Department of Medical Education (DME)

Musculoskeletal-II Module

Study Guide
First Year MBBS 2022 - 2023

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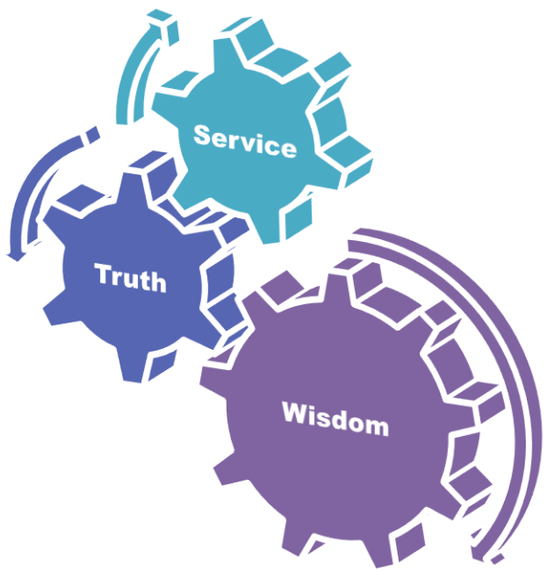
University Moto, Vision, Values & Goals

RMU Motto



Mission Statement

To impart evidence-based research-oriented health professional education in order to provide best possible patient care and inculcate the values of mutual respect, ethical practice of healthcare and social accountability.

Vision and Values

Highly recognized and accredited centre of excellence in Medical Education, using evidence-based training techniques for development of highly competent health professionals, who are lifelong experiential learner and are socially accountable.

Goals of the Undergraduate Integrated Modular Curriculum

The Undergraduate Integrated Learning Program is geared to provide you with quality medical education in an environment designed to:

- Provide thorough grounding in the basic theoretical concepts underpinning the practice of medicine.
- Develop and polish the skills required for providing medical services at all levels of the Health care delivery system.
- Help you attain and maintain the highest possible levels of ethical and professional conduct in your future life.
- Kindle a spirit of inquiry and acquisition of knowledge to help you attain personal and professional growth & excellence.

Second Year MBBS 2023

Study Guide

MSK-II Module

Discipline Wise Details of Modular Content

Block	Module	General Anatomy	Embryology	Histology	Gross Anatomy
II	• Anatomy	• Muscles • Skin	• Development of Axial Skeleton • Development of limbs • Development of muscles	General Histology • Muscles • Skin • Skin appendages	Gluteal Region to Lateral compartment of leg
	• Biochemistry	• Protein chemistry, Protein separation techniques, Collagen and Elastin			
	• Physiology	• Sarcotubular system, excitation contraction coupling mechanism in skeletal muscle. • Molecular Mechanism of skeletal muscle contraction, Rigormortis, Muscular dystrophies • Introduction to muscle physiology, Structure of sarcomere • Energetics, efficiency and types of contraction, heat production in muscle • Physiologic anatomy, types and properties of Smooth Muscle • Mechanism of smooth muscle contraction & its control • Introduction to pericardium Properties of myocardium & endocardium,myocardial action potential • Regulation of myocardial activity • Comparison of 3 types of Muscle • Introduction to CVS • Excitatory & Conducting system of heart			
	• Bioethics & Professionalism	• Introduction to Professional Ethics and PM&DC Code of Conduct • History of Medical Ethics			
	• Research Club Activity (IUGRC)	• Student Practical Session-I • Student Practical Session-II			
	•	• Communication Skills			
	• Behavioural Sciences	• Rights and Responsibilities of patients and doctors			
	• Radiology & Artificial Inteligence	• x-rays of hipbone lower limb			
	• Vertical components	• The Holy Quran Translation Component			
	• Vertical Integration	• Clinically co-related lectures			

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MSK-II Module Team

Module Name	:	MSK- II Module
Duration of module	:	05 Weeks
Coordinator	:	Dr. Fahd Anwar
Co- Coordinator	:	Dr. Sajjad Hussain
Reviewed by	:	Module Committee

Module Committee	
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Focal Person Community Medicine	Dr. Afifa Kulsoom
Focal Person Quran Translation Lectures	Dr. Fahd Anwar

Module task force	
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Co-Coordinator	Dr. Almas (Senior Demonstrator Biochemistry
Co-coordinator	Dr. Fareed Ullah Khan (Senior Demonstrator Physiology) & Clinical Co- Coordinatior

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Deputy Director DME	Dr. Shazia Zeb
Module planner & Implementation coordinator	Dr. Sidra Hamid
Editor	Muhammad Arslan Aslam

Module III – MSK-II Module

Rationale: This module describes the structural organization, functions, and congenital anomalies of musculoskeletal system. It explains the mechanism of neuromuscular transmission, comparison of three types of muscle and physiology of smooth and cardiac muscle, its biochemical basis and the importance of Ca++ in the body. This module covers cardiac muscle physiology including conducting system of heart. It depicts structure and function of joints in upper and lower limb. It elaborates identification of common fractures of long bones on radiograph.

Module Outcomes

At the end of this module the student should be able to:

Knowledge:

1. Explain the development & structure of musculoskeletal system.
2. Explain the physiological and biochemical factors affecting neuromuscular transmission.
3. Explain physiology of smooth and cardiac muscle.
4. Apply the knowledge of the basic sciences to understand common fractures.
5. Use technology based medical education including
    - **Artifical Intelligence.**
6. Appreciate concepts & importance of
    - **Family Medicine**
    - **Biomedical Ethics**
    - **Research**

Skill:

1. Dissect limbs to demonstrate regional Anatomy and relationships of various structures to each other.
2. Identify histological features of connective tissue and muscles under microscope.
3. Perform practicals on estimation of calcium and protein chemistry.

Attitude:

1. Demonstrate a professional attitude, team building spirit and good communication skills and cadaveric handling.

SECTION - I

Terms & Abbreviations

Contents

- Domains of Learning
- Teaching and Learning Methodologies/Strategies
    - Large Group Interactive Session (LGIS)
    - Small Group Discussion (SGD)
    - Self-Directed Learning (SDL)
    - Case Based Learning (CBL)
    - Problem- Based Learning (PBL)
    - Skill Labs/Practicals (SKL)

Tables & Figures

- Table1. Domains of learning according to Blooms Taxonomy
- Figure 1. Prof Umar's Model of Integrated Lecture
- Table2. Standardization of teaching content in Small Group Discussions
- Table 3. Steps of taking Small Group Discussions
- Figure 2. PBL 7 Jumps Model

Table1. Domains of Learning According to Blooms Taxonomy

Sr. #	Abbreviation	Domains of learning
1.	C	**Cognitive Domain:** knowledge and mental skills.
	• C1	Remembering
	• C2	Understanding
	• C3	Applying
	• C4	Analyzing
	• C5	Evaluating
	• C6	Creating
2.	P	**Psychomotor Domain:** motor skills.
	• P1	Imitation
	• P2	Manipulation
	• P3	Precision
	• P4	Articulation
	• P5	Naturalization
3.	A	**Affective Domain:** feelings, values, dispositions, attitudes, etc
	• A1	Receive
	• A2	Respond
	• A3	Value
	• A4	Organize
	• A5	Internalize

Teaching and Learning Methodologies / Strategies

Large Group Interactive Session (LGIS)

The large group interactive session is structured format of Prof Umar Model of Integrated lecture. It will the followed for delivery of all LGIS. The lecturer will introduce a topic or common clinical condition and explains the underlying phenomena through questions, pictures, videos of patients, interviews and exercises, etc. Students are actively involved in the learning process.

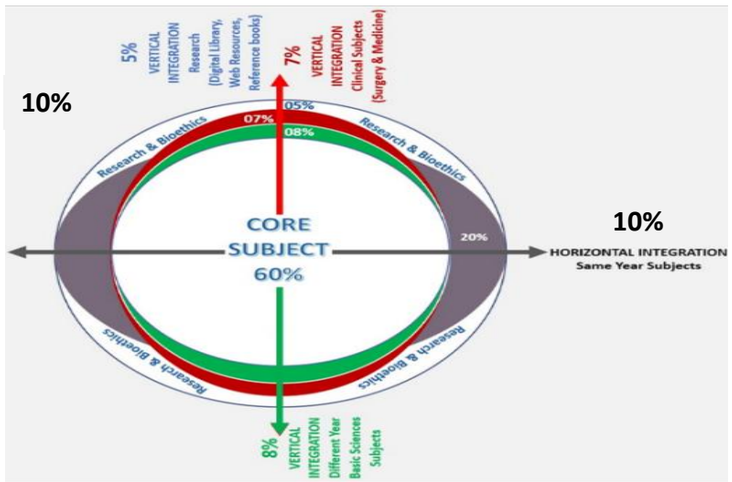


Figure 1. Prof Umar's Model of Integrated Lecture

Small Group Discussion (SGD)

This format helps students to clarify concepts acquire skills and attitudes. Sessions are structured with the help of specific exercises such as patient case, interviews or discussion topics or power point presentations. Students exchange opinions and apply knowledge gained from lectures, SGDs and self study. The facilitator role is to ask probing questions, summarize and help to clarify the concepts.

Table 2. Standardization of teaching content in Small Group Discussions

S. No	Topics	Approximate %
1	Title Of SGD	
2	Learning Objectives from Study Guides	
3	Horizontal Integration	5%+5%=10%
4	Core Concepts of the topic	60%
5	Vertical Integration	20%
6	Related Advance Research points	3%
7	Related Ethical points	2%

Table 3. Steps of Implementaion of Small Group Discussions

Step 1	Sharing of Learning objectives by using students Study guides	First 5 minutes
Step 2	Asking students pre-planned questions from previous teaching session to develop co-relation (these questions will be standardized)	5minutes
Step 3	Students divided into groups of three and allocation of learning objectives	5minutes
Step 4	ACTIVITY: Students will discuss the learning objectives among themselves	15 minutes
Step 5	Each group of students will present its learning objectives	20 min
Step 6	Discussion of learning content in the main group	30min
Step 7	Clarification of concept by the facilitator by asking structured questions from learning content	15 min
Step 8	Questions on core concepts	
Step 9	Questions on horizontal integration	
Step 10	Questions on vertical integration	
Step 11	Questions on related research article	
Step 12	Questions on related ethics content	
Step 13	Students Assessment on online MS teams (5 MCQs)	5 min
Step 14	Summarization of main points by the facilitator	5 min
Step 15	Students feedback on the SGD and entry into log book	5 min
Step 16	Ending remarks	

Self Directed Learning (SDL)

- Self- directed learning is a process where students take primary charge of planning, continuing, and evaluating their learning experiences.
- Time Home assignment
- Learning objectives will be defined
- Learning resources will be given to students = Textbook (page no), web site
- Assessment:

  i Will be online on LMS (Mid module/ end of Module)

  ii.OSPE station

Case Based Learning (CBL)

- It's a learner centered model which engages students in discussion of specific scenarios that typically resemble real world examples.
- Case scenario will be given to the students
- Will engage students in discussion of specific scenarios that resemble or typically are real-world examples.
- Learning objectives will be given to the students and will be based on
  i. To provide students with a relevant opportunity to see theory in practice
  ii. Require students to analyze data in order to reach a conclusion.
  iii. Develop analytic, communicative, and collaborative skills along with content knowledge.

Problem Based Learning (PBL)

- Problem-based learning (PBL) is a student-centered approach in which students learn about a subject by working in groups to solve an open-ended problem.
- This problem is what drives the motivation and the learning.

The 7- Jump-Format of PBL (Masstricht Medical School)	
Step 7	Syntheise & Report
Step 6	Collect Information from outside
Step 5	Generate learning Issues
Step 4	Discuss and Organise Ideas
Step 3	Brainstorming to Identify Explanations
Step 2	Define the Problem
Step 1	Clarify the Terms and Concepts of the Problem Scenario
Problem- Scenario	

Figure 2. PBL 7 Jumps Model

Practical Sessions/Skill Lab (SKL)

Practical Session/ Skill Lab (SKL)	
Demonstration/ power point presentation 4-5 slide	10-15 minutes
Practical work	25-30 minutes
Write/ draw and get it checked by teacher	20-25 minutes
05 mcqs at the end of the practical	10 minutes
At the end of module practical copy will be signed by head of department	
At the end of block the practical copy will be signed by Head of Department Dean Medical education department QEC	

SECTION – II

Learning Objectives, Teaching Strategies & Assesssments

Contents

- Horizontally Integrated Basic Sciences (Anatomy, Physiology & Biochemistry)
- Large Group Interactive Session:
  - Anatomy (LGIS)
  - Physiology (LGIS)
  - Biochemistry (LGIS)
- Small Group Discussions
  - Anatomy (SGD)
  - Physiology (SGD)
  - Biochemistry (SGD)
- Self Directed Topic, Learning Objectives & References
  - Anatomy (SDL)
  - Physiology (SDL)
  - Biochemistry (SDL)
- Skill Laboratory
  - Anatomy
  - Physiology
  - Biochemistry

Horizontally Integrated Basic Sciences (Anatomy, Physiology & Biochemistry)

Anatomy Large Group Interactive Session (LGIS)

Topic	Learning Objectives At The End Of Lecture Students Should Be Able To:	Learning Domain	Teaching Strategy	Assessment Tools
General Anatomy Muscle I	• Classify muscles with examples according to i) Shape` ii) Histology iii) Development iv) Contraction • Describe the general features of skeletal muscle. • Differentiate between Red white and intermediate fibers. • Describe blood supply and nerve supply of skeletal muscles. • Correlate clinical condition • How to use digital library • Read a research article	C1 C2 C2 C2 C3 C3 C3	LGIS	MCQ SAQ VIVA
General Histology Muscle-I	• Classify muscle on histological basis. • Describe histological structure of skeletal muscles • Discuss ultrastructure of skeletal muscles • Understand the contraction mechanisim • Correlate clinical condition • How to use digital library • Read a research article	C1 C2 C2 C2 C3 C3 C3	LGIS	MCQ SAQ VIVA
General Anatomy Muscle II	• Discuss connective tissue associated with skeletal muscle. • Discuss parts of skeletal muscles. • Give classification of skeletal muscles. • Explain the actions of a prime mover or agonist Fixators • Synergist and antagonist with examples. • Correlate clinical condition • How to use digital library • Read a research article	C2 C2 C1 C2 C3 C3 C3	LGIS	MCQ SAQ VIVA

General Histology Muscle-II	• Describe histological structure of cardiac and smooth muscles • Describe ultrastructure of smooth and cardiac muscles. • Differentiate between skeletal smooth and cardiac muscles. • Discuss regeneration of muscle fibers • Correlate clinical condition • How to use digital library • Read a research article	C2 C2 C2 C2 C3 C3 C3	LGIS	MCQ SAQ VIVA
General Histology Skin	• Enlist components of integumentary system • Describe histological structure of skin with special reference to cells residing in epidermis. • Describe histological features of thick and thin skin • Differentiate between thick and thin skin • Correlate clinical condition • How to use digital library • Read a research article	C1 C2 C2 C2 C3 C3 C3	LGIS	MCQ SAQ VIVA
General Embryology Development of axial skeleton	• Discuss the cartilagenous stage of vertebral column • Discuss the bony stage of vertebral column • Describe development of ribs and sternum. • Correlate clinical condition • How to use digital library • Read a research article	C2 C2 C2 C3 C3 C3	LGIS	MCQ SAQ VIVA
General Histology Skin appendages	• Describe appendages of skin • Discuss histological structure of hair • Discuss histological structure of nail • Discuss histological structure of glands of skin • Correlate clinical conditions • How to use digital library • Read a research article	C2 C2 C2 C2 C3 C3 C3	LGIS	MCQ SAQ VIVA
General Embryology Development of limbs	• Enlist different stages of limb development • Discuss early and late stage of limb development • Correlate congenital anomalies of limb development • How to use digital library	C1 C2 C3 C3	LGIS	MCQ SAQ VIVA

	• Read a research article	C3		
General Embryology Development of muscles	• Discuss development of skeletal muscle with special reference to myotomes, pharyngeal arch muscles and limb muscle along with limb skeleton. • Describe development of smooth and cardiac muscles with anomalies. • Correlate clinical condition • How to use digital library • Read a research article	C2 C2 C3 C3 C3 C3	LGIS	MCQ SAQ VIVA
General Anatomy Skin	• Enlist functions of skin • Discuss types of skin • Compare between thick and thin skin • Classify skin lines • Describe the significance of skin lines • Discuss burns of skin • Correlate clinical conditions • How to use digital library • Read a research article	C1 C2 C2 C1 C2 C3 C3 C3	LGIS	MCQ SAQ VIVA

Physiology Large Group Interactive Session (LGIS)

Topic	Learning Objectives At The End Of Lecture Students Should Be Able To:	References	Learning Resources
Introduction to muscle physiology, Structure of Sarcomere	Explain the physiologicanatomy of skeletal muscle Draw and label thesarcomere	• Ganong's Review of Medical Physiology.25TH Edition.Section 01,Excitable tissue:Muscle (Chapter 05,Page 99) • Physiology by Linda S. Costanzo 6th Edition.Cellular Physiology (Chapter 1.Page 34) • Human Physiology by Dee UnglaubSilver thorn. 8TH Edition.Muscle (Chapter 12,Page 411) • Textbook of Medical Physiology by Guyton & Hall.14th Edition.Contractionof Skeletal muscle.Section 02. (Chapter 06, Page 79)	1. https://youtu.be/8iklTDlra5Q 2. https://www.sciencedirect.com/science/article/abs/pii/0197018687901070 3. https://teachmephysiology.com/histology/tissue-structure/muscle-histology/skeletal-muscle/
Sarcotubular system, excitation contraction coupling mechanism in skeletal muscle	Discuss the sliding filament model of muscle contraction Describe the structure sarcotubular system andits importance in musclecontraction	• Ganong's Review of Medical Physiology.25TH Edition.Section 01,Excitable tissue:Muscle (Chapter 05, Page 103) • Physiology by Linda S. Costanzo 6th Edition.Cellular Physiology (Chapter 1. Page 36) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 413,421) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 01, Excitation and Contraction of Skeletal muscle, (Chapter 04,page 68) • Textbook of Medical Physiology by Guyton & Hall.14th Edition.Contraction of Skeletal muscle.Section 02. (Chapter 06, Page 81) (Chapter 07, Page 93,97)	1. https://www.sciencedirect.com/science/article/abs/pii/0197018687901070 2. https://youtu.be/8iklTDlra5Q 3. .https://link.springer.com/article/10.1007/s12551-013-0135-x

Molecular Mechanism of skeletal muscle contraction, Rigor mortis, Muscular dystrophies	Define motor unit Discuss recruitment and its effect on force of contraction Discuss Molecular Mechanism of skeletal muscle contraction	• Physiology by Linda S. Costanzo 6th Edition.Cellular Physiology (Chapter 1. Page 36) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 413,421) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 01, Excitation and Contraction of Skeletal muscle, , (Chapter 04,page 70) • Textbook of Medical Physiology by Guyton & Hall.14th Edition.Contraction of Skeletal muscle.Section 02. (Chapter 06, Page 82,88)	1. https://youtu.be/RTnKBt2sDf0 2. https://youtu.be/NvV2xTrShvg
Length tension curve, Load and velocity of contraction, diseases of muscle	Draw and describe Length duration curve Load and velocity of contraction	• Physiology by Linda S. Costanzo 6th Edition.Cellular Physiology (Chapter 1. Page 39) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 431,435) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 01, Excitation and Contraction of Skeletal muscle, , (Chapter 04,page 74) • Textbook of Medical Physiology by Guyton & Hall.14th Edition.Contraction of Skeletal muscle.Section 02. (Chapter 06, Page 91)	1. https://www.urmc.rochester.edu/encyclopedia/content.aspx?ContentTypeID=85&ContentID=P00792 2. https://www.sciencedirect.com/topics/engineering/length-tension-curve
Energetics, efficiency and types of contraction, heat production in muscle	Elaborate Energetic and efficiency of contraction. Discuss heat production in nerve and muscle	• Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 431) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 01, Excitation and Contraction of Skeletal muscle, , (Chapter 04,page 77,84) • Textbook of Medical Physiology by Guyton & Hall.14th Edition.Contraction of Skeletal muscle.Section 02. (Chapter 06, Page 85,87)	1. https://www.sciencedirect.com/topics/engineering/length-tension-curve 2. https://youtu.be/3ntulKD4kvY

Properties of skeletal muscles, Tetanus & Fatigue	Discuss various properties of skeletal muscle in detail Tetanus and fatigue	• Ganong's Review of Medical Physiology.25TH Edition.Section 01,Excitable tissue:Muscle (Chapter 05, Page 110) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 422,424,428) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 01, Excitation and Contraction of Skeletal muscle, (Chapter 04,page 74,86)	1. https://youtu.be/v5Nm_LaAQVo 2. https://www.sciencedirect.com/science/article/abs/pii/S2387020622003485
Introduction to CVS	Introduction to Cardiovascular system. Classify blood vessels	• Ganong's Review of Medical Physiology.25TH Edition.Section 05,Cardioascular physiology (Chapter 29, Page 519) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Cardioascular physiology (Chapter 14,Page 469) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 02, Introduction to Cardiovascular system.(Chapter 05,page 101)	1. https://youtu.be/28CYhgjrBLA 2. https://litfl.com/cardiovascular-physiology-overview/
Physiologic anatomy, types and properties of Smooth Muscle	Enlist type of smooth muscles and explain their characteristics Explain the properties of smooth muscle	• Physiology by Linda S. Costanzo 6th Edition.Cellular Physiology (Chapter 1. Page 40) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 436) • Textbook of Medical Physiology by Guyton & Hall.14th Edition.Excitation and Contraction of Smooth muscle.Section 02. (Chapter 08, Page 101)	1. https://www.kenhub.com/en/library/anatomy/smooth-musculature 2. https://youtu.be/qEVRoKuoj4U

Introduction to pericardium Properties of myocardium & endocardium, myocardial action potential	Describe the physiologic anatomy of myocardium Discuss properties of myocardium Discuss in detail various properties of myocardium Describe the mechanism of production of action potential and its propagation Describe excitation contraction coupling in detail Discuss propagation of electrical activity in cardiac muscle	• Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 14. Page 131) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 482) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 09, Page 114)	1. https://youtu.be/L2Gf9cj7jBw 2. https://www.sciencedirect.com/topics/medicine-and-dentistry/cardiac-action-potential
Mechanism of smooth muscle contraction & its control	Explain the chemical and physical basis of smooth muscle contraction	• Ganong's Review of Medica Physiology by Linda S. Costanzo 6th Edition.Cellular Physiology (Chapter 1. Page 42) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 439,443) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Excitation and Contraction of Smooth muscle.Section 02. (Chapter 08, Page 103,105)	1. https://www.kenhub.com/en/library/anatomy/smooth-musculature 2. https://youtu.be/qEVRoKuoj4U
Regulation of myocardial activity	Describe the regulation of pumping activity of heart	• Textbook of Medical Physiology by Guyton & Hall.14th Edition. Excitation and Contraction of Smooth muscle.Section 02. (Chapter 09, Page 123)	1. https://pubmed.ncbi.nlm.nih.gov/16618829/ 2. https://www.sciencedirect.com/topics/medicine-and-dentistry/cardiac-action-potential
Comparison of 3 types of muscle	• Discuss differences among three types of muscle in detail	• Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 444)	1. https://training.seer.cancer.gov/anatomy/muscular/types.html 2. https://youtu.be/eShBZ3-RxHA

Excitatory & Conducting system of heart	• Describe the conductive system of heart in detail • Enlist the various components of conductive system of heart • Describe the mechanism of production of action potential in SA node, AV node, ventricles.also describe its propogation	• Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 488) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. (Chapter 08,page 155,162) • Textbook of Medical Physiology by Guyton & Hall.14th Edition.Section 02. (Chapter 10, Page 127,133)	3. https://youtu.be/TnFoJ7Hhi-M 4. https://teachmeanatomy.info/thorax/organs/heart/conducting-system/

Biochemistry Large Group Interactive Session (LGIS)

Topic	Learning Objectives At the end of lecture students should be able to	Learning Domain	Teaching strategy	Assessment Tool
	Protein chemistry			
Properties of amino acids& Important peptides	• Describe amphoteric properties of amino acids • Discuss Post transitional amino acids and location of amino acids in proteins • Explain Important peptides	C2 C2 C2	LGIS	MCQs, SAQs & Viva
Proteins	• Discuss Importance of proteins • Classify proteins • Describe Functions of proteins	C1 C2 C2	LGIS	MCQs, SAQs & Viva
Primary structure of proteins	• Describe Primary structure of protein • Discuss Peptide bond	C2 C2	LGIS	MCQs, SAQs & Viva
Secondary structure of proteins	• Enlist Types of secondary structure. • Describe Secondary structure of proteins. • Elaborate Significance of secondary structure	C1 C2 C2	LGIS	MCQs, SAQs & Viva
	• Describe Tertiary and quaternary structure of proteins	C2	LGIS	MCQs, SAQs &

Tertiary and quaternary structure	• Understand the forces stabilizing protein structure	C2		Viva
Protein folding And denaturation	• Discuss Folding of proteins • Describe protein misfolding • Interpret the clinical cases related to protein misfolding • Discuss denaturation of proteins	C2 C2 C3 C2	LGIS	MCQs, SAQs & Viva
Collagen and Elastin	• Describe structure of collagen and elastin • Discuss differences between collagen and elastin • Explain Synthesis of collagen • Enlist Factor regulating and helping in strengthening of collagen • Interpret defects of collagen synthesis and elastin	C2 C2 C2 C1 C3	LGIS	MCQs, SAQs & Viva
Techniques for separation of proteins	• Describe Techniques for separation of proteins	C2	LGIS	MCQs, SAQs & Viva

Anatomy Small Group Discussion (SGDs)

Topic	Learning Objectives Students Should Be Able To	Learning Domain	Teaching Strategy	Assessment Tools
Hip Bone-I	• Demonstrate the anatomical position • Identify bony features of ilium. • Describe the muscular, ligamentous, and capsular attachments. • Discuss the ventral and dorsal auricular surfaces, ossification. • Correlate the clinical aspects • Read relevant research article • Use digital library	P C1 C2 C2 C3 C3 C3	Skill Lab	MCQ SEQ VIVA OSPE
Hip Bone-II	• Demonstrate the anatomical position • Identify bony features of pubis and ischium. • Describe the muscular, ligamentous, and capsular attachments. • Discuss the ventral and dorsal auricular surfaces, ossification. • Correlate the clinical aspects • Read relevant research article • Use digital library	P C1 C2 C2 C3 C3 C3	Skill Lab	MCQ SEQ VIVA OSPE
Femur	• Demonstrate the anatomical position of bone • Demonstrate different parts • Describe proximal and distal articulations • State angle of femoral torsion. • Correlate the clinical aspects • Read relevant research article • Use digital library	P C1 C2 C1 C3 C3 C3	Skill Lab	MCQ SEQ VIVA OSPE

Femur and Patella	• Demonstrate the anatomical position of bones • Describe muscle attachment and ossification • Discuss fractures with special reference to the fracture of neck of femur in old age. • Describe anatomy of patella and factors responsible for its stability. • Enumerate different bursae related to patella • Correlate the clinical aspects • Read relevant research article • Use digital library	P C2 C3 C2 C1 C3 C3 C3	Skill Lab	MCQ SEQ VIVA OSPE
Anterolateral Compartment Of Thigh (Muscles)	• Describe the origin and insertion of muscles in anterior compartment of thigh. • Describe the origin and insertion of muscles in lateral compartment of thigh. • Discuss the femoral triangle and adductor canal with contents • Identify these muscles. • Correlate the clinical aspects • Read relevant research article • Use digital library	C2 C2 C2 C1 C3 C3 C3	Skill Lab	MCQ SEQ VIVA OSPE
Anterolateral compartment of thigh (Neurovascular organization)	• Describe the nerves and vessels of anterolateral compartment of thigh • Discuss various relation of vessels and nerves in anterolateral compartment of thigh • Identify these structures • Correlate the clinical aspects • Read relevant research article • Use digital library	C2 C2 C1 C3 C3 C3	Skill Lab	MCQ SEQ VIVA OSPE
Medial Compartment of thigh	• Describe the muscles of medial compartment of thigh • Discuss origin, insertion and nerve supply of medial compartment of thigh • Describe the course relations and branches of obturator nerve. • Correlate the clinical aspects	C2 C2 C2 C3	Skill Lab	MCQ SEQ VIVA OSPE

	• Read relevant research article • Use digital library	C3 C3		
Gluteal Region (Muscles)	• Tabulate the he various muscles of gluteal region with origin, insertion, action nerve supply. • Enlist various structures undercover of gluteal maximus i.e. muscles, vessels, nerves, bones and joints, ligaments, bursae. • Correlate the clinical aspects • Read relevant research article • Use digital library	C2 C1 C3 C3 C3	Skill Lab	MCQ SEQ VIVA OSPE
Gluteal Region (Neurovascular organization)	• Describe trochancteric anastomosis and cruciate anastomosis. • Enumerate the structures passing through greater sciatic foraman. • Discuss the formation course relations, branches, distribution of sciatic nerve with applied anatomy.. • Correlate the clinical aspects • Read relevant research article • Use digital library	C2 C1 C2 C2 C3 C3 C3	Skill Lab	MCQ SEQ VIVA OSPE
Posterior Compartment of Thigh (Muscles)	• Enlist the Hamstring muscles • Discuss origin insertion, nerve supply and actions • Identify the muscles • Correlate the clinical aspects • Read relevant research article • Use digital library	C1 C2 C1 C3 C3 C3	Skill Lab	MCQ SEQ VIVA OSPE
Posterior Compartment of thigh (Neurovascular Organization)	• Describe the nerves and vessels of posterior compartment of thigh • Discuss course, relations , distribution and branches of neurovascular structures of posterior compartment • Identify these structures • Correlate the clinical aspects • Read relevant research article	C2 C2 C1 C3	Skill Lab	MCQ SEQ VIVA OSPE

	• Use digital library	C3 C3		
Hip Joint	• Describe the type of joint • Describe articular surfaces, • Describe capsular attachments. • Discuss synovial membrane and its folding. • Enlist ligaments and their attachments • Discuss movements possible at hip joint and muscles producing them • Describe blood supply and nerve supply. • Correlate the clinical aspects • Read relevant research article • Use digital library	C2 C2 C2 C2 C1 C2 C2 C3 C3 C3	Skill Lab	MCQ SEQ VIVA OSPE
Tibia	• Identify bone • Demonstrate its side. • Demonstrate its normal anatomical position. • Describe bony features. • Discuss attachment of muscle and ligament • Describe articular surfaces • Identify nutrient foramen • Describe its ossification • Correlate the clinical aspects • Read relevant research article • Use digital library	C1 P P C2 C2 C2 C1 C2 C3 C3 C3	Skill Lab	MCQ SEQ VIVA OSPE
Fibula	• Identify bone • Demonstrate its side. • Demonstrate its normal anatomical position. • Describe bony features. • Discuss attachment of muscles and ligaments • Describe articular surfaces • Identify nutrient foramen • Describe its ossification • Correlate the clinical aspects • Read relevant research article	C1 P P C2 C2 C2 C1 C2 C3 C3	Skill Lab	MCQ SEQ VIVA OSPE

	• Use digital library	C3		
Popliteal Fossa	• Identify surface landmarks • Enlist contents • Discuss boundaries, roof and floor • Correlate the clinical aspects • Read relevant research article • Use digital library	C1 C1 C2 C3 C3 C3	Skill Lab	MCQ SEQ VIVA OSPE
Knee Joint	• State type of joint • Describe its articular surfaces • Demonstrate capsular attachments, • Enlist extra capsular and intracapsular ligaments and their attachments • Demonstrate the movements possible at knee joint and muscles producing them. • Describe the concept of locking and unlocking of knee joint • Describe blood supply and nerve supply of joint • Correlate the clinical aspects • Read relevant research article • Use digital library	C1 C2 P C1 C1 p C2 C2 C3 C3 C3	Skill Lab	MCQ SEQ VIVA OSPE
Anterior Compartment Of Leg (Muscles and Neurovascular Organization)	• Demonstrate surface landmarks • Discuss superficial fascia & deep fascia, their contents including retinecula • Describe Origin, insertion, nerve supply and action of all muscles of anterior compartment of leg • Identify different structures in compartment • Correlate the clinical aspects • Read relevant research article • Use digital library	P C2 C2 C1 C3 C3 C3	Skill Lab	MCQ SEQ VIVA OSPE
Surface Anatomy/Radiology	• Demonstrate the surface anatomy of various structures present in anterior, medial and lateral compartment of thigh • Demonstrate the surface anatomy of various structures present in anterior compartment of thigh	P P	Skill Lab	MCQ SEQ VIVA OSPE

	• Demonstrate major landmarks of thigh and anterior compartment of leg on radiographs • Correlate the clinical aspects • Read relevant research article • Use digital library	P C3 C3 C3		

Physiology Small Group Discussion (SGDs)

Topic	Learning Objectives Students Should Be Able To	Learning Domain	Teaching Strategy	Assessment Tools
Physiology of Smooth Muscle	• Enlist type of smooth muscles and explain their characteristics	C1	SGD	MCQ SAQ VIVA
	• Explain the chemical and physical basis of smooth muscle contraction	C2		
	• Explain the properties of smooth muscle	C2		
Introduction to myocardium Properties of myocardium Myocardial action potentials and regulation of myocardial activity	• Describe the physiologic anatomy of myocardium	C1	SGD	MCQ SAQ VIVA
	• Discuss properties of myocardium			
	• Discuss in detail various properties of myocardium	C2		
	• Describe the mechanism of production of action potential and its	C1		
	• Discuss propagation of electrical activity in cardiac muscle	C2		
	• Describe excitation contraction coupling in detail	C1		
	• Describe the regulation of pumping activity of heart	C1		
ECG changes in blocks and arrhythmias	• Define arrhythmia	C1	LGIS	MCQ SAQ VIVA
	• Describe abnormal sinus rhythms	C1		
	• Discuss and draw ECG changes in arrhythmias	C2		
	• Describe abnormal rhythms resulting from the block of heart signals within the intra cardiac conduction pathways	C1		
	• Describe different degrees of heart block and ECG changes	C1		
	• Describe abnormal rhythms resulting from the block of heart signals within the intra cardiac conduction pathways	C1		

	• Explain the following with the help of relevant ECGs. • Premature contractions. • Paroxysmal tachycardia. • Ventricular fibrillation. • Atrial fibrillation. • Atrial flutter. • Cardiac arrest.	C2		

Biochemistry Small Group Discussion (SGDs)

Topic	Learning Objectives At The End of Tutorial Students Should Be Able To	Learning Domain	Teaching Strategy	Assessment Tool
Protein structure	• Explain primary, secondary, tertiary and quaternary structures of proteins	C2	SGD	MCQs & SAQs
Protein folding and misfolding	• Describe protein folding with related disorders	C2	SGD	MCQs & SAQs
Collagen	• Discuss structure of collagen • Describe synthesis of collagen • Interpret related clinical disorders	C2 C2 C3	SGD	MCQs & SAQs
Elastin	• Discuss structure of elastin • Interpret related clinical disorders	C2 C2	SGD	MCQs & SAQs

Anatomy Self Directed Learning (SDL)

Topics Of SDL	Learning Objective	References
Hip Bone	• Demonstrate the anatomical position • Identify bony features of ilium. • Describe the muscular, ligamentous, and capsular attachments. • Discuss the ventral and dorsal auricular surfaces, ossification. • Demonstrate the anatomical position • Identify bony features of pubis and ischium. • Describe the muscular, ligamentous, and capsular attachments. • Correlate the clinical aspects • Read relevant research article • Use digital library	Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 510-516,526,328,329). https://www.youtube.com/watch?v=AeuLBN5ouwo https://link.springer.com/referenceworkentry/10.1007/978-3-030-43240-9_2
Femur	• Demonstrate the anatomical position of bone • Demonstrate different parts • Describe proximal and distal articulations • State angle of femoral torsion. • Demonstrate the anatomical position of bone • Describe muscle attachment and ossification • Discuss fractures with special reference to the fracture of neck of femur in old age. • Correlate the clinical aspects • Read relevant research article • Use digital library	Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 20,435,510,516-518,527,659-660). https://www.youtube.com/watch?v=AeuLBN5ouwo https://link.springer.com/chapter/10.1007/978-981-13-8468-4_10

Anterolateral Compartment Of Thigh	• Describe the origin and insertion of muscles in anteriorlateral compartment of thigh. • Describe the nerves and vessels of anterolateral compartment of thigh • Discuss the femoral triangle and adductor canal with contents • Identify these muscles. • Correlate the clinical aspects • Read relevant research article • Use digital library	Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 510, 545-548,557-558). https://www.youtube.com/watch?v=AeuLBN5ouwo https://link.springer.com/article/10.1186/s10195-023-00691-w
Medial Compartment Of Thigh	• Describe the muscles of medial compartment of thigh • Discuss origin, insertion and nerve supply of medial compartment of thigh • Describe the course relations and branches of obturator nerve. • Correlate the clinical aspects • Read relevant research article • Use digital library	Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 548-551). https://www.youtube.com/watch?v=AeuLBN5ouwo https://link.springer.com/article/10.1186/s10195-023-00691-w
Gluteal Region	• Tabulate the he various muscles of gluteal region with origin, insertion, action nerve supply. • List various structures undercover of gluteal maximus i.e. muscles, vessels, nerves, bones and joints, ligaments, bursae. • Describe trochancteric anastomosis and cruciate anastomosis. • Enumerate the structures passing through greater sciatic foraman. • Discuss the formation course relations, branches, distribution of sciatic nerve with applied anatomy.. • Correlate the clinical aspects • Read relevant research article • Use digital library	Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 510, 562-563,575-583). https://www.youtube.com/watch?v=AeuLBN5ouwo https://link.springer.com/chapter/10.1007/978-3-030-11033-8_5

Posterior Compartment Of Thigh	• Tabulate the Hamstring muscles • Discuss origin insertion, nerve supply and action • Describe the nerves and vessels of posterior compartment of thigh • Discuss course relations distribution and branches of neurovascular structures of posterior compartment • Identify these structures • Correlate the clinical aspects • Read relevant research article • Use digital library	Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 569-572). https://www.youtube.com/watch?v=AeuLBN5ouwo https://link.springer.com/article/10.1186/s10195-023-00691-w
Hip Joint	• Describe the type of joint • Describe articular surfaces, • Describe capsular attachments. • Discuss synovial membrane and its folding. • Enlist ligaments and their attachments • Discuss movements possible at hip joint and muscles producing them • Describe blood supply and nerve supply. • Correlate the clinical aspects • Read relevant research article • Use digital library	Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 510-626,629-632,660-661). https://www.youtube.com/watch?v=AeuLBN5ouwo https://link.springer.com/referenceworkentry/10.1007/978-3-030-43240-9_2
Tibia	• Identify bone • Demonstrate its side. • Demonstrate its normal anatomical position. • Describe bony features. • Discuss attachment of muscle and ligament • Describe articular surfaces • Identify nutrient foramen • Describe its ossification • Correlate the clinical aspects • Read relevant research article • Use digital library	Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 19, 510,520-521,604). https://www.youtube.com/watch?v=AeuLBN5ouwo https://link.springer.com/chapter/10.1007/978-3-030-93685-3_14 https://link.springer.com/chapter/10.1007/978-3-319-78387-1_69

Fibula	• Identify bone • Demonstrate its side. • Demonstrate its normal anatomical position. • Describe bony features. • Discuss attachment of muscleS and ligamentS • Describe articular surfaces • Identify nutrient foramen • Describe its ossification • Correlate the clinical aspects • Read relevant research article • Use digital library	Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 20,510,513,521,528,687,790). https://www.youtube.com/watch?v=AeuLBN5ouwo https://link.springer.com/chapter/10.1007/978-3-030-93685-3_14 https://link.springer.com/chapter/10.1007/978-3-319-78387-1_69

Physiology Self Directed Learning (SDL)

Topics Of SDL	Learning Objective	References	Learning Resources
SDL (On Campus): Sarcotubular system, excitation contraction coupling mechanism in skeletal muscle	Discuss the sliding filament model of muscle contraction Describe the structure sarcotubular systemand its importance in muscle contraction	• Ganong's Review of Medical Physiology.25TH Edition.Section 01,Excitable tissue:Muscle (Chapter 05,Page 103) • Physiology by Linda S. Costanzo 6th Edition.Cellular Physiology (Chapter 1.Page 36) • Human Physiology by Dee Unglaub Silverthorn. 8TH Edition.Muscle (Chapter 12,Page 413,421) • Physiological Basis of Medical Practice byBest & Taylor's.13th Edition.Section 01, Excitation and Contraction of Skeletal muscle, (Chapter 04,page 68) ❖ Textbook of Medical Physiology by Guyton & Hall.14th Edition.Contraction ofSkeletal muscle.Section 02. (Chapter 06,Page 81) (Chapter 07, Page 93,97)	• https://www.sciencedirect.com/science/article/abs/pii/0197018687901070 • https://youtu.be/8iklTDlra5Q • https://link.springer.com/article/10.1007/s12551-013-0135-x

Molecular Mechanism of skeletal muscle contraction, Rigor	Define motor unit Discuss recruitment and its effect on force of contraction	• Physiology by Linda S. Costanzo 6th Edition.Cellular Physiology (Chapter 1.Page 36) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 413,421) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 01, Excitation and Contraction of Skeletal muscle, (Chapter 04,page 68) • Textbook of Medical Physiology by Guyton & Hall.14th Edition.Contraction of Skeletal muscle.Section 02. (Chapter 06, Page 81) (Chapter 07, Page 93,97)	• https://youtu.be/RTnKBt2sDf0 • https://youtu.be/NvV2xTrShvg
Molecular Mechanism of skeletal muscle contraction, Rigor mortis, Muscular dystrophies	Define motor unit Discuss recruitment and its effect on force of contraction Discuss Molecular Mechanism of skeletal muscle contraction	• Physiology by Linda S. Costanzo 6th Edition.Cellular Physiology (Chapter 1. Page 36) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 413,421) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 01, Excitation and Contraction of Skeletal muscle, , (Chapter 04,page 70) • Textbook of Medical Physiology by Guyton & Hall.14th Edition.Contraction of Skeletal muscle.Section 02. (Chapter 06, Page 82,88)	• https://youtu.be/RTnKBt2sDf0 • https://youtu.be/NvV2xTrShvg
Length tension curve, Load and velocity of	Draw and describe Length duration curve Load and velocity of contraction	• Physiology by Linda S. Costanzo 6th Edition.Cellular Physiology (Chapter 1. Page 39) • Human Physiology by Dee Unglaub Silver	• https://www.urmc.rochester.edu/encyclopedia/content.aspx?ContentTypeID=85&ContentID=P00792 • https://www.sciencedirect.com/topics/engineering/length-tension-curve

contraction, diseases of muscle		thorn. 8TH Edition.Muscle (Chapter 12,Page 431,435) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 01, Excitation and Contraction of Skeletal muscle, ,(Chapter 04,page 74) • Textbook of Medical Physiology by Guyton & Hall.14th Edition.Contraction of Skeletal muscle.Section 02. (Chapter 06, Page 91)	
Energetics, efficiency and types of contraction, heat production in muscle	Elaborate Energetic and efficiency of contraction. Discuss heat production in nerve and muscle	• Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 431) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 01, Excitation and Contraction of Skeletal muscle, , (Chapter 04,page 77,84) • Textbook of Medical Physiology by Guyton & Hall.14th Edition.Contraction of Skeletal muscle.Section 02. (Chapter 06, Page 85,87)	• https://www.sciencedirect.com/topics/engineering/length-tension-curve • https://youtu.be/3ntulKD4kvY
Properties of skeletal muscles, Tetanus & Fatigue	Discuss various properties of skeletal muscle in detail Tetanus and fatigue	• Ganong's Review of Medical Physiology.25TH Edition.Section 01,Excitable tissue:Muscle (Chapter 05, Page 110) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 422,424,428) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 01, Excitation and Contraction of Skeletal muscle, (Chapter 04,page 74,86)	• https://youtu.be/v5Nm_LaAQVo • https://www.sciencedirect.com/science/aricle/abs/pii/S2387020622003485

Introduction to CVS	Introduction to Cardiovascular system. Classify blood vessels	• Ganong's Review of Medical Physiology.25TH Edition.Section 05,Cardioascular physiology (Chapter 29, Page 519) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Cardioascular physiology (Chapter 14,Page 469) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 02, Introduction to Cardiovascular system.(Chapter 05,page 101)	• https://youtu.be/28CYhgjrBLA • https://litfl.com/cardiovascular-physiology-overview/
Physiologic anatomy, types and properties of Smooth Muscle	Enlist type of smooth muscles and explain their characteristics Explain the properties of smooth muscle	• Physiology by Linda S. Costanzo 6th Edition.Cellular Physiology (Chapter 1. Page 40) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 436) • Textbook of Medical Physiology by Guyton & Hall.14th Edition.Excitation and Contraction of Smooth muscle.Section 02. (Chapter 08, Page 101)	• https://www.kenhub.com/en/library/anatomy/smooth-musculature • https://youtu.be/qEVRoKuoj4U
Introduction to pericardium Properties of myocardium & endocardium, myocardial action potential	Describe the physiologic anatomy of myocardium Discuss properties of myocardium Discuss in detail various properties of myocardium Describe the mechanism of production of action potential and its propagation Describe excitation contraction coupling in detail Discuss propagation of electrical activity in cardiac muscle	• Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 14. Page 131) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 482) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 09, Page 114)	• https://youtu.be/L2Gf9cj7jBw • https://www.sciencedirect.com/topics/medicine-and-dentistry/cardiac-action-potential

Mechanism of smooth muscle contraction & its control	Explain the chemical and physical basis of smooth muscle contraction	• Ganong's Review of Medica Physiology by Linda S. Costanzo 6th Edition.Cellular Physiology (Chapter 1. Page 42) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 439,443) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Excitation and Contraction of Smooth muscle.Section 02. (Chapter 08, Page 103,105)	• https://www.kenhub.com/en/library/anatomy/smooth-musculature • https://youtu.be/qEVRoKuoj4U
Regulation of myocardial activity	Describe the regulation of pumping activity of heart	• Textbook of Medical Physiology by Guyton & Hall.14th Edition. Excitation and Contraction of Smooth muscle.Section 02. (Chapter 09, Page 123)	• https://pubmed.ncbi.nlm.nih.gov/1661829/ • https://www.sciencedirect.com/topics/medicine-and-dentistry/cardiac-action-potential
Comparison of 3 types of muscle	• Discuss differences among three types of muscle in detail	• Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 444)	• https://training.seer.cancer.gov/anatomy/muscular/types.html • https://youtu.be/eShBZ3-RxHA
Excitatory & Conducting system of heart	• Describe the conductive system of heart in detail • Enlist the various components of conductive system of heart • Describe the mechanism of production of action potential in SA node, AV node, ventricles.also describe its propogation	• Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Muscle (Chapter 12,Page 488) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. (Chapter 08,page 155,162) • Textbook of Medical Physiology by Guyton & Hall.14th Edition.Section 02. (Chapter 10, Page 127,133)	• https://youtu.be/TnFoJ7Hhi-M • https://teachmeanatomy.info/thorax/organs/heart/conducting-system/

Biochemistry Self Directed Learning (SDL)

Topic	Learning Objectives At the end of lecture students should be able to	References
Protein chemistry		
Properties of amino acids& Important peptides	• Describe amphoteric properties of amino acids • Discuss Post transitional amino acids and location of amino acids in proteins • Explain Important peptides	• Textbook of Mushtaq 8th Eidtion Chapter No. 4 pg 97
Proteins	• Discuss Importance of proteins • Classify proteins • Describe Functions of proteins	• Textbook of Mushtaq 8th Eidtion Chapter No. 4 pg 97, 98
Primary structure of proteins	• Describe Primary structure of protein • Discuss Peptide bond	• Textbook of Lippincott 8th Eidtion Chapter No. 2 pg 14
Secondary structure of proteins	• Enlist Types of secondary structure. • Describe Secondary structure of proteins. • Elaborate Significance of secondary structure	• Textbook of Lippincott 8th Eidtion Chapter No. 2 pg 16
Tertiary and quaternary structure	• Describe Tertiary and quaternary structure of proteins • Understand the forces stabilizing protein structure	• Textbook of Lippincott 8th Eidtion Chapter No. 2 pg 19
Protein folding And denaturation	• Discuss Folding of proteins • Describe protein misfolding • Interpret the clinical cases related to protein misfolding • Discuss denaturation of proteins	• Textbook of Lippincott 8th Eidtion Chapter No. 2 pg 20, 21
Collagen and Elastin	• Describe structure of collagen and elastin • Discuss differences between collagen and elastin • Explain Synthesis of collagen • Enlist Factor regulating and helping in strengthening of collagen • Interpret defects of collagen synthesis and elastin	• Textbook of Lippincott 8th Eidtion Chapter No. 4 pg 45,97
Techniques for separation of proteins	• Describe Techniques for separation of proteins	• Textbook of Mushtaq 8th Eidtion Chapter No. 4 pg 104

Histology Practicals Skill Laboratory (SKL)

Practical	At The End Of This Skill Lab, Student Should Be Able To Illustrate:	Learning Domain	Teaching Strategy	Assessment Tools
Skeletal muscle	• Identify muscle under microscope • Illustrate microscopic structure of muscle • Write two points of identification • Focus the slide	P C2 C1 P	Skill Lab	OSPE
Cardiac muscle Smooth muscle	• Identify muscles under microscope • Illustrate microscopic structure of muscles • Write two points of identification • Focus the slide	P C2 C1 P	Skill Lab	OSPE
Thick skin	• Identify thick skin under microscope • Illustrate microscopic structure of thick skin • Write two points of identification • Focus the slide	P C2 C1 P	Skill Lab	OSPE
Thin skin	• Identify thin skin under microscope • Illustrate microscopic structure of thin skin • Write two points of identification • Focus the slide	P C2 C1 P	Skill Lab	OSPE

Physiology Practicals Skill Laboratory (SKL)

Practical	At The End Of This Skill Lab, Student Should Be Able To Illustrate:	References
Determination of RBC count	• Apparatus identification	Practical Notebook of Physiology Second year MBBS by Dr Saqib Sohail
	• Principle	
	• Procedure	
	• Recall composition of Diluents • Comprehend	
	• Calculation on hemocytometer	
	• Recall Normal values	
Determinati on of TLC	• Apparatus identification	Practical Notebook of Physiology Second year MBBS by Dr Saqib Sohail
	• Principle	
	• Procedure	

	• Recall composition of Diluents • Comprehend Calculation on hemocytometer • Recall Normal values	
Determination of PlateletCount	• Apparatus identification • Principle • Procedure • Recall composition of Diluents • Comprehend, Calculation on hemocytometer • Recall Normal values	Practical Notebook of Physiology Second year MBBS by Dr Saqib Sohail
Determination of ABO, Blood groups	• Principle • Procedure • Methods • Types of blood groups • Clinical Corelations of blood transfusion	Practical Notebook of Physiology Second year MBBS by Dr Saqib Sohail

Biochemistry Practicals Skill Laboratory (SKL)

Topic	Learning Objectives At The End Of Practical Students Should Be Able To	Learning Domain	Teaching Strategy	Assessment Tool
Color tests for detection of proteins	Perform the color tests	P	Skill Lab	OSPE
Detection of proteins by Isoelectric pH	Detect proteins by isoelectric pH	P	Skill Lab	OSPE
Fractional precipitation of proteins	Detect proteins by precipitation reactions (precipitation by full and half saturation with ammonium sulphate)	P	Skill Lab	OSPE
Chromatography	Separate proteins by Chromatography	P	Skill Lab	OSPE

SECTION - III

Basic and Clinical Sciences (Vertical Integration)

Content

- **CBLs**
- **Vertical Integration LGIS**
- **Longitudinal Themes**
    - **Biomedical Ethics & Professionalism**
    - **Family Medicine**
    - **Artificial Intelligence (Innovation)**
    - **Integrated Undergraduate Research Curriculum (IUGRC)**

Basic And Clinical Sciences (Vertical Integration)

Case Based Learning (CBL)

Subject	Topic	Learning Objectives At the end of the lecture the student should be able to	Learning Domain
Anatomy	• Traumatic Hip dislocation	Apply basic knowledge of subject to study clinical case.	C3
	• Fracture of neck of femur	Apply basic knowledge of subject to study clinical case.	C3
Physiology	• Weight Training	Apply basic knowledge of subject to study clinical case.	C3
Biochemistry	• Marfan Syndrome	Apply basic knowledge of subject to study clinical case.	C3
	• Collagen deficiency	Apply basic knowledge of subject to study clinical case.	C3

Large Group Interactive Sessions (LGIS)

Radiology

Topic	At The End Of Lecture Students Should Be Able To	Learning Domain	Teaching Strategy	Assessment Tool
Radiology of hip bone & Lower Limb	• Interpret normal x-rays of Hip bone & Lower Limb	C2	LGIS	MCQs
	• Discuss features of different Fractures of Hip Bone & Lower Limb	C2		

Biomedical Ethics

Practical Session 1 Affective & Psychomotor Domain					
Introduction to Professional Ethics and PM&DC Code of Conduct	Discussion will cover; • Introduction to Professional Ethics and PM&DC Code of Conduct • Purpose of medical code of conduct by Regulatory body PM&DC; covering following subtopics • What Is the 'Professional Ethics and Code of Conduct'? • Why to Have the Code of Conduct? • Who Needs to Follow the Code of Conduct? • Who is it for? What Are the Code of Conduct Requirements?	At the end of the session students should be able to • Cognizant with need for professional code of conduct by PM&DC.**C1** • Elaborate the purpose and relevance for medical code of conduct at undergraduate level . **C2**	LGIS 1hr contact session in 2-4 parallel classes conducted by Senior faculty	1 MCQs of level C1 to C3 will cover this session teachings in relevant block examination in pool of total 04 MCQs. Result / marks obtained will contribute towards Internal assessment (IA) in 1st Prof. MBBS exam.	PMDC Code of Ethics: http://www.pmdc.org.pk/LinkClick.aspx?fileticket=v5WmQYMvhz4%3D&tabid=102&mid=554
History of Medical Ethics	Discussion on Health Research ethics focusing; •Historical perspective of Tuskegee studies, Willow brook Experiment •Codes of medical ethics: traditional foundations and contemporary practice •Nuremburg code, Belmont report, Declaration of Helsinki and importance of historical background of ethics in current research trends • General ethical principles including explanation of 04 basic principles of Beneficence, non-maleficence, respect and justice. - Interpretation research ethics for; - Informed consent and confidentiality in research HR	At the end of the session students should be able to; • Explain the meaning of the term "'ethics'".**C1** • Describe the historical perspective of global development of medical ethics. **C1** • Describe the codes of medical ethics and their implications.**C1** • Recognize ethical issues relevant to the case situation and apply the ethical codes as appropriate. **C2**	LGIS 1hr contact session in 2-4 parallel classes, Conducted by Senior faculty.	1 MCQs of level C1 to C3 will cover this session teachings in relevant block examination in pool of total 04 MCQs. Result / marks obtained will contribute towards Internal assessment (IA) in 1st Prof. MBBS exam.	Guidelines and Teachers Handbook for Introducing Bioethics to Medical and Dental Students http://nbcpakistan.org.pk/assets/may-16-bioethics-facilitator-book---may-16%2C-2017.pdf The Nuremberg Code: http://www.hhs.gov/ohrp/archive/nurcode.html 10 WMA Declaration of Helsinki: http://www.wma.net/en/30publications/10policies/b3/ CIOMS Guidelines: http://www.cioms.ch/publications/layout_guide2002.pdf .

		• Discuss the development of indigenous ethical codes in the South-East Asian Region. **C2.** • Demonstrate sensitivity to cultural diversity in medical care.**C3**			Nuffield Council on Bioethics Guidelines: http://www.sirc.org/news/nuffield.shtml
Laboratory Ethics	Discussion will cover basic elements of Laboratory Ethics focusing; • Importance of medical professionalism for the medical student; including respect and gratitude towards colleagues • Code of conduct: Collaboration, partnership, Teamwork , Maintaining dress code, religion obligations of medical doctor , focus on physicians' character, virtues and duties • Delineate the ethical consideration while performing procedures on real patients or simulated patients in Laboratory setting	At the end of the session students should be able to ; • Understand the importance of taking permission before performing procedures (drawing blood, administering injections etc.) during laboratory sessions .**A1** • Show Respects other health professional team members and complete assigned task in professional manner.**A1** •Employ collaborative negotiation to resolve conflict, anger, confusion and misunderstanding. **A2**	Case based discussion in 2 hr contact session in 4-6 parallel classes conducted by faculty of respective departments Role plays Reflective writing	Assignment based assessment under aggregate Marks (Internal Assessment) Assignment to be uploaded on LMS	- Real life scenarios in form of Case base learning /problem based learning (PBL) To be share with students one week before the session Introduction to criteria for assessment of behavior, code of conduct and professionalism at RMU

Behavioural Sciences

Topic	At The End Of Lecture Students Should Be Able To	Learning Domain	Teaching Strategy	Assessment Tool
Rights and Responsibilities of patients and doctors	➢ To be able to identify and differentiate own rights and rights of the patients.	C2	LGIS CBL	MCQS
	• To apply this knowledge in clinical settings	C2		

Family Medicine

Topic	• At The End Of Lecture Students Should Be Able To	Learning Domain	Teaching Strategy	Assessment Tool
Communication skills	• To be able to communicate with the patients keeping mind the principle of communication skills	C2	LGIS CBL	MCQS

Integrated Undergraduate Research Curriculum (IUGRC)

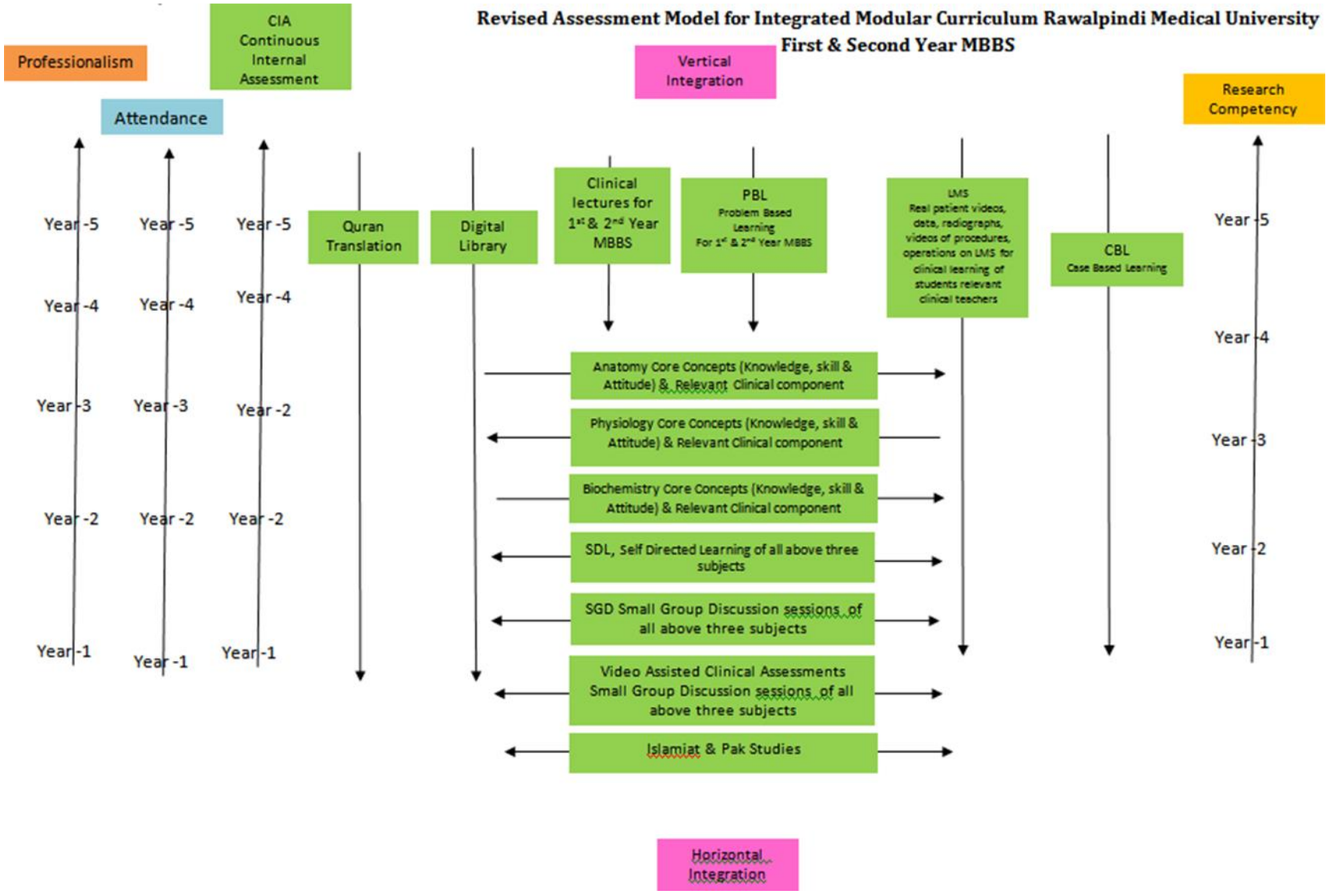
Session	Learning Objectives
Students Practical Session 1: (placement in 1st Module) (work track & assessment by Logbook)	In supervised session, at the end of the session, participants would be able to; **(Los)** 1. Comprehend the "theme and scheme" of IUGRC-1st Year Practical component. 2. Identify their individual role in Poster formation process according to steps of "updated evidence in Health" (UEIH) work. 3. Take leads for broader readings / literature review on boarder areas of UEIH 4. Make account on LMS, how to upload their individual assigned work. 5. Access HEC Digital Library, PERN access. 6. Group work learning protocols
Practical session 2: (placement in 2nd Module) (work track & assessment by Logbook)	In supervised session, after individual work sharing & supervised brainstorming (PAL) on ideas on broader areas UEIH-Poster formation, students will: (session outlines or Los) 1. Identify specific areas of work within the borde area of study done after 1st Practical session. 2. Do earlier discussion on sub-topics to sub-groups on specific area or topic for UEIH for Poster formation. 3. Perform some literature search, retrieval & archiving for detailed study after the CS. 4. Do discussions on assigned work on individual or subgroup basis. 5. Plan mutual sub-group work within group, for their better understanding, supervised by their relevant mentor. 6. Finalize the topic under supervision of supervisor (mentor) for UEIH for Poster formation.

SECTION - IV

Assessment Policies

Contents

- **Assessment plan**
- **Types of Assessment:**
- **Modular Examinations**
- **Block Examination**
- **Table 4: Assessment Frequency & Time in MSK-II Module**



Gauge for Continuous Internal Assessment (CIA)

Red Zone	High Alert	Yellow Zone	Green Zone	Excellent	Extra Ordinary
0 - 25%	26 - *50%	51 - 60%	61 – 70%	71 – 80%	81 - 100%

*50% and above is Passing Marks.

Gauge for attendance percentage

Red Zone	High Alert	Yellow Zone-1	Yellow Zone-2	Green Zone	Excellent
0 - 25%	26 - 50%	51 - 60%	61 – 74%	*75 – 80%	81 - 100%

90% is eligibility criteria for appearing in professional examination.

Assessment plan

University has followed the guidelines of Pakistan Medical and Dental Council for assessment. Assessment is conducted at the mid modular,modular and block levels.

Types of Assessment:

The assessment is formative and summative.

Formative Assessment	Summative Assessment
Formative assessment is taken at modular (2/3rd of the module is complete) level through MS Teams. Tool for this assessment is best choice questions and all subjects are given theshare according to their hour percentage.	Summative assessment is taken at the mid modular (LMS Based),modular and block levels.

Modular Assessment

Theory Paper	Viva Voce
There is a module examination at the end of first module of each block. The content of the whole teaching of the module are tested in this examination. It consists of paper with objective type questions and structured essay questions. The distribution of the questions is based on the Table of Specifications of the module. (Annexure I attached)	Structured table viva voce is conducted including the practical content of the module.

Block Assessment

On completion of a block which consists of two modules, there is a block examination which consists of one theory paper and a structured viva with OSPE.

Theory Paper	Block OSPE
There is one written paper for each subject. The paper consists of objective type questions and structured essay questions. The distribution of the questions is based on the Table of Specifications of the module.	This covers the practical content of the whole block.

Table 4-Assessment Frequency & Time in MSK-II

Block	Sr #	Module – 1 MSK-II Module Components	Type of Assessments	Total Assessments Time			No. of Assessments	
				Assessment Time	Summative Assessment Time	Formative Assessment Time		
Block-I	1	Mid Module Examinations LMS based (Anatomy, Physiology & Biochemistry)	Summative	30 Minutes	3 Hour 15 Minutes	45 Minutes	2 Formative	6 Summative
	2	Topics of SDL Examination on MS Team	Formative	30 Minutes				
	3	End Module Examinations (SEQ & MCQs Based)	Summative	2 Hours				
	4	Anatomy Structured and Clinically Oriented Viva	Summative	10 Minutes				
	5	Physiology Structured & Clinically oriented Viva voce	Summative	10 Minutes				
	6	Assessment of Clinical Lectures	Formative	15 Minutes				
	7	Assessment of Bioethics Lectures	Summative	2 Minutes				
	8	Assessment of IUGRC Lectures	Summative	10 Minutes				

Learning Resources

Subject	Resources
Anatomy	**A. Gross Anatomy** 1. Gray's Anatomy by Prof. Susan Standring 42th edition, Elsevier. 2. Clinical Anatomy for Medical Students by Richard S. Snell 10th edition. 3. Clinically Oriented Anatomy by Keith Moore 9th edition. 4. Cunningham's Manual of Practical Anatomy by G.J. Romanes, 16th edition, Vol-I, II and III **B. Histology** 1. B. Young J. W. Health Wheather's Functional Histology 6th edition. 2. Medical Histology by Prof. Laiq Hussain 7th edition. **C. Embryology** 1. Keith L. Moore. The Developing Human 11th edition. 2. Langman's Medical Embryology 14th edition.
Physiology	**A. Textbooks** 1. Textbook Of Medical Physiology by Guyton And Hall 14th edition. 2. Ganong ' S Review of Medical Physiology 26th edition. **B. Reference Books** 1. Human Physiology by Lauralee Sherwood 10th edition. 2. Berne & Levy Physiology 7th edition. 3. Best & Taylor Physiological Basis of Medical Practice 13th edition. 4. Guyton & Hall Physiological Review 3rd edition.
Biochemistry	**Textbooks** 1. Harper's Illustrated Biochemistry 32th edition. 2. Lehninger Principle of Biochemistry 8th edition. 3. Biochemistry by Devlin 7th edition.
Community Medicine	**Textbooks** 1. Community Medicine by Parikh 25th edition. 2. Community Medicine by M Illyas 8th edition. 3. Basic Statistics for the Health Sciences by Jan W Kuzma 5th edition.
Pathology/Microbiology	**Textbooks** 1. Robbins & Cotran, Pathologic Basis of Disease, 10th edition. 2. Rapid Review Pathology, 5th edition by Edward F. Goljan MD. 3. http://library.med.utah.edu/WebPath/webpath.html
Pharmacology	**Textbooks** 1. Lippincot Illustrated Pharmacology 9th edition. 2. Basic and Clinical Pharmacology by Katzung 5th edition.

SECTION - V

Time Table

Integrated Spiral Clinically Oriented Modular Curriculum for First Year MBBS

MSK-II Module Time Table

First Year MBBS

Session 2022 - 2023

Batch- 50

MSK-II Module Team

Module Name	:	MSK- II Module
Duration of module	:	05 Weeks
Coordinator	:	Dr. Fahd Anwar
Co- Coordinator	:	Dr. Sajjad Hussain
Reviewed by	:	Module Committee

Module Committee	
Vice Chancellor RMU	Prof. Dr. Muhammad Umar
Director DME	Prof. Dr. Rai Muhammad Asghar
Convener Curriculum	Prof. Dr. Naeem Akhter
Chairperson Anatomy & Dean Basic Sciences	Prof Dr. Ayesha Yousaf
Additional Director DME	Prof. Dr. Ifra Saeed
Chairperson Physiology	Prof. Dr. Samia Sarwar
Chairperson Biochemistry	Dr. Aneela Jamil
Focal Person Anatomy First Year MBBS	Prof Dr. Ayesha Yousaf
Focal Person Physiology	Dr. Sidra Hamid
Focal Person Biochemistry	Dr. Aneela Jamil
Focal Person Pharmacology	Dr. Zunera Hakim
Focal Person Pathology	Dr. Asiya Niazi
Focal Person Behavioral Sciences	Dr. Saadia Yasir
Focal Person Community Medicine	Dr. Afifa Kulsoom
Focal Person Quran Translation Lectures	Dr. Fahd Anwar

Module task force	
Coordinator	Dr. Fahd Anwar
DME Focal Person	Dr. Sidra Hamid
Co-coordinator	Dr. Sajjad Hussain (Senior Demonstrator of Anatomy)
Co-Coordinator	Dr. Almas (Senior Demonstrator Biochemistry
Co-coordinator	Dr. Fareed Ullah Khan (Senior Demonstrator Physiology) & Clinical Co- Coordinatior

DME Implementation Team	
Director DME	Prof. Dr. Rai Muhammad Asghar
Implementation Incharge 1st & 2nd Year MBBS & Add. Director DME	Prof. Dr. Ifra Saeed
Deputy Director DME	Dr. Shazia Zeb
Module planner & Implementation coordinator	Dr. Sidra Hamid
Editor	Muhammad Arslan Aslam

Discipline Wise Details of Modular Content

Block	Module	General Anatomy	Embryology	Histology	Gross Anatomy
II	• Anatomy	• Muscles • Skin	• Development of Axial Skeleton • Development of limbs • Development of muscles	General Histology • Muscles • Skin • Skin appendages	Gluteal Region to Lateral compartment of leg
	• Biochemistry	• Protein chemistry, Protein separation techniques, Collagen and Elastin			
	• Physiology	• Sarcotubular system, excitation contraction coupling mechanism in skeletal muscle. • Molecular Mechanism of skeletal muscle contraction, Rigormortis, Muscular dystrophies • Introduction to muscle physiology, Structure of sarcomere • Energetics, efficiency and types of contraction, heat production in muscle • Physiologic anatomy, types and properties of Smooth Muscle • Mechanism of smooth muscle contraction & its control • Introduction to pericardium Properties of myocardium & endocardium,myocardial action potential • Regulation of myocardial activity • Comparison of 3 types of Muscle • Introduction to CVS • Excitatory & Conducting system of heart			
	• Bioethics & Professionalism	• Introduction to Professional Ethics and PM&DC Code of Conduct • History of Medical Ethics			
	• Research Club Activity (IUGRC)	• Student Practical Session-I • Student Practical Session-II			
	•	• Communication Skills			
	• Behavioural Sciences	• Rights and Responsibilities of patients and doctors			
	• Radiology & Artificial Inteligence	• x-rays of hipbone lower limb			
	• Vertical components	• The Holy Quran Translation Component			
	• Vertical Integration	• Clinically co-related lectures			

Categorization of Modular Content

Department of Anatomy

Category A*	Category B**		Category C***			
Embryology	**General Histology**	**General Anatomy**	**Demonstrations (SGD)**	**Practicals/Skill lab. (SKL)**	**CBL**	**SDL**
- Development of Axial Skeleton - Development of limbs - Development of muscles	- Muscles-I - Muscles-II - Skin - Skin Appendages	- Muscles-I - Muscles-II - Skin	**Gross Anatomy:** - Hip bone - Femur - Anterolateral compartment of thigh (muscles) - Anterolateral compartment of thigh (neurovascular organization) - Medial compartment of thigh - Gluteal region (muscles) - Gluteal region (neurovascular organization) - Posterior compartment of thigh (muscles) - Posterior compartment of thigh (neurovascular organization) - Hip joint - Tibia - Fibula - Popliteal fossa - Knee joint - Anterior compartment of leg(muscles) - Anterior compartment of leg (neurovascular organization) - Lateral compartment of leg - Surface marking and radiology	- Skeletal muscles - Smooth muscle and cardiac muscle - Thick skin - Thin skin	- Hip Dislocation - Fracture of neck of femur	- Hip bone - Femur - Anterolateral compartment of thigh - Medial compartment of thigh - Gluteal region - Posterior compartment of thigh - Hip joint, Tibia & Fibula

Category A*: By Professors

Category B:** By Associate & Assistant Professors

Category C*:** By Senior Demonstrators & Demonstrators

Teaching Staff / Human Resource of Department of Anatomy

Sr. #	Designation Of Teaching Staff / Human Resource	Total number of teaching staff
1.	Professor of Anatomy department	01
2.	Associate professor of Anatomy department	01
3.	Assistant professor of Anatomy department (AP)	01
4.	Demonstrators of Anatomy department	04

Contact Hours (Faculty)

Sr. #	Hours Calculation for Various Type of Teaching Strategies	Total Hours
1.	Large Group Interactive Session (LGIS)	2 * 13 = 26 hours
2.	Small Group Discussions (SGD)	2*21=42 hours
3.	Case Based Learning (CBL)	2* 2 = 4 hours
4.	Practical / Skill Lab	1.5 * 20 = 30 hours

Contact Hours (Students)

Sr. #	Hours Calculation for Various Type of Teaching Strategies	Total Hours
1.	Large Group Interactive Session (LGIS)	1 * 13 = 13 hours
2.	Small Group Discussions (SGD)	2*21=42 hours
3.	Case Based Learning (CBL)	2* 2 = 4 hours
4.	Practical / Skill Lab	1.5 * 4 = 6 hours
5.	Self-Directed Learning (SDL)	1 * 8= 8 hours

Department of Physiology

Category A	Category B	Category C
Sarcotubular system, excitation contraction coupling mechanism inskeletal muscle (**Prof. Dr. Samia Sarwar/Dr Aneela) (Even)**	Introduction to pericardium Properties of myocardium & endocardium,myocardial action potential **(By Dr. Sidra**)	Length tension curve, Load and velocity of contraction, diseases of muscle (**By Dr. Nayab**)
		Properties of skeletal muscles, Tetanus & Fatigue (**By Dr. Nayab**)
Molecular Mechanism of skeletal muscle contraction, Rigormortis, Muscular dystrophies (**Prof. Dr. Samia Sarwar/ Dr Aneela) (Even)**	Regulation of myocardial activity **(By Dr Sidra**)	Practical: **1.** Determination of RBC count **2.** Determinati on of TLC **3.** Determination of Platelet Count **4.** Determination of ABO, Blood groups
	Introduction to muscle physiology, Structure of sarcomere **(By DrAneela) (Even)**	SGD: 1. Sliding filaments of skeletal muscle, sarcotubular system 2. Physiology of smooth muscle, mechanism of smooth muscle contraction 3. Properties of myocardium, myocardial action potential, Excitatory and conduction system of heart 4. Comparison of three types of muscle
	Physiologic anatomy, types and properties of Smooth Muscle **(ByDr Aneela)**	SDL: (ON CAMPUS) 1. Sarcotubular system, excitation contraction coupling mechanism in skeletal muscle 2. Molecular Mechanism of skeletal muscle contraction, Rigor mortis, Muscular dystrophies 3. Length tension curve, Load and velocity of contraction, diseases of muscle 4. Physiological properties and types of Smooth Muscle 5. Mechanism of smooth muscle contraction & its control 6. Regulation of myocardial activity 7. Excitatory & Conducting system of heart 8. Comparison of 3 types of muscle
	Mechanism of smooth muscle contraction & its control (By **DrAneela)**	
	Comparison of 3 types of Muscle **(By Dr Aneela)**	

	Introduction to muscle physiology, Structure of sarcomere **(By DrUzma) (Odd)**	SDL: (OFF CAMPUS) 1. Introduction to muscle physiology, Structure of sarcomere 2. Sarcotubular system, excitation contraction coupling mechanism in skeletal muscle 3. Mechanism of skeletal muscle contraction. 4. Rigor mortis, Muscular dystrophies 5. Energetics, efficiency and types of contraction 6. Properties of skeletal muscles, Tetanus & Fatigue 7. Physiological properties of Smooth Muscle 8. Myocardial Action potential
	Sarcotubular system, excitation contraction coupling mechanism inskeletal muscle **(By Dr Uzma) (Odd)**	
	Molecular Mechanism of skeletal muscle contraction , Rigormortis, Muscular dystrophies **(By Dr Uzma)(Odd)**	
	Energetics, efficiency and types of contraction, heat production in muscle **(By Dr Uzma)**	
	Introduction to CVS **(By Dr Fahad)**	
	Excitatory & Conducting system of heart **(By Dr Fahad)**	PBL=NIL
		CBL=NIL

Category A*: By Professors

Category B:** By Associate & Assistant Professors

Category C*:** By Senior Demonstrators & Demonstrators

Teaching Staff / Human Resource of Department of Physiology

Sr. #	Designation Of Teaching Staff / Human Resource	Total number of teaching staff
1.	Professor of Physiology department	01
2.	Associate professor of Physiology department	01
3.	Assistant professor of Physiology department (AP)	01 (DME)
4.	Demonstrators of Physiology department	07

Contact Hours (Faculty)

Sr. #	Hours Calculation for Various Type of Teaching Strategies	Total Hours
1.	Large Group Interactive Session (LGIS)	13 * 2 = 26 hours
2.	Small Group Discussions (SGD) / (CBL)	20 * 1.5=30 hours
3.	Practical / Skill Lab	20 * 1.5 = 30 hours

Department of Biochemistry

Category A*	Category B**	Category C***			
LGIS	**LGIS**	**PBL**	**CBL**	**Practical's**	**SGD**
Protein folding and denaturation	Properties of amino acids and important peptides		Protein folding and misfolding	• Color tests for detection of proteins	Protein structure
	Classification of protein and function of protein			• Detection of proteins by Isoelectric pH	
	Primary sturcutres of protiens			Fractional precipitation of proteins	Collagen
Collagen and elastin	Secondary structure of protein				
Techniques of separation of protein	Tertiary and quarternary structure of proteins			Chromatography	Elastin

Category A*: By HOD and Assistant Professor

Category B:** By All (HOD, Assistant Professors, Senior Demonstrators)

Category C*:** By All Demonstrators

Teaching Staff / Human Resource of Department of Biochemistry

Sr. #	Designation Of Teaching Staff / Human Resource	Total Number Of Teaching Staff
1.	Assistant Professor of Biochemistry department	02
2.	Demonstrators of biochemistry department	08

Contact Hours (Faculty)

Sr. #	Hours Calculation for Various Type of Teaching Strategies	Total Hours
1.	Large Group Interactive Session (LGIS)	8 * 1 = 5 hours
2.	Small Group Discussions (SGD)	1.5 * 4 = 6 hours
3.	Case Based Learning (PBL)	2 * 1 = 2 hours
4.	Practical / Skill Lab	1.5 * 04 = 6 hours

Contact Hours (Students)

Sr. #	Hours Calculation for Various Type of Teaching Strategies	Total Hours
1.	Large Group Interactive Session (LGIS)	8
2.	Small Group Discussions (SGD)	6
3.	Case Based Learning (PBL)	02
4.	Practical / Skill Lab	6
5.	Self-Directed Learning (SDL)	08

Time Table For Module MSK-II (First Week)
(15-05-2023 To 20-05-2023)

<table>
<tr><th>Date/Day</th><th>8:00 AM – 09:00 AM</th><th colspan="2">9:00 AM – 10:00 AM</th><th colspan="2">10:00 AM – 11:00 AM</th><th colspan="2">11:00 AM – 12:00 PM</th><th>12:00 PM – 12:20 PM</th><th>12:20 PM – 2:00 PM</th><th>02:00- 03:00PM</th></tr>
<tr><td>Monday
15-05-2023</td><td colspan="6">Viva Voce of Block-I (Foundation + MSK-II)</td><td rowspan="6">B r e a k</td><td>Practical & SGD/CBL
Topics & venue mentioned at the end</td><td>SDL Physiology
Intro. to muscle physiology, structure of sarcomere</td></tr>
<tr><td>Tuesday
16-05-2023</td><td colspan="6">Integrated + Gross OSPE</td><td>Practical & SGD/CBL
Topics & venue mentioned at the end</td><td>SDL Physiology
Sarcotublar system, excitation contraction coupling mechanism in skeletal muscle</td></tr>
<tr><td rowspan="3">Wednesday
17-05-2023</td><td colspan="2">SGD/Dissection</td><td colspan="2">Anatomy LGIS</td><td colspan="2">Physiology LGIS</td><td rowspan="3">Practical & SGD/CBL
Topics & venue mentioned at the end</td><td rowspan="3">SDL
Biochemistry
Classification of proteins</td></tr>
<tr><td colspan="2" rowspan="2">Hip bone</td><td>General Anatomy
Muscle I</td><td>General Histology
Muscle I</td><td>Introduction to muscle physiology,Structure ofsarcomere</td><td>Introduction to muscle physiology, Structure of sarcomere</td></tr>
<tr><td>Asst. Prof.
Dr Arsalan Even</td><td>Assoc. Prof.
Dr Mohtasham Odd</td><td>Dr Aneela
(Even)</td><td>Dr. Uzma
(Odd)</td></tr>
<tr><td rowspan="3">Thursday
18-05-2023</td><td colspan="2">CBL/Dissection</td><td colspan="2">Anatomy LGIS</td><td colspan="2">Biomedical Ethics</td><td rowspan="3">Practical & SGD/CBL
Topics & venue mentioned at the end</td><td rowspan="3">SDL
Biochemistry
Introduction to proteins and amino acids</td></tr>
<tr><td colspan="2" rowspan="2">Hip bone</td><td>General Histology Muscle I</td><td>General Anatomy Muscle I</td><td colspan="2">Introduction to Professional Ethics and PM&DC Code of Conduct</td></tr>
<tr><td>Assoc. Prof.
Dr Mohtasham Even</td><td>Asst. Prof.
Dr Arsalan Odd</td><td>Dr. Aneela Even</td><td>Dr. Kashid Odd</td></tr>
<tr><td rowspan="3">Friday
19-05-2023</td><td>8:00 AM – 09:00 AM</td><td colspan="2">9:00 AM – 10:00 AM</td><td colspan="2">Biochemistry LGIS</td><td colspan="2" rowspan="3">Practical & SGD/CBL
Topics & venue mentioned at the end</td><td>12:00 PM – 01:00PM</td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td rowspan="2">CBL / Dissection</td><td colspan="2">Anatomy LGIS</td><td rowspan="2">Properties of amino acids & important peptides</td><td rowspan="2">Collagn structure, synthesuis and related disorders</td><td rowspan="2">SDL
Anatomy
Hip bone</td></tr>
<tr><td>General Anatomy Muscle II</td><td>General Histology Muscle II</td></tr>
<tr><td>Femur</td><td>Asst. Prof. Dr Arsalan Even</td><td>Assoc. Prof. Dr Mohtasham Odd</td><td>Dr. Rahat Even</td><td>Dr. Isma Odd</td></tr>
<tr><td rowspan="3">Saturday
20-05-2023</td><td colspan="2">SGD / Dissection</td><td colspan="2">Biochemistry LGIS</td><td colspan="2">Physiology LGIS</td><td rowspan="3">Break</td><td rowspan="3">Practical & SGD/CBL
Topics & venue mentioned at the end</td><td rowspan="3">SDL Anatomy
Femur</td></tr>
<tr><td colspan="2" rowspan="2">Femur / Patella</td><td>Collagn structure, synthesuis and related disorders</td><td>Properties of amino acids & important peptides</td><td>Sarcotubular system, excitation contraction coupling mechanism in skeletal muscle</td><td>Sarcotubular system, excitation contraction coupling mechanism in skeletal muscle</td></tr>
<tr><td>Dr. Isma Even</td><td>Dr. Rahat Odd</td><td>Prof.Dr. Samia Sarwar/ Dr Aneela (Even)</td><td>Dr. Uzma (Odd)</td></tr>
</table>

Topics For Practical with Venue	Topics For Small Group Discussion& CBLs With Venue
• Anatomy Histology Practical: Skeletal Muscles • Physiology Practical: Determination of Red blood cell count • Biochemistry Practical: Color tests for detection of proteins	• Physiology SGD: Sliding filaments of skeletal muscle, sarcotubular system (Lecture Hall 5) • Biochemistry SGD: Protein structure

Schedule For Practical / Small Group Discussion

Day	Histology Practical	Biochemistry Practical	Physiology Practical	Physiology SGD	Biochemistry SGD
Monday	**C**	**B**	**E**	**A**	**D**
Tuesday	**D**	**C**	**A**	**B**	**E**
Wednesday	**E**	**D**	**B**	**C**	**A**
Thursday	**B**	**A**	**D**	**E**	**C**
Saturday	**A**	**E**	**C**	**D**	**B**

Venue For First Year Batches for Anatomy Dissection / Small Group Discussion

Batches	Roll No	Anatomy Teacher	Venue
A	1-90	Dr Urooj Shah	Lecture Hall No.03 Anatomy Lecture Hall
B	91-180	Dr Zeneara Saqib	Lecture Hall No.04 Anatomy Lecture Hall
C	181-270	Dr Ali Raza	Dissection Hall
D	271 onwards	Dr Qurat ul Ain	New Lecture theatre complex no.3

Venue For First Year Batches for PBL & SGD Team-I

Batches	Roll No	Venue	
Batch-A1	(01-35)	New Lecture Hall Complex Lecture no.02	Dr. Sheena Tariq
Batch-A2	(36-70)	New Lecture Hall Complex Lecture no.03	Dr. Uzma Kiani
Batch-B1	(71-105)	Lecture Hall no.02(Basement)	Dr. Fahd Anwar
Batch-B2	(106-140)	Conference room (Basement)	Dr. Fareedullah
Batch-C1	(141-175)	Lecture Hall no.04(Basement)	Dr. Maryam Abbas (PGT Physiology)
Batch-C2	(176-210)	Lecture Hall no.05(Basement)	Dr. Nayab (PGT Physiology)
Batch-D1	(210-245)	Lecture Hall no.03 (First Floor)	Dr. Iqra Ayub (PGT Physiology)
Batch-D2	(246-280)	Anatomy Museum (First Floor Anatomy)	Dr. Shahrukh (PBL) Dr. Shazia Noreen (SGD)
Batch-E1	(281-315)	Lecture Hall no.04 (First Floor Anatomy)	Dr. Izzah (PGT Physiology)
Batch-E2	(315 onwards)	Lecture Hall no.05Physiology	Dr. Uzma Zafar (PBL) Dr. Kamil Tahir (SGD)

Sr. No	Batch	Roll no	Names of Teachers	
			Biochemistry	Physiology
1.	A	1-70	Dr. Almas Ijaz	Dr. Sheena Tariq
2.	B	71-140	Dr. Rahat Afzal	Dr Uzma Kiyani
3.	C	141-210	Dr. Romessa	Dr fahd Anwar
4.	D	211-280	Dr Uzma Zafar	Dr. Maryam Abbas & Dr. Nayab Zonish
5.	E	281 onwards	Dr. Nayab Ramzan	Dr Fareed

Venues for Large Group Interactive Session (LGIS) and SDL

Odd Roll Numbers	New Lecture Hall Complex Lecture Theater # 03
Even Roll Number	New Lecture Hall Complex Lecture Theater # 02

Time Table For Module MSK-II (Second Week)
(22-05-2023 To 27-06-2023)

S P O R T S W E E K

Time Table For Module MSK-II (Third Week)
(29-05-2023 To 03-06-2023)

Date/Day	8:00 AM – 09:00 AM	9:00 AM – 10:00 AM	10:00 AM – 11:00 AM		11:00 AM – 12:00 PM		12:00 PM – 12:20 PM	12:20 PM – 2:00 PM	02:00- 03:00PM
Monday 29-05-2023	SGD / Dissection		Anatomy LGIS		Physiology LGIS		B r e a k	**Practical & SGD/CBL** Topics & venue mentioned at the end	SDLPhysiology Molecular Mechanism of skeletal muscle
	Anterolateral compartment of thigh (Muscles & Neurovascular organization)		General Embryology	General Histology	Molecular Mechanism of skeletal muscle contraction rigor mortis, Muscular dystrophies	Molecular Mechanism of skeletal muscle contraction rigor mortis, Muscular dystrophies			
			Development of Axial Skeleton	Histology of Skin					
			Prof. Dr Ayesha Even	Assoc. Prof. Dr Mohtasham Odd	Prof .Dr.Samia Sarwar/ Dr. Aneela (Even)	Dr. Uzma(Odd)			
Tuesday 30-05-2023	SGD / Dissection	Anatomy LGIS			Biochemistry LGIS			Physiology LGIS			**Practical & SGD/CBL** Topics & venue mentioned at the end	SDL Physiology Rigor mortis, Muscular dystrophies
	Dissection	General Histology Muscle II	General Anatomy Muscle II	Classification and functions of proteins	Elastin structure and related disorders	Length tension curve, Load and velocity of contraction, diseases of muscle	Energetics, efficiency and types of contraction, heat production in muscle			
		Assoc. Prof. Dr Mohtasham Even	Asst. Prof. Dr Arsalan Odd	Dr. Rahat Even	Dr. Isma Odd	Dr. Nayab Even	Dr. Uzma Odd			
Wednesday 31-05-2023	SGD / Dissection			Biochemistry LGIS		Physiology LGIS			**Practical & SGD/CBL** Topics & venue mentioned at the end	SDL Biochemistry Collagen and related disorders
	Medial Compartment of thigh			Elastin structure and related disorders	Classification and functions of proteins	Energetics, efficiency and types of contraction, heat production in muscle	Length tension curve, Load and velocity of contraction, diseases of muscle			
				Dr. Isma Even	Dr. Rahat Odd	Dr. Uzma Even	Dr. Nayab Odd			
Thursday 01-06-2023	SGD / Dissection		Anatomy LGIS		Research Club Activity				**Practical & SGD/CBL** Topics & venue mentioned at the end	SDL Biochemistry Secondary Structure of protiens
	Dissection		General Histology	General Embryology	Student Practical Session-I					
			Histology of Skin	Development of Axial Skeleton	Leacture Hall Complex No. 2					
			Assoc. Prof. Dr MohtashamEven	Prof. Dr Ayesha Odd	Dr. Khaula Noreen & Dr. Gul Maher Research Team-I (Roll no 1-180) NLC 2	Prof. Dr. Arshad & Assit. Prof. Dr Afifa Research Team-I (Roll no 181-onwards) NHC 3				
Friday 02-06-2023	SGD / Dissection		Anatomy LGIS		Quran Translation		12:00 PM – 01:00PM			
	Gluteal Region (muscles)		General Histology	General Embryology	Imaniat-I	Ibadat-II	SDL Anatomy Anterolateral compartment of thigh			
			Histology of Skin appendages	Development of limbs						
			Assoc. Prof. Dr MohtashamEven	Prof. Dr Ayesha Odd	Mufti Naeem Sherazi Even	Molana Abdul Waahid Abbasi Odd				
Saturday 03-06-2023	SGD / Dissection		Anatomy LGIS		Biochemistry LGIS		**12:00PM-12:20PM** B r e a k	**Practical & SGD/CBL** Topics & venue mentioned at the end	SDL Anatomy Medial Compartment of thigh
	Gluteal Region (Neurovascular organization)		General Embryology	General Histology	Protein folding and misfolding	Primary protein structure			
			Development of limbs	Histology of Skin appendages					
			Prof. Dr Ayesha Even	Assoc. Prof. Dr Mohtasham Odd	Dr. Isma (Even)	Dr. Rahat Odd			

Topics For Practical With Venue	Topics For Small Group Discussion& CBLs With Venue
• Anatomy Histology Practical: Smooth and cardiac muscles • Physiology Practical: Determination of Total leukocyte Count (TLC) • Biochemistry practical: Detection of proteins by Isoelectric pH	• Physiology SGD: Physiology of smooth muscle, mechanism of smooth muscle contraction • (Lecture Hall 5) • Biochemistry CBL: Protein folding and misfolding

Schedule For Practical / Small Group Discussion

Day	Histology Practical	Biochemistry Practical	Physiology Practical	Physiology SGD	Biochemistry SGD
Monday	**C**	**B**	**E**	**A**	**D**
Tuesday	**D**	**C**	**A**	**B**	**E**
Wednesday	**E**	**D**	**B**	**C**	**A**
Thursday	**B**	**A**	**D**	**E**	**C**
Saturday	**A**	**E**	**C**	**D**	**B**

Venue For First Year Batches For Anatomy Dissection / Small Group Discussion

Batches	Roll No	Anatomy Teacher	Venue
A	1-90	Dr Urooj Shah	Lecture Hall No.03 Anatomy Lecture Hall
B	91-180	Dr Zeneara Saqib	Lecture Hall No.04 Anatomy Lecture Hall
C	181-270	Dr Ali Raza	Dissection Hall
D	271 onwards	Dr Qurat ul Ain	New Lecture theatre complex no.3

Venue For First Year Batches For PBL & SGD Team-I

Batches	Roll No	Venue	
Batch-A1	(01-35)	New Lecture Hall Complex Lecture no.02	Dr. Sheena Tariq
Batch-A2	(36-70)	New Lecture Hall Complex Lecture no.03	Dr. Uzma Kiani
Batch-B1	(71-105)	Lecture Hall no.02(Basement)	Dr. Fahd Anwar
Batch-B2	(106-140)	Conference room (Basement)	Dr. Fareedullah
Batch-C1	(141-175)	Lecture Hall no.04(Basement)	Dr. Maryam Abbas (PGT Physiology)
Batch-C2	(176-210)	Lecture Hall no.05(Basement)	Dr. Nayab (PGT Physiology)
Batch-D1	(210-245)	Lecture Hall no.03 (First Floor)	Dr. Iqra Ayub (PGT Physiology)
Batch-D2	(246-280)	Anatomy Museum (First Floor Anatomy)	Dr. Shahrukh (PBL) Dr. Shazia Noreen (SGD)
Batch-E1	(281-315)	Lecture Hall no.04 (First Floor Anatomy)	Dr. Izzah (PGT Physiology)
Batch-E2	(315 onwards)	Lecture Hall no.05Physiology	Dr. Uzma Zafar (PBL) Dr. Kamil Tahir (SGD)

Sr. No	Batch	Roll no	Names of Teachers	
			Biochemistry	Physiology
1.	A	1-70	Dr. Almas Ijaz	Dr. Sheena Tariq
2.	B	71-140	Dr. Rahat Afzal	Dr Uzma Kiyani
3.	C	141-210	Dr. Romessa	Dr fahd Anwar
4.	D	211-280	Dr Uzma Zafar	Dr. Maryam Abbas & Dr. Nayab Zonish
5.	E	281 onwards	Dr. Nayab Ramzan	Dr Fareed

Venues for Large Group Interactive Session (LGIS) and SDL

Odd Roll Numbers	New Lecture Hall Complex Lecture Theater # 03
Even Roll Number	New Lecture Hall Complex Lecture Theater # 02

Time Table For Module MSK-II (Fourth Week)
(05-06-2023 To 10-06-2023)

Date/Day	8:00 AM – 9:00 AM	10:00AM – 11:00AM	11:00 AM – 12:00 PM	12:00 PM – 12:20 PM	12:20 PM – 2:00 PM	02:00- 03:00PM
Monday 05-06-2023	SGD / Dissection Dissection	Anatomy LGIS General Embryology Development of Muscles / General Anatomy of Skin Prof. Dr Ayesha Even / Asst. Prof. Dr Arsalan Odd	Physiology LGIS Properties of skeletal muscles, Tetanus & Fatigue / Introduction to CVS Dr. Nayab Even / Dr. Fahd Odd	Break	**Practical & SGD/CBL** Topics & venue mentioned at the end	SDL Physiology Properties of skeletal muscles, Tetanus & Fatigue
Tuesday 06-06-2023	SGD / Dissection Posterior compartment of thigh (muscles)	Biochemistry LGIS Primary protein structure / Protein folding and misfolding Dr. Rahat Even / Dr. Isma (odd)	Physiology LGIS Introduction to CVS / Properties of skeletal muscles, Tetanus & Fatigue Dr. Fahd Even / Dr. Nayab Odd		**Practical & SGD/CBL** Topics & venue mentioned at the end	SDL Physiology Energetics, efficiency, and types of contraction
Wednesday 07-06-2023	SGD / Dissection Posterior compartment of thigh (Neurovascular organization)	Anatomy LGIS General Anatomy / General Embryology General Anatomy of Skin / Development of Muscles Asst. Prof. Dr Arsalan Even / Prof. Dr Ayesha Odd	Biochemistry LGIS Secondary protein structure / Protein separation techniques Dr. Rahat Even / Dr. Isma Odd		Muscle	Biochemistry Protein misfolding disorders Online SDL Evaluation
Thursday 08-06-2023	SGD / Dissection Dissection	Reseacrh Club Activity Student Practical Session-II Lecture Hall Complex No. 3 Dr. Khaula Noreen, Research Team-I(roll no 1-180) NLC 2 / Dr. Gul Maher, Research Team-I (roll no 181-ONWARDS) NLC 3			**Practical & SGD/CBL** Topics & venue mentioned at the end	Biochemistry Protein Denatureration
Friday 09-06-2023	CBL/ Dissection Tibia	9:00AM – 10:00AM Biochemistry LGIS Protein separation techniques / Secondary protein structure Dr. Isma Even / Dr. Rahat Odd	Quran Tranlation Ibadat-II / Imaniat -I Mufti Naeem Sherazi Even / Molana Abdul Waahid Abbasi Odd	Quran Tranlation Immaniat-II / Ibadat-III Mufti Naeem Sherazi Even / Molana Abdul Waahid Odd	12:00 PM – 01:00PM SDL Anatomy Gluteal Region		
Saturday 10-06-2023	SGD / Dissection Hip joint	Biochemistry LGIS Protein folding & denaturation / Tertiary and quaternary structure Dr. Isma Riaz even / Dr. Rahat odd	Biomedical Ehtics History of Medical Ethics Dr. Arsalan Even / Dr. Maria Odd	**12:00PM-12:20PM** **Break**	**Practical & SGD/CBL** Topics & venue mentioned at the end	SDL Anatomy Posterior compartment of thigh Online Clinical evaluation

Topics For Practical With Venue	Topics For Small Group Discussion& CBLs With Venue
• Anatomy Histology Practical: Thick Skin • Physiology Practical: Determination of platelet count • Biochemistry Practical: Fractional precipitation of proteins	Physiology SGD: Properties of myocardium, myocardial action potential, Excitatory and conductionsystem of heart (Physiology Lecture 05) Biochemistry SGD: Collagen

Schedule For Practical / Small Group Discussion

Day	Histology Practical	Biochemistry Practical	Physiology Practical	Physiology SGD	Biochemistry SGD
Monday	**C**	**B**	**E**	**A**	**D**
Tuesday	**D**	**C**	**A**	**B**	**E**
Wednesday	**E**	**D**	**B**	**C**	**A**
Thursday	**B**	**A**	**D**	**E**	**C**
Saturday	**A**	**E**	**C**	**D**	**B**

Venue For First Year Batches For Anatomy Dissection / Small Group Discussion

Batches	Roll No	Anatomy Teacher	Venue
A	1-90	Dr Urooj Shah	Lecture Hall No.03 Anatomy Lecture Hall
B	91-180	Dr Zeneara Saqib	Lecture Hall No.04 Anatomy Lecture Hall
C	181-270	Dr Ali Raza	Dissection Hall
D	271 onwards	Dr Qurat ul Ain	New Lecture theatre complex no.3

Venue For First Year Batches For PBL & SGD Team-I

Batches	Roll No	Venue	
Batch-A1	(01-35)	New Lecture Hall Complex Lecture no.02	Dr. Sheena Tariq
Batch-A2	(36-70)	New Lecture Hall Complex Lecture no.03	Dr. Uzma Kiani
Batch-B1	(71-105)	Lecture Hall no.02(Basement)	Dr. Fahd Anwar
Batch-B2	(106-140)	Conference room (Basement)	Dr. Fareedullah
Batch-C1	(141-175)	Lecture Hall no.04(Basement)	Dr. Maryam Abbas (PGT Physiology)
Batch-C2	(176-210)	Lecture Hall no.05(Basement)	Dr. Nayab (PGT Physiology)
Batch-D1	(210-245)	Lecture Hall no.03 (First Floor)	Dr. Iqra Ayub (PGT Physiology)
Batch-D2	(246-280)	Anatomy Museum (First Floor Anatomy)	Dr. Shahrukh (PBL) Dr. Shazia Noreen (SGD)
Batch-E1	(281-315)	Lecture Hall no.04 (First Floor Anatomy)	Dr. Izzah (PGT Physiology)
Batch-E2	(315 onwards)	Lecture Hall no.05Physiology	Dr. Uzma Zafar (PBL) Dr. Kamil Tahir (SGD)

Sr. No	Batch	Roll no	Names of Teachers	
			Biochemistry	Physiology
1.	A	1-70	Dr. Almas Ijaz	Dr. Sheena Tariq
2.	B	71-140	Dr. Rahat Afzal	Dr Uzma Kiyani
3.	C	141-210	Dr. Romessa	Dr fahd Anwar
4.	D	211-280	Dr Uzma Zafar	Dr. Maryam Abbas & Dr. Nayab Zonish
5.	E	281 onwards	Dr. Nayab Ramzan	Dr Fareed

Venues for Large Group Interactive Session (LGIS) and SDL

Odd Roll Numbers	New Lecture Hall Complex Lecture # 03
Even Roll Number	New Lecture Hall Complex Lecture Theater # 02

Time Table For Module MSK-II (Fifth Week)
(12-06-2023 To 17-06-2023)

Date/Day	8:00 AM – 09:00 AM	9:00 AM – 10:00 AM	10:00 AM – 11:00 AM		11:00 AM – 12:00 PM		12:00 PM – 12:20 PM	12:20 PM – 2:00 PM	02:00- 03:00PM
Monday 12-06-2023	SGD / Dissection		Biochemistry LGIS		Physiology LGIS		B r e a k	**Practical & SGD/CBL** Topics & venue mentioned at the end	SDL Physiology Physiological properties of Smooth Muscle
	Fibula		Tertiary and quaternary structure	Protein folding & denaturation	Physiologic anatomy, types and properties of Smooth muscle	Introduction topericardium Properties of myocardium & endocardium myocardial action potential			
			Dr. Isma Riaz Even	Dr. Rahat Odd	Dr. Aneela (Even)	Dr. Sidra Odd			
Tuesday 13-06-2023	SGD / Dissection		Behaviriioural Sceinces		Physiology LGIS			**Practical & SGD/CBL** Topics & venue mentioned at the end	SDL Physiology Myocardial Action potential
	Popliteal Fossae		Communication Skills		Introduction to pericardium Properties of myocardium & endocardium myocardial action potential	Physiologic anatomy, types and properties of Smooth muscle			
					Dr. Sidra Even	Dr. Aneela Odd			
Wednesday 14-06-2023	SGD / Dissection		Behavioural Sciences (LGIS)		Physiology LGIS			**Practical & SGD/CBL** Topics & venue mentioned at the end	SDL Biochemistry Importance of variousclasses of protein
	Knee joint		Rights and Responsibilities of patients anddoctors		Mechanism of smooth muscle contraction & its control	Regulation of myocardial activity			
			Dr. Zona Even	Dr. Sadia Yasir Odd	Dr..Aneela Even	Dr. Sidra Odd			
Thursday 15-06-2023	SGD / Dissection		Radiology		Physiology LGIS			**Practical & SGD/CBL** Topics & venue mentioned at the end	SDL lastin and related disorders
	Anterior compartment of leg (muscles and neurovascular organization)		x-rays of hipbone lower limb		Regulation of myocardial activity	Mechanism of smooth muscle contraction & its control			
			Dr. Aniqa Even	Dr. Riffat Odd	Dr..Sdra Odd	Dr. Aneela Odd			
Friday 16-06-2023	SGD/ Dissection	Quran Tranlation	Quran Tranlation		Physiology LGIS		12:00 PM – 01:00PM		
	Lateral compartment of leg (muscles and neurovascular organization)	Ibadat-III	Ibadat-IV	Immaniat-III	Excitatory &Conducting system ofheart	Comparison of 3 types of muscle	SDL Anatomy Tibia, Fibula		
		Molana Abdul Waahid Even	Molana Abdul Waahid even	Mufti Naeem Sherazi Odd	Dr. Fahd Even	Dr. Aneela Odd			
		Immaniat-II							
		Mufti Naeem Sherazi Odd							
Saturday 17-06-2023	SGD / Dissection		Dissection		Physiology LGIS		**12:00 PM-12:20 PM**	**Practical & SGD/CBL** Topics & venue mentioned at the end	SDL Anatomy Hip joint, Knee Joint
	Surface Anatomy / Radiology		Dissection		Comparison of 3 types ofmuscle	Excitatory &Conducting system ofheart	**Break**		
					Dr. Aneela Even	Dr. Fahd Odd			

Topics For Practical With Venue	Topics For Small Group Discussion& CBLs With Venue
• Anatomy Histology Practical: Thick Skin • Physiology Practical: Determination of ABO, Blood groups • Biochemistry Practical: Chromatography	Physiology SGD: Comparison of three types of muscle (Physiology Lecture 05) Biochemistry SGD: Elastin

Schedule for Practical / Small Group Discussion

Day	Histology Practical	Biochemistry Practical	Physiology Practical	Physiology SGD	Biochemistry SGD
Monday	**C**	**B**	**E**	**A**	**D**
Tuesday	**D**	**C**	**A**	**B**	**E**
Wednesday	**E**	**D**	**B**	**C**	**A**
Thursday	**B**	**A**	**D**	**E**	**C**
Saturday	**A**	**E**	**C**	**D**	**B**

Venue For First Year Batches for Anatomy Dissection / Small Group Discussion

Batches	Roll No	Anatomy Teacher	Venue
A	1-90	Dr Urooj Shah	Lecture Hall No.03 Anatomy Lecture Hall
B	91-180	Dr Zeneara Saqib	Lecture Hall No.04 Anatomy Lecture Hall
C	181-270	Dr Ali Raza	Dissection Hall
D	271 onwards	Dr Qurat ul Ain	New Lecture theatre complex no.3

Venue For First Year Batches for PBL & SGD Team-I

Batches	Roll No	Venue	
Batch-A1	(01-35)	New Lecture Hall Complex Lecture no.02	Dr. Sheena Tariq
Batch-A2	(36-70)	New Lecture Hall Complex Lecture no.03	Dr. Uzma Kiani
Batch-B1	(71-105)	Lecture Hall no.02 (Basement)	Dr. Fahd Anwar
Batch-B2	(106-140)	Conference room (Basement)	Dr. Fareedullah
Batch-C1	(141-175)	Lecture Hall no.04 (Basement)	Dr. Maryam Abbas (PGT Physiology)
Batch-C2	(176-210)	Lecture Hall no.05 (Basement)	Dr. Nayab (PGT Physiology)
Batch-D1	(210-245)	Lecture Hall no.03 (First Floor)	Dr. Iqra Ayub (PGT Physiology)
Batch-D2	(246-280)	Anatomy Museum (First Floor Anatomy)	Dr. Shahrukh (PBL) Dr. Shazia Noreen (SGD)
Batch-E1	(281-315)	Lecture Hall no.04 (First Floor Anatomy)	Dr. Izzah (PGT Physiology)
Batch-E2	(315 onwards)	Lecture Hall no.05 Physiology	Dr. Uzma Zafar (PBL) Dr. Kamil Tahir (SGD)

Sr. No	Batch	Roll no	Names of Teachers	
			Biochemistry	Physiology
1.	A	1-70	Dr. Almas Ijaz	Dr. Sheena Tariq
2.	B	71-140	Dr. Rahat Afzal	Dr Uzma Kiyani
3.	C	141-210	Dr. Romessa	Dr fahd Anwar
4.	D	211-280	Dr Uzma Zafar	Dr. Maryam Abbas & Dr. Nayab Zonish
5.	E	281 onwards	Dr. Nayab Ramzan	Dr Fareed

Venues for Large Group Interactive Session (LGIS) and SDL

Odd Roll Numbers	New Lecture Hall Complex Lecture Theater # 03
Even Roll Number	New Lecture Hall Complex Lecture Theater # 02

Time Table For Module MSK-II (Sixth Week)
(19-06-2023 To 24-06-2023)

Date & Day	8:00 AM – 9:00 AM	11:00AM – 12:00 PM
Monday 19-06-2023	SDL For Exam Prepration	
Tuesday 20-06-2023	Anatomy Theory Paper	
Wednesday 21-06-2023	Physiology theory Paper	
Thursday 22-06-2023	Biochemistry Theory paper& Allied	
Friday 23-06-2023	Anatomy Viva Voce (Roll no :1-180 students) & Physiology Viva Voce (Roll no :181 to 322 students)	
Saturday 24-06-2023	Physiology Viva Voce (Roll no :1-180 students) & Anatomy Viva Voce (Roll no :181 to 322 students)	

SECTION VI

Table of Specification (TOS) For MSK-II Module Examination for First Year MBBS

Sr. #	Discipline	No. of MCQs (%)	No. of MCQs according to cognitive domain			No. of SEQs (%)		No. of SEQs according to cognitive domain			Viva voce/OSPE	Total Marks
			C1	C2	C3	No. of items	Marks	C1	C2	C3		
1.	Anatomy	25	15	5	5	5	25	1	2	2	50	100
2.	Physiology	30	18	9	3	4	20	1	1.5	1.5	50	100
3.	Biochemistry	7	4	3	-	3	15	1	1	1	5	29
4.	Bioethics & Professionalism	5										5
5.	Research Club Activity (IUGRC)	10										6
6.	Family Medicine	1										1
7.	Behavioural Sciences	2										2
8.	Radiology & Artificial Intelligence Innovation	3										3
										Grand Total		246

Annexure-I

(Sample MCQ & SEQ papers)

RAWALPINDI MEDICAL UNIVERSITY, RWP
ANATOMY DEPARTMENT
1st Year MBBS MCQs Module Exam (MSK-II)

1. A 50-years-old man complaint of a lump in his groin. His physician suspected enlarged superficial inguinal lymph nodes. Which area should be examined to find the source?
    a. Skin of the buttocks
    b. Skin of the scrotum
    c. Both skin of buttocks and scrotum
    d. Glans penis
    e. Posterolateral part of calf
3. A football player presented in emergency with injury. The doctor tested his knee by pulling anteriorly on the leg with knee flexed. The leg moved forward significantly due to the damage of?
    a. Anterior Cruciate Ligament
    b. Medical Meniscus
    c. Lateral Meniscus
    d. Oblique Poptiteal Ligament
    e. Posterior Cruciate Ligament
5. A cardiac patient was advised to undergo coronary artery grafting. From which of following vein graft can be used as in this procedure.
    a. Femoral vein
    b. Perforating vein
    c. Great saphenous vein
    d. Small saphneous vein
    e. Popliteal vein
2. A 52-years-old woman fell after slipping and was unable to extend her leg at the knee joint. Which of the following muscles were most likely to be damaged as a result of this accident?
    a. Semitendinosus
    b. Sartorius
    c. Gracilis
    d. Quadriceps femoris
    e. Biceps femoris
4. While observing a patient walking a doctor noticed a tilt in the pelvis towards right. Which nerve could be impacted in this scenario.
    a. Right superior gluteal nerve
    b. Right superior gluteal nerve
    c. Right inferior gluteal nerve
    d. Right inferior gluteal nerve
    e. Right femoral nerve

RAWALPINDI MEDICAL UNIVERSITY, RWP
ANATOMY DEPARTMENT
1st Year MBBS SEQs Module Exam (MSK-II)

Note: Attempt all questions. All questions carry equal marks. Draw diagram where necessary

1. a. Name the opening present in upper mid part of fascia lata of thigh. Give location and margins of opening. Enlist structures passing through it? 0.5+0.5+0.5+1.5

   b. Name arteries contributing in anastomosis around lesser trochanter of femur. 2

2. a. Name the opening present in upper mid part of fascia lata of thigh. Give location and margins of opening. Enlist structures passing through it? 0.5+0.5+0.5+1.5

   b. Name arteries contributing in anastomosis around lesser trochanter of femur. 2

3. a. A patient walked in OPD with waddling gait. On examination his pelvis tilted towards unsupported side when he was asked to raise his leg.

   I. Which nerve is damaged 1

   II. Enlist muscles that are damaged 1

   III. Explain the mechanism behind this clinical condition 1.5

   b. Discuss unhappy triad of knee 1.5

RAWALPINDI MEDICAL UNIVERSITY, RWP
PHYSIOLOOGY DEPARTMENT
1st Year MBBS MCQs Module Exam (MSK-II)

1. Stress relaxation is the characteristic feature of:
   a. Slow oxidative skeletal muscle fibres
   b. Smooth muscle
   c. Cardiac muscle
   d. Fast oxidative skeletal muscle fibres
   e. Fast glycolytic skeletal muscle fibres

2. The attachment –detachment cycling of the myosin head with the actin filament requires the following chemical change in regulatory protein chains:
   a. Phosphorylation
   b. Hydroxylation
   c. Oxidation
   d. Methylation
   e. Carboxylation

3. The enzyme important for cessation of smooth muscle contraction is:
   a. Creatine Kinase
   b. Myosin phosphatase
   c. Myosin Light chain kinase
   d. ATPase
   e. Hyaluronidase

4. The following connections are present between autonomic nerve fibers and multi –unit smooth muscle fibres:
   a. Gap junctions
   b. Tight junctions
   c. Contact junctions
   d. Desmosomes
   e. Hemidesmosomes

5. Prolonged holding of contractions of smooth muscle is facilitated by:
   a. Stress Relaxation
   b. Latch mechanism
   c. The walk –along mechanism
   d. Excitation-contraction coupling
   e. Reverse stress relaxation

RAWALPINDI MEDICAL UNIVERSITY, RWP
PHYSIOLOOGY DEPARTMENT
1st Year MBBS SEQs Module Exam (MSK-II)

Q.1 A young male athlete was fond of going to gym for body building. He was using energy drinks and special protein supplements to increase his muscle endurance. He was mainly interested in power lifting exercises.

a. Which type of skeletal muscle contraction he was doing predominantly? **(1)**
b. Name the type of skeletal muscle fibers involved in causing this type of contraction. **(1)**
c. Differentiate between the two types of skeletal muscle fibers. **(3)**

Q.2 A 65-year-old male presented with burning micturition, increased urinary frequency, and nocturia. His Urine R/E showed numerous pus cells and he was diagnosed to be suffering from urinary tract infection.

a. Name the type of smooth muscle present in the wall of urinary bladder & type of its innervation. **(0.5,0.5)**
b. Briefly write about the Latch phenomenon & its significance. **(2,2)**

Q.3 During postmortem of 38-year-old male the examining doctor observed stiffness of muscles and joints of the deceased.

a. Name this condition which has been developed after death. **(1)**
b. What is the molecular basis of this condition? **(3)**
c. What is the medicolegal importance of muscle stiffness after death? **(1)**

Q.4 A 45-year-old male presented in emergency department of Rawalpindi Institute of Cardiology with severe bradycardia and fainting attack.

a. Name the normal pacemaker of the heart. **(0.5)**
b. Briefly write the molecular mechanism of the normal pacemaker potential. **(3)**
c. Draw & label excitatory & conductive system of the heart. **(1.5)**

Q.5 Draw a flow chart elaborating the excitation-contraction coupling mechanism for skeletal muscle. **(5)**

RAWALPINDI MEDICAL UNIVERSITY, RWP
BIOCHEMISTRY DEPARTMENT
1st Year MBBS SEQs Module Exam (MSK-II)

1. Each turn of α-helix contains the amino acid residues:
   a. 3.0
   b. 3.6
   c. 4.2
   d. 4.5
   e. 4.8

2. One of the following proteins is chromoprotein as well as metalloprotein
   a. Ferritin
   b. Albumin
   c. Myoglobin
   d. Hemoglobin
   e. Transferrin

3. In protein structure, alpha helix and beta sheets are examples of:
   a. Primary structure
   b. Secondary structure
   c. Tertiary structure
   d. Quaternary structure
   e. Protein folding

4. Disulfide bond is formed between sulfhydryl groups of
   a. Alanine
   b. Methionine
   c. Cysteine
   d. Valine
   e. Proline

SEQ

Q. a. Describe secondary structure of proteins with at least twosuitable examples. 03

b. Discuss causes of protein misfolding. 02

RAWALPINDI MEDICAL UNIVERSITY

1ST YEAR MBBS BIOETHICS MCQs EXAM

1. ----Includes rules of conduct that may be used to regulate our activities concerning the biological world.
   a. Bio-piracy
   b. Biosafety
   c. Bioethics
   d. Bio-patents
   e. Bio-logistic

2. The right of patients having self-decision is called.
   a. Justice
   b. Autonomy
   c. Beneficence
   d. Veracity
   e. Fidelity

3. Following is not code of ethics.
   a. Integrity
   b. Objectivity
   c. Confidentiality
   d. Behaviour
   e. Autonomy

4. -------in the context of medical ethics, if it's fair and balanced
   a. Justice
   b. Autonomy
   c. Beneficence
   d. Veracity
   e. Fidelity

5. ------Principle requiring that physicians provide, positive benefits
   a. Justice
   b. Autonomy
   c. Beneficence
   d. Veracity
   e. Fidelity