiac plexus.		
	Describe components and significance of fibrous skeleton of heart		
	Describe the cardiac valves		
	Explain the anatomical basis for valvular heart diseases	Integrate with Cardiology/ Medicine **C3**	
	Perform surface marking of various anatomical landmarks of heart and great vessels	Human Anatomy **C1,C2**	
	Perform percussion and auscultation of heart	Integrate with Medicine **C3**	
	Identify the salient features of heart and great vessels on Computed tomography/ Magnetic Resonance Imaging CT/ MRI	Integrate with Radiology **C3**	

EMBRYOLOGY & POST-NATAL DEVELOPMENT			
CODE	**SPECIFIC LEARNING OUTCOMES**	**TOTAL HOURS = 14**	
		DISCIPLINE	**TOPIC**
CV-A-004	Describe the early development of heart and blood vessels	Human Embryo **C1,C2**	Introduction
	Describe the development of pericardial cavity	Human Embryology **C1,C2**	
CV-A-005	Define parts of primitive heart tube and give its folding	Human Embryology **C1,C2**	Development of Heart
	Describe the development of various chambers of heart with emphasis on their partitioning		
	Identify various parts of developing heart tube and structures derived from them during embryonic and fetal life (Models and specimens)	Human Embryology **C1,C2**	
CV-A-006	Describe the embryological basis of dextrocardia and ectopia cordis		Development of Heart and Development of Lymphatic System
	Describe the partitioning of primordial heart: atrioventricular canal and atrium		
	Describe the development of sinus venosus		
	List clinically significant types of atrial septal defects along with their embryological basis and features. Describe probe patent foramen ovale	Integrate with Pediatrics **C1,C2,C3**	
	Describe the partitioning of truncus arteriosus and bulbus cordis	Human Embryology **C1,C2**	
	Describe the formation of ventricles and interventricular septum		
	Describe the clinical features and embryological basis of ventricular septal defects	Integrate with Pediatrics **C1,C2,C3**	
	Describe the development of cardiac valves and conducting system.	Human Embryology **C1,C2**	
	Describe the development of lymphatic system	Human Embryology	
CV-A-007	Describe the embryological correlates and clinical presentation of developmental defects of heart:	Integrate with Pediatrics	

	Tetralogy of Fallot, Patent ductus arteriosus, Unequal division of arterial trunks, Transposition of great vessels and Valvular stenosis, Coarctation of aorta	C3	Development of Arteries
	Describe the formation and fate of pharyngeal arch arteries	Human Embryology C2	
	Describe the anomalies of great arteries emerging from heart: Coarctation of aorta, anomalous arteries	Integrate with Cardiology/ Medicine C3	
CV-A-008	Describe the development of embryonic veins associated with developing heart: Vitelline veins, Umbilical Veins and Common cardinal vein and their fate	Human Embryology C 1,C2	Development of Veins
	Describe the formation of superior & inferior vena cava and portal vein with their congenital anomalies		
	With the help of diagrams illustrate the development of superior vena cava, inferior vena cava and portal vein		
CV-A-009	List the derivatives of fetal vessels and structures: Umbilical vein, ductus venosus, umbilical artery, foramen ovale, ductus arteriosus	Human Embryology C1	Fetal Vessels & Circulation
	Describe Fetal and neonatal circulation mentioning transitional neonatal circulation with its clinical implication	Integrate with Pediatrics/ Obgyn C3	
CV-A-010	List clinically significant types of atrial septal defects along with their embryological basis and features. Describe patent foramen ovale.	Pediatrics C3	Congenital Heart defects
	Describe the embryological correlates and clinical presentation of developmental defects of heart: Tetralogy of Fallot, Persistent ductus arteriosus, Unequal division of arterial trunks, Transposition of great vessels and Valvular stenosis		

MICROSCOPIC ANATOMY (HISTOLOGY & PATHOLOGY)			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 04**	
		DISCIPLINE	**TOPIC**
CV-A-011	Describe microscopic structure of Heart wall (Endocardium, Myocardium, Epicardium) Describe histology of Cardiac skeleton, SA (sinoatrial) node, AV (atrioventricular) node, Purkinje fibers.	Histology **C1,C2**	Heart & Cardiac Muscle
	Describe the microscopic and ultramicroscopic structure of cardiac muscle emphasizing on Tubules, sarcoplasmic reticulum and intercalated discs. Identify, draw and label histological structure of cardiac muscle		
CV-A-012	Describe general histological organization of blood vessels: Tunica intima, media and adventitia.	Histology **C1,C2**	Blood Vessels Organization
	Identify, draw and label histological sections of elastic artery, muscular artery, arterioles, vein, capillaries and sinusoids		
CV-A-013	Describe histological features of arteries: Muscular arteries, elastic arteries, Arterioles	Histology **C1,C2**	Arteries
CV-A-014	Describe histological features of veins and exchange vessels: large veins, medium sized veins, venules, Capillaries, and sinusoids	Histology **C1,C2**	Veins
	Compare and contrast the light microscopic structure of arteries and veins		
CV-A-015	Describe the histopathological basis of thrombus and embolus formation.	Integrate with Pathology **C1,C2**	Thrombus/ Embolus formation
CV-A-016	Explain the histological basis of arteriosclerosis and atherosclerosis. Describe role of arterioles in hypertension	Histology **C1,C2**	Arteriosclerosi s atherosclerosis Hypertension
CV-A-017	Describe histological features of Lymph vascular system (Lymph capillaries, Lymph vessels & Lymphatic duct)		Lymph vascular System

NORMAL FUNCTION			
MEDICAL PHYSIOLOGY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 68**	
		DISCIPLINE	**TOPIC**
CV-P-001	Explain the physiological anatomy of cardiac muscle.	Physiology C1,C2	Cardiac Muscle
	Explain the functional importance of intercalated discs.		
	Discuss the properties of cardiac muscles.		
	Describe and draw the phases of action potential of ventricle.		
	Describe and draw the phases of action potential of SA node along with explanation of the mechanism of self-excitation/ Auto rhythmicity of SA node.		
	Define and give the duration of the Absolute and relative refractory period in cardiac muscle.		
	Describe the mechanism of excitation-contraction coupling and relaxation in cardiac muscle.		
	Draw & explain pressure & volume changes of left ventricle during cardiac cycle.		
	Explain & draw relationship of ECG (Electrocardiography) with cardiac cycle.		
	Explain & draw the relationship of heart sounds with cardiac cycle.		
	Enlist, draw, and explain the physiological basis of atrial pressure waves in relation to cardiac cycle.		
	Define & give the normal values of the cardiac output, stroke volume, end diastolic volume & end systolic volume	Integrate with Medicine C1,C2	
CV-P-002	Describe the Frank starling mechanism.	Physiology C1,C2	Regulation of heart pumping
	Describe the autonomic regulation of heart pumping.		
	Describe the effect of potassium, calcium ions & temperature on heart function.		
	Define chronotropic effect- positive and negative.		

	Define the inotropic effect: positive and negative.		
	Define dromotropic effect: positive and negative		
	Describe the location of adrenergic & cholinergic receptors in heart.		
	Name the receptors present in coronary arterioles.		
	Explain sympathetic & parasympathetic effects on heart rate & conduction velocity		
CV-P-003	Draw and explain the conducting system of heart	Physiology C1,C2	Conducting system of heart
	Describe the physiological basis and significance of AV nodal delay.		
CV-P-004	Explain the ectopic pacemaker	Integrate withCardiology/ MEdicine C2	Fundamental s of ECG
	Enlist, draw, and explain the physiological basis & give durations of waves, intervals, and segments of normal ECG.	Physiology C1,C2	
	Describe the standard limb leads, Augmented limb leads & precordial leads.		
	Define Einthoven's Triangle & Einthoven's law.		
	Explain the physiological basis of upright T wave in normal ECG.		
	Describe the location and significance of J point in ECG.		
	Explain the physiological basis of current of injury.		
	Enlist the ECG changes in angina pectoris.	Integrate with Medicine C2,C3	
	Enlist the ECG changes in myocardial infarction.		
	Plot the mean cardiac axis.	Physiology C1,C2	
	Enlist the physiological & pathological causes of right axis deviation of heart.		
	Enlist the physiological & pathological causes of left axis deviation of heart		
	Describe the abnormalities of T wave and their causes	Integrate with Medicine C2,C3	
CV-P- 005	Describe the effect of hypokalemia and hyperkalemia on ECG	C2,C3	

	Describe the effect of hypocalcemia and hypercalcemia on ECG.	Integrate with Biochemistry	Effect of electrolyte on ECG
CV-P- 006	Define tachycardia and enlist its causes.	Integrate with Medicine **C2,C3**	Cardiac arrhythmia
	Define bradycardia and enlist its causes.		
	Classify arrhythmias	Physiology **C1,C2,C3**	
	Explain the physiological basis of sinus arrythmia.		
	Explain the physiological basis of reflex bradycardia in Athletes.		
	Explain the carotid sinus syndrome.		
	Enlist the causes of atrioventricular block.	Integrate with Cardiology/ Medicine **C1,C2,C3**	
	Explain the types of atrioventricular blocks.		
	Explain the ECG changes in 1st, 2nd & 3rd degree heart block.		
	Explain the cause, physiological basis & ECG changes in Stokes Adam syndrome/ventricular escape.	Physiology **C1,C2,C3**	
	Enlist the causes of premature contractions.	Integrate with Cardiology/ Medicine **C1,C2,C3**	
	Explain the causes and ECG changes of premature atrial contractions.		
	Explain the physiological basis of pulses deficit.	Physiology **C1,C2,C3**	
	Explain the causes and ECG changes in Premature Ventricular Contraction (PVC)	Integrate with Cardiology/ Medicine **C1,C2,C3**	
	Enlist the causes and ECG findings in Long QT syndrome.		
	Explain the causes, physiological basis, features, ECG changes & management of premature heartbeat.		
	Explain the causes, physiological basis, features, ECG changes & management of atrial fibrillation.		
	Explain the causes, physiological basis, features & ECG changes of ventricular fibrillation.		
	Explain the physiological basis, features & ECG changes of atrial flutter.	Physiology **C1,C2,C3**	
	Compare Flutter and Fibrillations		

CV-P-007	Explain the functional parts of circulation (arteries, arterioles, capillaries, veins, venules).		Organization of Circulation
CV-P-008	Explain the pressures in systemic & pulmonary circulation.	Physiology C1,C2	Blood flow
	Explain the types of Blood flow and significance of Reynolds number.		
CV-P-009	Describe local control of blood flow according to tissue needs.	Physiology C1,C2	Local & Humoral Control of Blood flow
	Discuss humoral control of local blood flow.		
	Explain long term control of local blood flow.		
	Describe vascular control by ions and other chemical factors.		
	Name the organs in which auto regulation of blood flow occurs during changes in arterial pressure (metabolic & myogenic mechanisms).		
CV-P-010	Explain the role of autonomic nervous system for regulating the circulation.	Physiology C1,C2,C3	Nervous Regulation of circulation
	Explain the vasomotor center.		
	Explain the control of vasomotor center by higher nervous centers.		
	Explain emotional fainting/vasovagal syncope.		
	Identify vessels constituting micro-capillaries. Enumerate hydrostatic and osmotic factors that underlie starling's hypothesis for capillary function.		
CV-P-011	Explain the role of nervous system in rapid control of arterial blood pressure.	Physiology C1,C2,C3	Rapid control of arterial blood pressure
	Explain the regulation of arterial blood pressure during exercise.		
	Enlist different mechanisms for short term regulation of arterial blood pressure.		
	Explain the role of baroreceptors in regulation of arterial blood pressure.		
	Explain the role of chemoreceptors in regulation of arterial blood pressure.		

	Make a flow chart to discuss the role of Atrial volume reflexes/ Bainbridge reflex in control of blood pressure.		
	Make a flow chart to show the reflex responses to increased blood volume which increase blood pressure and atrial stretch.		
	Describe the role of CNS ischemic response in regulation of the blood pressure.		
	Explain the Cushing reflex		
	Explain the role of abdominal compression reflex to increase the arterial blood pressure.		
CV-P-012	Make a flow chart to discuss the role of renin angiotensin system for long term control of blood pressure.	Physiology **C1,C2**	Role of kidneys in long term Regulation of Arterial Blood Pressure
	Make a flow chart to show the regulation of blood pressure in response to increase in ECF (Extra Cellular Fluid) volume.		
	Make a flow chart to show the regulation of blood pressure in response to increase in salt intake.		
CV-P-013	Define cardiac output, cardiac index & venous return with their normal values.	Integrate with Cardiology/ Medicine **C1,C2**	Cardiac output
	Discuss the factors regulating cardiac output		
	Discuss factors regulating venous return	Physiology **C1,C2**	
CV-P-014	Explain the regulation of skeletal muscle blood flow at rest & during exercise.	Physiology **C1,C2**	Skeletal muscle Circulation
CV-P-015	Explain the physiological anatomy of coronary circulation.	Physiology **C1,C2,C3**	Coronary circulation
	Explain the regulation of coronary blood flow.		
	Explain the physiological basis of angina, myocardial & subendocardial infarction		
CV-P-016	Define & enlist different types of shock.	Physiology **C1,C2.C3**	Circulatory shock
	Explain the causes, features, and pathophysiology of hypovolemic/hemorrhagic shock.		

	Explain the causes, features, and pathophysiology of septic shock.		
	Explain the causes, features, and pathophysiology of neurogenic shock.	Integrate with Pathology **C1,C2,C3**	
	Explain the causes, features, and pathophysiology of anaphylactic shock.		
	Discuss the treatment of different types of shock.	Integrate with Medicine **C1,C2,C3**	
	Explain the different stages of shock.	Physiology **C1,C2,C3**	
	Explain the mechanisms that maintain the cardiac output & arterial blood pressure in non-progressive shock.		
	Enlist different types of positive feedback mechanisms that can lead to the progression of shock.		
CV-P-017	Enlist the different types of heart sounds and explain the physiological basis of each.	Physiology **C1,C2,C3**	Heart sounds
	Enlist the causes of 3rd and 4th heart sounds.		
	Explain the causes & physiological basis of murmurs caused by valvular lesions.		
	Enumerate abnormal heart sounds and describe the physiological basis of each.	Integrate with Medicine **C1,C2,C3**	

MEDICAL BIOCHEMISTRY

CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 21	
		DISCIPLINE	TOPIC
CV-B-001	Classify lipids	Biochemistry **C1,C2**	Classification of lipids
CV-B-002	Discuss the biomedical functions & properties of lipids		Functions of lipids & Properties of lipids
CV-B-003	Classify fatty acids. Discuss the role of trans saturated, saturated, poly- and mono-unsaturated fatty acids in diet on lipid profile.		Classification of fatty acids &

CV-B-004	Discuss lipid peroxidation and its significance	Biochemistry C1,C2,C3	Lipid peroxidation
CV-B-005	Explain the biochemical and therapeutic roles of eicosanoids (prostaglandins, leukotrienes, thromboxane, and prostacyclin)		Eicosanoids
CV-B-006	Discuss Lipoprotein metabolism		Lipoprotein metabolism
	Discuss role of oxidized LDL in atherosclerosis		
CV-B-007	Discuss the signs and symptoms of hyperlipidemia		Type I to V hyperlipidemias
	Interpret data related to hyperlipidemia		
CV-B-008	Discuss the sources, biomedical importance, active states, deficiency and excess of fat-soluble vitamins (excluding Vitamin K).		Fat soluble vitamins
CV-B-009	Discuss the sources, biomedical importance, active states, deficiency and excess of water-soluble vitamins (excluding B6, B9 & B12 and Vitamin C).		Water soluble vitamins
CV-B-010	Discuss the sources, biomedical importance, active states, deficiency and excess of minerals and trace elements especially zinc, Mg, Na, K, I, Ca, P, Se, S, Cu and Cl.		Minerals and trace elements

AGING			
CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 05	
		DISCIPLINE	TOPIC
CV-Ag-001	Discuss the effect of age on blood vessels with reference to hypertension	Physiology/ Geriatrics/ Medicine C3	Hypertension
CV-Ag-002	Discuss the risk of cardiac attack in old age and weather conditions		Cardiac Attack
CV-Ag-003	Discuss the effect of age on valvular system of the heart.		Valvular diseases
CV-Ag-004	Discuss the effect of age on neural conduction of the heart in relation to arrythmia.		Arrythmia
CV-Ag-005	Discuss the protective role of female hormone against CVS diseases in women of reproductive age group	Physiology/ Obstetrics and Gynecology C3	Role of female hormone on CVS disease
PATHOPHYSIOLOGY AND PHARMACOTHERAPEUTICS			
CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 14	
		DISCIPLINE	TOPIC
CV-Pa-001	Define Inflammation Enumerate cardinal signs of acute inflammation Enlist types of Inflammation	Pathology C1,C2	Inflammation
	Enumerate causes & outcomes of inflammation Differentiate acute & chronic inflammation		
	Describe general concept of vascular & cellular events of acute inflammation Enumerate chemical mediators of inflammation along with their principal functions		
CV-Pa-002	Classify types of thrombosis, embolism, and infarction	Pathology/	Atherosclerosis
	Discuss the pathophysiology of thrombosis, embolism, and infarction		
	Identify the types and causes of hypertension		

CV-Pa-003	Discuss the clinical consequences of hypertension and atherosclerosis	Integrate with medicine C1,C2,C3	Hypertension
CV-Pa-004	Discuss the pathophysiology of shock		Shock
CV-Pa-005	Classify the types of heart failure		Cardiac Failure
	Identify the causes leading to heart failure		
CV-Pa-006	Identify the types of ischemic heart disease		Ischemic Heart Disease
	Discuss the pathophysiology of different types of ischemic heart disease		
CV-Pa-007	Explain the pathological causes of high & low cardiac output.		Cardiac Output
CV-Ph-001	Classify antihypertensive drugs.	Pharmacology C1,C2	Anti-hypertensive drugs
CV-Ph-002	Classify antianginal drugs.		Antianginal drugs
CV-Ph-003	Classify antiarrhythmic drugs.		Antiarrhythmic mics drugs
CV-Ph-004	Classify drugs used in cardiac failure.		Drugs for cardiac failure

DISEASE PREVENTION AND IMPACT

CODE	COMMUNITY MEDICINE & BEHAVIORAL SCIENCE	TOTAL HOURS = 11+2=13	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
CV-CM-001	Describe the various strategies and models to prevent diseases.	Community Medicine and Public Health C1,C2	Disease Prevention Models
CV-CM-002	Describe primordial prevention and its application to preventing CVS diseases.		Primordial Prevention
	Depict the concept of primary prevention in context to CVS and able to apply on CVS diseases.		
CV-CM-003	Discuss the basic concept of health promotion and its application to CVS.		Health Promotion
CV-CM-004	Discuss various methods of behavioural change interventions at community level.		Behavioural Change Intervention

CV-CM-005	To apply secondary and tertiary preventions on CVS diseases (coronary heart disease, ischemic heart disease, hypertension)		Secondary & Tertiary Prevention
CV-CM-006	Describe the concept of cardiovascular diseases as non-communicable diseases		Noncommunicable disease
CV-CM-007	Identify the risk factors in the community for CVS diseases.		Risk factor assessment of CVS diseases
	Learn and apply interventions to prevent the risk factors in community.		
CV-BhS-001	Identify and deal with the various psychosocial aspects of Cardiovascular conditions (such as Hypertension, Coronary artery disease, Heart failure, Arrythmias, and other cardiovascular conditions) on Individual, Family and Society.	Behavioral Sciences **C1,C2,C3**	Personal, Psychosocial and vocational issues
CV-BhS-002	Psychological basis of emotional fainting & its impact		Emotional fainting

PRACTICAL

PRACTICAL

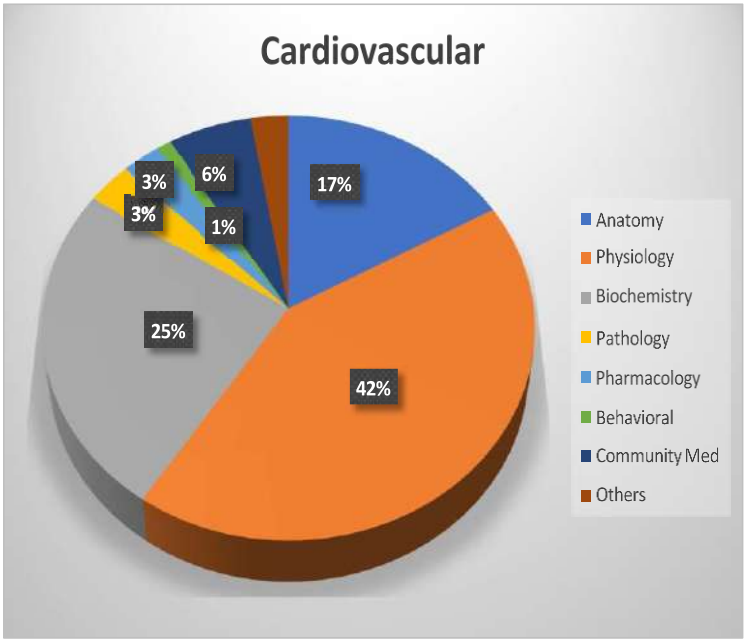
HISTOLOGY

CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 03	
		DISCIPLINE	TOPIC
CV-A-018	Identify, draw and label histological structure of cardiac muscle	Histology	Histological features of Cardiac Muscle
CV-A-019	Identify, draw and label histological sections of elastic artery, muscular artery, arterioles, vein, capillaries and sinusoids	Histology	Histological features of Blood Vessels

PHYSIOLOGY

CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 10	
		DISCIPLINE	TOPIC
CV-P-018	Record an electrocardiogram (ECG) by correct lead placement and connections. Perform auscultation of the chest to recognize normal heart sounds.	Physiology	ECG & Heart Sounds
CV-P-019	Determine the effect of posture and exercise on blood pressure by auscultatory method.		Blood Pressure
CV-P-020	Measure the blood pressure of the subject by palpatory and auscultatory methods.		Blood Pressure
CV-P-021	Examine arterial pulse to recognize normal characteristics of pulse.		Arterial Pulse
CV-P-022	Examine neck veins to determine Jugular Venous Pulse (JVP)		JVP

BIOCHEMISTRY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 10**	
		DISCIPLINE	**TOPIC**
CV-B-011	Perform cardiac markers Creatine Kinase and Lactate Dehydrogenase (CK and LDH) Interpret lab reports based on enzymes for diseases like cardiac disorders and hyperlipidemias	Biochemistry	Performance Interpretation of Lab report
PATHOLOGY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 01**	
		DISCIPLINE	**TOPIC**
CV-Pa-008	Identify the pathological changes of infarction (microscopic)	Pathology	Hemodynami cs
	Identify the pathological changes of thrombosis (microscopic)		
PHARMACOLOGY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 01**	
		DISCIPLINE	**TOPIC**
CV-Ph-004	Illustrate mechanism of action of antihypertensive drugs.	Pharmacolo gy	Anti-hypertensive drugs
CV-Ph-005	Illustrate mechanism of action of antianginal drugs.		Antianginal drugs
CV-Ph-006	Illustrate mechanism of action of drugs used in cardiac failure.		Drugs for cardiac failure



Module week	Recommended minimum hours
07	166

MODULE 5
RESPIRATORY

MODULE RATIONALE

The diseases related to the respiratory system are on the rise not only in developing countries but also in developed countries. The infant mortality rate in Pakistan is highest in Southeast Asia and one of the important reasons is common respiratory infections in children. With the world suffering from COVID-19 not only physically but also mentally, it is very important for medical students to study in detail the structures, functions, prevention, epidemiology, genetic basis of diseases and their management.

The respiratory system is responsible for bringing oxygen into the body and removing carbon dioxide. It is made up of several organs and structures, including the nose, pharynx, larynx, trachea, bronchi, lungs, and diaphragm.

MODULE OUTCOMES

- Apply basic sciences` knowledge to understand the causes of common respiratory problems.
- Explain the pathogenesis of respiratory diseases.
- Enlist the main investigations relevant to respiratory disorders.
- Recognize risk factors and preventive measures of main respiratory diseases.

THEMES

- Rib cage
- Thoracic vertebrae
- Upper respiratory system
- Lower Respiratory system

CLINICAL RELEVANCE

- Acute Respiratory Distress Syndrome
- Bronchial Asthma
- Tuberculosis
- Pneumonia

IMPLEMENTATION TORs

- The time calculation for completion of modules and blocks is based on 35 hours per week. Total hours of teaching, learning and formative/summative internal assessment to be completed in a year are 1200.
- The hours mentioned within each module are the mandatory minimum required. The rest of the hours are left to the discretion of the institution that can be used in teaching, learning and assessment as per decision of the institutional academic council.
- The content and the intended learning outcomes written are mandatory, to be taught, at the level required, as the end year assessment will be based on these.
- However, the level of cognition can be kept at a higher level by the institution.

The Table of Specifications provided will be used for the three papers of the first professional examination. The same table of specifications should be used for the respective three block exams for internal assessment.

THEORY

NORMAL STRUCTURE			
GROSS ANATOMY			
CODE	**SPECIFIC LEARNING OUTCOMES**	**TOTAL HOURS = 24**	
		DISCIPLINE	**TOPIC**
Re-A-001	Give the boundaries of thoracic cavity, superior and inferior thoracic apertures and list the structures contained/ traversing them.	Human Anatomy **C1,C2**	Thoracic Cavity
	Describe the anatomical correlates of Thoracic outlet syndrome	Integrate with Surgery **C1,C2**	
Re-A-002	Identify and differentiate the typical from atypical ribs.	Human Anatomy **C1,C2**	Rib Cage
	Describe the anatomical features of ribs		
	Describe the anatomical correlates of supernumerary cervical rib.	Integrate with Surgery **C1,C2**	
	Classify the articulations of the ribs.	Human Anatomy **C1,C2**	
	Describe the anatomical features of these articulations.		
	Describe the movements with the muscles producing articulations.	Human Anatomy **C1,C2**	
	Describe the effects of fracture to the neck of rib and give its anatomical justification	Integrate with Orthopedics **C1,C2**	
	Describe the anatomical correlates of Flail Chest.		
Re-A-003	Describe the anatomical correlates of Thoracotomy	Integrate with Surgery **C1,C2**	Intercostal space
	Define the attachments, relations, nerve supply and actions of intercostal muscles	Human Anatomy **C1,C2**	
	Define an intercostal space and give details of its contents		
Re-A-004	Describe the anatomical features of typical & atypical thoracic vertebrae.	Human Anatomy **C1,C2,C3**	Thoracic Vertebrae
	Differentiate between typical and atypical vertebrae		
	Explain the thoracic part of the vertebral column (normal curvature, intervertebral joints & fascia of the back, blood supply, lymphatic drainage, nerve supply of back) Associated Clinical conditions -Kyphosis, Scoliosis		
Re-A-005	Describe the bony features of the sternum	Human Anatomy **C1,C2**	Sternum

	Describe the anatomical correlates of sternal biopsy. and sternotomy	Integrate with Surgery **C1,C2,C3**	
	Describe the presentation of sternal fractures and correlate it anatomically	Integrate with Orthopedics **C1,C2,C3**	
Re-A-006	Define endo thoracic fascia	Human Anatomy **C1,C2**	Connective tissue of Thorax
	Describe the supra-pleural membrane with its attachments.		
Re-A-007	Classify the joints of the thorax mentioning their articulations, movements with the muscle producing them.		Joints of Thorax
	Describe the mechanics of inspiration and expiration		
Re-A-008	Describe the origin, course, relations and distribution of intercostal nerves and vessels		Neurovascular supply of Thorax
	Describe the alternate routes of venous drainage in blockage of superior/ inferior vena cava		
Re-A-009	Describe the cutaneous nerve supply and dermatomes of thorax.	Integrate with Medicine **C1,C2**	
	Give anatomical justification of the manifestations of herpes zoster infection on thoracic wall.	Human Anatomy **C1,C2,C3**	Cutaneous nerve supply of Thorax
	Discuss anatomical correlates of intercostal nerve block	Integrate with Medicine **C1,C2,C3**	
Re-A-010	Describe the anatomical features of the Trachea with its extent, relations, neurovascular supply and lymphatics.	Human Anatomy **C1,C2**	Trachea
Re-A-011	Name the parts of diaphragm mentioning their attachments and neurovascular supply	Integrate with Anesthesia **C1,C2**	Diaphragm
	Explain the role of diaphragm in respiration	Human Anatomy **C1,C2**	
	Enumerate the diaphragmatic apertures with their vertebral levels, mentioning the structures traversing them.		
Re-A-012	Describe the pleura giving its parts, layers, neurovascular supply, and lymphatic drainage		Pleural cavity
	Describe the pleural cavity giving its recesses and the lines of pleural reflection		

	Describe the anatomical correlates of pleural pain pleurisy, pneumothorax, pleural effusion	Human Anatomy **C2,C3**	
	Describe the anatomical features, relations of lungs	Integrate with Medicine **C1,C2**	
Re-A-013	Describe the neurovascular supply and lymphatic drainage of lungs.	Human Anatomy **C1,C2,C3**	Lungs
	Compare and contrast the anatomical features and relations of right and left lung		
	Describe the root of the lung and pulmonary ligament with arrangement of structures at the hilum		
	Define Bronchopulmonary segments. Give their vascular supply, lymphatic drainage and clinical significance		
	Describe the anatomical correlates of chest tube intubation	Integrate with Surgery **C1,C2,C3**	
	Describe the anatomical correlates of thoracentesis		
	Describe the anatomical correlates of bronchoscopy	Integrate with Pulmonology **C1,C2,C3**	
	Describe the anatomical basis for medicolegal significance of lungs in determining the viability of newborn	Integrate with Forensic Medicine **C1,C2,C3**	
	Identify various anatomical landmarks on chest X-Rays, CT and MRI	Integrate with Radiology **C1,C2,C3**	

EMBRYOLOGY & POST-NATAL DEVELOPMENT			
CODE	**SPECIFIC LEARNING OUTCOMES**	**TOTAL HOURS = 05**	
		DISCIPLINE	**TOPIC**
Re-A-014	Describe the development of ribs, sternum, and thoracic vertebrae. Give the associated congenital malformations	Human Embryology **C1,C2,C3**	Bony components of Thoracic cavity
Re-A-015	Describe the developmental process of Vertebral Column		Development of Vertebral Column
Re-A-016	List the embryological sources of the diaphragm. Describe the events taking place in the development and descent of the diaphragm	Human Embryology **C1,C2**	Diaphragm & Thoracic cavity
	Describe the development of Thoracic cavities (Pleural and Pericardial cavities)	Integrate with Pediatrics **C1,C2**	
Re-A-017	Describe the development of trachea.	Human Embryology **C1,C2**	Upper Respiratory Tract
	Describe congenital anomalies of Trachea-Tracheoesophageal fistulas of different types	Integrate with Pediatrics **C2,C3**	
Re-A-018	List the phases of lung development with their time periods. Describe the events taking place in each phase	Human Embryology **C1,C2**	Lungs
	Describe the embryological basis of respiratory distress syndrome/Hyaline membrane disease, Ectopic Lung lobes, Congenital cysts of Lung	Integrate with Pediatrics **C2,C3**	
MICROSCOPIC STRUCTURE			
CODE	**SPECIFIC LEARNING OUTCOMES**	**TOTAL HOURS = 04**	
		DISCIPLINE	**TOPIC**
Re-A-019	Give the general histological organization of respiratory system.	Histology **C1,C2**	Organizatio n of respiratory system
Re-A-020	Describe the microscopic features of respiratory epithelium & Olfactory epithelium	Histology **C1,C2**	Respiratory epithelium
Re-A-021	Describe histology of Nasopharynx		Nasophary nx
Re-A-022	Describe the histological features of epiglottis and larynx		Epiglottis & larynx

Re-A-023	Describe the histological features of trachea and lungs Describe histology of blood-air barrier	Histology **C1,C2**	Trachea & lungs blood-air barrier
Re-A-024	Explain the histological basis of: 1. Laryngitis 2. Singer's nodules 3. Emphysema 4. Pneumonia 5. Atelectasis 1. Infant respiratory distress syndrome	Integrate with Pathology **C1,C2,C3**	Clinical correlates

NORMAL FUNCTION			
MEDICAL PHYSIOLOGY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 45**	
		DISCIPLINE	**TOPIC**
Re-P-001	Enlist the muscles of inspiration and expiration in quiet breathing	Integrate with Anatomy **C1,C2,C3**	Breathing
	Enlist the muscles of inspiration and expiration in labored breathing		
	Explain the components of the work of breathing	Medical Physiology **C1,C2**	
	Discuss the mechanics of pulmonary ventilation		
	Explain periodic breathing		
	Explain the causes and pathophysiology of sleep apnea	Integrate with medicine **C1,C2,C3**	
Re-P-002	Define and explain lung compliance	Medical Physiology **C1,C2,C3**	Lung Compliance
	Enlist the factors that affect lung compliance		
	Draw the compliance diagram of air filled and saline filled lungs		
	Enlist the components of surfactant		
	Describe the role of surfactant in lung compliance		
	Explain the role of surfactant in premature babies	Integrate with Pediatrics **C2,C3**	
Re-P-003	Define the different lung volumes and capacities and their clinical significance	Medical Physiology **C2,C3**	Lung volumes and Capacities
	Discuss Forced Expiratory Volume 1/ Forced Vital Capacity (FEV1/FVC) ratio and its clinical significance		
	Enlist the lung volumes and capacities that cannot be measured by spirometer.		
	Define dead space & explain its types		
	Discuss FEV1/FVC ratio in relation to Bronchial Asthma.	Integrate with Pulmonology **C2,C3**	
	Discuss FEV1/FVC ratio in relation to Chronic Obstructive Pulmonary disease/restrictive lung diseases		
	Discuss Forced Expiratory Volume 1/ Forced Vital Capacity (FEV1/FVC) ratio in relation to pulmonary embolism	Integrate with medicine **C2,C3**	

Re-P-004	Define alveolar ventilation.	Medical Physiology **C1,C2**	Pulmonary ventilation
	Define minute respiratory volume		
	Describe the pressures in the pulmonary system.		
Re-P-005	Describe the blood volume of the Lungs	Medical Physiology **C1,C2,C3**	Pulmonary Circulation
	Describe the distribution and regulation of blood flow through the lungs.		
	Describe the mechanics of blood flow in the three blood flow zones of the lung		
	Describe the effect of heavy exercise on pulmonary arterial pressure.		
	Describe the function of pulmonary circulation when left atrial pressure rises as a result of left-sided heart failure.		
	Explain pulmonary capillary dynamics.		
Re-P-006	Discuss pathophysiology and common causes of pulmonary edema		Pulmonary Edema, and Pleural Fluid
	Explain the safety factors that prevent pulmonary edema.		
	Explain the physiological basis of the presence of fluid normally in the pleural cavity.		
	Define pleural effusion and give its causes.		
Re-P-007	Explain the ultrastructure of respiratory membrane	Medical Physiology **C1,C2,C3**	Principles of Gaseous Exchange
	Discuss the factors affecting diffusion of gases across the respiratory membrane		
	Explain the diffusion capacity of respiratory membrane for oxygen and carbon dioxide		
	Define alveolar, pleural and transpulmonary pressure.		
	Explain differences in the partial pressures of atmospheric, humidified, alveolar air and explain physiological basis of change in each pressure		
Re-P-008	Explain the different forms of transport of oxygen in the blood	Medical Physiology **C1,C2,C3**	Transport of oxygen in the blood
Re-P-009	Draw and explain oxyhemoglobin dissociation curve		oxyhemoglobi n dissociation curve &
	Enlist the factors that cause the rightward shift of oxyhemoglobin dissociation curve		

	Enlist the factors that cause the leftward shift of oxyhemoglobin dissociation curve		oxyhemoglobi n dissociation curve & Bohr`s effect & Cyanosis
	Discuss the P50 in relation to oxygen hemoglobin dissociation curve		
	Explain the Bohr`s effect		
	Define, enlist the types and causes of cyanosis	Integrate with Medicine **C1,C2,C3**	
Re-P-010	Enlist different forms in which Carbon dioxide CO_2 is transported in the blood	Medical Physiology **C1,C2,C3**	Transport of CO_2 in blood
	Explain carboxyhemoglobin dissociation curve		
	Explain the Haldane effect		
	Explain the chloride shift/Hamburger phenomenon		
	Define the respiratory exchange ratio (RER)		
Re-P-011	Explain the alveolar oxygen and carbon dioxide pressure when Pulmonary ventilation (V) and Perfusion (Q), VA/Q= infinity, zero, and normal	Medical Physiology **C1,C2,C3**	VA/Q (ventilation perfusion ratio)
	Explain the concept of physiological shunt when VA/Q ratio is above normal		
	Explain the concept of physiological dead space when VA/Q ratio is above normal		
Re-P-012	Enlist the respiratory and non-respiratory functions of the lung	Medical Physiology **C1,C2,C3**	Protective reflexes
	Explain the nervous control of bronchiolar musculature		
	Trace the reflex arc of cough reflex and sneeze reflex		
Re-P-013	Explain the principle means by which acclimatization occurs	Medical Physiology **C2,C3**	Aviation and space
	Explain the events that occur during acute mountain sickness		
	Enlist the features of chronic mountain sickness		
Re-P-014	Explain the pathophysiology, features, prevention and treatment of decompression sickness.	Medical Physiology **C2,C3**	Deep sea diving
Re-P-015	Draw and explain the effect of CO poisoning on oxyhemoglobin dissociation curve	Medical Physiology **C2,C3**	Carbon monoxide poisoning
	Explain the pathophysiology, features, and treatment of CO poisoning.	Integrate with Medicine **C2,C3**	

Re-P-016	Enumerate the components of respiratory centers and explain their functions.	Medical Physiology **C2,C3**	Nervous regulation of respiration
	Explain the inspiratory RAMP signal		
	Explain the Herring Breuer reflex/lung inflation reflex and its clinical significance		
Re-P-017	Explain the location of chemo sensitive area (central chemoreceptors) and peripheral chemoreceptors	Medical Physiology **C2,C3**	Chemical control of respiration
	Explain the effect of hydrogen ions & carbon dioxide on the chemo- sensitive area		
	Explain the role of oxygen in the control of respiration/peripheral chemoreceptors		
Re-P-018	Explain the regulation of Respiration during Exercise	Medical Physiology **C2,C3**	Exercise and Respiration
Re-P-019	Enlist the effects of acute hypoxia	Medical Physiology **C2,C3**	Hypoxia
	Explain the hypoxia inducible factor a master switch for body response to hypoxia		
	Define and explain different types of hypoxias	Integrate with Medicine **C2,C3**	
Re-P-021	Discuss the bacteria and viruses that cause Pneumonia	Integrate with Microbiology **C2,C3**	Pneumonia
Re-P-022	Define Dyspnea	General Medicine **C2,C3**	Dyspnea
	Enlist different causes of dyspnea		
	Differentiate between cardiac and respiratory dyspnea		
	Outline management strategies for dyspnea		
Re-P-023	Explain the pathophysiology of emphysema	Integrate with pathology **C2,C3**	emphysema
Re-P-024	Explain the pathophysiology of Atelectasis.		Atelectasis
Re-P-025	Enlist the causes of Pneumothorax	General Medicine **C2,C3**	Pneumothora x
	Describe the signs and symptoms of Pneumothorax		
Re-P-026	Enlist the causes of Pleuritis		Pleuritis
	Describe the signs and symptoms of Pleuritis		
	Discuss the management of Pleuritis		
Re-P-027	Enlist the causes of Bronchitis	Integration with General Medicine **C2,C3**	Bronchitis
	Discuss the signs and symptoms of Bronchitis		
	Discuss the management of Bronchitis		

Re-P-028	Classify different types of pneumonia Discuss the sign symptoms of pneumonia Discuss the management of pneumonia		Pneumonia
Re-P-029	Classify different types of asthma Discuss the signs and symptoms of asthma Discuss the management of asthma		Asthma
Re-P-030	Classify different types of Tuberculosis Discuss the signs and symptoms of tuberculosis Discuss the management of Tuberculosis		Tuberculosis
Re-P-031	Classify different types of acute respiratory distress syndrome Discuss the signs and symptoms of acute respiratory distress syndrome Discuss the management of acute respiratory distress syndrome	Integration with General Medicine **C2,C3**	Acute respiratory distress syndrome
Re-P-032	Define respiratory failure Describe various types of respiratory failure Enlist various causes of respiratory failure Outline management strategies of respiratory failure	Integration with General Medicine **C1,C2,C3**	Respiratory Failure
Re-P-033	Describe ABC in a trauma patient	Integration with Surgery **C1C2,C3**	First Aid in Surgical Patients
MEDICAL BIOCHEMISTRY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 14**	
		DISCIPLINE	**TOPIC**
Re-B-001	Describe the biochemical basis of emphysema, Chronic obstructive pulmonary disease (COPD) and cystic fibrosis Explain and interpret the pedigree of single gene defect i.e., Emphysema and cystic fibrosis (autosomal recessive) Discuss the biochemical basis of Respiratory Distress syndrome	Medical Biochemistry **C2,C3**	Genetic defects
Re-B-002	Describe ionization of water and elaborate its significance. Discuss water and electrolyte balance in health and disease.	Integrate with Physiology **C2,C3**	Water, pH, Buffers/ Ionization of water

		C1,C2,C3	
Re-B-003	Define pH and describe the concept of pH scale.		Water, pH, Buffers/ pH and pH scale
Re-B-004	Define weak acids and conjugate base.		Water, pH, Buffers/ weak acids and their significance
Re-B-005	Define Ka and pKa and give their significance.		Water, pH, Buffers/ Ka And pKa
Re-B-006	Describe Henderson-Hasselbach (HH) equation. (no derivation required) along with its application/use. Interpret the titration curve for amino acids (alanine, histidine& acetic acid)		Water, pH, Buffers/ HH equation and its applications
Re-B-007	Define buffers. Enumerate the component of a buffers system and describe their mechanism of action. Enlist important buffers present in blood, plasma, ECF (Extra Cellular Fluid), ICF (Intra Cellular Fluid) and renal tubular fluid. Elaborate the working of bicarbonate buffer and phosphate buffer.		Water, pH, Buffers/ HH equation and its applications
Re-B-008	Elaborate the role of lungs in the regulation of acid base balance.		Acid Base balance and imbalance/ Lung mechanisms for pH regulation
Re-B-009	Elaborate the concept of 1st, 2nd and 3rd line of defense against changes in H^+ ion concentration.	Biochemistry C1,C2	Acid Base balance and imbalance/ Defense mechanisms against changes in H+ concentration

Re-B-010	Discuss the concept of acid base balance	Medical Biochemistry C2,C3	Acid base balance
PATHOPHYSIOLOGY AND PHARMACOTHERAPEUTICS			
THEORY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 5+3=08**	
		DISCIPLINE	**TOPIC**
Re-Ph-001	Classify the drugs for cough suppression & expectoration	Pharmacology & Therapeutics C1,C2	Cough Suppressants
	Explain the mechanism of action and adverse effects of cough suppressants		
Re-Ph-002	Explain the mechanism of action and adverse effects of anti-asthmatics		anti-asthmatics
Re-Ph-003	Classify anti-histamines		Anti asthmatics
Re-Pa-001	Describe the pathophysiology of acute respiratory distress syndrome	Pathology C2,C3	Acute Respiratory Distress Syndrome
Re-Pa-002	Give the salient features of Obstructive and Restrictive Lung diseases.		Obstructive lung Disease
Re-Pa-003	Tabulate the differences between Obstructive and Restrictive lung diseases		Restrictive Lung Disease
DISEASE PREVENTION & IMPACT			
CODE	**COMMUNITY MEDICINE & BEHAVIORAL SCIENCES**	**TOTAL HOURS = 10**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
Re-CM-001	Identify the common risk factors of acute respiratory infections with emphasis on smoking	Community Medicine and Public Health C2,C3	Prevention of acute Respiratory Infections (ARI)
	Discuss preventive strategies of different problems related to respiratory system		
	Enlist the common vaccines used for the prevention of ARI		
	Explain the role of vitamins in the respiratory tract infections	Integrate with Biochemistry C2,C3	

Re-CM-002	Explain the effect of air pollutants on the respiratory system		Interaction of environment & Respiratory System
Re-CM-003	Describe the burden of respiratory diseases	Community Medicine and Public Health C1,C2,C3	Epidemiology of respiratory Diseases
Re-CM-004	Enlist the common respiratory diseases related to occupation		Occupational Lung Diseases
Re-BhS-001	identify the psychosocial factors leading to dyspnea.	Behavioral Sciences C2,C3	Dyspnea
Re-BhS-002	Identify the psychosocial factors leading to psychogenic cough.		Psychogenic Cough
Re-BhS-003	Identify and deal with the various psychosocial aspects of Respiratory conditions (such as Asthma, COPD, Tuberculosis, Cystic Fibrosis, Sleep Apnea) on Individual, Family and Society.		Personal, Psychosocial and vocational issues

AGING

THEORY

CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 03	
		DISCIPLINE	TOPIC
Re-Ag-001	Discuss the microbiological basis of respiratory infections in old age in cold weather	Microbiology C2,C3	Respiratory infections in old age
Re-Ag-002	Discuss how aging impairs respiratory clearance, increasing inflammation and infection risk.	Pathology C2,C3	Increased vulnerability to infection
	Describe the biochemical basis of emphysema, COPD and cystic fibrosis	Chemical Pathology C2,C3	Respiratory diseases

PRACTICAL

PRACTICAL

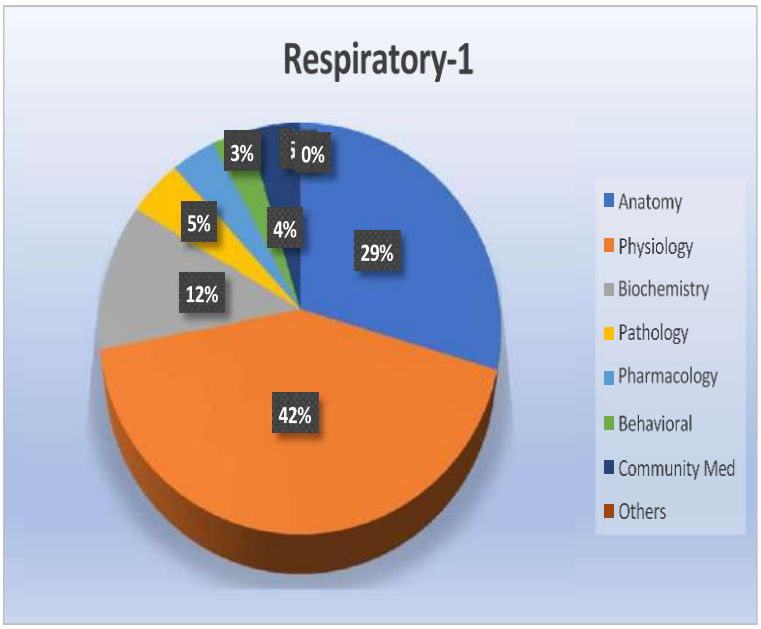
HISTOLOGY

CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 05	
		DISCIPLINE	TOPIC
Re-A-025	Identify, draw and label the histologic sections of epiglottis and larynx.	Histology	Epiglottis& Larynx
Re-A-026	Describe the histological features of bronchial tree: trachea, bronchi, bronchioles, alveoli		Trachea & Organization of Respiratory System
Re-A-027	Identify, draw and label the histological sections of bronchial tree: trachea, bronchi, bronchioles, alveoli, Lung		Bronchial tree & Lung
	Describe the mucosal changes encountered in the trachea-bronchial tree		
	Compare and contrast the histological features of various components of bronchial tree: trachea, bronchi, bronchioles, alveoli.		
Re-A-028	Describe, compare and contrast the light and electron microscopic features of type I and type II pneumocytes		Pneumocytes

PHYSIOLOGY

CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 06	
		DISCIPLINE	TOPIC
Re-P-034	Perform the clinical examination of chest for the respiratory system (inspection, palpation, percussion, Auscultation)	Medical Physiology	Clinical Examination of Chest
Re-P-035	Determine lung volumes and capacities with a spirometer.		Lung volume & capacities
Re-P-036	Determine Blood Oxygen Saturation with finger Pulse Oximeter		Oxygen Saturation

Re-P-037	Determine Peak Expiratory Flow rate.		Peak Expiratory Flow rate
Re-P-038	Perform Cardio pulmonary Resuscitation (CPR) on adult and infant.		CPR
BIOCHEMISTRY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**TOTAL HOURS = 04**	
		DISCIPLINE	**TOPIC**
Re-B-011	Determine the pH of the solution by pH meter	Medical Biochemistry	Determination of pH
Re-B-012	Interpret metabolic and respiratory disorders of acid base balance on the basis of sign, symptoms and ABG findings	Biochemistry	Acid base balance Interpretations



Module week	Recommended minimum hours
04	128

THE HOLY QURAN

1. MODULE RATIONALE

The Holy Quran provides wisdom and knowledge to be followed in every applied component of modern civilization covering Ethical, Social, Legal, Financial and Healthcare Domains. The complete Quran encompasses the guidelines, all full of 'Hikmah' (wisdom) to deal with all practical scenarios encountering patients and health professionals. As the Holy Quran is the guiding light for humanity and a way of life for all the believers of one true Allah, therefore, understanding the message of this Holy Book is mandatory for realizing the duties which one has towards other human beings in general and the profession in particular. Holy Quran is a guide for the modern society and scientific development therefore, orbiting around Quranic doctrines and axioms of Hadith, all challenges faced by modern healthcare can be solved. Therefore, this longitudinal curriculum is developed so that all health professionals can get, as enunciated by the Holy Quran itself, "the best of this world as well as the best of the Hereafter".

2. VISION & MISSION

2.1 : Vision: Building the personality and character of health professionals in light of teachings of the Holy Quran and Sunnah, to alleviate human sufferings.

2.2 : Mission: Teaching Holy Quran and Sunnah to undergraduate students of Health Sciences, building their personality and character, enabling them to apply these principles in patient care and innovative research.

3. CURRICULUM DESIGN AND ORGANIZATION

3.1 : Course Aim: The Holy Quran course aims to imbibe Health profession students with professionalism, general and medical, based on Divine teachings. The professionals thus groomed shall be able to correlate religion with healthcare delivery and modern science with an understanding that evidence-based practice itself originated from the system by which the "Hadith" was preserved after centuries.

3.2 : Mode of Delivery: The module will be taught in the form of interactive lectures.

3.3 : Learning Experience: Classroom environment will be used.

3.4 : Attendance: Eighty five percent (85%) attendance is mandatory to be eligible to sit in the professional examination.

3.5 : Course Modules for Year 1 and Year 2

The curriculum will be taught under three Major Sections

- Faith
- Worship
- Specific Quranic Commandments

3.6 : Module Credit hours & Contact hours: This will be a three (03) credit hour course where each credit hour will be equivalent to eighteen (18) contact hours distributed over two years.

3.7 : Assessment Portfolio

The assessment will be done through student portfolios based on four written assignments and two quizzes per year. The portfolio submission to the Quran teacher will be mandatory for sending admission to the university and sitting in the professional examination. The assignments will be based on the topics discussed during the year. One will be given after first half of the course will be completed for the year and second will be given at the completion of the Quran course.

3.8 : Reference Material

- Translations of the Holy Quran approved by the Quran Board
- Six Authentic Books of Hadith

3.9. Module Faculty

At least one full time faculty member (Lecturer or above) will be hired for running the Holy Quran course throughout four years. The qualifications of the faculty member will be certified by the academic council of the college/institution to be declared as the teacher of Holy Quran course.

Quran: Year-1

SECTION ONE: FAITH (AQAID)

LEARNING OUTCOMES

a. Oneness of Allah (SWT) (Tawheed)

i. Describe Unity of Allah in being
ii. Describe Unity of Allah in attributes
iii. Describe concept of Shirk
iv. Impact of Tawheed in human life

b. Prophethood (Risalat)

i. Explain Significance of Risalat
ii. Identify Prophets as role models
iii. Recognize finality of Prophethood - Prophet Muhammad (PBUH)

c. Belief in Hereafter (Aakhirat)

i. Appraise continuity of life beyond material world
ii. Concept of Doomsday and its various stages
iii. Concept of Day of Judgment and accountability in the Hereafter
iv. Concept of “Meezan”

d. Divine Revelations (Holy Books)

i. Explain the divine decree in sending the Holy Books
ii. Identify the Holy Quran as the only preserved & authenticated divine revelation to date
iii. Interpret Quran as Furqan

e. Angels

i. Discuss belief in angels and its significance
ii. Describe the universal role of angels (their specific duties)

f. Qadr

i. Identify Taqdeer as Knowledge of Allah
ii. Explain the concept of Faith in Good and Evil

CONTENTS

1. Oneness of Allah subhan wa taala (Tawheed)
2. Prophethood (Risalat)
3. Belief in Hereafter (Akhirat)
4. Devine revelations (Holy Books)

SECTION TWO: WORSHIP (IBADAAT)

LEARNING OUTCOMES

a. Prayer (Namaz)

i. Recognize the importance of physical purity (Taharah)
ii. Discuss the philosophy of prayer and its role in purification of soul
iii. Recognize the importance of prayer in building personal character - sense of duty, patience, perseverance, punctuality and self/social discipline
iv. Spiritual, moral and social impact of prayer in building of righteous community
v. Role in creating brotherhood, equality and unity in ummah
vi. Identify the conditions in which relaxation in prayer is allowed e.g. during operation, travelling etc.

b. Obligatory Charity (Zakat)

i. Identify obligatory importance of Zakat and other items as outlined under the title of 'Infaq-fee-sabilillah'
ii. Categorize the people who can be the beneficiaries of Zakat
iii. Role of zakat in eradication of greed and love of material world
iv. Effect of Zakat and sadaqat in circulation of wealth and alleviation of poverty
v. Explain the essence of zakat and sadaqat in building just communities
vi. Describe the role of state in collection and disbursement of zakat

c. Fasting (Roza)

i. Discuss the importance and significance of fasting
ii. Relate the Holy Quran and the month of Ramadan
iii. Role of fasting in building personal qualities like self-control, piety and soft corner for the poor and needy persons
iv. Identify the applications of "Taqwa" through fasting

d. Pilgrimage (Hajj)

i. Discuss the importance and significance of Hajj
ii. Identify the conditions in which Hajj becomes an obligation
iii. Role of manasik-e-Hajj in producing discipline and complete submission
iv. Recognize the importance of Hajj in uniting the ummah
v. Sacrifice for Allah subhan wa taala (essence of qurbani)

TOPIC AREAS

1. Prayer (Salah/Namaz)

2. Obligatory charity (Zakat)
3. Fasting (Saum/Roza)
4. Pilgrimage (Hajj)

Quran: Year-2

SECTION THREE: SPECIFIC QURANIC COMMANDMENTS

LEARNING OUTCOMES

a. Importance of the protection of Human life

i. Concept of the sanctity of human life in Quran and Sunnah
ii. Importance and significance of a single human being even during war
iii. Concept of punishment in regard to the killing of a human being, voluntarily or involuntarily

b. Jihad

i. Concept of Jihad and its significance (hikmat)
ii. Different forms of Jihad and their importance
iii. Principles and preparation of Jihad
iv. Devine reward of Jihad

c. Heirship/Inheritence (Virasat)

i. Heirship and division of wealth in accordance with divine teachings
ii. Heirs and their shares
iii. Legal aspect of virasat (Hud-e-Illahi)

d. Amar-bil-maroof-wa-Nahi-anil-munkar

i. Differentiation between Maroof and Munkar
ii. Importance and significance (effects of avoiding this principle)
iii. Necessary conditions of both amar-bil-maroof and nahi-anil-munkar
iv. The different stages and the necessary prerequisites

e. Hadood-e Illahee and taazeerat

i. Meaning and various types of hadood-e-Illahee
ii. Authority for fixation of limit (hudd)
iii. Criteria and permissible relaxation in fixing the limits
iv. Difference between 'Hadood', 'Qisas' and 'Tazeerat'. Punishments which are left to the court of law
v. Benefits for the good of community

f. Justice (Adal-o-insaf)

i. Justice of Allah subhan wa taala
ii. Importance of justice for the survival of community
iii. Need of justice to be prevailed irrespective of religion
iv. Devine reward for fair justice

g. Business (Bay-o-tijarat)

i. Importance of fair business and its necessary constituents
ii. Permissible and impermissible conditions of businesses
iii. Concept of loan in businesses

h. Interest (Riba or Sudi karobar)

i. Meaning of Riba or interest and its different forms
ii. Impact of Riba on a society in general
iii. Devine declaration and its punishment both in this world and Hereafter

i. Nikah-o-talaq

i. Basic rulings regarding marriage and divorce
ii. Importance of Nikah and its constituents
iii. Conditions of Nikah and various forms of prohibited/impermissible nikah
iv. Misconception of dowry
v. Talaq and its various forms
vi. Meaning of Khula and its conditions

CONTENTS

ISLAMIYAT &PAKISTAN STUDIES

MODULE RATIONALE

This module comprises of Islamiyat & Pakistan Studies. All the medical or other curricula relate to our core context and internal fiber. The study of religion and country endorses all relevancy and competency acquisition for the purpose of service to humanity and community orientation.

ISLAMIYAT

A short course on Islamic Studies will be completed in First and Second year with an exam at the end of second year.

Course Content:

1. Understand the basic principles of Islam.
2. Explain the concept of the Islamic state.
3. Explain the Quran as a guide for modern society and scientific development.
4. Describe the life of the Holy Prophet Peace be upon him as an example to follow.
5. Explain ethics in the Islamic prospective.
6. Describe the rights of the individual in Islam.
7. Describe the rights of women and children in Islam.
8. Explain the contribution of Islamic scholars to science and medicine.
9. Understand Islam in terms of modern scientific development.
10. Explain the concept of Rizk-e-Hilal.
11. Explain the concept of Hukook-ul-Ibad.

PAKISTAN STUDIES

A short course on Pakistan Studies will be completed in First and Second year with an exam at the end of second year.

Course Content:

1. Describe brief the salient features of the Pakistan movement.
2. Explain the basis for the creation of Pakistan.
3. Give a brief account of the history of Pakistan.
4. Explain the ethnic and cultural distribution of the population of Pakistan.
5. Describe the Provinces and resources available in Pakistan.
6. Explain current problems faced by Pakistan.
7. Describe the social, economic and health problems of the rural population of Pakistan.

ISLAMIYAT AND PAKISTAN STUDIES BOOKS
• Standard Islamiyat (Compulsory) for B.A, B.Sc., M.A, M.Sc., MBBS by Prof. M.Sharif Islahi Ilmi Islamiyat (Compulsory) for B.A. B.Sc., & equivalent. • Pakistan studies (Compulsory) for B.A. B.Sc., B.Com., Medical/Engineering by Prof. Shah Jahan Kahlun • Pakistan studies (Compulsory) for B.A, B.Sc., B.Com., B.Ed., Medical/Engineering by Prof. Shah Jahan Kahlun

CIVICS

1. MODULE RATIONALE

Civics is part and parcel of life and the study of Civics has major thrust on improvement of the quality of life and welfare of human beings. This discipline enhances the approach towards rational behavior and daily life.

There is a need for us to know role of a citizen with specific reference to Global Village, the Citizen and Daily life issues, Citizenship, Rights and Responsibility, Role of Government and State, Implementation

Issues of Devolution plan, Social Welfare Institutions/ NGOs and their role at basic level, social interactions and the new discoveries in IT and mass media, relations with International Organizations and Pakistan and its neighbors. Civics goes beyond the cognitive level to deal with social values and attitudes. From the earliest stages of the course, it is important to respect students' opinions while helping them to develop a rationale for their opinions. This curriculum is adapted from Agha Khan University Examination Board curriculum for higher secondary examination.

2. VISION & MISSION

2.1 : Vision: Building the personality and character of health professionals

2.2 : Mission: Teaching Civics to undergraduate students of Health Sciences, building their personality and character, enabling them to apply these principles in patient care.

3. CURRICULUM DESIGN AND ORGANIZATION

3.1 : Course Aim:

- To develop understanding of the social nature and significance of civics, its key concepts and civic life.
- To emphasize learning of related themes in a way that encourages creativity, curiosity, observation, exploration and questioning.
- To create awareness of the nature of civic life and the relationship between civics and other social sciences.
- To promote understanding about the ideology of Pakistan and the struggle of an independent state.
- To inculcate the behavior patterns of national character, and qualities of a good citizen,
- self-reliance, patriotism and leadership.
- To create a strong sense of national unity, integration and cohesion.

- To prepare students as future citizens, conscious of their positive role in a society and the world at large.

3.2 : Mode of Delivery: The module will be taught in the form of interactive lectures.

3.3 : Learning Experience: Classroom environment will be used.

3.4 : Attendance: Eighty-five percent (85%) attendance is mandatory to be eligible to sit in the professional examination.

3.5 : Assessment: The assessment will be done through two written assignments and two quizzes per year. The assignments will be based on the topics discussed during the year. One will be given after first half of the course will be completed for the year and second will be given at the completion of the course.

3.7: Module Faculty: At least one full time faculty member (Lecturer or above) will be hired to run the civics course throughout four years. The qualifications of the faculty member will be certified by the academic council of the college/institution to be declared as the teacher of civics.

LEARNING OUTCOMES	TOPICS
i. Define civics ii. Describe how civics can improve the citizenship iii. Illustrate the scope of civics iv. Discuss the nature of civics v. Give examples how civics can help in the national development	Civics-Meaning & Nature
i. Examine the significance of civics ii. Explain how civics is important to know the problems of daily life iii. Discuss how civics can help to bring improvements in the civics life of citizens iv. Evaluate how civics can improve the sense of love and respect for human relationship v. Discuss that studying civics can develop a sense of gratitude vi. Give examples how civics is important to develop the global unity	Significance and Utility
i. Compare civics with political science, history, economics, sociology and ethics	Relationship with Social Sciences
i. Describe the term harmonic relationship ii. Explain the harmonic relationship among different members of society. (Women, children and senior citizens) iii. Explain how harmonic relationship develop for respect of religion	Harmonic Relationship
i. Define the term individual in relation to civics ii. Define the term state iii. Explain the relation between an individual and a state iv. Describe the importance of an individual in a state v. Enlist the responsibilities of an individual in a state	Individual and state

i. Identify the basic unit of social institution Discuss and characterize the different types of family ii. Give the importance of basic unit of social institution in the development of a state Enlist the responsibilities of family in general iii. Analyze your role for the betterment of the family Compare and contrast the impact of the deterioration of family in the western society and give examples	Family

i. Define community ii. Explain the nature and significance of community iii. Discuss the role of a family in community iv. Analyze the role of an individual for the betterment of the community	Community
i. Define society ii. Elaborate the relation between an individual and society and society and state iii. Analyze the role of an individual for the betterment of society	Society
i. Define the term nation, nationality and ummah differentiate between nation and nationality distinguish between nation and ummah analyze the value, behavior and the pattern of society based on religions ii. Evaluate the characteristics of society developed by religions	Nation, Nationality
i. Trace the origin of state with reference to the theories of Divine Origin, Force and Social ii. Contract (Hobbs, Lock, Rousseau) iii. Describe the elements of a state (sovereignty, population, territory, Government) iv. Compare and distinguish the role of state, society and government	Origin and elements of State
i. Describe the functions of state ii. Describe the factors which are necessary for proper functioning of state iii. Analyze the situation when a state does not function properly iv. Describe the characteristics of a welfare state Analyze how a welfare state guarantees the equity and justice on the issues of gender, religion, and social classes	Functions of state. (Defense, law and order, welfare etc.)
i. Define the concept of sovereignty in west ii. Discuss different kinds of sovereignty iii. Explain Austin's concept of sovereignty iv. Analyze critically Austin's concept of sovereignty	Sovereignty

TABLE OF SPECIFICATIN

MBBS 1st Professional

Block-1

Theme	Subject	Written Exam		Oral/Practical/Clinical Exam			
		MCQ (1 mark)	Marks	OSPE (8 marks each observed)	OSCE (5 marks each observed)	OSVE (14 marks each observed)	Marks
Normal Structure	Anatomy applied/clinical	40	40	04	-	01	46
Normal Function	Physiology applied/clinical	37	37	03	-	01	38
	Biochemistry applied/clinical	34	34	02	-	01	30
Disease Burden & Prevention	Community Medicine & Public Health	06	06	-	-	-	-
	Behavioral Sciences	05	05	-	-	-	-
Pathophysiology & pharmacotherapeutics	Pathology	13	13	1	-	-	8
	Pharmacology	05	05	1	-	-	8
CFRC	CF-I	-	-	-	01	-	05
PERLs	PERLs-I	-	-	-	01	-	05
Total		**140**	**140**	**11 stations x 08 = 88**	**02 stations x 05 = 10**	**03 stations x 14=42**	**140**

MBBS 1st Professional

Block-2

Theme	Subject	Written Exam		Oral/Practical/Clinical Exam			
		MCQ (1 mark)	Marks	OSPE (8 marks each observed)	OSCE (5 marks each observed)	OSVE (14 marks each observed)	Marks
Normal Structure	Anatomy applied/clinical	55	55	05	-	01	54
Normal Function	Physiology applied/clinical	27	27	02	-	01	30
	Biochemistry applied/clinical	23	23	02	-	01	30
Disease Burden & Prevention	Community Medicine & Public Health	06	06	-	-	-	-
	Behavioral Sciences	04	04	-	-	-	-
Pathophysiology & pharmacotherapeutics	Pathology	15	15	01	-	-	08
	Pharmacology	10	10	01	-	-	08
CFRC	CF-I	-	-	-	01	-	05
PERLs	PERLs-I	-	-	-	01	-	05
Total		**140**	**140**	**11 stations x 08 = 88**	**02 stations x 05 = 10**	**03 stations x 14=42**	**140**

MBBS 1st Professional

Block-3

Theme	Subject	Written Exam		Oral/Practical/Clinical Exam			
		MCQ (1 mark)	Marks	OSPE (8 marks each observed)	OSCE (5 marks each observed)	OSVE (14 marks each observed)	Marks
Normal Structure	Anatomy applied/clinical	32	32	03	-	01	38
Normal Function	Physiology applied/clinical	51	51	04	-	01	46
	Biochemistry applied/clinical	29	29	02	-	01	30
Disease Burden & Prevention	Community Medicine & Public Health	06	06	-	-	-	-
	Behavioral Sciences	02	02	-	-	-	-
Pathophysiology & pharmacotherapeutics	Pathology	15	15	01	-	-	08
	Pharmacology	05	05	01	-	-	08
CFRC	CF-I	-	-	-	01	-	05
PERLs	PERLs-I	-	-	-	01	-	05
Total		**140**	**140**	**011 stations x 08 = 88**	**02 stations x 05 = 10**	**03 stations x 14=42**	**140**


UMDC
PERLS

MODULE RATIONALE

The PERL module is designed to equip medical students with essential competencies in Professionalism, Ethics, Research, and Leadership, aligning with the PMDC 7-Star Doctor (Professional, Ethical, Scholar, Leader, Communicator, Health Advocate, and Collaborator) framework. This framework emphasizes the multifaceted role of a physician, highlighting the need for a holistic approach to medical education. In an era where healthcare systems are constantly evolving, integrating these core areas is vital for developing well-rounded, responsible, and effective healthcare professionals.

1. **Importance of Professionalism:**
   Professionalism is the cornerstone of medical practice, influencing patient trust and the overall quality of care. This module emphasizes the significance of professional behavior, including accountability, integrity, and respect for diversity, ensuring that students cultivate a strong ethical foundation as they progress through their medical education.
2. **Ethical Decision-Making:**
   As future healthcare providers, students will face complex ethical dilemmas that require sound judgment and moral reasoning. This module focuses on key ethical principles, such as patient autonomy, equity, and justice in resource allocation, particularly in challenging areas like neoplasia and inflammation. Understanding these principles prepares students to advocate for their patients while navigating the intricate landscape of modern healthcare.
3. **Research Competence:**
   Research plays a critical role in advancing medical knowledge and improving patient outcomes. By emphasizing evidence-based practice, this module encourages students to engage with scientific literature, develop robust literature search strategies, conduct research projects and apply research findings to clinical decision-making. This skill set is essential for fostering a culture of inquiry and continuous improvement within the healthcare profession.
4. **Leadership Development:**
   Leadership is an integral part of effective healthcare delivery. This module prepares students to take on leadership roles, emphasizing teamwork, conflict resolution, and

effective communication. By fostering leadership skills, we aim to empower students to influence positive changes in their future workplaces and advocate for patient-centered care.

In summary, the PERL module is designed to create a comprehensive learning experience that prepares medical students for the challenges and responsibilities they will face in their careers. By integrating Professionalism, Ethics, Research, and Leadership, we aim to cultivate competent, compassionate, and ethical healthcare professionals who are equipped to make informed decisions and lead with integrity in an ever-changing medical landscape.

MODULE LEARNING OUTCOMES

- Exhibit accountability, integrity, and respect for diversity in all aspects of medical practice, embodying the principles of professionalism in clinical and academic settings.
- Analyze and apply ethical principles related to patient care, including autonomy, beneficence, non-maleficence, and justice, particularly in challenging situations such as end-of-life decisions and resource allocation.
- Develop and implement effective literature search strategies, critically evaluate scientific literature, and synthesize findings to inform clinical decision-making and practice.
- Participate in a comprehensive research project, from formulating a research question to data collection and analysis, culminating in the production of a publishable manuscript that meets academic and ethical standards.
- Demonstrate leadership skills through effective communication, conflict resolution, and teamwork, fostering a collaborative environment that enhances patient care and academic performance.
- Recognize and address the social determinants of health, advocating for equity in healthcare access and outcomes for diverse patient populations.
- Engage in self-assessment and reflective practices to identify strengths and areas for improvement, creating actionable plans for personal and professional growth throughout their medical education.
- Utilize effective verbal and non-verbal communication skills to engage with patients, families, and colleagues, ensuring clear and compassionate exchanges that enhance understanding and trust.

SUBJECTS INTEGRATED IN THE MODULE

1. Professionalism
2. Ethics
3. Research
4. Leadership

LEARNING RESOURCES

1. **Professionalism**:

- Azam, M. (2021). Mind maps for medicine. Scion Publishing. https://scionpublishing.com/product/mind-maps-for-medicine/
- Bin Abdulrahman, K. A., Khalaf, A. M., Bin Abbas, F. B., & Alanazi, O. T. (2021). Study habits of highly effective medical students. *Advances in Medical Education and Practice, 12*, 627-633. https://doi.org/10.2147/AMEP.S309535
- Bandaranayake, R. C. (2013). Study skills. In K. Walsh (Ed.), *Oxford textbook of medical education* (pp. 244-254). Oxford University Press. https://doi.org/10.1093/med/9780199652679.003.0021
- American Board of Internal Medicine Foundation, American College of Physicians Foundation, & European Federation of Internal Medicine. (2005). Medical professionalism in the new millennium: A physician charter. Retrieved from https://www.abimfoundation.org/what-we-do/physician-charter:contentReference[oaicite:0]{index=0}
- Barnhoorn, P. C., Houtlosser, M., Ottenhoff-de Jonge, M. W., Essers, G. T. J. M., Numans, M. E., & Kramer, A. W. M. (2019). A practical framework for remediating unprofessional behavior and for developing professionalism competencies and a professional identity. *Medical Teacher, 41*(3), 303-308. https://doi.org/10.1080/0142159X.2018.1464133:contentReference[oaicite:1]{index=1}
- Guraya, S. S., Guraya, S. Y., Harkin, D. W., Ryan, Á., Mat Nor, M. Z. B., & Yusoff, M. S. B. (2021). Medical Education e-Professionalism (MEeP) framework; From conception to development. *Medical Education Online, 26*(1), 1983926. https://doi.org/10.1080/10872981.2021.1983926:contentReference[oaicite:2]{index=2}
- Kirk, L. M. (2007). Professionalism in medicine: Definitions and considerations for teaching. *Baylor University Medical Center Proceedings, 20*(1), 13-16. https://doi.org/10.1080/08998280.2007.11928225:contentReference[oaicite:3]{index=3}
- Al-Eraky, M. M. (2015). Faculty development for medical professionalism in an Arabian context. [Doctoral Thesis, Maastricht University]. Maastricht University. https://doi.org/10.26481/dis.20150521ma:contentReference[oaicite:0]{index=0}

- Online Journals and Reading Materials through HEC Digital Library Facility

2. **Ethics**:

- World Health Organization. (2015). Global health ethics: Key issues. World Health Organization. https://apps.who.int/iris/handle/10665/164576
- World Health Organization. (2011). Standards and operational guidance for ethics review of health-related research with human participants. World Health Organization. https://www.who.int/publications/i/item/9789241502948
- World Health Organization. (2023). WHO Code of Ethics. World Health Organization.
- Harvey, J. C. (n.d.). Clinical ethics: The art of medicine. In Military Medical Ethics, Volume 1, Chapter 3.
- National Bioethics Committee. (2017). Guidelines and teachers handbook for introducing bioethics to medical and dental students. Healthcare Ethics Committee (HCEC).
- Varkey, B. (2021). Principles of clinical ethics and their application to practice. Medical Principles and Practice, 30(1), 17-28. https://doi.org/10.1159/000509119
- Pakistan Medical and Dental Council. (2018). Professional ethics and code of conduct.
- Online Journals and Reading Materials through HEC Digital Library Facility

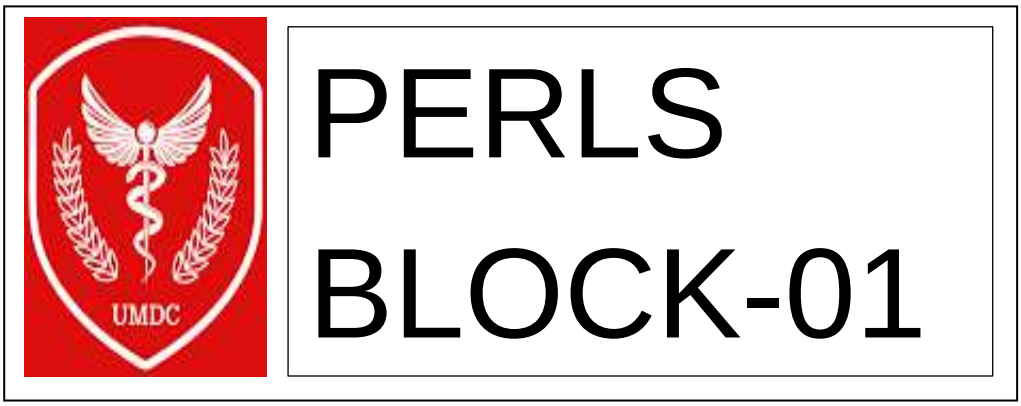
3. **Research**

- Medical Statistics. 2nd Ed. by R. Turkwood.
- Biddle, K., Blundell, A., & Sofat, N. (2023). Understanding clinical research: An introduction. Scion Publishing. https://scionpublishing.com/product/understanding- clinical-research/
- Harris, M., & Taylor, G. (2020). Medical Statistics Made Easy (4th ed.). Scion Publishing. https://scionpublishing.com/product/medical-statistics-made-easy-fourth-edition/
- Allen, A. K. (2012). Research skills for medical students. SAGE Publications, Inc. https://doi.org/10.4135/9781526436016
- Online Journals and Reading Materials through HEC Digital Library Facility

4. **Leadership**

- Wamboldt, R., & Loughran, N. (2017). Communication skills for OSCEs. Scion Publishing. https://scionpublishing.com/product/communication-skills-for-osces/
- Edmonstone, J. (2018). Leadership development in health care in low and middle-income countries: Is there another way? *International Journal of Health Planning and Management, 33*(4), e1193-e1199. https://doi.org/10.1002/hpm.2606:contentReference[oaicite:0]{index=0}
- National Center for Healthcare Leadership. (2018). Health Leadership Competency Model 3.0. Chicago, IL: National Center for Healthcare Leadership. https://nchl.org:contentReference[oaicite:0]{index=0}

- Chen T. Y. (2018). Medical leadership: An important and required competency for medical students. *Ci ji yi xue za zhi = Tzu-chi medical journal*, *30*(2), 66-70. https://doi.org/10.4103/tcmj.tcmj_26_18


UMDC
PERLS
BLOCK-01

ORIENTATION				
*Proposed Sequence of Topics Mentioned below. Medical Colleges are at liberty to manage according to their resources. Topics can switch within each Block				**Total Hours = 10.5**
***Research (R)** in the PERL curriculum will be delivered by the Department of Community Medicine as a longitudinal component from the first to the fourth year of the MBBS program. At the end of the fourth year, students' research projects will be assessed through a dedicated PERL station.*				
Code	**Domain**	**Topic**	**Specific Learning Objectives**	**Proposed Portfolio Entry**
PERLs-1-001	**Professionalism**	History of Medical Profession	• Discuss the origins of Medicine in Ancient Civilizations • Explain the key Figures in Medical History (Hippocrates, Avicenna, Florence Nightingale) • Discuss modernization of Medicine and Technological Advances • Introduce the development of Medical Education and Licensing	-
PERLs-1-002		Reflective Doctor	• Discuss the concept of reflective practice and its importance in medical professionalism, including self-awareness, critical thinking, and continuous improvement. • Write a reflective entry after a learning experience, identifying key lessons, areas for improvement, and how these insights will influence their future practice.	
PERLs-1-003	**Ethics**	Hippocratic Oath taking	• Explain the history and Significance of the Hippocratic Oath	

			• Discuss the importance of Professional Integrity and Moral Conduct • Explain the need for lifelong Commitment to Patient Care and Well-being • Describe ethical Principles in the Oath: Autonomy, Beneficence, Non-maleficence, and Justice	-
PERLs-1-004	**Research**	Introduction to Research	• Describe research, inquiry, and evidence-based medicine. • Identify the importance of research in the practice of medicine	-
PERLs-1-005	**Leadership**	The Doctor as a learner- Study Skills	• Time Management: • Recognize the importance of planning and prioritizing tasks to make the most of available study time. • Learn to break down complex tasks and schedule study sessions to optimize productivity. • Organization: • Understand how to organize study materials, notes, and resources in a structured manner to make learning more efficient. • Develop systems for tracking assignments, deadlines, and upcoming exams to stay on top of coursework. • Learning Efficiency:	Submit a reflection on your study skills, highlighting your personal strategies for time management, organization, and learning efficiency. Include a weekly study schedule that demonstrates how you balance academic responsibilities with self-care and well-being.

			• Explore techniques for active learning, including summarization, self-testing, and spaced repetition. • Understand how to avoid common distractions and maintain focus during study sessions.	
PERLs-1-006	**Leadership**	Role Modelling/ Mentoring Session I	• Participate in the first mentoring session. • Introduce yourself to your assigned mentor. • Discuss their strengths and weaknesses with their mentor, receive feedback, and collaboratively create an action plan for personal and professional development	Submit a summary of your mentoring session, including feedback, areas identified for improvement, and the action plan you developed with your mentor to enhance your professional growth.
PERLs-1-007	**Computer/ IT**	Academic Writing-IT Skills	• Demonstrate the use of essential IT skills for academic writing, including word processing software (e.g., Microsoft Word), formatting documents, and essential editing tools to enhance the quality of academic papers. • Practice creating and formatting a simple document using a word processing tool, applying basic formatting features like headings, bullet points, and spacing to organize their writing.	

FOUNDATION-I				
*Proposed Sequence of Topics Mentioned below. Medical Colleges are at liberty to manage according to their resources. Topics can switch within each Block				**Total Hours = 7.5**
****Research (R)** in the PERL curriculum will be delivered by the Department of Community Medicine as a longitudinal component from the first to the fourth year of the MBBS program. At the end of the fourth year, students' research projects will be assessed through a dedicated PERL station.*				
Code	**Domain**	**Topic**	**Specific Learning Objectives**	**Proposed Portfolio Entry**
PERLs-1-008	**Professionalism**	Introduction of medical Professionalism	• Define Medical Professionalism • Discuss Core Values: Altruism, Accountability, Integrity • Explain Ethical Practice and Moral Responsibility Reflect on a scenario or case study that demonstrates professionalism in healthcare, identifying key behaviours and attitudes that align with professional standards	Submit a reflective entry discussing what professionalism means in the context of healthcare. Use a case or example to highlight key professional behaviours you observed or practiced.
PERLs-1-009		Responsible & Accountable Medical Student	• Understand the importance of responsibility and accountability in maintaining regularity and punctuality as core professional behaviors expected of medical students. • Demonstrating regular attendance and punctuality in academic and clinical activities, reflecting on how this consistency contributes to their professional development.	Evidence of Attendance Record.
PERLs-1-010	**Ethics**	Code of Conduct: Duties of healthcare professionals	• Appreciate student responsibility in following the code of conduct of the college • Review the college's code of conduct and	Submit a reflective entry discussing the key points of the college's code of conduct and your responsibilities as a

			identify key responsibilities expected of them as medical students. Reflect on the importance of following these guidelines in maintaining professionalism and being aware of actions for misconduct(academic, non-academic/disciplinary).	medical student. Include how adherence to these rules shapes your journey toward becoming a responsible healthcare professional.
PERLs-1-011	**Leadership**	Personal Qualities: Self Directed Learner	• Develop the ability to become a self-directed learner by setting achievable long-term and short-term goals and effectively managing time to meet academic and personal milestones. • Create a personal plan that includes both long-term and short-term academic goals and a weekly time schedule to help manage their studies and personal responsibilities.	Submit a personal learning plan outlining your long-term and short-term goals, as well as a detailed weekly time schedule. Reflect on how this plan will support your academic success and personal development as a self-directed learner
PERLs-1-012		Verbal Communication	• Develop effective verbal communication skills, focusing on clear and concise communication in academic, clinical, and team-based settings to enhance collaboration and leadership abilities. • Practice delivering clear and concise verbal explanations of medical concepts or tasks during group activities, focusing on tone, clarity, and engagement with peers	Submit a reflection on a group activity where you practiced verbal communication skills. Highlight how you conveyed information clearly and effectively, and reflect on areas where you can improve your verbal communication in academic or clinical settings.

HEMATOPOETIC & LYMPHATIC				
*Proposed Sequence of Topics Mentioned below. Medical Colleges are at liberty to manage according to their resources. Topics can switch within each Block				**Total Hours =03**
***Research (R)** in the PERL curriculum will be delivered by the Department of Community Medicine as a longitudinal component from the first to the fourth year of the MBBS program. At the end of the fourth year, students' research projects will be assessed through a dedicated PERL station.*				
Code	**Domain**	**Topic**	**Specific Learning Objectives**	**Proposed Portfolio Entry**
PERLs-1-013	**Leadership**	Non-Verbal Communication	• Discuss the role of non-verbal communication, including body language, facial expressions, and gestures, in effectively conveying messages and building rapport in healthcare settings • Practice using appropriate non-verbal communication during simulated patient interactions or group discussions, such as eye contact, posture, and active listening cues.	Submit a reflection on a group activity or simulated interaction where you consciously used non-verbal communication to enhance the interaction. Discuss how it impacted your ability to lead or communicate effectively
PERLs-1-014	**Research**	Scientific Writing	• Differentiate between types of scientific publications, including editorials, original articles, systematic reviews, case reports, meta-analyses, and narrative reviews. • Identify different forms of scientific writing in published journals.	

PERLS BLOCK -02

MUSCULOSKELETAL AND LOCOMOTION-I				
*Proposed Sequence of Topics Mentioned below. Medical Colleges are at liberty to manage according to their resources. Topics can switch within each Block				**Total Hours = 06**
***Research (R)** in the PERL curriculum will be delivered by the Department of Community Medicine as a longitudinal component from the first to the fourth year of the MBBS program. At the end of the fourth year, students' research projects will be assessed through a dedicated PERL station.*				
Code	**Domain**	**Topic**	**Specific Learning Objectives**	**Proposed Portfolio Entry**
PERLs-1-014	**Professionalism**	Respect for the Human Body/Remain	• Understand the ethical and professional significance of respecting the human body, especially in medical education settings such as anatomy labs, and appreciate the contributions of body donors to medical science.	Write a Code of Conduct of professional behaviours in Anatomy Hall, Laboratories /museums with human tissue/remains.
PERLs-1-015	**Ethics**	Virtues of a Medical Professional	• Analyse the key virtues expected from healthcare providers, including compassion, courage, integrity, humility, patience, altruism, professional responsibility, trustworthiness, and honesty, and their role in ethical medical practice. • Reflect on a case or scenario where healthcare professionals demonstrated one or more of these virtues, discussing how these traits influenced patient care and outcomes.	Write a reflective entry on a case or scenario where healthcare professionals demonstrated one or more of these virtues, discussing how these traits influenced patient care and outcomes
PERLs-1-016	**Leadership**	Written and Electronic Communication Skills	• Appreciate effective written and electronic communication skills, focusing on clarity, professionalism, and	Submit a sample professional email or electronic communication (e.g., a message to a

			accuracy in both academic and clinical contexts, including emails and electronic health records. • Students will practice composing a clear and professional email to a faculty member or peer, ensuring correct format, tone, and content.	faculty member) that demonstrates clarity, appropriate tone, and adherence to communication protocols.
PERLs-1-017	**Leadership**	Giving Feedback	• Appreciate the importance of giving constructive feedback • Discuss the principles using techniques like the Sandwich Technique and "2 Stars and a Wish" to promote improvement while maintaining positive communication. • Practice giving feedback to a peer using the Sandwich Technique (positive- constructive-positive) or '2 Stars and a Wish' (two positive aspects and one area for improvement) during a group activity or simulated scenario.	Submit the feedback given to you by your peer during class activity with the identification of areas for improvement and an action plan.
PERLs-1-018	**Research**	Research Manuscript	• Discuss the basic structure of a research manuscript using the IMRAD format (Introduction, Methods, Results, and Discussion) and its importance in scientific communication. • Identify the components of a research manuscript using the IMRAD structure. • Apply knowledge of IMRAD by submitting	

			an original article to the portfolio, labelling its key components.	
PERLs-1-019	**Ethics**	Patient Autonomy in decision making	• Define patient autonomy and understand its foundational role in medical ethics, recognizing that every patient has the right to make informed decisions regarding their own healthcare. • Describe necessary components of informed decision-making, including the provision of accurate information, understanding of risks and benefits, patient comprehension, and the patient's ability to voluntarily make choices free from coercion. • Appreciate the responsibilities of healthcare providers in ensuring that patients receive all necessary information and support to make autonomous decisions, including effective communication and respecting cultural, religious, or personal values.	Submit a reflective case study analyzing how patient autonomy was handled in a clinical situation. Discuss whether the patient was fully informed, how their preferences were respected, and the role of healthcare providers in ensuring the patient's right to make decisions about their own care.

PERLS BLOCK-03

CARDIOVASCULAR-I				
*Proposed Sequence of Topics Mentioned below. Medical Colleges are at liberty to manage according to their resources. Topics can switch within each Block				**Total Hours = 09**
***Research (R)** in the PERL curriculum will be delivered by the Department of Community Medicine as a longitudinal component from the first to the fourth year of the MBBS program. At the end of the fourth year, students' research projects will be assessed through a dedicated PERL station.*				
Code	**Domain**	**Topic**	**Specific Learning Objectives**	**Proposed Portfolio Entry**
PERLs-1-020	**Professionalism**	Digital Identity	• Understand the concept of digital identity, focusing on the impact of a healthcare professional's digital footprint and the importance of maintaining professional conduct in online spaces • Analyze their current digital footprint, identify areas where they can improve their online presence to reflect professionalism and develop a plan for maintaining appropriate online conduct.	Submit evidence of your digital footprint.
PERLs-1-021	**Ethics**	Justice in Resource Allocation	• Describe the ethical principle of justice in healthcare, focusing on the fair allocation of limited resources and how healthcare professionals can make ethical decisions to ensure equity in patient care. • Analyze a case where healthcare resources e.g. Ventilators are limited in CCU, evaluating how justice and fairness principles were applied in resource allocation and proposing ways to	Submit a case analysis discussing the ethical challenges of resource allocation in healthcare, focusing on how justice was applied or compromised. Propose strategies for making fair and equitable decisions in future resource-constrained scenarios.

			ensure equitable distribution.	
PERLs-1-022	**Leadership**	Asking for Feedback	• Discuss the importance of seeking constructive feedback as a leadership skill to foster personal growth, enhance team performance, and improve communication within healthcare settings. • Discuss the critical principles of seeking constructive feedback, including openness to criticism, active listening, and using feedback for personal and professional growth. • Practice seeking constructive feedback by asking specific, open-ended questions to peers or mentors about their performance and demonstrating active listening and reflection on the feedback received.	Submit a list of areas where you want feedback from your mentor in the upcoming mentor meeting.
PERLs-1-023		Role Modelling/ Mentoring Session II	• Participate in a mentoring session where they will discuss their strengths and weaknesses with their mentor, receive feedback, and collaboratively create an action plan for personal and professional development	Submit a summary of your progress from your last mentoring session, including feedback, areas identified for improvement, and the action plan you developed with your mentor to enhance your professional growth.
PERLs-1-024		Receiving Feedback	• Describe the principles of receiving feedback effectively, including openness, self-	Submit a reflection on how you received feedback during a task or project.

			awareness, and using feedback constructively to improve performance and personal development. • Practice receiving feedback by actively listening, acknowledging the feedback, and reflecting on how it can be applied to improve their performance in academic or clinical tasks.	Discuss howyou responded to the feedback and how you plan to incorporate it into your personal or professional development
PERLs-1-025	**Research**	Research Types	• Identify different types of health research (basic, clinical, applied, public health). • Differentiate between quantitative and qualitative research approaches.	

RESPIRATORY-I				
*Proposed Sequence of Topics Mentioned below. Medical Colleges are at liberty to manage according to their resources. Topics can switch within each Block				**Total Hours = 4.5**
****Research (R)** in the PERL curriculum will be delivered by the Department of Community Medicine as a longitudinal component from the first to the fourth year of the MBBS program. At the end of the fourth year, students' research projects will be assessed through a dedicated PERL station.*				
Code	**Domain**	**Topic**	**Specific Learning Objectives**	**Proposed Portfolio Entry**
PERLs-1-026	**Ethics**	Digital Ethics	• The principles of digital ethics, including proper netiquette, maintaining confidentiality in online spaces, and the legal and ethical implications of online harassment and misconduct. • Identify examples of ethical and unethical online behaviour, focusing on netiquette, confidentiality, and how to prevent and address online harassment by relevant laws.	Make a poster for Netiquette in using your Class Social Media Groups.
PERLs-1-027	**Professionalism**	Integrity & Honesty	• Describe the importance of integrity and honesty in academic and clinical environments, focusing on demonstrating ethical behaviour in assignment submissions and during examinations. • Commit to completing and submitting assignments and exams with honesty and integrity, reflecting on the significance of these values in their academic and future professional practice.	Submit an incident report of a case of cheating in an exam and provide recommendations on how it should have been handled.

PERLs-1-028	**Research**	Scientific article understanding & Research ethics	• Present the main features of a selected scientific article to peers, demonstrating understanding of its structure and findings. • Explain the basic principles of research ethics (e.g., consent, confidentiality, authorship, plagiarism).	

EXPOSITORY

Module Rationale

To integrate Expository Writing with an Introduction to Information Technology (IT) course for undergraduate medical students, we can align the IT skills taught each year with the writing tasks and objectives. The aim is to enhance students' digital literacy and writing skills,

This integrated spiral of Expository Writing and IT ensures that as students advance in their medical education, they also develop digital literacy skills. These skills complement their writing abilities and prepare them for modern medical practice, where digital communication, research, and data management are essential. By the end of the 4-year program, students will be proficient in writing and using technology to support their work as

Year 1: Expository Writing I – Foundations in Academic Writing + Introduction to IT: Basic Digital Literacy			
THEORY			
Code	**Subject: Expository writing & IT**		**Total Hours =10**
	Specific Learning Outcome	**Integrating Disciplines**	**Topics**
EXP-01	**Expository Writing Focus:** 1. To write expository essays using planning, prewriting, organizing, drafting, revising, editing, and proofreading strategies. 2. To edit own written work using the checklist, for fixing errors. 3. To sketch a template of a formal outline for the sequencing of the essay 4. To write patient history and simple case reports. **IT Integration:** 5. Word, Google Docs), internet search strategies, and using online libraries (e.g., PubMed, Google Scholar). **Writing Application:** 6. To use word processing tools to draft and format essays, case reports, and patient histories. 8. Introduction to citation management tools (e.g., Zotero, Mendeley) for referencing sources in essay.	PERLS, Anatomy, Physiology & Biochemistry	• Step by step process of expository writing which includes planning, prewriting, organizing, drafting, revising, editing and proofreading. • Brain storming process for generating ideas for selection of topics. • idea mapping for the organization of an essay. • Self-editing of the essays. • Template for sequencing of the essay. • Writing patient history and basic case reports • Basic computer and internet skills (Microsoft Word, Google Scholar) • Use of digital writing assistance (Grammarly)

STUDY RESOURCES

Anatomy

- Snell's Clinical Anatomy 10th ed.
- Langman's Medical Embryology 12th ed
- Medical Histology by Laiq Hussain Siddiqui 8th edition.
- General Anatomy by Laiq Hussain Siddiqui 6th edition.

Biochemistry

- Harpers illustrated Biochemistry (latest edition). Rodwell.V.W MCGrawHill publishers.
- Lippincott illustrated Review (latest edition). Kluwer.W.
- Essentials of Medical Biochemistry vol 1&2 by Mushtaq Ahmed.

Pathology

- Vinary Kumar, Abul K. Abbas and Nelson Fausto Robbins and Cotran, Pathologic basis of disease. WB Saunders.
- Robbins and Cotran Pathological Basis of Disease. Kumar, V., Abbas, A. and Aster, J. Latest Edition
- Richard Mitchall, Vinary Kumar, Abul K. Abbas and Nelson Fausto Robbins and Cotran, Pocket Companion to Pathologic basis of diseases, Saunder Harcourt.
- Walter and Israel. General Pathology. Churchill Livingstone.
- Robbins & Kumar, Medical Microbiology and Immunology Levinson.

General Medicine

- Principles and Practice of Medicine by Davidson (latest edition)
- Clinical Medicine by Parveen J Kumar & Michaell Clark
- Oxford Handbook of Medicine
- Macleod's Clinical Examination book
- Medicine and Toxicology by C.K. Parikh
- Hutchison's Clinical Methods by Michael Swash. 21st edition

Pharmacology And Therapeutics

- Katzung and Trevor's Pharmacology: Examination and Board Review- 15th Edition
- Basic and Clinical Pharmacology by Bertram G Katzung (case scenarios only) - 16th Edition-
- Current Medical Diagnosis and Treatment- reference book –Edition-2024
- Basic and Clinical Pharmacology by Bertram G Katzung (case scenarios only) - 15th Edition
- Basic and Clinical Pharmacology by Katzung, McGraw-Hill. 16th Edition.
- Pharmacology by Champe and Harvey, Lippincott Williams & Wilkins 8th Edition.
- Katzung Basic and Clinical pharmacology, Lippincot Illustated reviews.
- Clinical Pathology Interpretations by A. H. Nagi

Behavioural Sciences

- Handbook of Behavioural Sciences by Prof. Mowadat H.Rana, 3rd Edition
- Medical and Psychosocial aspects of chronic illness and disability 6th edition by Donna R.Falvo and Beverely E.Holland,
- Integrating behavioral sciences in healthcare, Asma Humayun,2003, 1st edition

Community medicine

- Parks Textbook of Preventive and Social Medicine. K. Park
- Public Health and Community Medicine by Ilyas Ansari
- MSDS manual of Government of Punjab
- Text book of Community Medicine by Park J E. Latest Edition

Surgery

- Bailey & Love's Short Practice of Surgery (latest edition)
- Browse's Introduction to the Symptoms & Signs of Surgical Disease 4th Edition
- Bailey & Love Short Practice of Surgery, Clinical Surgery pearls by Dayananda Babu RACS for Surgical Audits.

Patient Safety

- Patient Safety Currciulum Guide: Multi Professional Guide

Microbiology

- Levinson's review of Microbiology
- Medical Microbiology and Immunology by Levinson and Jawetz,

Pediatrics Medicine

- Nelson Textbook of Pediatrics
- Basis of Pediatrics by Pervez Akbar Khan

Gynecology

- Gynecology by Ten Teachers

Infection Control

- National Guidelines Infection Prevention and control, National Institute of Health Pakistan

Biosafety

- Biosafety in Microbiological and Biomedical Laboratories, 6th Edition (CDC, USA)
- WHO Laboratory Biosafety Manual, Fourth Edition, And Associated Monographs
- WHO safe management of wastes from healthcare facilities chapter 7 -8 page 77-99, 105-125)

Family medicine

- Oxford Handbook of General Practice, 5th Edition

Orthopedics

- Apley and Solomon's System of Orthopaedics and Trauma by Ashley Blom (Editor)

Rheumatology

- Davidson's Principles and Practice of Medicine
- Clinical Medicine by Parveen J Kumar & Michaell, Clark
- Hutchison's Clinical Methods by Michael Swash

Radiology

- Aids to Radiological Differential Diagnosis by Chapman S. and Nakielny R. 4th edition. Elsevier Science Limited; 2003.

Forensic Medicine

- Knight's Forensic Pathology by Barnard Knight 3rd edition
- G. Principles and Practice of Forensic Medicine by Prof. NasibR. Awan,2nd edition
- Forensic DNA Typing – 2nd Edition, Author: John M. Butler
- Parikh's Text book of Medical Jurisprudence, Forensic Medicine and Toxicology by C.K. Parikh 6th Ed., CBS Publisher.
- Gun Shot Wounds 2nd edition by V.J.Deimaio
- Knight B. Simpson's Forensic Medicine.
- Knight and Pekka. Principles of Forensic Medicine

Forensic Pathology

- Forensic pathology 2nd edition by V.J.Deimaio CRC press Boca Raton London New York Washington DC

Toxicology

- Principles of clinical toxicology 3rd edition Thomas . Gossel CRC press Taylor and Francis group

Forensic Sciences

- Fundamentals of Forensic Science- 3rd Edition: Author: Max M Houck, Jay A. Siegel
- Text Book of forensic medicine and toxicology Principles and Practice 5th edition by Krishan Vig

Biomedical ethics

- Principles of Biomedical ethics, 8th edition by Tom. L. Beauchamp, James F. Childress.

Evidence Based Medicine

- Databases for the latest articles/manuscripts
- Clinical Practice Guidelines- local and international - (within last 3 years)
- Books (Latest edition-within last 5 years)

Pediatrics

- Nelson's Book of Pediatric 22 edition Illustrated book of Pediatrics, Pervaiz Akbar textbook peads medicine

Islamiyat

- Standard Islamiyat (compulsory) for B.A, BSc, MA, MSc, MBBS by Prof M Sharif Islahi.
- IImi Islamiyat(compulsory) for BA, BSc & equivalent.

SKILL ACQUISITION WORKSHOPS YEAR 01

Workshop Schedule for MBBS students

The Following **Skill Acquisition Workshops** are included:

Sr. No.	Course Name	Academic Year	Duration	Eligibility
1.	Basic Life Support	1st Year / 2nd Year	2 days	Eligibility requirement for appearing in the 4th Professional Examination
2.	Advanced Life Support	3rd Year / 4th Year	1 day	Eligibility requirement for appearing in the Surgical Clerkship examination
3.	Cardiac First Response	3rd Year / 4th Year	1 day	Eligibility requirement for appearing in the Medicine Clerkship examination
4.	Trauma first responders	3rd Year / 4th Year	1 day	Eligibility requirement for appearing in the Surgical Clerkship examination
5.	Emergency Neonatal Resuscitation	3rd Year / 4th Year	1 day	Eligibility requirement for appearing in the Pediatrics Clerkship examination
6.	Emergency Obstetrics Resuscitation	3rd Year / 4th Year	1 day	Eligibility requirement for appearing in the Gynecology / Obstetrics Clerkship Examination