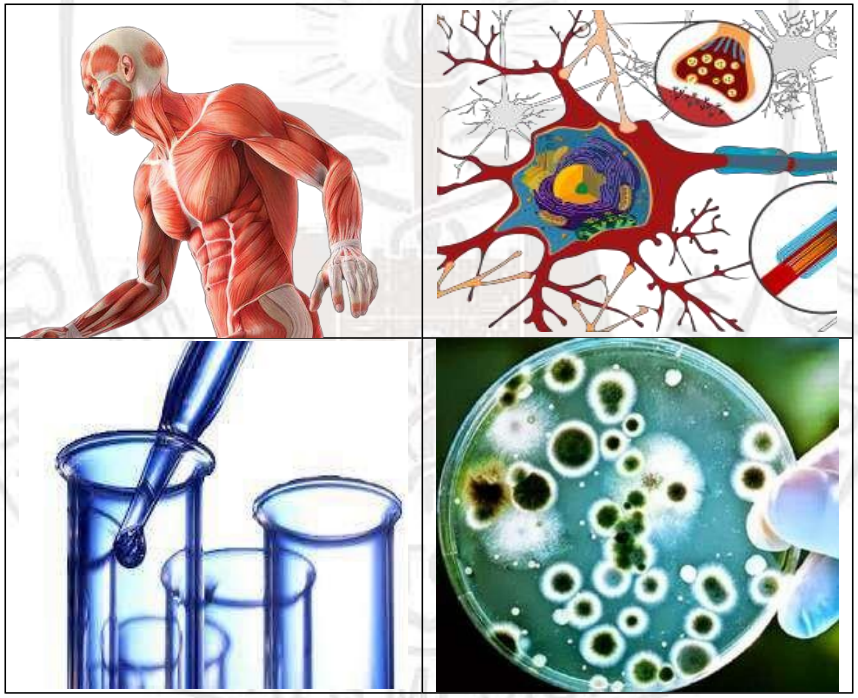
Musculoskeletal Module

First Professional Year

Study Guide



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Vision and Mission of KGMC

Khyber Medical University: Vision

Khyber Medical University will be the global leader in health sciences academics and research for efficient and compassionate health care.

Khyber Girls Medical College: Vision

"Excellence in health care, research, teaching and training in the service of Humanity"

Khyber Girls Medical College: Mission

The mission of KGMC is to promote compassionate and professional health care leaders Who are knowledgeable, skillful, and community oriented lifelong learners serving humanity through evidence based practices.

Curriculum Committee KGMC

Chair:

Professor Dr.Zahid Aman, Dean KGMC.

Co-Chair:

Dr. Sabina Aziz, Associate Dean KGMC.

Clinical Sciences:

- Dr Mohammad Noor Wazir, Department of Medicine KGMC/HMC
- Dr. Said Amin Department of Medicine KGMC/HMC.
- Dr. Sofia Iqbal, Department of Ophthalmology KGMC/HMC.
- Dr. Ghareeb Nawaz Department of ENT KGMC/HMC.
- Dr. Bushra Rauf Department of Gynae KGMC/HMC.
- Dr. Jamshed Alam Department of Surgery KGMC/HMC.
- Dr. Ambreen Ahmad, Department of Pediatrics KGMC/HMC.
- Dr. Ain-ul-Hadi Department of Surgery KGMC/HMC.
- Dr. Fawad Rahim Department of Medicine KGMC/HMC.

Behavioral Sciences:

- Dr. Ameer Abbas Department of Psychiatry KGMC/HMC.

Medical Education

- Dr. Naheed Mahsood, Department of Medical Education, KGMC.

- Dr. Naveed Afzal Khan, Department of Medical Education, KGMC.
- Dr. Khurram Naushad, Department of Medical Education, KGMC.

Basic Sciences:

- Dr. Khalid Javed Department of Pathology, KGMC.
- Dr. Zubia Shah Department of Physiology, KGMC.
- Dr. Amin-ul-Haq Department of Biochemistry, KGMC.
- Dr. Naheed Siddique Department of Forensic Medicine, KGMC.
- Dr. Shams Suleman Department of Pharmacology, KGMC.
- Dr. Raheela Amin Department of Community Medicine, KGMC.
- Dr. Shahab-ud-Din, Department of Anatomy, KGMC.

Outcomes of the Curriculum:

The Curricular Outcomes of the MBBS Program for a Graduating Doctor according to the PMDC are as follows:

1. **Knowledgeable**

Knowledgeable about the diseases and health conditions prevalent in the population of Pakistan and use Evidence-based medicine to provide best possible cost-effective care.

2. **Skillful**

Skillful in History taking and Physical examination to compassionately deal with a patient.

3. **Community health promoter**

Take appropriate decisions and actions for protecting and promoting the health of their community.

4. **Critical Thinker**

Evaluate critically the patient data to effectively deal with complexity of medical decisions for the best possible outcomes using evidence-based practices in service of humanity.

5. Professional

Display professional values (honesty, accountability, cultural and religious sensitivity), attitudes and behaviors (empathy, ethics, good communication skills and lifelong learner) that embody good medical practice.

6. Researcher

Exhibit a spirit of inquisitiveness, inventiveness, and ethical conduct while carrying out research in accordance with the prescribed guidelines.

7. Leader and role Model

Demonstrate exemplary conduct and leadership in Advancing healthcare, enhancing medical education, and Enhancing the trust of the public in the medical profession by being exceptional role models

KNOWLEDGE

By the end of five year MBBS program the KGMC student should be able to;

1. Acquire a high level of clinical proficiency in history taking, physical examination, differential diagnosis, and the effective use of medicine's evolving diagnostic and procedural capabilities including therapeutic and palliative modalities
2. Manage the common prevalent diseases in community
3. Identify the common medical emergencies
4. Develop plan for prevention of common community diseases
5. Formulate a referral plan
6. Compose a prescription plan

PSYCHOMOTOR

By the end of five year MBBS program the KGMC student should be able to;

1. Demonstrate the ability to perform the disease specific relevant examination
2. Respond to common medical emergencies
3. Master the skill of first aid
4. Perform BLS
5. Apply the best evidenced practices for local health problems

AFFECTIVE

By the end of five year MBBS program the KGMC student should be able to

1. Relate to patient and careers vulnerability
2. Demonstrate ethical self-management
3. Counsel and educate patients and their families to empower them to participate in their care and enable shared decision-making.
4. Display compassion with patient and colleagues
5. Demonstrate in clinical care an understanding of the impact of psychological, social, and economic factors on human health and disease

Introduction to the Musculoskeletal Module

The musculoskeletal system involves the complex interactions of muscles, bones, and connective tissues. Throughout the lifespan it provides support and protection and allows for movement, and thus provides a means for us to engage in life. Each component of the musculoskeletal system varies in its structure and function, but there are similar patterns of change that occur as we age.

Module Committee

1. Dr. Qaisar Zaman/ Dr. Ibrar Wazir, Lecturer **Anatomy**. .....Module Coordinator:
2. Dr. Naheed Mahsood Assistant Professor **DME**..... Module Secretory
3. Dr. Naveed Afzal Khan Coordinator **DME** .....Module Secretory:
4. Dr. Shabnam Gul Senior Lecturer **Admin**.....Member:
5. Dr. Riffat Sultana Professor **Physiology**.....Member
6. Dr. Gull Muhammad, Senior Lecturer **Physiology** ....Member:
7. Dr. Saima Nadeem, Assistant Professor **Pathology** .....Member:
8. Dr. Ameer Abbass Assistant Professor **psychiatry** .....Member:
9. Dr. Muhammad Alam Assistant Professor **Surgical B** ….Member
10. Dr. Zahid Assistant professor **Orthopedics**..... Member
11. Dr. Tauseef Aman Assistant professor **Community Medicine**... Member
12. Dr. Noreen Shah Senior Lecturer **Community Medicine**... Member
13. Dr. Gull Naz lecturer **Biochemistry** .....Member:
14. Dr. Farida Mujahid Lecturer **Biochemistry**.....Member
15. Dr. Fahad Falah Lecturer **Pharmacology** .....Member
16. Dr. Faiza Nadeem, Lecturer **Forensic Medicine** .....Member:
17. Dr. Hassan, Lecturer **Anatomy**..... Member:

General Learning Outcomes of Course:

By the end of this module the students should be able to;

Knowledge

By the end of this module, students should be able to:

1. Develop an understanding of the fundamental components of the musculoskeletal system.
2. Explain the structure & function of the musculoskeletal (MSK) components of limbs and back.
3. Describe how injury and disease alter the MSK structure & function.
4. Integrate concepts relating to various metabolic processes, their disorders and relevant lab investigations in the study of human MSK system.
5. Describe the role of the limbs (upper/lower) in musculoskeletal support, stability and movements.
6. Describe the development of the limbs & correlate it with organization and gross congenital anomalies of the limbs.
7. Identify the anatomical features of bones, muscles & neurovascular components of the limbs and correlate them with their functions, injuries and clinical problems.
8. Describe the types, formation, stability, function & clinical significance of joints of the upper and lower limb.
9. Describe the basic histology of muscle fibers including its molecular structure (Sarcomere).
10. Explain the mechanism of excitation and contraction of skeletal and smooth muscles.

Skills

By the end of this module, it is a core objective that students should have acquired the following skills:

1. Demonstrate the anatomical structures of the limbs in a dissected cadaver/Model/prosecuted specimen & X-ray.
2. Demonstrate the provision of first aid measures in case of a limb fracture.
3. Communicate effectively in a team with colleagues and teachers.

Attitude

While not necessarily taught explicitly, students are expected to develop following attitudes throughout the course:

1. Demonstrate respect and care for the cadaver and prosected parts.
2. Demonstrate humbleness and use socially acceptable language during academic and social interactions with colleagues and teachers.
3. Make ethically competent decisions when confronted with an ethical, social or moral problem related to MSKS in professional or personal life.
4. Discuss ethical issues social and preventive aspect of health care in the context of MSK system.
5. To create awareness about the ethical, social and preventive aspect of health care in the context of locomotors system.

THEMES FOR MUSCULOSKELETAL MODULE

8 weeks

SNO	Theme	Duration
1	Orientation and shoulder pain	2 weeks
2	Weak grip and painful hand	1 week
3	Pain lower limb/limping	2 weeks
4	Bony arches and fracture of foot	1 week
5	Backache	1 week
6	Muscle weakness and fatigue	1 week

THEME -I

ORIENTATION AND SHOULDER PAIN

SNO.	Topic	Learning Outcomes	MIT	Teaching strategy
		ANATOMY		
1	Introduction	• Define osseous tissue • Classify the skeletal system (axial and appendicular) • Name and locate different bones of axial and appendicular skeleton • Classify bones • Describe general features of bones • Describe Nerve/blood supply of bone • Describe bone marrow and its types • Describe ossification and its types • Describe surface markings of bones • Define fracture, osteoporosis, rickets, osteomalacia • Introduction to muscular system • Classify the muscles according to the directions of fibers • Classify the skeletal muscles according to their action. • Types of skeletal muscle fibers(Type1 ,2,3) • Describe the nomenclature of skeletal muscles • Describe the principle of innervations and nerve supply of muscles • Define paralysis, hyperplasia,hypertrophy,mysthena gravis	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ,SEQ
2	Introduction to locomotion and upper limb	Identify the extent of the upper limb.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ,SEQ

		Identify various regions of upper limb. Describe the division of the regions into compartments. State the contents of compartments of arm, forearm & hand Describe the joints of upper limb. Describe the clinical anatomy of upper limb		
3	Osteology of clavicle	Recognize the bone Identify the site of bone State the bony land marks of clavicle: like borders, surfaces & land mark used for bone determination Describe & demonstrate the attachments of muscles. Describe the common fractures of the bone.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

		Identify and describe the salient features of the bones scapula and clavicle Describe the surface anatomy clavicle Describe the radiological anatomy clavicle Describe the applied anatomy clavicle		
4	Osteology of scapula	Recognize the bone. Identify the site of bone. State the bony landmarks of scapula: like borders, surfaces & land mark used for bone determination. Demonstrate the attachment of muscles on scapula Describe the common fractures of the bone. Identify and describe the salient features of the bones scapula. Identify the attachments to scapula Describe the surface anatomy scapula Describe the radiological anatomy scapula. Describe the applied anatomy scapula.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

5	Osteology of humerus	Recognize the bone. Identify the site of bone. State the bony landmarks of humerus: like borders, surfaces & land mark used for bone determination. Demonstrate the attachment of muscles & ligaments. Describe the common fractures of the bone. Identify and describe the salient features of the humerus Identify the attachments to humerus Describe the surface anatomy humerus Describe the radiological anatomy humerus Describe the applied anatomy humerus	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
6	Muscles of the pectoral girdle	Recognize the role of muscles of pectoral region in stabilizing the pectoral girdle. List the muscle of pectoral girdle. Describe & Demonstrate the attachments of muscle of pectoral girdle, nerve supply and actions. Describe the structural organization of the clavi-pectoral fascia. Identify the triangle of auscultation.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

		Describe the nerves and blood vessels of this region		
7	Muscles of the shoulder Region	Recognize the extent of shoulder region. Describe the muscle of shoulder region. List the muscles of shoulder region. State the detailed structures of each muscle with respect to Origin, Insertion, Nerve supply and Action of muscles with any characteristic features.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
8	The shoulder joint & its movements	Classify the type of shoulder joint. Describe the structure of shoulder joint. Name the muscles acting on the joint/rotator cuff muscles. Explain the range of mobility. Describe the movements of shoulder joint. Explain the clinical anatomy of the joint	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
9	Brachial plexus	Mention the formation of brachial plexus (roots, trunk, division, and cords). Describe the relation of brachial plexus also in connection to clavicle (Supra, retro, infra clavicular parts). State the branches arising the different cords. Draw the brachial plexus.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

		Describe the clinical correlates of the brachial plexus. Erb duchane palsy Klumpke palsy Saturday night palsy		
	Nerves of upper limb	Describe the course and branches of nerves of upper limbs. Axillary nerve Musculocutaneous nerve Radial Nerve Ulnar Nerve Median Nerve Explain the injuries associated with these nerves. Identify the causes and motor and sensory loss associated with nerve injuries of upper limb. Apply knowledge of gross anatomy to identify the deformities associated with these nerves.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Axilla	Describe the position, shape of axilla. Describe the boundaries and content of axilla Describe the boundaries and muscle forming the boundaries of axilla. Describe the formation, course and relations of axillary vessels. Describe arrangement and groups axillary lymph nod	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Arm	Describe the compartments of arm and how they are formed.		

		Identify and explain the muscles and their actions found in the arm. Describe the nerve supply of arm. Describe the course of the nerves Identify the branches of the nerves Relate & integrate with the clinical correlations Describe cutaneous supply of arm.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Brachial vessels	Describe the extension, relation and branches of the Brachial artery. Describe the course of the Basilic and cephalic veins Describe and explain the formation and purpose of the scapular anastomosis. Identify the type of the joint.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Elbow joint	State and Identify the muscles acting on the elbow joint. Describe the neurovascular supply of the joint. Describe the carrying angle and applied aspect of the joint. Describe the anastomosis and collateral circulation.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

		Describe formation of anastomosis around elbow joint		
	Osteology of ulna	Recognize the bone. Determine the side of bone. Identify the features of bone. Identify the muscles attached to bone. Describe the common fractures of the bone. Describe and Identify the salient features of the ulna Identify the attachments to ulna Describe the surface anatomy ulna and the radiological anatomy ulna Describe the applied anatomy ulna	iNTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Superficial veins, lymphatic's and lymph nodes of upper limb	Describe the normal anatomy of veins of upper limb. Differentiate between superficial and deep veins. Describe the features of individual superficial veins of upper limb. Correlate the applied anatomy with the gross anatomy of superficial Veins of upper limb. Describe the structure of a lymph node.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

		Identify the groups of lymph nodes. Describe groups and area of drainage of each group of lymph nodes. Describe the commencement, course and termination of superficial lymphatic vessels. Describe the clinical conditions related to lymphatic channels of upper		
	Cubital fossa	Describe the boundaries, the contents and the relationship among structures of Cubital fossa. Demonstrate the surface anatomy of the Cubital fossa. Explain the clinical importance of the Cubital fossa.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Anterior compartment of forearm	List the muscles of forearm. State the nerve supply of these muscles. Explain actions of the muscles of anterior compartment of forearm. Describe attachment and functions of flexor retinaculum Identify/Describe muscles of the anterior compartment of the arm (origin, insertion, nerve supply, blood supply, and action)	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Posterior compartment	Explain the organization of muscles of posterior compartment of forearm		

	of forearm	Identify/Describe muscles of the posterior compartment of the arm (origin, insertion, nerve supply, blood supply, and action) State the nerve supply of these muscles. Explain the actions of the muscles of posterior compartment of forearm. Describe the structural organization of the Extensor Retinaculum	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Blood vessels & nerves of the forearm	Describe the different vessels & nerves in forearm. Describe the location, destination, course & relations of radial and ulnar arteries & their branches in forearm. Describe the deep veins of forearm and their tributaries. Describe the location, destination, course & relations of ulnar, radial and median nerves & their branch.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Blood vessels & nerves of the forearm	Describe the different vessels & nerves in forearm. Describe the location, destination, course & relations of radial and ulnar arteries & their branches in forearm. Describe the deep veins of forearm and their tributaries. Describe the location, destination, course & relations	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

		of ulnar, radial and median nerves & their branch.		
	Radio-ulnar joint	Recognize the details of Radio-ulnar joint. Describe and explain the movements occurring on Radio-ulnar joint. Name the muscles acting in pronation and supination. Describe the nerve supply and blood supply of Radio-ulnar joint. Describe clinical problems related to Radio-ulnar joints.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Surface anatomy of upper limb	Demonstrate the surface markings for various arteries of upper limb	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
		Embryology		
	Somitogenesis	Define the process of gastrulation. Describe the development of mesoderm. Describe the process of somitogenesis. Describe the formation of cartilage	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Development of bone ,	Describe histogenesis of Bone Describe the Intramembranous Ossification		

	cartilage and joints	Describe the Endochondral Ossification Describe the Ossification of limb bones Describe the development of joints Describe the development of cartilage Describe developmental events of fibrous joints Describe developmental events of cartilaginous joint Describe developmental events of synovial joints Describe important congenital correlates	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Development of upper limb	Describe the early stages of upper limb development Describe the development of upper limb buds Describe the final stages of upper limb development Describe and explain the anomalies of the upper limb ~~Describe the development of skeletal muscle.~~	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Development of muscles	Describe the development of Myotomes and derivatives of epaxial divisions of myotomes and derivatives of hypaxial divisions of myotomes	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

HISTOLOGY				
	Bone histology	Define and identify compact and spongy bone Describe and identify bone matrix (organic and inorganic component) Describe and identify cells of boney tissue i.e. (osteoprogenitor, osteoblasts, osteoclast, and osteocytes) Describe and identify periosteum and endosteum Describe and identify the microscopic structure of bone i.e. (primary bone, secondary bone and haversian system) Describe Functions of various bone cells Describe important Functions and its role in calcium metabolism	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Classification & histology of cartilage	Describe the General properties of cartilage Describe the Different types of cartilage Describe the Hyaline, Elastic and Fibrocartilage Explain the growth of cartilage	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Histology of cartilage	Identify types of cartilages on microscopy, including distinctive features of each. Describe the structural basis.		

		Classify and distinguish three types of cartilages Describe the microscopic structure of hyaline cartilage Describe the microscopic structure of Elastic cartilage Describe the microscopic structure of fibrous cartilage Describe important functional correlates of three types of cartilages	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Classification & histology of bone	Recognize bone and its functions and ncomposition. Differentiate between woven bone and lamellar bone. Differentiate between compact bone and spongy bone. Describe the applied aspect of bone Identify three types of bone on microscopy, including distinctive features of each.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Histology of bone	Describe the structural basis of classification.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Histology of muscles	Identify three types of muscles on microscopy, including distinctive features of each muscle fiber. Describe the structural basis of muscle striations. Recognize the structural elements that produces muscle contraction and brings the movement of a	INTERACTIVE ACC TO GAGNES 9 EVENTS OF	

		body part. Recognize the function and organization of the connective tissue in muscle. Classify and distinguish three types of muscles Describe the microscopic structure of skeletal muscle Describe important functional correlates of skeletal, smooth Describe the microscopic structure of smooth muscle Identify/Describe the microscopic structure of cardiac muscle fiber Describe important functional correlates of cardiac muscle fiber	INSTRUCTION	MCQ, SEQ
		Physiology		
	Skeletal vs smooth muscle	Differentiate between skeletal muscle and smooth muscle.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Mechanism of muscle contraction	Describe the general mechanism of muscle contraction.		
		Describe the molecular mechanism of muscle	INTERACTIVE ACC TO	

		contraction	GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Energetics of muscle contraction	Describe the energetics of muscle contraction.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Terms related to MSK	Describe the following terms related to MSK Excitable tissue Stimulus Threshold Depolarization Hyperpolarization Presynaptic potential Post synaptic potential Goldmann Equation Nernst Equation	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Connective	**Biochemistry** Explain in detail the biochemistry of connective tissues.		

	tissues		INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Glycosaminoglycan	Discus the role of glycosaminoglycan (GAG) in the formation of the connective tissues, cartilage, skin, blood vessels and tendons	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Collagen	Describe the chemical structures of cellular matrix of collagen and elastin	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Chemistry of Amino acids and Proteins	Describe structure of amino acids & Proteins Classify proteins Describe different types of Plasma proteins	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Biochemistry Practical			
	Detection of Sulphur containing amino acids	Define Sulphur containing amino acids their structure and types Lead Sulphate test	Practical	OSPE

THEME -II

WEAK GRIP AND PAINFUL HAND

Topic	Learning Outcomes	MIT	Teaching strategy
Muscles of hand	Recall the structure and functions of palmar aponeurosis. Describe the attachments, nerve supply & actions of muscles of hand. Describe the thenar Muscles. Correlate the movements of thumb with hand anatomy. Identify the anatomical snuffbox. Relate applied with gross anatomy of few structures of hand Enumerate, describe and identify the small muscles of the hand Describe Surface anatomy of important muscles of hand Identify structures on transverse MRI hand taken at various levels Describe relevant clinical anatomy of important muscles Identify/Describe joints of the hand and fingers (intercarpal joints, carpometacarpal and intermetacarpal joints, carpometacarpal joint of the	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	thumb, and metacarpophalangeal joints Describe surface , radiological and clinical anatomy of important joints		
Vessels & nerves of the hand	Identify different vessels in hand. Describe the location, destination course relations of radial and ulnar arteries in hand. State the branches of radial and ulnar arteries in hand. Describe the formation of superficial and deep palmar arch, veins of hand and their tributaries. Describe the nervous supply of the hand.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Wrist joint	Recognize the details of wrist joints. Describe and explain the movements occurring on wrist joints. Name the muscles acting in pronation and supination. Describe the nerve supply and blood supply of wrist joints. Describe wrist joint, nerve supply and blood supply. Describe clinical problems related to Wrist joints.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Spaces of the palm	Identify the different spaces of the hand on both palmar and dorsal aspects. Describe the clinical importance of these spaces	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

Describe the important terms	Describe the following Motor unit Summation Tetanization Staircase effect Skeletal muscle tone Muscle fatigue Agonist Antagonists Coactivation of agonist and antagonis	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Excitation contraction coupling in skeletal muscles	Discuss the process of excitation contraction coupling in skeletal muscles. Explain Transverse tubule-sarcoplasmic reticulum system Describe Release of Calcium ions by sarcoplasmic reticulum Explain Role of Calcium pump Describe Excitatory pulse of Ca+	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Muscle action potential	Describe the muscle action potential.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Excitation contraction coupling	Describe excitation contraction coupling of skeletal muscle.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Role of calcium and phosphorus	Explain the role of calcium and phosphorous in formation of cellular matrix and bone	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

Vitamins	Vitamins and their role Define vitamins Classify vitamins Differentiate between Fats and water soluble vitamins Describe role of Vitamin A Explain the role of Vitamin D Describe the role of Vitamin E Describe the role of water soluble vitamins	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Introduction to minerals	Define Minerals, Define major and minor minerals Describe classification of minerals	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Detection of Cyclic amino Acids Osteology of radius & hand	Define Cyclic amino Acids Understand their structure and types Xanthoproteic Test Recognize the bones of forearm & hand	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
	Determine side of bones. Identify the features of bones. Identify the muscles attached to bones. Describe the ossification of bones Explain the clinical significance of bones. Describe the common fractures of the bone.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	Describe and Identify the salient features of the radius Identify the attachments to radius Describe the surface anatomy radius and the radiological anatomy radius Describe the applied anatomy radius Describe and Identify the salient features bones of hand Identify the attachments to bones of hand Describe the surface anatomy main bones of hand and the radiological anatomy of main bones Describe the applied anatomy main bones of hand including carpal tunnel and fractures		

THEME -III

Pain lower limb/limping

Topic	Learning Outcome	MIT	Teaching strategy
Introduction to lower limb	**Recognize different parts of lower limb.** **Describe regions of lower limb.** **List the bones of lower limb.** **Describe the vessels and nerves of lower limb.** **Identify different land marks in different regions of lower limb**	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Hip bone	**Identify the different parts of the bone.** **Describe side determination.** **Describe muscle attachments.** **Describe ligamentous attachments.** **Describe the different bones articulating with the hip bone** **Identify the different parts of the bone.** **Describe the common fractures of the bone.** **Identify and describe the salient**	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	features of the bones of hip bone **Identify the attachments of hip bone** **Describe the surface anatomy of hip bone** **Describe the radiological anatomy of hip bone** **Describe the applied anatomy of hip bone.** **Describe the characteristics**		
The hip joint and movements	**features of synovial joint** **Describe the Articular surfaces of hip** **joint** **Identify the capsule of hip joint** **Describe the synovial membrane, cavity & fluid of hip joint** **Enumerate the ligaments of hip joint** **& describe their attachments** **Describe the movements possible at** **hip joint** **Describe the clinical correlates of**	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	the hip joint **Describe surface and radiological anatomy (X-rays and MRI) and clinical of hip joints** **Describe the boundaries of gluteal region**		
Gluteal region	**Describe bones and ligaments of gluteal region** **Describe the different structures entering and leaving gluteal region** **Describe muscles of the gluteal region.** **Describe Vessels of the gluteal region.** **Describe nerves of the gluteal region.** **Describe about certain clinical correlates regarding gluteal region** **Describe Surface anatomy of important muscles** **Identify structures on transverse MRI of gluteal region taken at various levels**	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	Describe clinical anatomy of important muscles **Identify different parts of the**		
Femur	**femur** **Determine the side of the bone** **Identify the surfaces and borders of** **the bone** **Describe the common fractures of the bone.** **Describe the attachments of the different muscles and ligaments on the bone** **Describe the arterial supply of the bone** **Relate to the general idea about fractures of femur and other clinical conditions Identify and describe the salient features of the bones of hip bone** **Describe the surface anatomy of femur** **Describe the radiological anatomy of**	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	femur **Describe the applied anatomy of femur** Identify the names of nerves and		
Nerves of lower limb and their injuries	their main branches innervating lower limb Identify the nerves closely related to a bone or other structure of lower limb Recognize the main nerves commonly vulnerable to injury Identify the main area and loss of function if particular nerve is injured Define and understand terms neuritis, anesthesia, par aesthesia, paralysis, neuralgia, sciatica Enumerate and describe the superficial arteries of lower limb	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Superficial vessels and lymphatic's of lower limb	Name and Describe superficial veins of lower limb - List and Describe the superficial lymphatic vessels and lymph nodes of lower limb	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

Deep fascia of thigh, iliotibialtract and superficial vessels	Describe the arrangement of deep fascia in thigh Describe how the iliotibial tract participates in walking and running Describe the location of saphenous opening and its relations Describe the great saphenous vein. • Describe clinical correlates of saphenous vein	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Muscles of the anterior fascial compartment of thigh	Describe the muscles of anterior compartment of thigh. Describe the nerve supply of anterior Compartment. • Describe the action of these muscles	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Nerves and vessels of anterior compartment of thigh	Describe the nerve supply of the anterior compartment of thigh. Describe the blood supply and the venous drainage of anterior compartment of thigh • Describe the action of these muscles	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

The medial compartment of thigh	Describe the muscles of medial compartment of the thigh. Describe the nerve supply of these muscles. Describe the actions of the muscles of medial compartment of thigh • Describe the vessels of medial compartment of the thigh Describe the muscles of posterior compartment of thigh	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Posterior compartment of thigh	Describe the arterial supply of posterior compartment of thigh Discuss the trochanteric and cruciate anastomosis at the back of thigh Describe the venous drainage of this region Describe the nerve supply of posterior compartment of thigh and • Relate to the clinical conditions effecting the region Describe the boundaries of popliteal fossa.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Popliteal fossa	Describe the contents of the popliteal fossa. Describe some clinical correlates	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	regarding popliteal fossa Describe the boundaries of femoral		
Femoral triangle and its contents	triangle List the contents of femoral triangle Describe the femoral sheath & canal Describe the clinical correlates of the Femoral triangle. Describe the location, boundaries and contents of adductor canal Describe the division of tibia bone	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Tibia bone	in 3 parts Identify the surfaces and borders of tibia Describe the attachments of muscles on the tibia bone Describe the ossification of tibia and its primary and secondary ossification centers Describe the common fractures of the bone. Identify and describe the salient	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	features of the bone of leg Identify the attachments to the bone of the leg Describe the surface anatomy of leg Describe the radiological anatomy of leg Describe the applied anatomy of leg		
Fibula & bones of foot	Determine the side of bone. Describe the bony features along with its different attachments on the fibula. Name and describe the tarsal bones and their arrangement Name and describe the metatarsal bones and phalangeal bones. Describe the common fractures of the bone. Describe the muscles of the sole of the foot (origin, insertion, nerve supply, blood supply, and action) Describe the muscles of the dorsum	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	of the foot (origin, insertion, nerve supply, blood supply, and action) Describe Surface anatomy of important muscles Identify structures on transverse MRI of foot taken at various levels Describe clinical anatomy of important muscles identify the boundaries of the ~~compartments of leg~~		
Anterior and lateral compartment of leg	State the muscles of anterior and lateral compartment of leg Describe the vessels of anterior and lateral compartment of leg Describe the nerves of lateral and anterior compartment of leg Describe action of these muscles Explain the muscles of posterior Compartment of leg.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Posterior compartment of leg	Describe nerve supply of these muscles. Explain the actions of the muscles of posterior compartment of leg	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

Knee joint	Describe the type of knee joint Describe the articular surfaces of this joint Describe the articular capsule Describe the synovial membrane and the synovial cavity Enumerate the ligaments of knee joint Describe the bursa around the knee joint Describe the blood and nerve supply of the knee joint Describe the mechanism of locking and unlocking of knee joint. Describe surface and radiological anatomy (Xrays and MRI) and clinical of knee joints	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Surface anatomy of lower limb	Demonstrate the surface anatomy of arteries of lower limb. Demonstrate the surface anatomy of superficial & deep veins lower limb. Demonstrate the surface anatomy of nerves of lower limb	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Development of lower limb	Describe the early stages of lower limb development Describe the development of lower limb buds	INTERACTIVE ACC TO GAGNES 9 EVENTS OF	MCQ, SEQ

	Describe the final stages of lower limb development Describe and explain the anomalies of the lower limb	INSTRUCTION	
Sodium, potassium and chlorine in biology	Discuss RDA, serum Levels Enlist sources of Sodium, Potassium and chlorine, Describe functions Discuss absorption excretion, Describe disorders related to increase and decrease in amount of Sodium, Potassium and chlorine	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
BIOCHEMISTRY PRACTICAL			
Salt Saturation Test	Perform Salt Saturation Test	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

THEME -IV

Bony arches and fracture of foot

Topic	Learning Outcome	MIT	Teaching strategy
Muscles and neurovascular supply of the foot	Describe the dorsal muscles of foot. Describe the origin and insertion of planter muscles of foot. Describe their nerve supply and actions. Describe vascular and nervous supply of sole and dorsum of foot Describe their course through foot Describe relationships Identify and describe the salient features of the bone of foot Identify the attachments to the bone of the foot Describe the surface anatomy of foot Describe the radiological anatomy of foot Describe the applied anatomy of foot Describe the arches of foot	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Arches of foot	Describe the factors responsible for their maintenance of the arches of the foot Recognize the injury when it occurs and be able to evaluate plantar fasciitis. Describe about counselling regarding	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	the rehabilitation for plantar fasciitis		
Role of vitamin c & D	Describe the role of Vitamin C and Vitamin D in the formation of connective tissues and bones. Discuss RDA, serum Levels Iodine	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Iodine in Biology	Enlist sources of Describe functions Discuss absorption excretion, Describe disorders related to increase and decrease in amount of Iodine	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
introduction to Bone pathology	Define and differentiate osteopenia, osteoporosis, osteomalacia Define osteomyelitis Enlist various forms of arthritis	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Injury Wound	Define injury on medico legal basis. Classify injury. Define mechanical injury Classify mechanical injury Describe mechanisms of injury. Interpret the nature (manner) of injury. Define wound.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	Define hurt. Identify factors affecting appearance of wound	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

THEME -V

Backache

Topic	Learning Outcome	MIT	Teaching strategy
Typical spinal nerve	Define a spinal nerve. Recognize the spinal nerve as a part of PNS. Enumerate the spinal nerves in different regions Identify their location and site of emergence. Identify various components of a typical spinal nerve. Recall the fate of rami. Associate the rami communicans with typical spinal nerve Recall the distribution of gray rami Describe the muscles of back (origin, insertion, nerve supply, blood supply, and action)	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Vertebral column	Describe Surface anatomy of important muscles Identify structures on CT/MRI of vertebral column taken at various levels Describe clinical anatomy of important muscles	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

Lumbo sacral plexus, cutaneous nerves	Describe the formation of lumbar Plexus. List the branches of lumber plexus with their root values. Describe relation of the nerves with Psoas major muscle. List the structures supplied by lumbar plexus. Describe the formation of sacral plexus. Describe the composition and relations of sacral plexus. List the branches of this plexus Discuss RDA, serum Levels	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Phosphorus and Magnesium in biology	Enlist sources of Phosphorus and Magnesium Describe functions Discuss absorption excretion, Describe disorders related to increase and decrease in amount of Phosphorus and Magnesium Discuss RDA, serum Levels	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Sulphur in biology	Enlist sources of Sulphur Describe functions	INTERACTIVE ACC TO GAGNES 9 EVENTS OF	MCQ, SEQ

		INSTRUCTION	
	Discuss absorption excretion, Describe disorders related to increase and decrease in amount of sulphur Discuss RDA, serum Levels Copper and		
Copper and cobalt in biology	cobalt Enlist sources of Describe functions Discuss absorption excretion, Describe disorders related to increase and decrease in amount of Copper and cobalt Explain the causes of low back	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Back pain	pain z Describe the prevention of low back pain z Describe the causes & prevention of msd related to child labor	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

THEME -VI

Muscle weakness and fatigue

Topic	Learning Outcome	MIT	Teaching strategy
Physiology			
Physiologic anatomy of the skeletal muscle fiber	Explain the physiologic anatomy of the skeletal muscle fiber. Skeletal muscle fiber Sarcolemma Myofibrils I band A band Z disk M line Sarcomere Titin microfilament molecules Sarcoplasm Sarcoplasmic reticulum	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Characteristics of whole muscle contraction	Identify the characteristics of whole muscle contraction. Compare isotonic and isometric exercises. Compare and contrast slow	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	and fast muscle fibers. Describe the mechanics of skeletal muscle contraction. Describe muscle tone and muscle fatigue. Describe lever systems of the body and positioning of a body part. Describe remodeling of muscle to match function.		
Neuromuscular junction	Describe the transmission of impulses from nerve endings to skeletal muscle fibers. Explain the physiologic anatomy of the neuromuscular junction	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Neuromuscular Transmission	Explain the mechanism of transmission of impulses from nerve endings to muscle fibers Explain Formation and Secretion of acetylcholine at nerve terminals Describe Action of acetylcholine at postsynaptic membrane Describe Degradation/Destruction of released acetylcholine	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	Describe End plate potential Describe Fatigue of junction		
Neuromuscular drugs	Describe the physiologic basis of the drugs used in the neuromuscular disorders (Drugs that enhance or block the transmission at neuromuscular junction) Enlist the excitatory and inhibitory transmitter substances secreted at the smooth muscle neuromuscular junction Drugs that stimulate the muscle fiber by acetylcholine like action Drugs that stimulate neuromuscular junction by inactivating acetylcholinesterase Drugs that block transmission at the neuromuscular junction Enlist the excitatory and inhibitory transmitter substances secreted at the	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	smooth muscle neuromuscular junction		
Myasthenia gravis	Describe the pathophysiology of myasthenia gravis Classify smooth muscles	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Smooth muscle	Describe the physiologic anatomy of the smooth muscle neuromuscular junction Discuss in detail types of	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Skeletal Muscle fiber	muscles and arrangement of skeletal muscle fibers. Describe the contractile	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Contraction of smooth muscle	~~mechanisms in smooth~~ muscles Describe excitation and contraction of smooth muscle. Identify the types of smooth muscles. Describe the chemical and physical basis for smooth muscle contraction. Compare smooth and skeletal muscle contraction. Chemical basis of smooth muscle contraction	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	Physical basis of smooth muscle contraction Explain how the calcium ions regulate the contraction. Regulation of smooth muscle contraction by the calcium ions Enlist the excitatory and inhibitory transmitter substances secreted at the smooth muscle neuromuscular junction		
Nervous and hormonal control of smooth muscle contraction	Describe the nervous and hormonal control of smooth muscle contraction Enumerate the intracellular	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Resting Membrane Potential Muscle Remodeling	and extracellular concentrations of sodium, potassium, chloride and calcium ions in a resting/normal cell. Describe the characteristics of major membrane ion channels and their role in the membrane potential Describe the resting membrane potential in a cell/nerve fiber Describe following	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	Muscle hypertrophy Muscle atrophy Muscle hyperplasia Rigor mortis Muscle dystrophy Recovery of muscle contraction in poliomyelitis	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Membrane potentials and action potentials in smooth muscles	Describe the membrane potentials and action potentials in smooth muscles. Describe Spike potentials Describe Action potentials with plateaus Describe Role of calcium channels in generating the smooth muscle action potential Describe Slow wave potentials Describe Excitation of visceral smooth muscle by muscle stretch Describe Depolarization of multi-unit smooth muscle without action potentials	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Control of smooth muscle	Describe the mechanism nervous, hormonal and local		

contraction	control of smooth muscle contraction.	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Smooth muscle and skeletal muscle contraction	Compare the smooth muscle contraction and skeletal muscle contraction	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Skeletal muscle contraction	Describe the three sources of energy for muscle contraction Compare isometric and isotonic contractions Compare characteristics of fast and slow muscle fibers. Sources of energy for muscle contraction Compare isometric and isotonic contractions Compare characteristics of fast and slow muscle fibers	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Hormonal regulation	Explain the hormonal regulation of calcium and phosphorous to maintain musculoskeletal system	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Sodium, potassium and chlorine in biology	Discuss RDA, serum Levels Enlist sources of Sodium, Potassium and chlorine, Describe functions Discuss absorption excretion,	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

	Describe disorders related to increase and decrease in amount of Sodium, Potassium and chlorine		
Calcium in Biology	Discuss RDA, serum Levels Enlist sources of Calcium Describe functions Discuss absorption excretion, Describe disorders related to increase and decrease in amount of Calcium Discuss RDA, serum Levels	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Fluoride and Lithium in biology Molybdenum, Selenium, Zinc, chromium,manganes	Fluoride Enlist sources of Describe functions Discuss absorption excretion, Describe disorders related to increase and decrease in amount of Fluoride Brief description on role of lithium in biology Enlist sources of Describe functions	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION INTERACTIVE ACC TO	MCQ, SEQ

e,silicon, vanadium in biology	Discuss absorption excretion, Describe disorders related to increase and decrease of the said elements	GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Toxic element Aluminum , Arsenic, Antimony, Boron, Bromine, Cadmium, Cesium, Germanium, Lead, Mercury, Silver, Strontium	Discuss different effects of toxic elements	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Drug used in MSK	Define & classify NSAIDS Classify neuromuscular blocking agents. Enlist more most comomly used analgesia aspirin , iburrofen , diclofenac, paracetamol, COX-2 Salicox Classify corticosteroids	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Community Medicine			
MSK diseases	Explain the risk factors for different types of msd's Describe the preventive measures for different types of risk factors for msd's	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ
Epidemiology and	Describe work related msd's		

prevention of MSD	Identify risk factors of msd at workplace. Describe prevention of exposure to risk factors related to workplace. Describe the preventive strategies and safety guidelines in order to reduce the incidence of msds related to work place. Describe the burden /epidemiology of work related msd's Describe application of ergonomics in the prevention of work related msd's	INTERACTIVE ACC TO GAGNES 9 EVENTS OF INSTRUCTION	MCQ, SEQ

Teaching and learning strategies:

The following teaching / learning methods are used to promote better understanding:

- Interactive Lectures
- Hospital / Clinic visits
- Small Group Discussion
- Skills session
- Self-Directed Study

Interactive lectures:

An interactive lecture is an easy way for instructors to intellectually engage and involve students as active participants in a lecture-based class of any size. Interactive lectures are classes in which the instructor breaks the lecture at least once per class to have students participate in an activity that lets them work directly with the material.

- The instructor might begin the interactive segment with an engagement trigger that captures and maintains student attention.

- Then the instructor incorporates an activity that allows students to apply what they have learned or give them a context for upcoming lecture material.
- As the instructor feels more comfortable using interactive techniques he or she might begin to call upon a blend of various interactive techniques all in one class period.

Hospital / Clinic visits:

In small groups, students observe patients with signs and symptoms in hospital or clinical settings. This helps students to relate knowledge of basic and clinical sciences of the relevant module.

Small group discussion (SGD):

The shy and less articulate are more able to contribute. Students learn from each other. Everyone gets more practice at expressing their ideas. A two way discussion is almost always more creative than individual thoughts. Social skills are practiced in a 'safe' environment e.g. tolerance, cooperation. This format helps students to clarify concepts acquire skills or attitudes. Students exchange opinions and apply knowledge gained from lectures, tutorials and self-study. The facilitator role is to ask probing questions, summarize, or rephrase to help clarify concepts.

Skills/Practical session:

Skills relevant to respective module are observed and practiced where applicable in skills laboratory or Laboratories of various departments.

Self-Directed learning (SDL):

Self-directed learning, which involves studying without direct supervision in a classroom/Library, is a valuable way to learn and is quickly growing in popularity among parents and students. Students' assume responsibilities of their own learning through individual study, sharing and discussing with peers, seeking information from Learning Resource Centre, teachers and resource persons within and outside the college. Students can utilize the time within the college scheduled hours of self-study.

Time Tables:

The timetables for the module will be shared via Edmodo and the notice boards in advance.

Assessment tools:

Theoretical knowledge is tested by a written examination system constituted by multiple choice questions (MCQs). The assessment of practical knowledge involves oral, spot, or objective structured practical examinations (OSPE).

Multiple Choice Questions (MCQs):

- Multiple choice questions (MCQs) are a form of assessment for which students are asked to select the best choice from a list of answers.
- MCQ consists of a stem and a set of options. The stem is usually the first part of the assessment that presents the question as a problem to be solved; the question can be an incomplete statement which requires to be completed and can include a graph, a picture or any other relevant information. The options are the possible answers that the student can choose from, with the correct answer called the key and the incorrect answers called distractors.

- Correct answer carries one mark, and incorrect ‘zero mark’. There is NO negative marking.
- Students mark their responses on specified computer-based sheet designed for the college.
- The block exam will comprise of 120 MCQs and will be compiled according to the shared blueprint.

Short Essay Questions (SEQ)

Short answer questions generally ask for brief, text-based responses and may also be referred to as *fill-in-the-blank*; or *completion* questions.

Variations of the short answer question may request a list of terms or rules in which the order is not important, or may require a numerical or formula response.

Here is some general information about short answer questions:

- Does not measure interpretation.
- Can be used to check for preciseness such as correct spelling (good when using computer grading), proper or specific names of things, especially factual knowledge, and proper creation of formulas.
- Requires specific, definite, exact information.
- Can be used to discriminate whether errors can be detected in a diagram, for

example. Advantages of Short Answer Questions

- Easy to write.

- Reduces possibility of guessing.
- Can have a lengthy stem such as a paragraph. (Caution: You generally should not expect an exact answer character-by-character.)
- May be easy to score if the required answer is short.

Disadvantages of Short Answer Questions

- It can take time to create items with complex formulas.
- Can be turned into a measure of memorization ability.
- Grading can be subjective.
- Correct responses may appear incorrect due to minor errors such as misspellings, order of words, etc.
- Difficult to machine score. Much work is being conducted in this area, but it is still in early stages of development.

Objective Structured Practical Examination (OSPE)

- The content may assess application of knowledge, or practical skills.
- Student will complete task in define time at one given station.
- All the students are assessed on the same content by the same examiner in the same allocated time.
- A structured examination will have observed, unobserved, interactive and rest stations.
- Observed and interactive stations will be assessed by internal or external examiners.

- Unobserved will be static stations in which students will have to answer the questions related to the given pictures, models or specimens the provided response sheet.
- Rest station is a station where there is no task given, and in this time student can organize his/her thoughts.
- The Block OSPE will be comprise of 18 examined station and 7 rest stations. The stations will be assigned according to the shred blueprint.

Internal Evaluation:

Internal evaluation is a process of quality review undertaken within an institution for its own ends. 10% marks of internal evaluation will be added to final marks. This 10% will be based on:

Distribution of 13 Marks for paper	
Marks obtained	**Average of Percentage in Block B exam and Pre professional exam**

Distribution of 10 Marks for Block OSPE/OSCE	
Marks obtained	**Average of percentage in Block B OSPE Exam and Block Pre Proff OSPE**

	Practical copies

Attendance Requirement:

More than 75% attendance is mandatory to sit for the examinations.

Anatomy

- Snell Neuroanatomy
- B.D Churasia
- Nelter Atlas
- Langman embryology
- Keithalmore embryology
- Laiq Hassain Basic Histology
- Difore Atlas Histology

Physiology

- Guyton and Hall physiology
- Human Physiology from cells to systems by lauralee sherwood
- Ganong physiology
- BRS Physiology
- Neuroscience by Dale Purves

Biochemistry

- Chatterjee text book of Biochemistry

- Harpers Biochemistry
- Lippincotts Biochemistry
- Satya Narayan biochemistry

Apart from these resources learning, students can consult books available in library or recommended by the specialty experts.