LAHORE
MEDICAL & DENTAL
COLLEGE

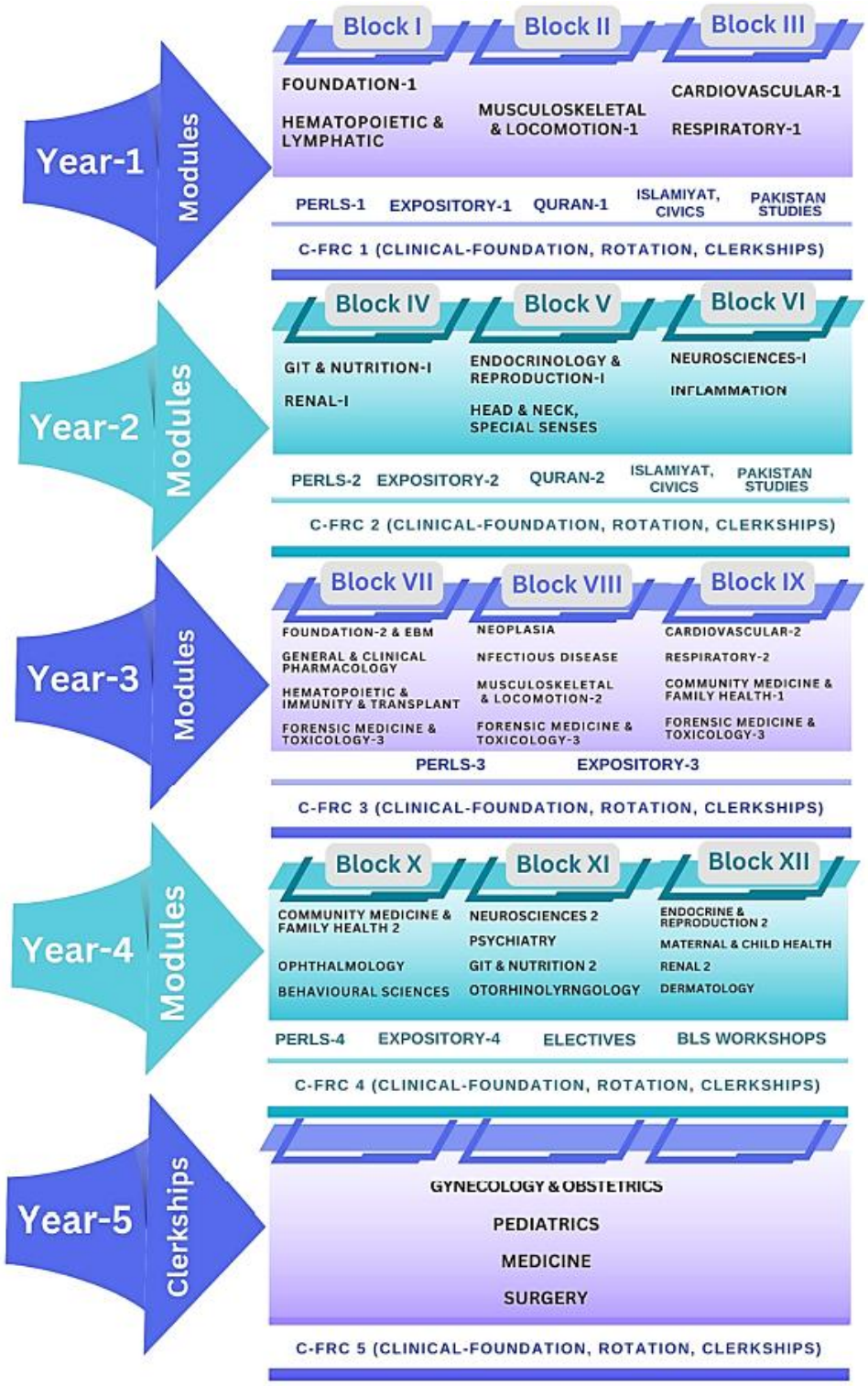
BLOCK-2

FIRST YEAR MBBS

STUDY GUIDE 2025

TABLE OF CONTENTS

CURRICULUM FRAMEWOR



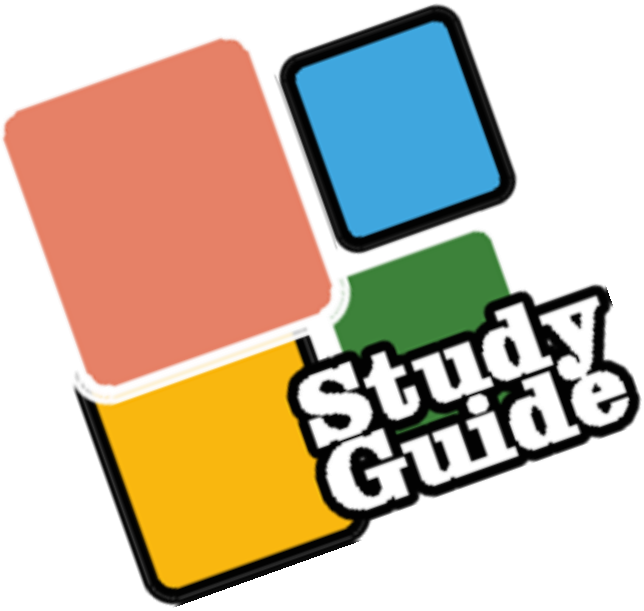
INTRODUCTION TO STUDY GUIDE

What is study guide?

The study guide is an important academic tool that aids students for different educational activities they are engaged in. It provides pertinent details on the module's structure, assisting students in planning their academic activities accordingly. Another purpose of study guide is to guide students about different rules and regulations as well as teaching and assessment techniques.

Purpose of study guide:

- Conveys details about the organization and management of the module.
- Helps the learners about departmental representatives who can be contacted in case of difficulty.
- Define the learning objectives that should be accomplished by the end of the module.
- Identifies learning methodologies such as lectures, small group discussion, practical that will be implemented during the module.
- Provide a list of learning resource to maximize their learning
- Includes information on the assessment methods and examination related rules and regulations



.

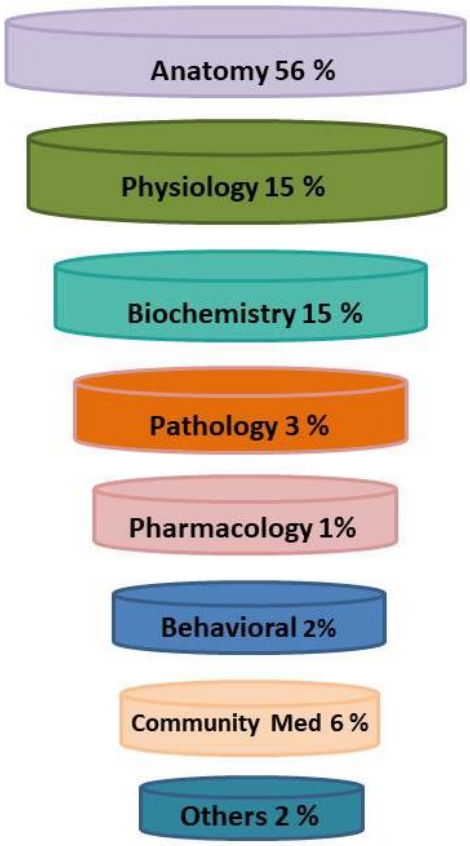
LAHORE
MEDICAL & DENTAL
COLLEGE

MUSCULOSKELETAL & LOCOMOTION-1 MODULE

INTRODUCTION TO MODULE

Program	MBBS
Year	One
Module No.	03
Module Title	Musculoskeletal & locomotion-1 Module
Module weeks	08
Recommended minimum hours	225

Integrated Disciplines of Musculoskeletal & locomotion-1 module



MODULE DESCRIPTION

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 OUTCOME

- 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

TIME TABLE

Lahore Medical & Dental College
Canal Bank North, Tulspura, Lahore
Phone No. 0346-4418891-98
No. LMDC/ /2025, Dated:

1st YEAR M.B.B.S TIMETABLE SESSION 2024-2025 w.e.f. 23-06-2025
BLOCK 2 (MUSCULOSKELETAL & LOCOMOTION – 1 MODULE)

DAYS & TIME	08:00 a.m. to 09:00 a.m.	09:00 a.m. to 10:40 a.m.	10:40 a.m. to 11:10 a.m.	11:10 a.m. to 11:55 a.m.	11:55 a.m. to 12:40 p.m.	12:40 p.m. to 01:30 p.m.	01:30 p.m. to 03:00 p.m.
MONDAY	Histo. Practical (A+B) * Physio Practical/**CFRC** (C+D) Physio tutorial (E+F) Biochem Tutorial (G+H) Biochem Practical (I+J)	Anatomy Dissection Dissection Hall	**Break**	Physiology Lecture theatre No. 1	Biochemistry Lecture theatre No. 1	** Aging/Disease Prevention & Impact Lecture theatre No. 1	Anatomy Dissection Dissection Hall
TUESDAY	Histo Practical (I+J) * Physio Practical/**CFRC** (A+B) Physio tutorial (C+D) Biochem Tutorial (E+F) Biochem. Practical (G+H)	Anatomy Dissection Dissection Hall		Physiology Lecture theatre No. 1	Biochemistry Lecture theatre No. 1	Pathophysiology and Pharmacotherapeutics Lecture theatre No. 1	Anatomy Dissection Dissection Hall
WEDNESDAY	Histo Practical (G+H) * Physio Practical /**CFRC** (I+J) Physio tutorial (A+B) Biochem Tutorial (C+D) Biochem Practical (E+F)	Anatomy Dissection Dissection Hall		Physiology Lecture theatre No. 1	Pathophysiology & Pharmacotherapeutic Lecture theatre No. 1	Anatomy Lecture theatre No. 1	Anatomy Dissection Dissection Hall
THURSDAY	Histo. Practical (E+F) * Physio Practical /**CFRC** (G+H) Physio tutorial (I+J) Biochem Tutorial (A+B) Biochem Practical (C+D)	**09:00 a.m. to 09:50 a.m.** Anatomy Lecture theatre No. 1	**09:50 a.m. to 11:20 a.m.** Anatomy Dissection Dissection Hall	**11:20 a.m. to 11:50 a.m.** **Break**	**11:50 a.m. to 12:40 p.m.** ****Physiology/ Biochemistry Lecture theatre No. 1	**12:40 p.m. to 01:30 p.m.** Disease Prevention & Impact Lecture theatre No. 1	**01:30 p.m. to 03:00 p.m.** Anatomy Dissection Dissection Hall
FRIDAY	Histo Practical (C+D) * Physio Practical /**CFRC** (E+F) Physio tutorial (G+H) Biochem Tutorial (I+J) Biochem Practical (A+B)	**09:00 a.m. to 09:45 a.m.** Biochemistry Lecture theatre No. 1	**09:45 a.m. to 10:30 a.m.** *** PERL/ Disease Prevention & Impact Lecture theatre No. 1	**10:30 a.m. to 10:45 a.m.** **Break**	**10:45 a.m. to 11:30 a.m.** Disease Prevention & Impact Lecture theatre No. 1	**11:30 a.m. to 12:15 p.m.** Physiology Lecture theatre No. 1	**12:15 p.m. to 01:00 p.m.** SDL Lecture theatre No. 1

CC:-
1. Principal, LMDC
2. Vice Principal, LMDC
3. Heads of All concerned Departments, LMDC/GTTH
4. HOD Medical Education, LMDC
5. Chief Administrative Officer / Director F&A, LMDC
6. Director Skills Lab, LMDC
7. Director IT, LMDC
8. Medical Superintendent, GTTH
9. Transport Incharge, LMDC
10. Manager Audio Video (Lecture Theatre Incharge), LMDC
11. Warden / Assistant Warden Hostels (Boy/Girl)
12. Security Supervisor, LMDC
13. Class Representative (Boy/Girl)
14. M/s Ali Tours, LMDC
15. Notice Board

*** Physio / Clinical Foundation Rotation Clerkship (Physiology: 1st 5 weeks, CFRC: last 3 weeks)**
**** Aging/Disease Prevention & Impact: Aging: First 5 weeks & Disease Prevention & Impact: Last 3 weeks.**
***** PERL/ Disease Prevention & Impact (PERL: First 3 weeks, Disease Prevention & Impact: Last 5 weeks).**
******Physiology/Biochemistry Lectures (Physiology: First 5 weeks, Biochemistry: Last 3 weeks).**

- **SDL: Will be scheduled between Anatomy, Physiology & Biochemistry.**
- ***CFRC will be held in Skill Lab/ WARD. Clinicals should relieve CFRC batch 15 minutes before for travel back to LMDC.***
- **SDL 30 minutes practical time.**
- **Expository writing will be managed by Anatomy/Physiology/Biochemistry.**

MAJ. GEN. (R) PROF. DR. NAEEM NAQI
PRINCIPAL

SUBJECT WISE TIME ALLOCATION

Subject	Time allocated (Hours)	Discipline
Anatomy		**Anatomy**
Gross Anatomy	**105**	
Embryology & post natal development	**06**	
Microscopic structure	**06**	
Histology Practical	**08**	
Medical Physiology		**Physiology**
Theory	**32**	
Practical	**6**	
Medical Biochemistry	**30**	**Biochemistry**
Pathophysiology & pharmacotherapeutics		
Theory	**4**	**Pharmacology & therapeutics**
	7	**Pathology**
Disease prevention & impact (6 total hours)		
Theory	**14**	**Community medicine & public health**
	3	**Behavioral sciences**
Aging (1 total hour)	**4**	**Geriatrics/ Medicine/ Biochemistry**

LEARNING OBJECTIVES

NORMAL STRUCTURE			
THEORY			
CODE	**GROSS ANATOMY**	**TOTAL HOURS = 105**	
	SPECIFIC LEARNING OUTCOMES	**DISCIPLINE**	**TOPIC**
UPPER LIMB			
MS-A-001	Describe the topographical anatomy of Pectoral Region	Human Anatomy	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	Dermatomes and cutaneous innervation of Upper Limb
	Describe the extent, attachments, and structures passing through Clavipectoral Fascia	Human Anatomy	
MS-A-002	Define the boundaries of auscultation and state its clinical significance	Integrate with Medicine	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	Human Anatomy	

	minor and major Mention the neurovascular supply of pectoral region and Correlate with important clinical conditions. Describe superficial muscles of the back with their origin, insertion, nerve supply and actions.		
MS-A-004	Describe the Osteology of Clavicle (Morphological features, side determination, attachments, ossification)	Human Anatomy	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	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	Axilla
	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	Human Anatomy	Axilla
	Describe the formation, tributaries, and drainage of Axillary Vein		
	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)		Bones of upper limb: Humerus
	Describe the Shoulder Joint under the following headings: Articulation, Type/ Variety, Capsule, Ligaments, Innervation, Blood supply, Movements.		

MS-A-008	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	Human Anatomy	Joints of Upper Limb: Shoulder Joint
	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 movements of abduction. Discuss important clinical conditions		
MS-A-009	Describe Rotator Cuff Muscles, state their Anatomical significance and explain Rotator Cuff Tendinitis	Human Anatomy	Rotator Cuff
	Clinical correlates of shoulder joint. (shoulder joint stability, dislocation and shoulder pain)	Integrate with Surgery	
MS-A-010	Describe the formation of Brachial Plexus; Infra and Supraclavicular parts. Discuss Brachial plexus injuries	Human Anatomy	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	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	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	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 Compartment of Forearm
	Tabulate the attachments, innervation, and actions of Lateral Muscles of the 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	Retinacula of Forearm

MS-A-019	Demonstrate the formation of carpal tunnel and	Human	
	identify the contents Describe Carpel Tunnel Syndrome	Anatomy-Integrate with surgery	Carpal tunnel syndrome
	Describe the features, attachments, relations and structures passing under Flexor Retinaculum	Human Anatomy	
MS-A-020	Describe the Origin, Course, Relations, and branches of Ulnar Artery in Forearm		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	Joints of Upper Limbs: Elbow Joint
MS-A-021	Describe Carrying Angle and justify its importance in limb movement	Integrate with Surgery	
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.	Human Anatomy	Joints of Upper Limbs: Radioulnar Joint

	Demonstrate mechanisms of movements of Pronation & Supination		
MS-A-023	Describe the features of Interosseous Membrane with structures that pierce through it	Human Anatomy	Interosseous membrane
MS-A-024	Describe the features and explain the importance of Fibrous Flexor Sheaths, synovial flexor sheaths and extensor expansion	Human Anatomy	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.	Human Anatomy	Hand & Actions of Muscles of Upper Limb as a Functional Unit
	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.		
MS-A-026	Draw the Radial Artery course, relation, and termination in hand with its clinical significance in the region	Human Anatomy	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	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	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	Skills
	Identify the topographical features of upper limb in a cross-sectional model/ specimen.	Integrate with Radiology	
	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	
LOWER LIMB			
THEORY			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
	Draw and label the Parts of the hip bone, with its attachments.		
	Describe the parts, attachments of hip bone		

MS-A-030	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	Human Anatomy	Hip Bone
MS-A-031	Describe the parts, attachments, side determination of 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	Human Anatomy	Femur
MS-A-032	Describe the extent, attachments, and modifications of Fascia Lata Demonstrate the attachment of fascia Lata, iliotibial tract	Human Anatomy	Fascia Lata
MS-A-033	Describe the cutaneous nerves and vessels of thigh Draw and label the cutaneous nerve supply of thigh 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	Human Anatomy	Neurovascular Supply of thigh

	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	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	
MS-A-035	Tabulate the muscles of anterior compartment of thigh with their attachments, nerve supply and actions	Human Anatomy	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	
	Identify and demonstrate the nerves and vessels of anterior compartment of thigh along with their branches		

MS-A-036	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.	Human Anatomy	Neurovascular supply of Anterior Compartment of Thigh
MS-A-037	Describe the formation, boundaries, contents of adductor canal Identify and demonstrate the boundaries and contents of adductor canal	Human Anatomy	Adductor Canal
MS-A-038	Describe Muscles of medial compartment of thigh with their proximal and distal attachments, innervation and actions 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		Muscles of Medial Compartment of Thigh
MS-A-039	Describe the origin, course, relations, branches/ tributaries, distribution, and termination of neurovascular structures of medial compartment of thigh Identify the nerves and vessels of medial compartment of thigh along with their branches	Human Anatomy	Neurovascular supply of Medial Compartment of Thigh

	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.		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		
MS-A-040	Explain the anatomical basis of the consequences of wrongly placed gluteal intramuscular injections Damage to Gluteus medius & minimus due to poliomyelitis	Integrate with Medicine	Gluteal Region
	Demonstrate and identify the origin, course, relations, branches/tributaries and termination of nerves and vessels of gluteal region	Human Anatomy	
	Describe the Attachments of muscles of posterior compartment of thigh with the innervation and action		
	Identify the muscles of posterior compartment of		

MS-A-041	thigh with their proximal and distal attachments	Human Anatomy	Muscles of Posterior 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	
MS-A-042	Describe the origin, course, relations, branches, distribution, and termination of Profunda femoris artery	Human Anatomy	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	Sciatic Nerve
	Describe the anatomical basis, signs, and symptoms of compression of or injury to sciatic nerve		
MS-A-044	Describe the hip joint with its type, articulations, ligaments, stabilizing factors	Integrate with Surgery	Hip Joint
	Movements, and neuro-vascular supply with clinical significance.	Human Anatomy	
	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	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	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	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	Tibio-fibular Joint
MS-A-051	Describe the ankle joint with its type, articulations, ligaments, movements, and nerve supply	Human Anatomy	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	Plantar Fascia
	Explain the anatomical basis of the signs and symptoms of plantar fasciitis.	Integrate with Orthopedics	
MS-A-053	Identify the parts and bony features, attachments, and important relations of the articulated foot	Human Anatomy	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 of foot		
MS-A-054	Describe the interphalangeal, subtalar and midtarsal joints with their types, articulation, movements, ligaments.	Human Anatomy	Small joints of foot

MS-A-055	Describe the formation, components, stabilizing and maintaining factors of the arches of foot Describe the clinical significance of arches of foot with respect to flat foot, claw foot.	Integrate with Orthopedics	Arches of foot
MS-A-056	Describe the fibrous flexor sheaths, extensor expansions and synovial flexor sheaths	Human Anatomy	Retinacula of foot
MS-A-057	Describe the origin, course, relations, branches/tributaries, distribution, and termination of plantar vessels 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	Human Anatomy	Neurovascular supply of foot
MS-A-058	Describe the surface anatomy, course, relations, tributaries, and communications of the superficial veins of the lower limb Draw a concept map of the superficial veins of lower limb List the factors favoring venous return of the lower limb Explain the anatomical basis of the formation,	Human Anatomy	Arterial and Venous drainage of lower limb

MS-A-059	and signs and symptoms of deep venous thrombosis	Integrate with Surgery	Human Gait
	Discuss Clinical correlations of Lower Limb Arteries (palpation of femoral, popliteal, posterior tibial & dorsalis pedis arteries, collateral circulation, intermittent claudication, occlusive arterial disease)	Integrate with Medicine	
MS-A-060	Draw a concept map of the lymphatic drainage of lower limb	Human Anatomy	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	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	

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	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	Joint Dislocation
THEORY			
CODE	**EMBRYOLOGY & POST-NATAL DEVELOPMENT**	**TOTAL HOURS = 06**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
MS-A-065	Name the molecular and genetic factors involved in the development of musculoskeletal system	Human Embryology	Development of Muscles

	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).		
MS-A-066	Describe the process of limb development and limb growth	Human Embryology	Development of Limb
MS-A-067	Describe the embryological basis of cutaneous innervation of limb	Human Embryology	Development of Nerve supply of limbs
	Describe the embryological basis of blood supply of limbs and concept of axial artery		
MS-A-068	Describe the embryological basis of congenital anomalies related to muscular system.	Human Embryology	Congenital anomalies of limbs
	Describe the clinical presentations and embryological basis of; i. Amelia ii. Meromelia iii. Phocomelia iv. Cleft Hand and Foot v. Polydactyly, Brachydactyly, Syndactyly vi. Congenital club foot	Integrate with Paedriatics	
MS-A-069	Describe the developmental process of cartilage and bone	Human Embryology	Development of Cartilage
	Describe the process of histogenesis of cartilage and bone		
	Describe the clinical picture and explain the embryological basis of Axial skeletal anomalies		

	Describe the developmental process of Vertebral Column		
THEORY			
CODE	**MICROSCOPIC ANATOMY**	**TOTAL HOURS = 06**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
MS-A-071	Describe the microscopic structure and ultramicroscopic structure of skeletal muscle	Histology	Histology of Muscles
	Explain the basis of myasthenia gravis.	Integrate with Medicine	
	Describe the microscopic andultramicroscopic structure of cardiac muscle	Histology	
	Describe the microscopic and ultramicroscopic structure of smooth muscle Compare and contrast the histological features of three types of muscle tissue		
MS-A-072	Describe Myosatellite Cells & their role in Regeneration of muscle, hyperplasia, and hypertrophy of muscle fiber	Histology/ Integrate with Pathology	Functional Histology
	Explain the histopathological basis of leiomyoma	Histopathology	
	Describe the light and electron microscopic structure of bone cells Describe the light and electron microscopic structure of compact and spongy bone	Histology	
	Describe the histological justification for osteoporosis, Osteopetrosis		

MS-A-073	Describe the histological basis for bone repair after fractures.	Integrate with Pathology	Histology of Osseous tissue
MS-A-074	Compare and contrast the microscopic features of compact and spongy bone Explain the characteristic features of ossification (Intramembranous & Endochondral ossification) Describe the zones seen in an epiphyseal growth plate	Histology	Histology of Bone
MS-A-075	Describe the metabolic role of bone	Integrate with Medicine	Functional Histology of Bone
	Describe the clinical presentation of osteoporosis, osteopenia	Integrate with Orthopedics	
MS-A-076	Describe the microscopic and ultramicroscopic structure of all types of cartilage Compare and contrast the structure of cartilage and bone matrix Tabulate the differences between three types of cartilage	Histology	Histology of Cartilage
MS-A-077	Describe the histological basis for bone & Cartilage growth and repair	Histology	Mechanism of Bone growth

PRACTICAL

CODE	HISTOLOGY	TOTAL HOURS = 08	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
MS-A-078	Draw and label the histology of skeletal muscle Draw and label the histology of smooth muscle Draw and label the histology of cardiac muscle	Histology	Histology of Muscles

MS-A-079	Draw and label the histological picture of compact bone Draw and label the histological picture of spongy bone	Histology	Histology of Bones
MS-A-080	Draw and label the microscopic structure of hyaline cartilage Draw and label the microscopic structure of elastic cartilage Draw and label the microscopic structure of fibro cartilage	Histology	Histology of Cartilage
NORMAL FUNCTION			
THEORY			
CODE	**MEDICAL PHYSIOLOGY**	**TOTAL HOURS = 32**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
MS-P-001	Explain the Physiological basis of membrane potential Explain diffusion potentials of Na & K	Medical Physiology	Diffusion/ Equilibrium Potentials
MS-P-002	Define 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		Nernst potential
MS-P-003	Describe the normal distribution of Na+, K+, Ca and Cl- across the cell membrane Explain physiological basis of Goldman equation		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.	Medical Physiology Integrate with Anesthesiology	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.		
MS-P-005	Describe the Physiological anatomy of Neurons	Medical Physiology	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		
MS-P-007	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-008	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-009	Explain Physiological basis& properties of Graded potential	Medical Physiology	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).		
MS-P-010	Classify and explain Physiological basis of different types of synapses		Synapse
	Elaborate how signal transmission takes place across chemical synapse		
MS-P-011	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-012	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	
MS-P-013	Discus the physiological anatomy of skeletalmuscles.	Medical Physiology	Skeletal muscle
	Differentiate b/w skeletal, smooth, and cardiac muscle		
	Describe the structure of Sarcomere		
MS-P-014	Differentiate between isometric and isotonic contraction by giving examples.		Characteristics of whole muscle contraction
	Compare the fast and slow muscle fibers.		
MS-P-015	Explain the mechanism of summation and Tetanization.	Medical Physiology	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	

MS-P-016	Describe the physiological anatomy of Neuro Muscular Junction (NMJ)	Medical Physiology	Neuromuscular junction
	Mechanism of Neuromuscular transmission & generation of End Plate Potential		
	Explain features, pathophysiology & treatment of myasthenia Gravis	Medical Physiology Integrate with Medicine	
	Describe the enhancers or blockers of neuromuscular transmission at the neuromuscular junction.	Medical Physiology	
	Discuss the steps/ events of excitation contraction coupling in skeletal muscle.	Medical Physiology	
MS-P-017	Differentiate between types of smooth muscles.	Medical Physiology	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.		
THEORY			
CODE	**MEDICAL BIOCHEMISTRY**	**TOTAL HOURS = 30**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
MS-B-001	Classify carbohydrates along with the structure and biomedical importance of each class	Biochemistry	Classification carbohydrates
MS-B-002	Explain the isomerization of carbohydrates	Biochemistry	Carbohydrates
MS-B-003	Describe the physical and chemical properties of carbohydrates	Biochemistry	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 6. Identify the defects in collagen synthesis based on given data (Ostegenesis Imperfecta)	Biochemistry	
	Interpret genetic basis of Duchene muscular dystrophy		
	Explain the transport and uptake of glucose in cells, steps of glycolysis and citric acid cycle along with enzymes, co enzymes and cofactors involved	Biochemistry	
MS-B-004	Discuss the provision of energy to the muscles and cells through glycolytic pathway and TCA cycle	Biochemistry	Glycolysis and Tricarboxylic acid cycle (TCA)
	Explain the hormonal and allosteric regulation of glycolysis and TCA	Biochemistry	
MS-B-005	Describe the digestion and absorption of proteins in mouth, stomach and small intestine. Discuss the uptake of amino acids by cells	Biochemistry	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. 5. Oxidative deamination.	Biochemistry	Reactions involve in catabolism
MS-B-007	Role of pyridoxal phosphate, glutamate, glutamine, alanine	Biochemistry	Transportation of ammonia to the liver
MS-B-008	Illustrate steps of urea cycle with enzymes and its importance Discuss ammonia intoxication	Biochemistry	Urea cycle
MS-B-009	Interpret different types of hyperammonia on basis of sign symptoms and data		
MS-B-010	Discuss the catabolic pathways 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 6. Alkaptonuria	Biochemistry	Inborn errors of amino acid metabolism

PRACTICAL

CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS=06	
		DISCIPLINE	TOPIC
MS-P-018	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-B-012	Estimation of total proteins by kit method/dipstick methods.	Biochemistry	Total proteins
MS-B-013	Estimation of albumin and globulin		Albumin/ globulin

PATHOPHYSIOLOGY AND PHARMACOTHERAPEUTICS

THEORY

CODE	SPECIFIC LEARNING OBJECTIVES	TOTAL HOURS = 4+7=11	
		DISCIPLINE	TOPIC
MS-Ph-01	Explain the mechanism by which drugs can stimulate NMJ.	Pharmacology & Therapeutics	Drugs acting on Neuromuscular Junction (NMJ)
	Explain the mechanism by which drugs can block NMJ.		
MS-Ph-02	Discuss briefly the therapeutic effect of drugs used in myasthenia gravis.		Drugs in Myasthenia Gravis
MS-Ph-03	Discuss briefly the therapeutic effect of drugs used as local anesthetics.		Local Anesthetics

MS-Pa-01	Describe the hyperplasia, hypertrophy, and atrophy of muscle fiber	Pathology	Muscle remodeling
	Explain the histopathological basis of leiomyoma		
MS-Pa-02	Describe the histological basis of Duchenne Muscular Dystrophy and myopathy.		Diseases of Muscle
MS-Pa-03	Describe the clinical presentation and histological justification for osteoporosis, osteopetrosis		Diseases of Bone
	Describe the histological basis for bone repair after fractures		
MS-Pa-04	Describe the histological basis for 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	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			
THEORY			
CODE	**SPECIFIC LEARNING OUTCOMES**	**TOTAL HOURS = 14+3 = 17**	
		DISCIPLINE	**TOPIC**
MS-CM-001	Explain causes of low back pain Describe prevention of low back pain	Community Medicine and Public Health	Back Pain
MS-CM-002	Describe work related musculoskeletal disorders addition with its burden/epidemiology Identify risk factors of Musculoskeletal disorders MSD at workplace Describe prevention of exposure to risk factors related to workplace		Work related Musculoskeletal disorders
MS-CM-003	Describe MSD related to mobile addition with its burden/epidemiology 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.	Community Medicine and Public Health	MSD related to mobile usage
MS-CM-004	Describe the application of ergonomics in MSD		Ergonomics

	related to the above disorders.	Community Medicine and Public Health	
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		
	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, Myesthenia Gravis, Sclerosis) on individual, family and society	Behavioral Sciences	
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.		

LEARNING METHOLDOGIES

Delivery of curriculum needs diversity of teaching strategies for better understanding. Thus, the following teaching methodologies may be used to facilitate students.

- large group interactive session
- Team based learning
- Problem based learning
- Tutorials
- Laboratory practical
- Demonstration
- Clinical case based conferences
- Skill Laboratories

Large group interactive session

Lecture format is the most widely used approach to teaching especially in a large class size with average attention span of 20-30 mins. Interactive lecturing involves a two-way interaction between the presenter and the participants. Interactive methods like brainstorming buzz group, simulation, role play and clinical cases can be used.

Significance of its usage:

- Relaxed environment, diverse opinions, active involvement
- Increased attention and motivation
- Independence and group skills
- Cost effective
- Suitable for taking advantage of available audiovisual technologies

Team based learning (TBL)

BL is a uniquely powerful form of small group learning. It provides a complete coherent framework for building a flipped course experience. There are four essential elements of TBL which includes;

- Teams must be properly formed and managed (5-7 students)
- Getting students ready
- Applying course concepts
- Making students accountable

Significance of its usage:

- Students are more engaged.
- Increased excitement in TBL classroom
- Teams outperforms best members
- Students perform better in final and standardized exams.

Problem based learning (PBL)

It is an instructional student-centered approach in which students work in small groups on a health problem, identifying their own educational needs and being responsible for the acquisition of the knowledge required to understand the scenario.

Significance of its usage:

- Teamwork
- Critical evaluation of literature
- Self-directed learning and use of resources
- Presentation skills
- Leadership
- Respect for colleagues' views

Tutorials

Tutorial is a class or short series of classes, in which one or more instructors provides intensive instruction on some subject to a small group. Its purpose is to explore students' point of view, allowing time for discussion, and inculcating self-directed, reflective learning skills.

Significance of its usage

- Develop and assess the extent of background knowledge of students, which enables them to properly understand concepts which may not have been understood in lectures.
- Develop problem-solving skills.
- Develop practice of self-learning.
- Reduced time to understand the topic.

Laboratory Practical

Lab practical involve things like identifying a structure, a type of stain through a microscope, a problem with a preparation, reading biochemical test results and answering safety questions. These simulations allow students to attempt the experiments in the laboratory in a risk-free way that provides the opportunity to make mistakes and learn how to correct them using the immediate feedback generated.

Significance of its usage

- Enhance mastery of subject matter.
- Develop scientific reasoning.
- Develop practical skills.
- Develop teamwork abilities.

Demonstrations

The demonstration method in teaching can be defined as giving a demo or performing a specific activity or concept. It is a teaching-learning process carried out in a very systematic manner.

Significance of its usage

- Promotes learning and correlates theory with practice.
- Sharpens the observation skills.
- Sustain interests in learning environment.
- Helps teacher to evaluate students' response

Clinical case based conferences

Clinical Case based conferences allow clinicians and medical students to present difficult case material and include discussions of diagnostic, clinical formulation, and/or treatment issues.

Significance of its usage

- Provides detailed (rich qualitative) information.
- Provides insight for further research.
- Permitting investigation of otherwise impractical (or unethical) situations.

Skill Laboratories

It refers to specifically equipped practice rooms functioning as training facilities offering hands on training for the practice of clinical skills within non-threatening environment prior to their real- life application. This applies to both basic clinical skills as well as complex surgical skills.

Significance of its usage

- Controlled, anxiety-free, and risk-free learning environment to students.
- A platform for repeated practice for mastery in relevant clinical skills
- Increase the preparedness of student learners before transitioning to the real hospital setting.
- Build strong communication skills
- Enable learners to make critical decisions.

Assessment policy

Statutes

1. The first Professional MBBS Examination shall be held at the end of the first year MBBS,

2. Every candidate shall be required to study contents of Anatomy (including Histology), Physiology, Biochemistry, Behavioural Sciences, Community Medicine & Public Health, Pathology, Pharmacology & Therapeutics, Islamic Studies/ Civics and Pakistan Studies, Clinical skills and Professionalism, Ethics, Research and leadership. The teaching and assessment shall be done in three modular blocks.

3. There will be three papers in the first professional examination.

First Professional Exam:

a. Paper 1 will be based on contents of Block 1;
b. Paper 2 will be based on contents of Block 2;
c. Paper 3 will be based on contents of Block 3

4. Each paper will comprise of two components 'Written' and Oral/Practical/Clinical' examinations.
5. The written and Oral/Practical/ Clinical' examination in each paper will carry 175 marks each, making the total marks of 350 for each of the papers 1, 2 and 3 (Inclusive of internal Assessment).
6. Total Marks for First Professional Examinations shall be 1050. Marks of Islamic Studies/Civics and Pakistan Studies shall not be counted towards total marks of any professional examination, and determination of position or merit of a candidate. However, the candidates failing in the subject of Islamic Studies/Civics & Pakistan Studies, while passing other subjects of 2nd Professional examination, may not be subjected to detention, as the subject has no contribution towards total marks of any professional examination, and determination of position or merit. The students may rather

be allowed to pass the examination in the subject, before appearing in their Final Prof. MBBS examination, and in case of their failure to clear the subject they may not be allowed to take their Final Professional MBBS Examination.

7. Major contents areas of the first two professional years shall be from:

a. Anatomy including applied/clinical Anatomy;
b. Physiology including applied/clinical physiology;
c. Biochemistry including applied/ clinical Biochemistry.

8. The applied/ clinical content for the Anatomy. Physiology and Biochemistry shall be based on clinical correlations.

9. Integrated clinical content areas of the both years include Behavioral Sciences, Community Medicine & Public Heath, Pathology, Pharmacology & Therapeutics, Clinical Foundation – I & ii and PERLs I & II.

Written Examination

i. The written document of papers 1, 2 and 3 will consist of Óne- best- type' Multiple Choice Questions (MCQ) and structured Essay Questions (SEQ) in a ratio of 65:35 %.
ii. Each MCQ will have five options (one best response and four distractors) and will carry one (01) mark.
iii. There will be no negative marking.
iv. There will be no sections within a SEQ, and it will be structured question with five (05) marks each.
v. SEQ's will only be based on major content areas of the year.
vi. There will be total of 90 MCQs and 10 SEQs in every written paper in Papers 1, 2 and 3.
vii. The duration of each written paper will be 195 minutes (03 hours & 15 min).
viii. The MCQ section will be of 95 minutes duration and the SEQ section of 100 minutes.

Oral/ Practical/ Clinical Examination

a. The 'Oral/Practical/Clinical' component of each paper 1, 2 and 3 will consist of a total of sixteen (16) OSPE/OSCE/OSVE stations in each 'Oral/Practical/Clinical' examination.

b. There will be eleven (11) observed OSPE (Objective Structured Practical Examination) stations from major subject areas. Each OSPE station will have the practical component and an evaluation of the underlying principle relevant to that practical with a component of applied knowledge.

c. There will be two (02) observed OSCE (Objective Structured Clinical Examination) stations, based on C- FRC1 and PERLs-1 in each 'Oral/Practical/Clinical' examination.

d. There will be three (03) Observed interactive OSVE (Objective Structured Viva Examination) from major subject areas. Each OSVE station will have a structured viva, to assess a practical component along with evaluation of the underlying principle relevant to that practical with a component of applied/practical knowledge and related clinical application.

e. Each OSPE station will carry eight (08) marks.

f. Each OSCE station from C-FRC1 and PERLs-1 will carry five (05) marks.

g. Each OSVE station will carry fourteen (14) marks

h. The duration of each 'Oral/Practical/Clinical' examination will be 100 minutes.

i. Time for each OSPE. OSCE and OSVE station will be six (06) minutes.

j. Each OSVE station will carry eight (08) marks

k. The duration of each 'Oral/Practical/Clinical' examination will be 120 minutes (2 hours).

l. Time for each OSPE. OSCE and OSVE station will be eight (08) minutes.

10. Every candidate shall take the examination in the following Blocks (Modules) in First Professional MBBS Examinations:-

Year 1

A.	Block 1(Foundation-1 + Hematopoietic & Lymphatic)	350 Marks
B.	Block 2 (Musculoskeletal & Locomotion -1)	350 Marks
C.	Block 3 (cardiovascular -1 + respiratory-1)	350 Marks

Block-2 (Musculoskeletal & Locomotion-1)

The examination of Block 2 shall be as follows:

I. One written paper of 140 marks having two parts:

ix. Part I shall have ninety (90) Multiple Choice Questions (MCQs) of total 90 marks (01 mark for each MCQ) and the time allotted shall be 95 minutes. There will be no negative marking.

ii. Part II shall have ten (10) Structured Essay Questions (SEQs) of total 35 marks (05 marks for each SEQ) and the time allotted shall be 100 minutes.

II. 'Oral/Practical/Clinical' examination shall have 140 marks in total.

III. The continuous internal assessment through 'Block Examination', conducted by the college of enrollment shall carry 70 marks, i.e., 20% of the total allocated marks (350) for the block. The score will be equally distributed to the written and 'Oral/Practical/Clinical' Examinations.

11. The marks distribution of Block – 2 exam is given Table 1:

Table 1

Block -2 **Modules** (Musculoskeletal & locomotion-1)	Part I MCQs (90)	90 Marks	Practical/ Clinical Examination	11 OSPE 02 OSCE 03OSVE	Marks 88 10 48	**350**
	Part II SEQS (10)	50 Marks				
	Internal Assessment 10%	35 Marks	Internal Assessment 10%	35 Marks		
	Total	**175**	**Total**	**175**		

12. No grace marks shall be allowed in any examination or practical under any guise or name.

13. At least 25% MCQs & 25% SEQs shall be based on applied/clinical/case scenario to assess high order thinking in the papers set for the students of First Professional MBBS Examinations.

RULES & REGULATIONS

1. Professional examination shall be open to any student who:-

a. Has been enrolled/ registered and completed one academic year preceding the concerned professional examination in a constituent/affiliated College of the University.

b. Has his/her name submitted to the Controller of Examinations, for the purpose of examination, by the Principal of the College in which he/she is enrolled & eligible as per all prerequisites of the examination.

c. Has his/her marks of internal assessment in all the Blocks sent to the Controller of Examinations by the Principal of the College along with the admission form.

d. Produces the following certificates duly verified by the Principal of his/her College:

   i) Of good character

   ii) Of having attended not less than 85% of the full course of lectures delivered and practical conducted in the particular academic session, in each block, as well as in the aggregate;

   iii) Certificate of having appeared at the Block Examinations conducted by the college of enrolment with at least 55% cumulative percentage in aggregate of blocks 1, 2, and 3 for the first year and blocks 4,5 and 6 for the second year;

   iv) Candidates falling short of attendance requirement shall not be admitted to the annual examination but may be permitted to appear at the supplementary examination if they make up the deficiency up to the commencement of the next examination by remaining on the rolls of a College as regular student, subject to fulfillment of all other mandatory requirements to appear at the examination.

2. The minimum number of marks required to pass the professional examination for each paper shall be fifty percent (55%) in Written and fifty percent (50%) in the 'Oral/Practical/Clinical' examinations and fifty percent (50%) in aggregate, independently and concomitantly, at one and the same time.

3. Candidates who secure eighty five percent (85%) or above marks in any of the papers shall be declared to have passed "with distinction" in that Block, subject to having at least 80 % marks in the Written component of that paper, concomitantly. However, no candidate shall be declared to have passed "with distinction" in any paper, who does not pass in all papers of the Professional Examination as a whole at one and the same time.

4. A candidate failing in one or more paper of annual examination shall be provisionally allowed to join the next professional class till the commencement of supplementary examinations. Under no circumstances, a candidate shall be promoted to the next professional class till he /she has passed all the papers in the preceding Professional MBBS Examination.

5. If a student appears in the supplementary examination for the first time as he/she did not appear in the annual examination because of any reason and fails in any paper in the Supplementary Examination, he/ she will be detained in the same class and will not be promoted to the next class.

6. The colleges may arrange remedial classes and one re-sit for each block examination after approval from competent authority.

7. The remedial classes and re-sit examination can be conducted during summer vacation/weekends, before or during preparatory leave, for the concerned professional examination, subject to the following conditions:

a. At the completion of each block, the principals of the colleges shall submit a detailed report to the university, including cases of students with short attendance, poor performance/absence in the block examination along with the reasons and evidence for the same, proposed schedule for remedial classes and re-sit examination.
b. Competent Authority UHS will have the cause and the submitted evidence evaluated and documented, before permitting the colleges to arrange remedial classes and re-sit examination at the concerned block. No college is allowed to conduct remedial classes or re-sit examination without prior approval of the competent authority.
c. The students can appear in remedial classes / re-sit of a block examination, However, conduct of

remedial classes shall be permitted only in the cases of students, who shall have attended at least 50 % of total attendance of the concerned block in the first instance.

i. However, in special circumstances a student can be allowed to attend the 'remedial classes' for a certain block, with the permission of the Competent Authority, to complete his/her requirement of attendance, even if the block attendance is less than 50%. In such cases, the evidence of reason will be provided by the college after the Principal has endorsed the case.
ii. The students, who have attained a cumulative attendance of 85% directly or with remedial classes, can appear in the 'annual' professional examination.
iii. The valid reasons for short attendance in a block or absence from a block examination may include major illness/accident/surgery of the student or sickness / death of an immediate relative/being afflicted by a natural/man- made calamity or disaster or detained students (missed the first block of the year) or UHS permitted late admission students

8. The application for admission of each candidate for examination shall be submitted to Controller of Examination, through the Principal of the College, in a prescribed format,as per notified schedule, accompanied by the prescribed fee.

9. The marks of internal assessment and attendance shall be submitted to Controller of Examinations three times, within two weeks of completion of each block examination.

10. At the end of each block, the colleges are required to submit question papers and keys for the block examination, internal assessment marks and attendance record to the Department of Examinations UHS. Further, parent-teacher meetings shall be arranged by the colleges after every block examination to share feedback on the progress of students with their parents. Minutes of parent teacher meetings shall be submitted to the Department of Medical Education UHS.

11. It is emphasized that fresh internal assessment or a revision of assessment for supplementary examination shall not be permissible. However, a revised internal assessment for the detained students

can be submitted. The internal assessment award in a particular year will not be decreased subsequently detrimental to the detainee candidate. A proper record of the continuous internal assessment shall be maintained by the concerned department/s in their colleges.

12. The candidates shall pay their fee through the Principal of their respective Colleges who shall forward a bank draft / pay order / crossed cheque I favor of Treasurer, University of Health Sciences Lahore, along with their Admission forms.

13. Only one annual and one supplementary of First and Second Professional MBBS Examinations shall be allowed in a particular academic session. In exceptional situations, I.e., national calamities, war or loss of solved answer books in case of accident, special examination may be arranged after having observed due process of law. This will require permission of relevant authorities, I.e., Syndicate and Board of Governors.

LEARNING SOURCES

Anatomy

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

Physiology

- Guyton AC and Hall JE. Textbook of Medical Physiology. W. B. Sunders & Co., Philadelphia 14th Edition.
- Essentials of Medical Physiology by Mushtaq Ahmed

Biochemistry

- Harpers illustrated Biochemistry 32nd edition. Rodwell.V.W MCGrawHill publishers.
- Lippincott illustrated Review 8th 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.
- 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.

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 & 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 Editio
- 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

Behavioral 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
- Textbook of Community Medicine by Park J E. Latest Edition

Surgery

- Bailey and Love's short practice of surgery

- 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.

Radiology

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

Gynecology

- Gynecology by Ten Teachers

Orthopedics

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

Pediatrics

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

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