



RMU – 12

**Integrated Modular
MBBS Curriculum 2026
Isolation to **Beyond Boundaries****

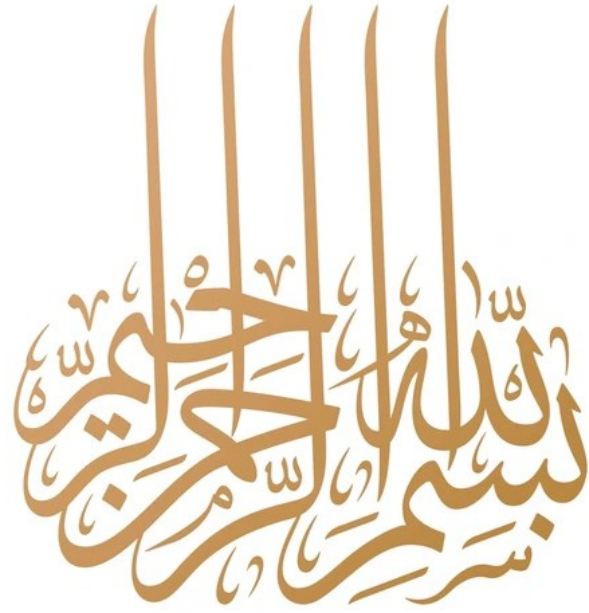
First Year MBBS

Department of Medical Education

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Curriculum

Curriculum



Dedicated to Hazrat Muhammad (S.A.W)

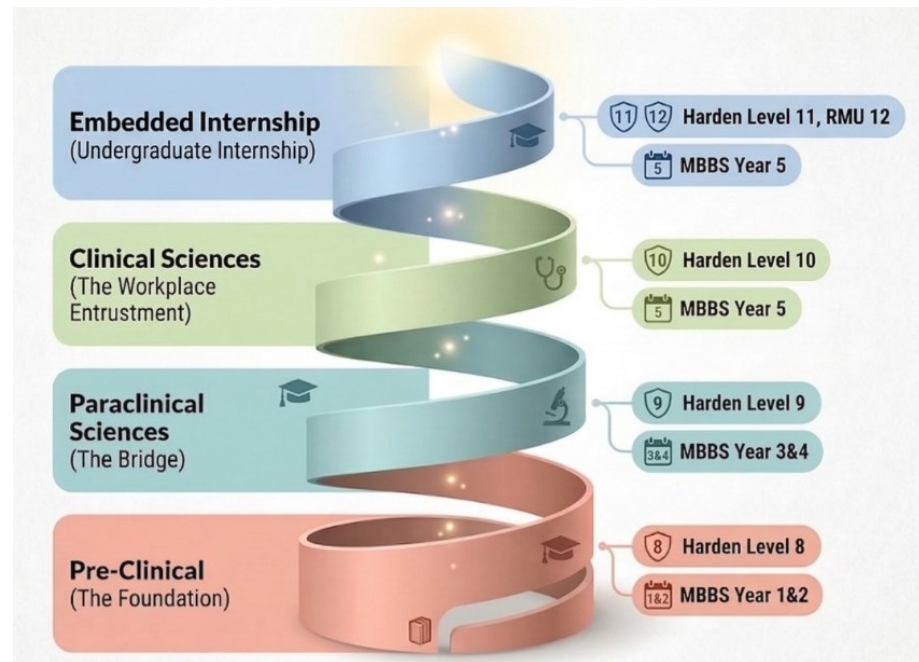


RMU – 12

Integrated Modular MBBS Curriculum 2026

Isolation to *Beyond Boundaries*

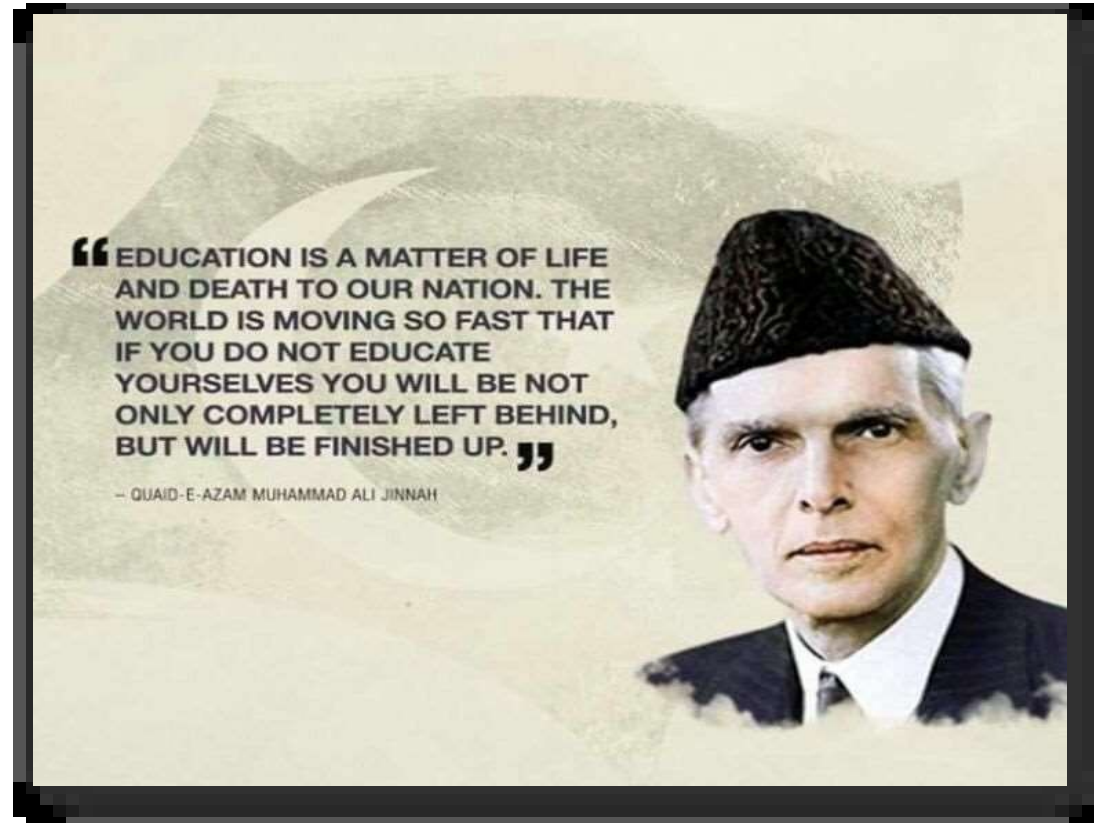
1st Year MBBS





➤ SECTION – I

Quote by Quaid-e-Azam Muhammad Ali Jinnah





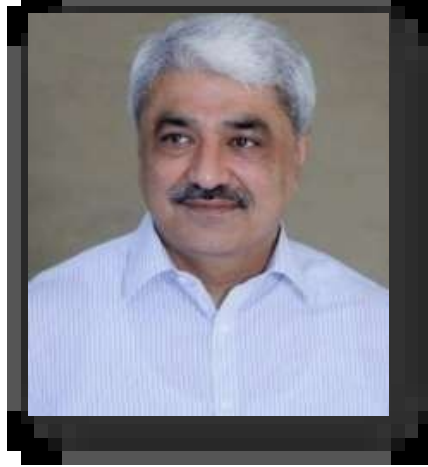
Sardar Saleem Haider Khan

Governor Punjab

It is with great pleasure that I extend my congratulations to Rawalpindi Medical University on the introduction of its Integrated Curriculum. This progressive step reflects the university's commitment to shaping the future of medical education in Pakistan, ensuring that our future healthcare professionals are equipped with the skills and knowledge needed to meet the evolving demands of healthcare, both locally and globally.

The integrated curriculum represents a significant shift in how medical education is delivered, focusing on the interconnection between various disciplines and emphasizing patient-centered care. By blending theoretical knowledge with practical application from the early stages of their education, students are better prepared to understand the complexities of human health and the diverse challenges they will face in their medical careers. This holistic approach is critical in nurturing well-rounded professionals who are not only adept clinicians but also compassionate caregivers.

Rawalpindi Medical University has always been at the forefront of medical education, and this curriculum reflects its visionary leadership in preparing graduates who are ready to confront the future of healthcare with confidence and competence. I am confident that this initiative will greatly contribute to the advancement of healthcare in Punjab and beyond, ensuring that our doctors are not only skilled but also compassionate and ethical leaders in their field.



Mr. Khawaja Salman Rafique

Minister, Specialized Healthcare & Medical Education Department

The Rawalpindi Medical University, Rawalpindi has consistently evolved and adapted to support its learners, uphold academic standards, and maintain its status as a globally recognized institution. The launch of the 'Modular Curriculum 2024 marks a significant step forward in advancing public health and addressing future healthcare needs. By embracing this curriculum, students and professionals alike will gain the tools to turn knowledge into practical expertise, positioning themselves as leaders in research, public service, sustainable healthcare, and accessible medical care.

A curriculum's success hinges on the dedication of those who implement it. The true impact of this program will be realized through the joint efforts of educators and learners. I am confident that this integrated educational framework will equip our future doctors to confront global health challenges, including emerging disease trends, healthcare equity, and solutions for underserved communities.



Prof. Dr. Muhammad Umar
Vice Chancellor RMU



Prof. Dr. Muhammad Khurram
Principal RMC

There is no subject which will require more careful consideration in the settlement of the educational details of the University of which RMU is to be the center than that of the choice and arrangement of the curriculum to be required for the degree in medicine. An exceptional opportunity presents itself, you have, within certain limits, a tabula rasa, and it behooves the authorities of the future university to mark it in the manner best calculated to promote the advance of medical science and the efficiency of medical teaching. If, from an experience acquired as a teacher and examiner in various universities during a period of more than a quarter of a century, I can help in the promotion of these objects, by pointing out virtues which may be emulated here, and failings which may be avoided there. I shall at least feel I have done something to assist in the modelling of what will, we all hope, become one of the great centers of learning of Pakistan.

But whilst endeavoring to sketch out what subjects should form part of the medical curriculum of a university, and to appraise their relative order and value, I do not propose to place before you an ideal which is unattainable under the circumstances of place and time, in which you find yourselves, although it would be easier to construct an ideal curriculum than to plan one out within the limits of present-day practicability. I suppose that the integrated modular curricula now being established in our university will more nearly approach the ideal.

The diverse faculty and student body make our programs earn top national and international reputation. I can say with complete confidence that what makes our university exceptional are the faculty & staff who are dedicated to help our aspiring students to become the compassionate, highly skilled health-care providers of tomorrow.



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This is a great prospect for RMU and curriculum committee to formulate the modular curriculum of basic medical sciences. It is a task, well meant for its contribution in medical education. Hopefully it will go a long way in training the medical graduates, as per required national and international standards of medical education. The Modular teaching is likely to give a fresh and varied approach to learning process and at the end optimizing maximum learning outcomes. This entails coordination, patience, commitment and diligence from all those who are on board, either the faculty or the students. All this seems to be encouraging, yet limited resources, inadequate manpower, and difficulty in breaking traditional shackles are tangible obstacles.

The preparation and implementation of modular curriculum provides the faculty an opportunity to design and reorientate and reconceptualize health –illness process. Transforming academic stakeholders' learning perspectives and then to translate it in students' development as an effective force of society, well versed with modern day problems, is an uphill task. This is a humble effort in this regard. Still there is lot to distill, crystallize and narrate. Hopefully from this marathon, the curiosity will emerge like a fresh breeze, from here the character will arise in the horizon, as all this at the end is meant to serve the ailing humanity and to accomplish the dream of a healthy society.

At the end, it will be great injustice not to acknowledge the unwavering and untiring support of Prof Dr Muhammad Umar, Vice Chancellor RMU, who is an ardent supporter and promoter of anything which gives a fresh impetus to medical education and practice. It's all because of his continuous input and persuasion, that the modular curriculum achieved fruition.

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| Dr Tehzeeb, Dr Samia Sarwar, Dr Ifra Saeed, Dr. Ayesha Yousaf, Dr Tehmina Qamar, & Dr Sidra Hamid | 2019-2020 | 2 nd | Developed for First Year MBBS. Horizontally and vertically integrated Learning objectives updated |
| Dr Tehzeeb, Dr Samia Sarwar, , Dr Ifra Saeed, Dr Ayesha Yousaf , Dr Tehmina Qamar, & Dr Sidra Hamid | 2021 - 2022 | 3 rd | Developed for First Year MBBS. Horizontally and vertically integrated Learning objectives updated, Research curriculum incorporated |
| Dr Tehzeeb, Dr Samia Sarwar, Dr Ifra Saeed, Dr Ayesha Yousaf, Dr Tehmina Qamar, & Dr Sidra Hamid | 2022 - 2023 | 4 th | Developed for First Year MBBS. Horizontally and vertically integrated Learning objectives updated, Research, Bioethics, Family Medicine curriculum incorporated along with Professionalism |
| Dr Samia Sarwar, Dr Ifra Saeed, Dr Ayesha Yousaf, Dr Aneela, & Dr Sidra Hamid | 2023 - 2024 | 5 th | Developed for First Year MBBS. Horizontally and vertically integrated Learning objectives updated, Research curriculum revamped Bioethics, Family Medicine curriculum incorporated along with Professionalism. Entrepreneurship curriculum incorporated |
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| Dr Samia Sarwar, Dr Ifra Saeed, Dr Ayesha Yousaf, Dr Aneela, Dr. Arsalan Manzoor & Dr Farzana Fatima | 2025-2026 | 7 th | Theme based curriculum developed for First Year MBBS. Horizontally and vertically integrated Learning objectives updated, Research curriculum revamped Bioethics, Family Medicine curriculum incorporated along with Professionalism. Entrepreneurship, Leadership, ITC, Artificial Intelligence, Video Graphy, Expository Writing, Social in Medicine curriculum incorporated |



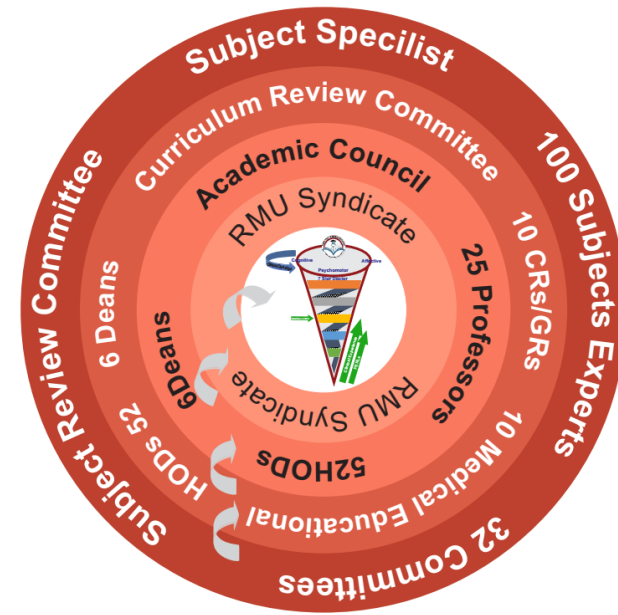
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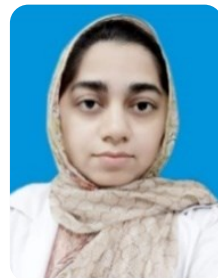
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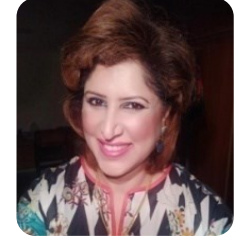


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| Dr. Moniba Iqbal PGT | Dr Saira Aijaz Demonstrator | Department of Family Medicine |
| Dr. Bushra Farooq PGR | | Assistant Prof. Dr. Sadia Azam Khan |
| Dr. Zaira Azhar PGR | | Department of Neurology |
| Dr. Saba Maryam PGR | | Assistant Prof. Dr. Waqas Ahmed |
| Dr. Ayesha zujaja PGR | | Department of Pulmonology |
| Dr. Maria Jabeen PGR | | Assistant Prof. Dr. Zaid Umar |
| Dr. Mehreen Noor PGR | | |



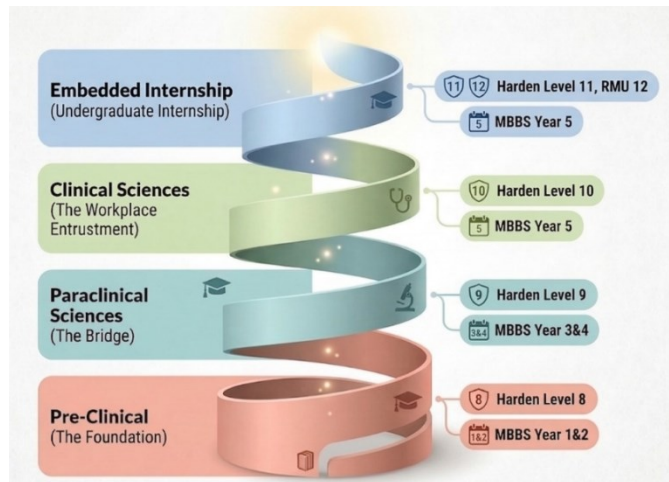
➤ SECTION – II

Preamble

RMU – 12

Integrated Modular MBBS Curriculum 2026

Isolation to *Beyond Boundaries*





Preamble:

RMU – 12 Integrated Modular MBBS Curriculum 2026 **Isolation to **Beyond Boundaries****

Medical education is undergoing a fundamental transformation globally, shifting from discipline-based, fragmented teaching toward integrated, competency-based, and clinically oriented learning systems that prepare graduates for real-world healthcare practice. In response to these evolving educational paradigms, national regulatory expectations, and the healthcare needs of society, Rawalpindi Medical University has adopted Clinically Oriented Integrated Modular RMU 12 MBBS Curriculum the envisioned under the guiding philosophy of “Isolation to Beyond Boundaries.”. This curriculum represents a structured, longitudinal, and outcome-driven educational continuum, progressing from foundational sciences to advanced clinical practice with a fully embedded internship. It is designed to ensure the gradual and coherent development of knowledge, clinical skills, professional attitudes, and Entrustable Professional Activities (EPAs), enabling graduates to emerge as practice-ready, safe, and competent medical professionals.

The Clinically Oriented Integrated Modular Curriculum transcends traditional disciplinary silos by promoting horizontal and vertical integration across basic, para-clinical, and clinical sciences. Learning experiences are contextualized around clinical problems and patient-centered care, fostering early clinical exposure, spiral learning, and progressive responsibility. This approach aligns with contemporary integration models, workplace-based assessment strategies, and competency-based medical education principles.

Anchored in national standards and international best practices, the curriculum ensures alignment with PM&DC, WFME and HEC requirements, while addressing local healthcare priorities. By embedding internship within the undergraduate framework and mapping outcomes to clearly defined competencies and Entrustable professional activities (EPAs), the curriculum ensures continuity, accountability, and seamless transition from undergraduate training to independent clinical practice.

Through this clinically oriented and integrated approach, Rawalpindi Medical University aims to produce graduates who are not only clinically proficient but also ethical, reflective, socially accountable, and equipped for lifelong learning moving decisively from isolated learning to integrated, boundary-transcending medical education.

RMU – 12 Integrated Modular MBBS Curriculum 2026
Isolation to Beyond Boundaries
Competency Framework

Competency

PMDC



Figure 1

References

Harden RM. *The integration ladder: a tool for curriculum planning and evaluation.* Medical education. 2000 Jul 1;34(7).
 Ten Cate O. *Nuts and bolts of entrustable professional activities.* Journal of graduate medical education. 2013 Mar 1;5(1):157-8.
 Pakistan Medical & Dental Council Guidelines for Undergraduate Medical Education (MBBS) Curriculum – 2024

RMU – 12 Structured Framework of Integrated Modular MBBS Curriculum 2026 Isolation to **Beyond Boundaries**

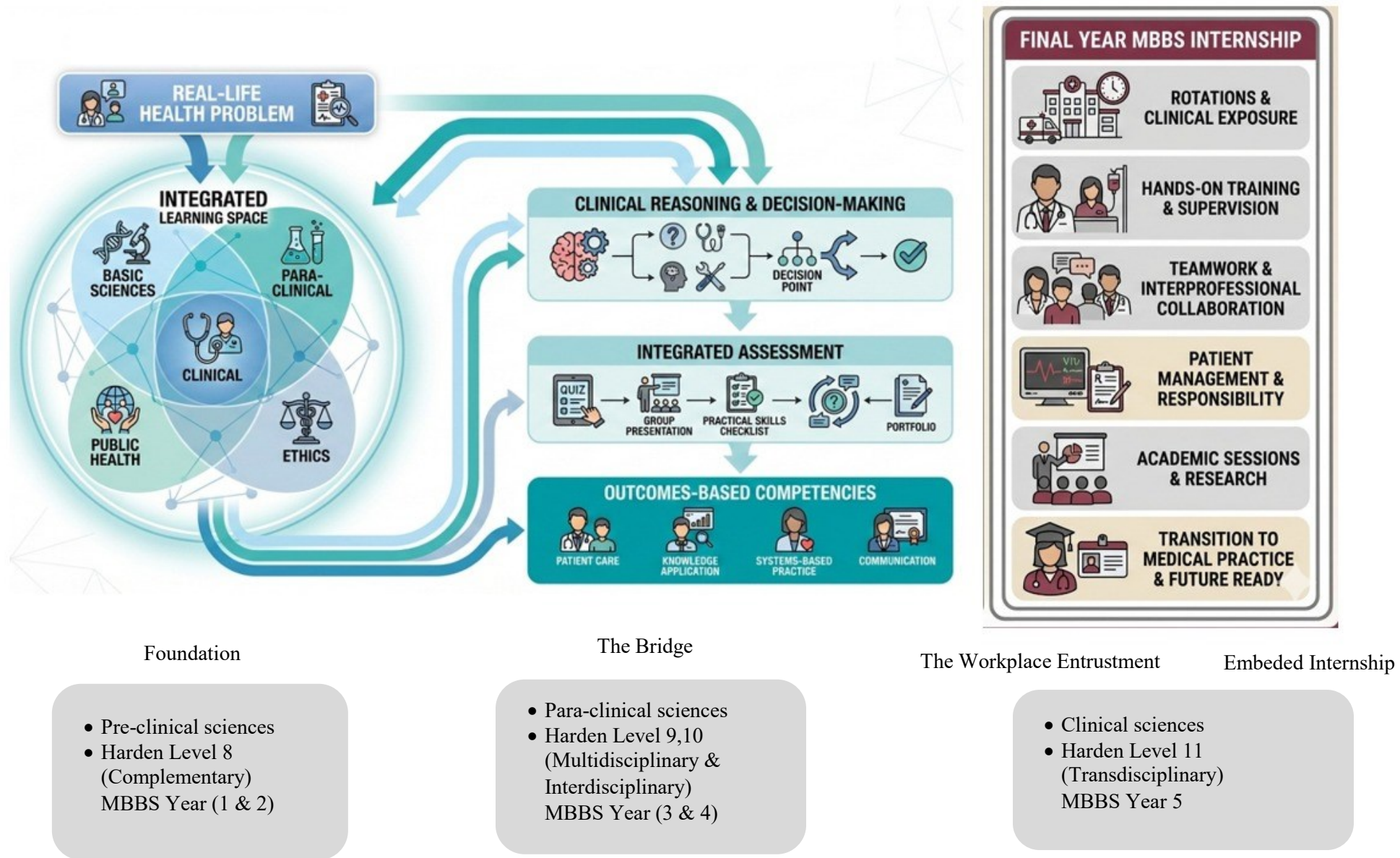


Figure 2

RMU – 12 Structured Framework of Integrated Modular MBBS Curriculum 2026
Isolation to Beyond Boundaries

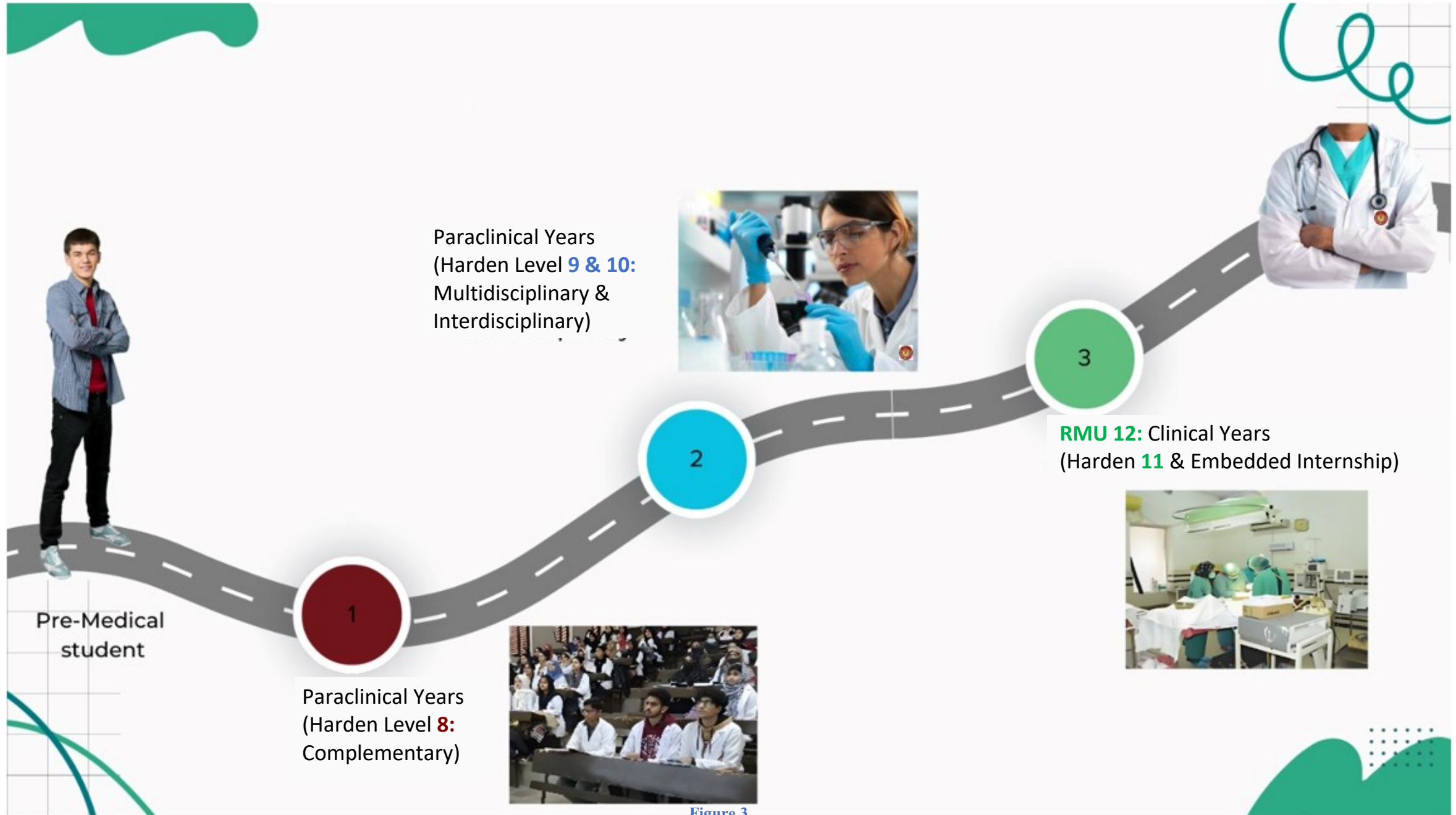


Figure 3

RMU – 12 Assessment Framework of Integrated Modular MBBS Curriculum 2026
Isolation to Beyond Boundaries

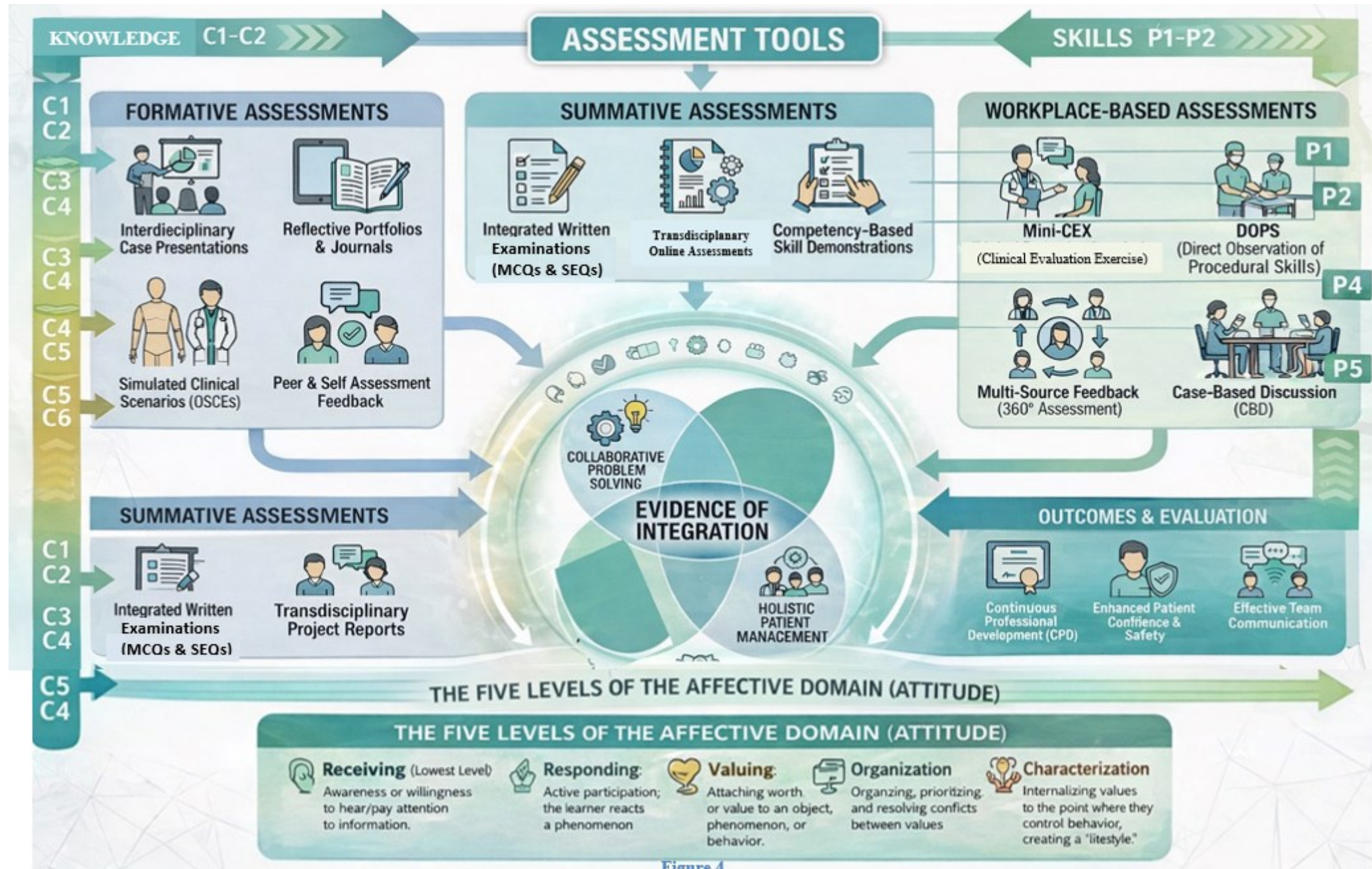
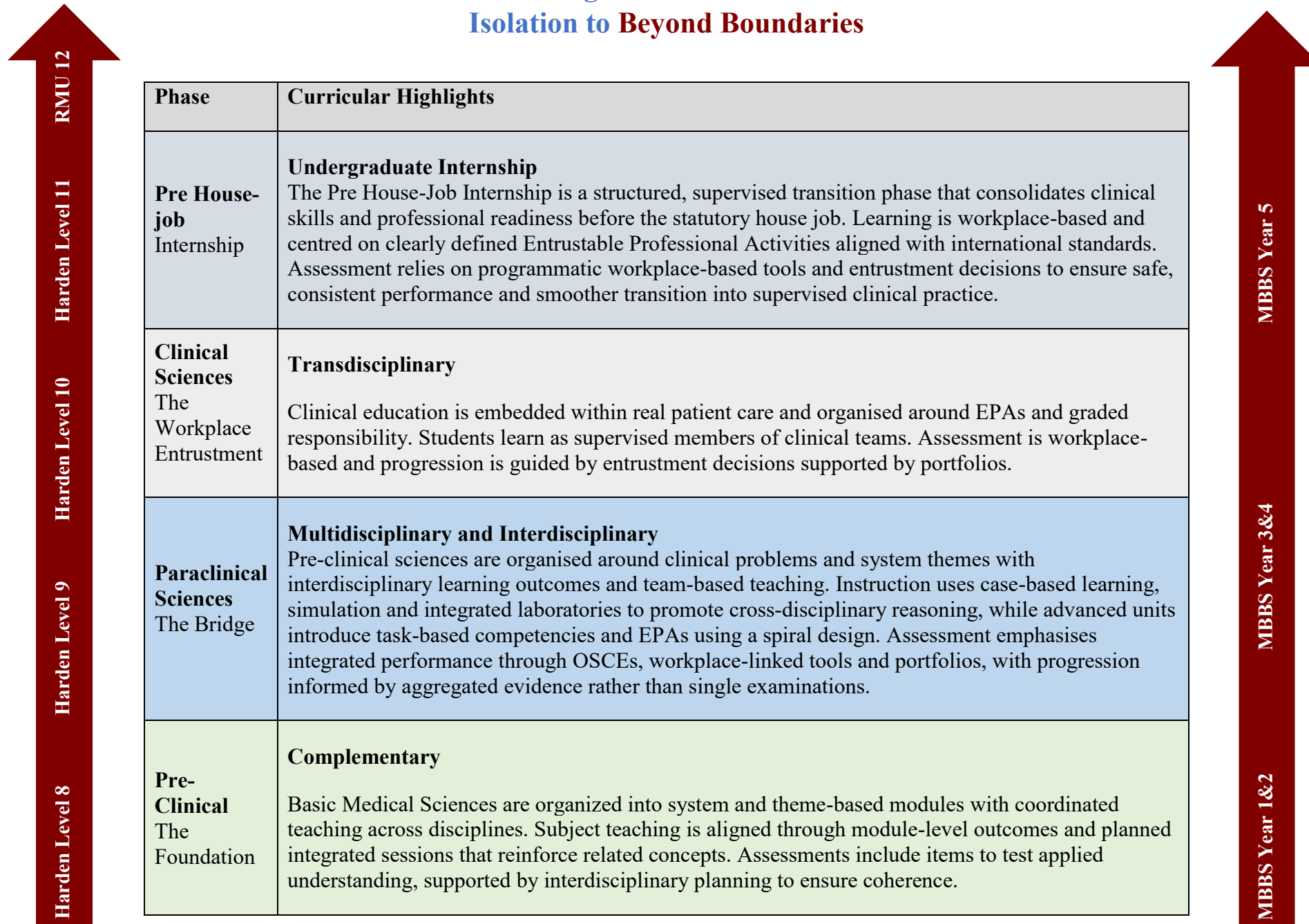


Figure 4

RMU – 12 Structured Framework of Integrated Modular MBBS Curriculum 2026
Isolation to Beyond Boundaries



RMU 12

Harden Level 11

Harden Level 10

Harden Level 9

Harden Level 8

MBBS Year 5

MBBS Year 3&4

MBBS Year 1&2

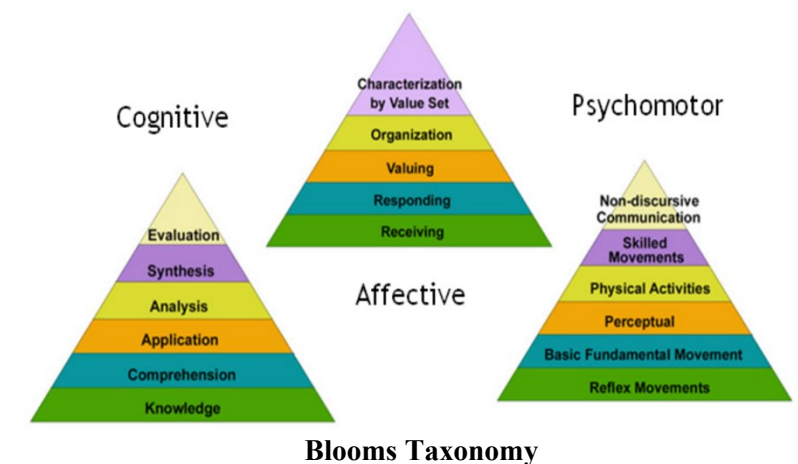
Rawalpindi Medical University has adopted a staged curricular framework that reflects a progressive movement along Harden's integration ladder, culminating in going beyond the ladder to **RMU 12**. The curriculum is designed to ensure that knowledge acquired in the early years is not isolated or terminal, but is progressively contextualized, applied and transformed into professional competence. This progression is achieved by aligning curricular structure, teaching approaches and assessment strategies so that students move from conceptual understanding to integrated reasoning and finally to authentic clinical performance with graded responsibility.

Phase 1- The Foundation

In the early phase, basic sciences are organised using a complementary approach. The curriculum is structured into system- and theme-based modules rather than isolated subject courses, allowing Anatomy, Physiology, Biochemistry and related disciplines to retain their academic identity while contributing in a coordinated and mutually reinforcing manner. Learning outcomes are written at the module level and are intentionally framed to reflect conceptual understanding of systems rather than discipline-specific factual recall alone. Teaching is primarily discipline-led, but content delivery is carefully sequenced so that related concepts across subjects are taught in close temporal proximity. This sequencing is reinforced through planned integrated **multidisciplinary** activities such as problem-based learning, case-based learning and **clinico concept connect sessions** that require students to draw connections across disciplines. Teaching methods extend beyond lectures to include small-group discussions with structured clinical problem triggers that encourage early application of knowledge. Assessment in this phase is knowledge-focused, but incorporates integrated items and short clinical vignettes to test applied understanding (**C4 level**) across disciplines. These integrated assessment elements are deliberately introduced to prepare students for more complex synthesis (**C6 level**) in later phases, while maintaining the reliability. Regular interdisciplinary planning meetings and module coordination ensure coherence, avoid unnecessary duplication and maintain alignment between teaching and assessment.

Phase 2- The Bridge

As students enter the pre-clinical phase, the curriculum transitions into a multidisciplinary and subsequently interdisciplinary design. At this stage, curricular organisation shifts more clearly towards clinical systems and patient presentations, and learning outcomes emphasise the integration of knowledge, skills and reasoning across disciplines. Rather than subjects contributing independently, departments collaborate in the design and delivery of modules, and students encounter learning experiences that require simultaneous application of concepts from multiple domains. Teaching is increasingly delivered through team-based and co-facilitated sessions, with clinicians and basic scientists jointly guiding learning activities. Case-based learning, integrated practical sessions and simulation-based teaching become central modalities, allowing students to engage with clinically meaningful problems while still grounded in scientific principles.



The curriculum adopts a spiral structure in which key concepts are revisited at increasing levels of complexity, enabling deeper understanding and clinical relevance. In advanced pre-clinical components, the curriculum becomes explicitly task-oriented, focusing on common clinical presentations and professional activities rather than disciplinary content. At this stage, portfolios are introduced to support longitudinal documentation of learning, and early forms of workplace-linked assessment and entrustable activities are incorporated to familiarise students with performance-based expectations. Assessment strategies emphasise synthesis and reasoning, using integrated written examinations, complex case vignettes, OSCEs and structured simulation assessments. Decisions about student progress increasingly rely on aggregated evidence from multiple assessment tools and research projects.

Phase 3- The Workplace Entrustment

In the clinical phase, the curriculum becomes fully transdisciplinary, with learning embedded within authentic patient care and professional practice. Educational activities are organised around real clinical tasks, patient care pathways and **Entrustable Professional Activities** that reflect the core responsibilities of a graduating doctor. Students are integrated into clinical teams and participate in patient care under supervision, progressively assuming greater responsibility as competence is demonstrated. Teaching is predominantly workplace-based, supported by bedside teaching, coaching, reflective practice and targeted simulation for complex or high-risk activities. The distinction between disciplines becomes secondary to the holistic management of patients, as students are expected to integrate biomedical knowledge, clinical skills, communication, professionalism and teamwork in real settings. Assessment is programmatic and centred on performance in the workplace, using tools such as mini-CEX, DOPS, case-based discussions and multisource feedback. Evidence from these assessments is collected longitudinally within



Miller's Pyramid of Clinical Competence

portfolios and reviewed by entrustment or competence committees to make informed decisions about progression and readiness for practice. Summative judgment is therefore based on sustained performance over time. Faculty roles evolve from subject teachers to supervisors, assessors and coaches, with explicit responsibility for observation, feedback and entrustment decisions. Diverse clinical exposure in tertiary public sector hospitals and community settings ensure adequate exposure, supervision and assessment opportunities, while quality assurance processes focus on the validity and consistency of entrustment decisions and learning experiences.

Phase 4- The Undergraduate Internship

The Undergraduate Internship is a structured, supervised transition phase designed to consolidate clinical competence and ensure readiness for the statutory house job. It provides learners with protected, workplace-based exposure focused on authentic patient care tasks, guided by clearly defined Entrustable Professional Activities aligned with international standards. Teaching emphasises supervised clinical practice, simulation for high-risk scenarios, and interprofessional teamwork, while assessment uses programmatic

workplace-based tools, portfolios and entrustment decisions to judge safe, consistent performance. This level strengthens patient safety, reduces transition shock, and ensures that graduates enter the house job with demonstrable, documented readiness for independent supervised practice.

Across all phases, the curriculum is underpinned by faculty development and continuous quality assurance. The staged movement from complementary through multidisciplinary and interdisciplinary learning to transdisciplinary clinical practice ensures that graduates are not only knowledgeable, but also capable of applying their learning effectively and safely in real clinical environments. This integrated and progressive design reflects contemporary best practices in medical education and aligns the educational experience with the expectations of modern healthcare systems.

Key Highlights

- Transcends Harden's Level 11 through integration with society, systems, ethics, and lifelong learning
- Fully aligned with PMDC undergraduate medical education standards
- Emphasizes higher-order thinking: Analysis, Evaluation, and Creation (Bloom's Taxonomy)
- Produces socially accountable, adaptive physicians prepared for 21st-century healthcare challenges

1. Foundations of Integration

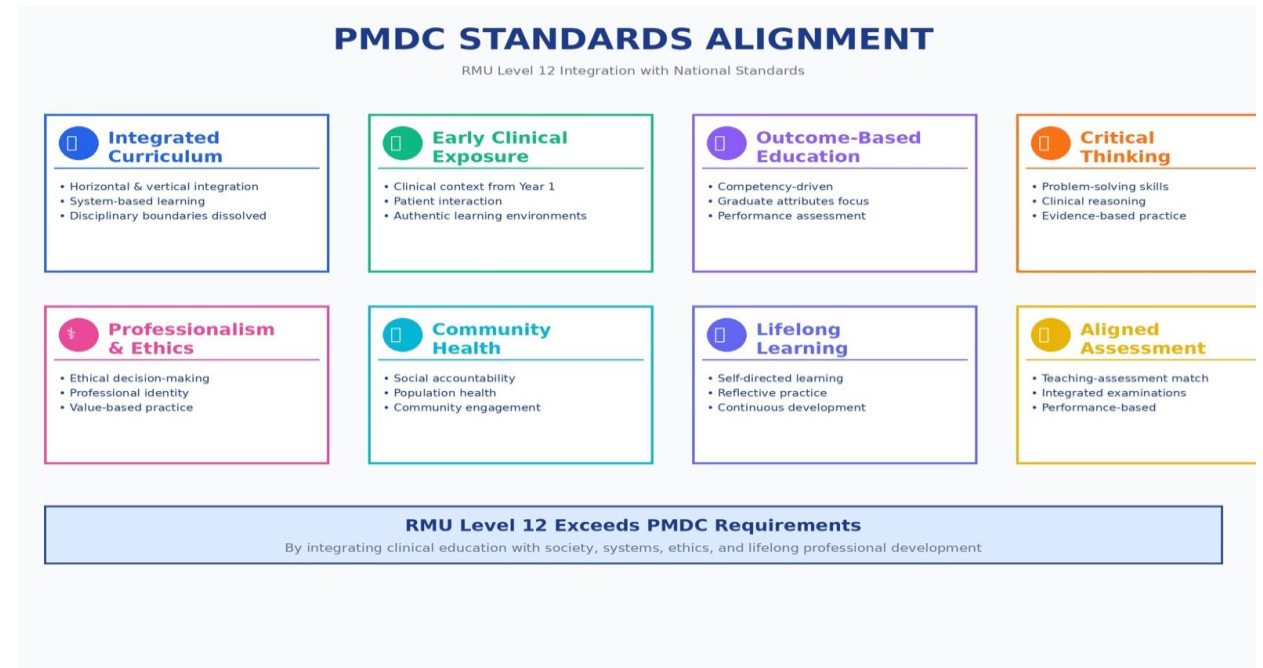
1.1 PMDC Standards for Medical Education

The Pakistan Medical and Dental Council mandates a transformative approach to undergraduate medical education characterized by:

- **Integrated Curriculum:** Horizontal integration (across disciplines) and vertical integration (across years)
- **Early Clinical Relevance:** Clinical context introduced from initial years
- **Outcome-Based Education:** Focus on graduate competencies rather than content coverage
- **Critical Thinking & Problem-Solving:** Development of analytical and evaluative skills
- **Professionalism & Ethics:** Embedded throughout the curriculum, not as isolated modules
- **Alignment of Teaching, Learning, and Assessment:** Constructive alignment with graduate outcomes

1.2 Harden's Integration Ladder: Overview

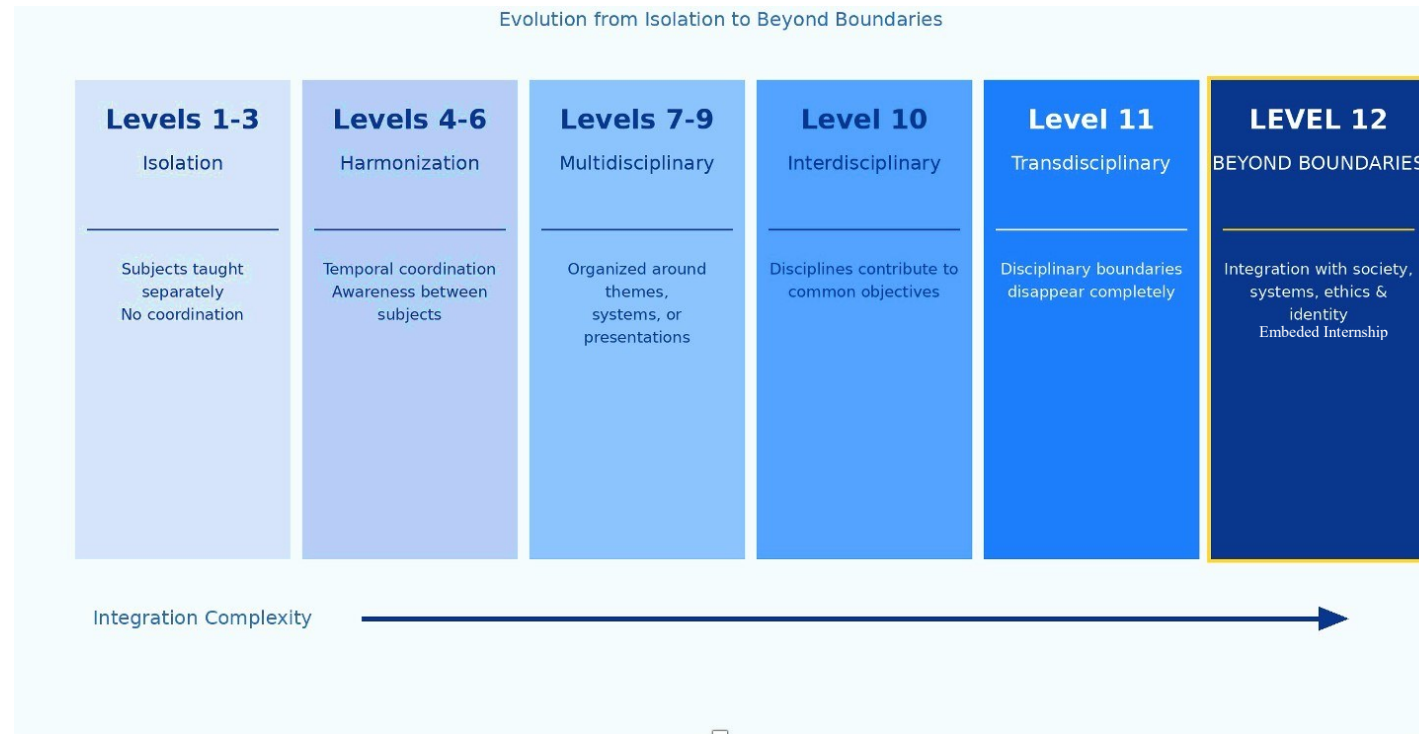
Harden's Integration Ladder provides a systematic framework for evaluating curricular integration, progressing through 11 levels:



Harden's Integration Ladder



RMU – 12 Beyond Boundaries



2. RMU 12 – Isolation to Beyond Boundaries

2.1 Conceptual Definition

RMU Level 12: Beyond Boundaries Integration

A curriculum in which learning is organized not merely around disciplines or clinical problems, but around real-world health systems, societal needs, ethical complexity, population health challenges, and professional identity formation—producing graduates who can adapt, lead, and innovate across contexts.

2.2 Why Level 12 Exists

While Harden's Integration Ladder culminates at Level 11 (Transdisciplinary Integration), contemporary medical education—particularly as mandated by PMDC—requires graduates who can function beyond the clinical encounter. RMU operates beyond transdisciplinary clinical integration by:

- Shifting the unit of integration from the patient alone to the patient embedded within society, systems, ethics, and professional identity
- Addressing health systems, governance, and resource allocation as integral learning domains
- Embedding knowledge creation and research literacy, not just knowledge synthesis
- Structuring lifelong learning and adaptive professionalism as explicit outcomes

2.3 Five Pillars of Level 12 Integration

A. Societal Integration: Patient-in-Society Problems

Level 11: Patient-centered clinical problems

RMU Level 12: Patient-in-society problems

RMU Implementation:

- Community-based medical education

- Analysis of social determinants of health
- Preventive and promotive healthcare strategies
- Health equity considerations in clinical decision-making

Students don't merely diagnose disease they analyze population patterns and design interventions, requiring evaluation and creation (Bloom's highest levels).

B. Value-Based Integration: Contextual Ethics

Level 11: Ethics integrated within cases

RMU Level 12: Ethics embedded longitudinally in real decisions

RMU Implementation:

- Ethical dilemmas arising from real patient encounters, not hypothetical scenarios
- Continuous professional identity formation throughout the curriculum
- Assessment of reflective practice and ethical reasoning

Students must weigh competing values, manage uncertainty, and justify actions—hallmarks of evaluation-level cognition.

C. System-Level Integration: Healthcare Systems & Leadership

Level 11: Focus on individual patient care

RMU Level 12: Focus on healthcare systems and governance

RMU Implementation:

- Exposure to health systems functioning and policy implications
- Understanding resource allocation realities
- Leadership and teamwork competencies



Students evaluate trade-offs between individual benefit and population good something no single discipline or clinical problem can teach.

D. Knowledge Creation: Beyond Synthesis

Level 11: Knowledge synthesis **RMU Level 12:** Knowledge generation

RMU Implementation:

- Research literacy and critical appraisal skills
- Clinical audits and community health projects
- Evidence-based practice and innovation

Students formulate research questions, design solutions, and create outputs—aligning with the creation level of Bloom's Taxonomy.

E. Temporal Integration: Lifelong Professional Identity

Level 11: Competent graduate **RMU Level 12:** Adaptive professional

RMU Implementation:

- Reflective portfolios documenting professional growth
- Self-directed learning plans
- Feedback-driven continuous improvement

Graduates leave with the ability to identify learning needs and adapt to new contexts—temporal integration across undergraduate education and professional life.

| LEVEL 11 vs LEVEL 12 | |
|--|--|
| The Evolution Beyond Transdisciplinary Integration | |
| LEVEL 11 Transdisciplinary | LEVEL 12 Beyond Boundaries |
| Unit of Integration Patient problem | Unit of Integration Patient within society, systems, and ethics |
| Primary Focus Clinical problem-solving | Primary Focus Clinical + population health + systems thinking |
| Scope Individual patient care | Scope Individual care + community + healthcare systems |
| Ethics Approach Integrated within cases | Ethics Approach Longitudinally embedded in real decisions |
| Knowledge Type Knowledge synthesis | Knowledge Type Knowledge creation & generation |
| Learning Organization Around clinical problems | Learning Organization Around health challenges & society |
| Disciplinary Boundaries Dissolved in teaching | Disciplinary Boundaries Extended to societal integration |
| Graduate Outcome Competent clinician | Graduate Outcome Adaptive, socially accountable professional |
| Bloom's Taxonomy Primarily Analysis | Bloom's Taxonomy Analysis → Evaluation → Creation |

3. Alignment with PMDC Standards

| PMDC Competency | RMU Implementation | Level 12 Justification |
|---|--|--|
| Medical Knowledge | Integrated system-based modules combining anatomy, physiology, pathology, pharmacology, radiology, and clinical medicine | Knowledge constructed through real patient problems; subject boundaries dissolved |
| Clinical Skills & Patient Care | Early clinical exposure, bedside teaching, skills labs, OSCEs | Skills and knowledge learned simultaneously in authentic clinical contexts |
| Clinical Reasoning | Case-based learning, problem-based tutorials, integrated examinations | Learning organized around clinical problems requiring synthesis beyond single disciplines |
| Communication Skills | Longitudinal communication training embedded in OSCEs and ward teaching | Communication competencies embedded within patient encounters, not isolated modules |
| Professionalism & Ethics | Longitudinal professionalism themes, ethics discussions during clinical rotations | Ethical reasoning contextualized within patient care—extends to value-based integration |
| Community & Preventive Health | Community-based medical education, public health projects, outreach programs | Integrates clinical medicine with population health and social determinants— societal integration |
| Lifelong Learning | Reflective practice, research literacy, self-directed learning tasks | Students identify learning needs from clinical encounters—temporal integration |

The following table demonstrates explicit mapping between PMDC graduate competencies, RMU curriculum implementation, and justification for Level 12 integration:

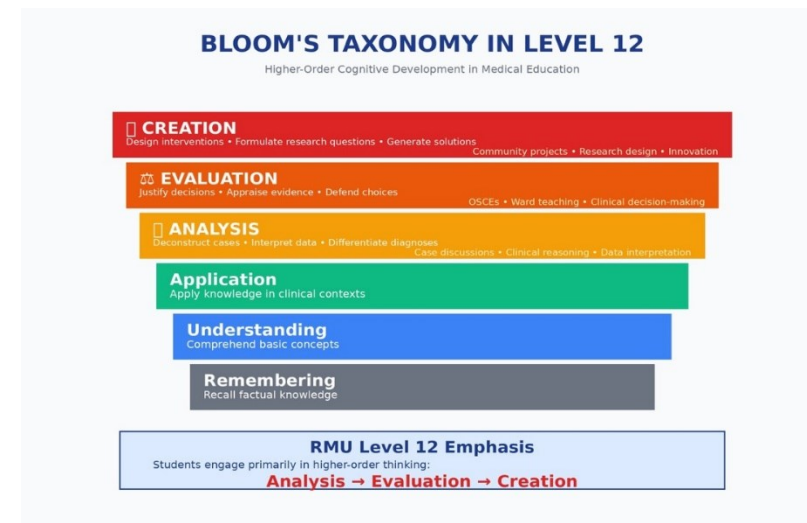
4. Bloom's Taxonomy & Higher-Order Thinking

RMU's curriculum explicitly targets higher-order cognitive domains of Bloom's Taxonomy:

- **Analysis:** Breaking down complex clinical cases, interpreting investigations, differentiating diagnoses
- **Evaluation:** Appraising evidence, justifying management decisions, defending clinical choices
- **Creation:** Designing interventions, formulating research questions, developing solution

4.1 Learning Activities Mapped to Bloom's Levels

| Learning Activity | Bloom's Level | Justification |
|-------------------------------------|------------------------------|--|
| Integrated case-based discussions | Analysis | Students deconstruct complex cases, interpret investigations, differentiate diagnoses |
| Ward-based clinical teaching | Analysis → Evaluation | Learners appraise patient data and justify management decisions in real time |
| OSCEs and scenario-based stations | Evaluation | Students defend clinical decisions, prioritize care, demonstrate judgment under pressure |
| Community health projects | Evaluation → Creation | Learners assess community needs and design context-specific preventive interventions |
| Research projects & clinical audits | Creation | Students formulate questions, design studies, generate new knowledge |



GRADUATE OUTCOMES

Level 12 Integration Produces Adaptive Professionals

CORE COMPETENCIES

- ✔ **Clinical Excellence**
 - Evidence-based practice
 - Diagnostic reasoning
 - Patient safety
- ✔ **Professionalism**
 - Ethical decision-making
 - Patient-centered care
 - Accountability
- ✔ **Communication**
 - Effective patient interaction
 - Interprofessional collaboration
 - Cultural competence
- ✔ **Population Health**
 - Community engagement
 - Preventive focus
 - Health promotion

ADAPTIVE CAPABILITIES

- ▢ **Systems Thinking**
 - Health systems understanding
 - Policy awareness
 - Resource management
- ▢ **Research Literacy**
 - Critical appraisal
 - Knowledge generation
 - Evidence synthesis
- ▢ **Lifelong Learning**
 - Self-directed growth
 - Reflective practice
 - Adaptive expertise
- ▢ **Leadership**
 - Innovation
 - Change management
 - Team development

**ADAPTIVE, SOCIALLY ACCOUNTABLE
PROFESSIONAL**

RMU LEVEL 12 FRAMEWORK

Complete Conceptual Flow

FOUNDATIONS

PMDC Standards

- Integrated curriculum
- Outcome-based education

Harden's Level 11

- Transdisciplinary
- Clinical problems focus

LEVEL 12: BEYOND BOUNDARIES

1

Societal
Integration

2

Value-Based
Integration

3

System-Level
Integration

4

Knowledge Creation
Integration

5

Temporal
Integration

Teaching

Strategies

Assessment

Strategies

Integration

Strategies

ADAPTIVE, SOCIALLY ACCOUNTABLE PROFESSIONAL

Analysis → Evaluation → Creation

Conclusion

Rawalpindi Medical University's curriculum exemplifies a transformational approach to medical education that extends beyond traditional disciplinary integration. By achieving **Level 12: Beyond Boundaries Integration**, RMU demonstrates that modern medical education must prepare graduates not only as competent clinicians but as adaptive, reflective, socially accountable professionals capable of navigating complex health systems, ethical dilemmas, and evolving healthcare landscapes.

This framework, fully aligned with PMDC standards and grounded in Bloom's higher-order cognitive domains, positions RMU as an innovator in outcome-based, student-centered medical education that produces physicians prepared for 21st-century healthcare challenges.

The Five Pillars of Level 12—Societal Integration, Value-Based Integration, System-Level Integration, Knowledge Creation, and Temporal Integration—collectively represent a holistic vision for medical education that transcends disciplinary boundaries and prepares graduates for lifelong professional excellence.

Key Takeaways for Educators

- Level 12 integration is achievable through deliberate curriculum design aligned with regulatory standards
- Higher-order thinking (Analysis, Evaluation, Creation) must be explicitly embedded in learning activities
- Integration extends beyond clinical problems to encompass society, systems, ethics, and professional identity
- Assessment strategies must align with transdisciplinary learning objectives
- The ultimate goal is producing adaptive professionals, not merely competent graduates

Clinico - Concept Connect Session (C³6)

Introduction:

A Clinico -Concept Connect Session is a **case-based, concept-driven educational encounter** in which a carefully designed clinical scenario is used as the central anchor to explore and integrate relevant concepts from basic and clinical sciences. This **Session** is an integrated teaching–learning activity designed to bridge the gap between **foundational biomedical concepts** and their **real-world clinical application**. It serves as a structured platform where students actively connect basic science principles with clinical reasoning, patient presentation, and professional decision-making, thereby promoting deeper understanding and long-term retention of knowledge.

This session moves beyond traditional discipline-based teaching by fostering **conceptual integration, contextual learning, and early clinical exposure**, enabling students to appreciate the relevance of basic sciences in patient care from the outset of their medical training.

Rather than teaching facts in isolation, the session emphasizes:

- Understanding **why** a concept matters clinically
- Applying **core principles** to explain patient findings
- Developing **clinical reasoning skills** in a guided, safe learning environment

The focus remains on **conceptual clarity, clinical correlation, and professional competence**, rather than diagnosis-driven or management-heavy discussions.

Structure of the Clinico -Concept Connect Session

The session is structured into clearly defined phases to ensure alignment with learning outcomes and progressive student engagement:

1. Clinical Trigger (Case Introduction)

- A concise, authentic clinical scenario is presented.
- The case is selected to naturally elicit key underlying concepts.
- Information is disclosed in a focused manner to stimulate curiosity and inquiry.

2. Concept Mapping and Exploration

- Relevant foundational concepts (e.g., physiological mechanisms, biochemical pathways, structural–functional relationships) are identified.
- Students are guided to link clinical signs, symptoms, and investigations to these concepts.

C3: Clinico Concept Connect

C6: Bloom's Level C6 (Creation / Synthesis)

Learners integrate knowledge from basic, para-clinical, and clinical sciences to formulate differential diagnoses, management plans, or clinical reasoning pathways, demonstrating higher-order thinking and decision-making.

Reference: Anderson, L. W., & Krathwohl, D. R. (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives.

- Emphasis is placed on **mechanisms**, not memorization.

3. Integrated Discussion

- Faculty from relevant disciplines facilitate discussion collaboratively.
- Concepts are reinforced through clinical correlation and guided questioning.
- Students actively participate in explaining findings using scientific reasoning.

4. Application and Reflection

- Learners reflect on how conceptual understanding informs clinical thinking.
- Key take-home messages are summarized.
- Opportunities for self-directed learning and further exploration are highlighted.

Implementation Strategy

The Clinico -Concept Connect Session is implemented as a **planned, scheduled activity** within the integrated curriculum and follows these principles:

- **Faculty Collaboration:** Basic science and clinical faculty jointly design and facilitate sessions to ensure coherence and relevance.
- **Curriculum Alignment:** Each session is mapped to predefined learning outcomes, competencies, and entrustable professional activities.
- **Active Learning:** Small-group discussions, guided questioning, and concept linking are emphasized over didactic teaching.
- **Progressive Complexity:** Early sessions focus on core concepts, with increasing clinical depth as students advance.
- **Feedback and Reflection:** Structured feedback is provided to reinforce learning and improve reasoning skills.

Educational Value

Through its integrated design, the Clinico -Concept Connect Session:

- Strengthens **conceptual understanding**
- Enhances **clinical reasoning and analytical skills**
- Encourages **horizontal and vertical integration**
- Promotes **student engagement and ownership of learning**
- Prepares learners to become **practice-ready, concept-driven clinicians**

Harden Level 11 Transdisciplinary

Example of **Clinico - Concept Connect (C³6)** Session

Theme Title from Molecules to Medicine: Clinical Applications of Molecular Biology and Genetics

Clinico -Concept Connect (C³6) Session

Clinical Case Scenario: A lady with progressive fatigue

A 22-year-old woman presents to the outpatient clinic with progressive fatigue, muscle weakness, and episodes of dizziness, particularly after prolonged fasting. She reports poor exercise tolerance and occasional nausea.

There is no history of infection or chronic illness. A sibling has a similar condition.

On examination, she appears thin but alert. Vital signs are stable. Mild proximal muscle weakness is noted.

There is no organomegaly.

Laboratory and Molecular Findings

- Fasting blood glucose: Low
- Serum electrolytes: Normal
- Enzyme activity assay: Reduced activity of a glucose-metabolizing enzyme
- Genetic analysis: Point mutation in enzyme-encoding gene
- Family screening: Similar mutation identified

This case exemplifies how a **single molecular defect** leads to systemic clinical manifestations, reinforcing the transition from molecular mechanisms to patient-centered medicine

Educational Relevance to Theme

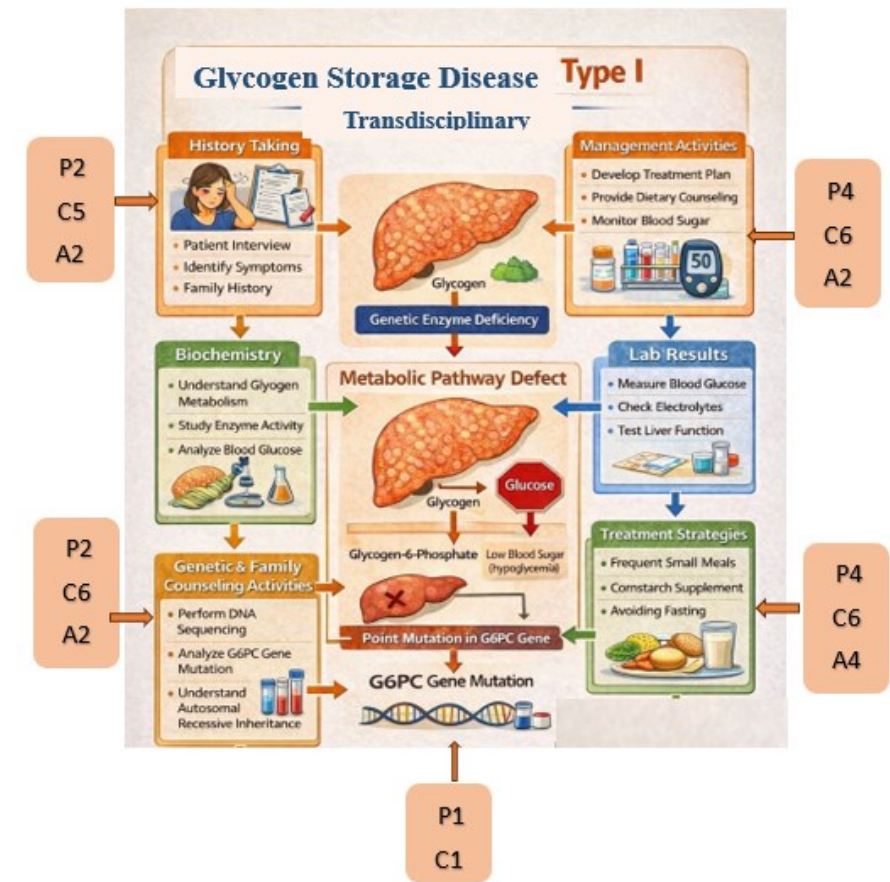
This case allows learners to trace disease progression:

Gene mutation → Altered protein structure → Enzyme dysfunction → Metabolic failure →

Clinical presentation

It reinforces:

- Gene expression and mutation



Clinico-Concept Connect (C³6) Sessions Transdisciplinary Integration (Harden Level 11)

| Domains of Learning According to Blooms Taxonomy | | | | | |
|--|---------------|---------------------------------------|----------------|--|-------------|
| Cognitive Domain: knowledge and mental skills. (C) | | Psychomotor Domain: Motor skills. (P) | | Affective Domain: feelings, values, dispositions, attitudes, etc (A) | |
| • C1 | Remembering | P1 | Imitation | A1 | Receive |
| • C2 | Understanding | P2 | Manipulation | A2 | Respond |
| • C3 | Applying | P3 | Precision | A3 | Value |
| • C4 | Analyzing | P4 | Articulation | A4 | Organize |
| • C5 | Evaluating | P5 | Naturalization | A5 | Internalize |
| • C6 | Creating | | | | |

- Enzyme kinetics and regulation
- Metabolic adaptation during fasting
- Familial inheritance patterns
- Role of molecular diagnostics in clinical practice

Learning Objectives

By the end of this theme, the student will be able to:

- Explain the molecular basis of gene expression, including transcription, translation, and regulation of enzymes.
- Describe the role of enzymes, cofactors, and inhibitors in normal metabolic processes and disease states.
- Correlate molecular and genetic abnormalities with common clinical conditions such as metabolic disorders, infertility, and cancer.
- Understand basic molecular mechanisms underlying inherited and acquired genetic diseases.
- Apply principles of molecular biology and genetics to interpret simple clinical and laboratory scenarios.

Appreciate the relevance of molecular medicine in diagnosis, prognosis, and therapeutic decision-making.

Integration Framework

Harden Level 9 – Multidisciplinary Integration

This C³⁶ session operates at **Harden Level 9**, where multiple disciplines address the *same clinical problem* in parallel, maintaining disciplinary identity while reinforcing conceptual alignment.

Disciplines Involved

- **Anatomy**
 - Liver and skeletal muscle structure involved in glucose metabolism
 - Anatomical basis of muscle weakness and exercise intolerance
- **Biochemistry**
 - Enzyme kinetics, regulation, and metabolic pathways
 - Impact of genetic mutations on enzyme activity
- **Medicine**

- Clinical evaluation of fasting hypoglycemia
- Diagnostic reasoning in inherited metabolic disorders
- **Surgery**
 - Peri-procedural metabolic considerations
 - Role in diagnostic evaluation where indicated

Each discipline contributes **complementary insights** without content fusion, fulfilling the criteria of multidisciplinary integration

Explicit EPA Mapping

EPA-1: Interpret Clinical and Laboratory Data

Entrustment Level: 1–2

Students interpret fasting glucose levels and enzyme assays under supervision.

EPA-2: Apply Basic Science to Clinical Reasoning

Entrustment Level: 1

Students explain how molecular mutations produce clinical disease.

EPA-3: Communicate Findings in a Structured Manner

Entrustment Level: 1–2

Students present the case during group discussions.

EPA-4: Demonstrate Professionalism and Teamwork

Entrustment Level: 1

Students engage respectfully in multidisciplinary learning.

Mapping to Harden Levels

- **Level 8 (Complementary):**
Coordinated teaching of genetics, biochemistry, and anatomy around a shared theme
- **Level 9 (Multidisciplinary):**
Parallel disciplinary analysis of the same clinical case

- **Level 10 (Interdisciplinary):**

Early synthesis of molecular, biochemical, and clinical data into a unified explanation

Teaching–Learning Strategy

- Case-based discussion
- Facilitated multidisciplinary dialogue
- Guided molecular-to-clinical reasoning
- Early clinical exposure emphasis

Assessment Alignment

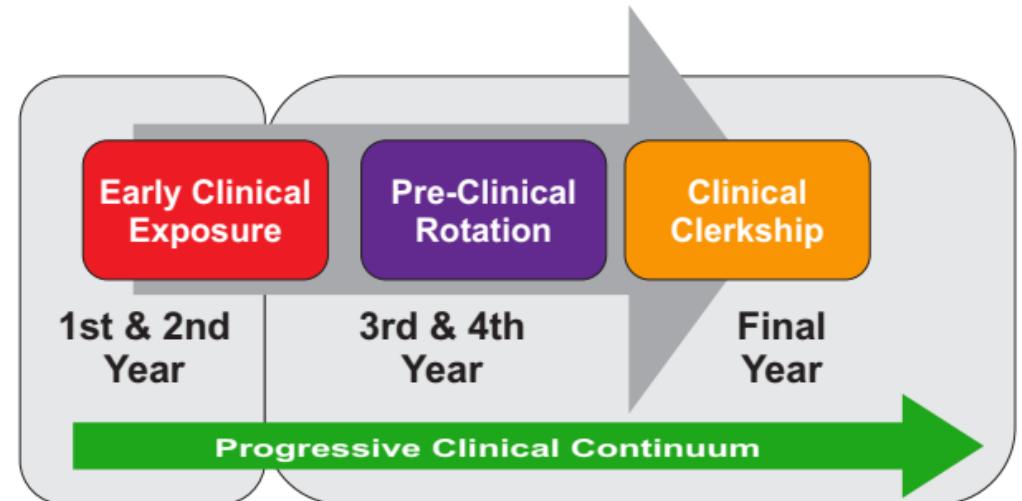
- MCQs (conceptual and application-based)
- SAQs focusing on molecular–clinical correlation
- OSPE/OSVE elements where applicable

Summary Statement

Theme Five exemplifies RMU-12’s philosophy of “From Isolation to Beyond Boundaries” by translating molecular biology and genetics into meaningful clinical understanding through a structured Clinico -Concept Connect session. Operating at Harden Level 9 and aligned with early EPAs, this theme prepares students for progressive entrustment, clinical reasoning, and future practice-ready learning in molecular and precision medicine.

Foreword to Curriculum 2026

- Introduction
- Levels of Integration
- PMDC Seven Star Doctor Competencies
- Contextualization in the curriculum
- Context Facets of Curriculum 2026 at Rawalpindi Medical University
- Process of Curriculum Development
- Curricular Organization and Structure



Integrated Curriculum Design

Introduction

Welcome to the fourth edition of the Clinically Oriented Integrated Modular Curriculum for the MBBS students at Rawalpindi Medical University. This revised version is tailored to integrate clinical insights from the very beginning, ensuring a more practical and application-focused approach to the fundamental medical sciences. At Rawalpindi Medical University, we are committed to providing a curriculum that not only covers the essential theoretical knowledge but also emphasizes the development of critical clinical skills necessary for future medical professionals. This curriculum is designed to foster a deep understanding of human biology and the pathophysiological processes, combined with hands-on clinical experiences that contextualize theoretical knowledge in real-world medical settings.

Version IV of the curriculum incorporates the latest advancements in medical education and reflects changes in the medical landscape, ensuring our students are well-prepared to meet the challenges of modern healthcare environments. With a focus on interdisciplinary learning and ethical practice, we aim to equip our students with the competence and compassion required to excel in their future careers.

We trust that this curriculum will inspire and challenge you to reach new heights in medical education and beyond. Welcome to a journey of learning that promises to be as rewarding as it is demanding.

What is curriculum?

According to definition curriculum can be classified into five categories:

1. Curriculum as a product - program, document, electronic media, or multimedia
2. Curriculum as a program of study - usually courses offered, curriculum sequences of study instandards as benchmarks, gateways,
3. Curriculum as intended learnings - goals, content, concepts, generalizations, outcomes
4. Curriculum as experiences of the learner - activities, planned and unplanned.
5. Hidden curriculum - what students learn that isn't planned - unless you plan for this - or is it possible?

What is a Integrated Medical Curriculum?

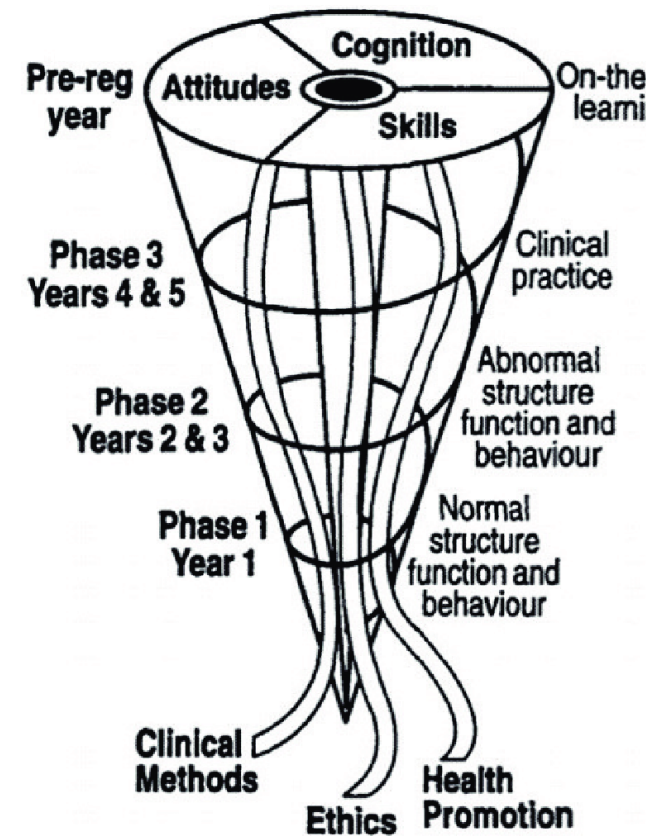
Shoemaker defines an integrated curriculum as “education that is organized in such a way that it cuts across subject matter lines, bringing together various aspects of the curriculum into meaningful association to focus upon broad areas of study.”

There is an ongoing discussion about whether medical curriculum should be discipline based or integrated.

Most curricula for medical education have been integrated horizontally and vertically—vertically between basic and clinical sciences. The Flexnerian curriculum has disappeared to permit integration between basic sciences and clinical sciences, which are taught throughout the curriculum. We have proposed a different form of integration where the horizontal axis represents the defined learning outcomes and the vertical axis represents the teaching of the sciences throughout the courses. We believe that a mere integration of basic and clinical sciences is not enough because it is necessary to emphasize the importance of humanism as well as health population sciences in medicine. It is necessary to integrate basic and clinical sciences, humanism, and health population in the vertical axis, not only in the early years but also throughout the curriculum, presupposing the use of active teaching methods based on problems or cases in small groups.

The method of teaching medicine, since Flexner's days, implies that students should first learn basic and biomedical sciences and then move to clinical sciences; however, this is not how patients are presented. A common criticism of this approach is that students will not see the relevance of basic and biomedical sciences applied to clinical practice, and it is preferable to encourage students to think as doctors from the day they enter medical school.

Integration is therefore of key importance for medical education because basic science learning is placed in the context of clinical and professional practice and is considered by students to be more meaningful and relevant. In the vast majority of curriculum reforms, vertical integration combines basic and clinical sciences, early clinical experience, clinician–scientist partnerships, and incorporation of sciences in the later years of the course. This is undoubtedly an advantage, but is based on a biologist's vision of the health-illness process



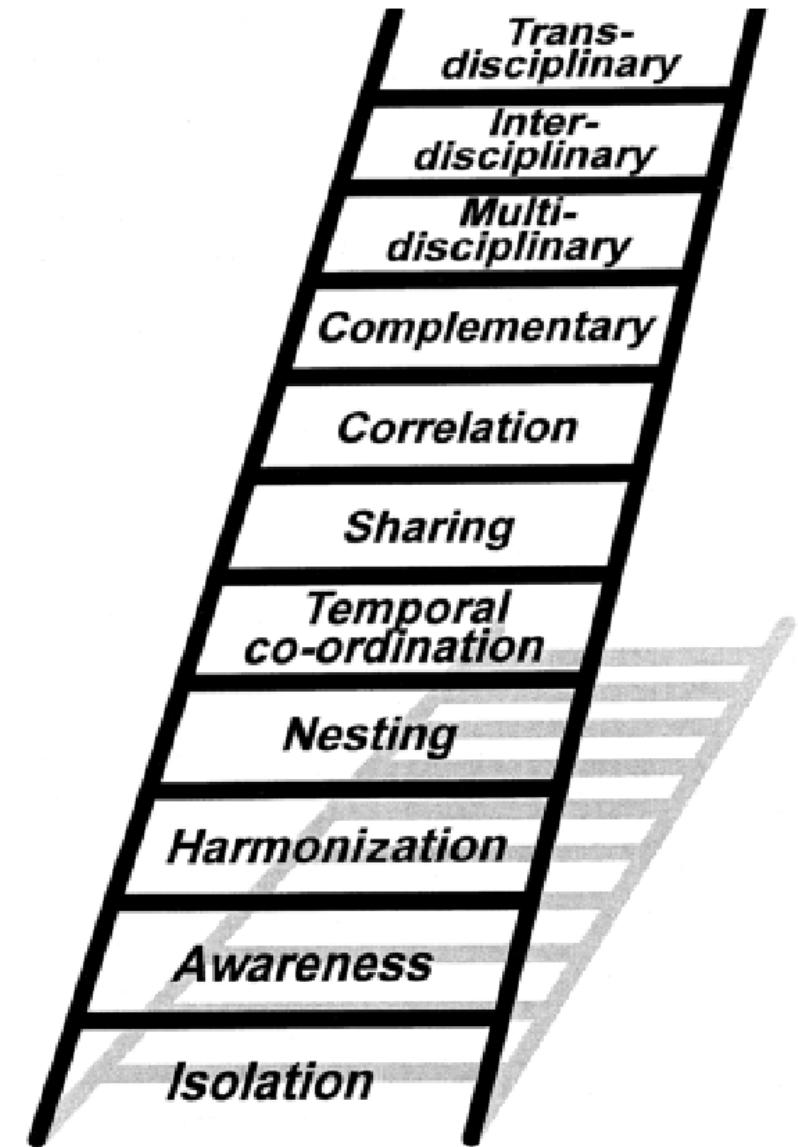
A Spiral Curriculum

Levels of Integration

At Rawalpindi Medical University, our curriculum for the MBBS program adheres to the sophisticated model of Correlation, recognized as level 7 on Harden's scale of integration. This approach is foundational throughout the initial four years of the medical education journey. Our emphasis predominantly remains on discipline-specific education, where courses focused on individual subjects constitute the majority of the curriculum. This traditional structure ensures a robust foundation in the core medical sciences.

Within this discipline-oriented framework, we introduce an innovative element—an integrated teaching session. These sessions are strategically designed to bridge various subjects by identifying and connecting areas of mutual relevance. This method facilitates a holistic learning experience by correlating distinct disciplines and embedding them within a clinical context. This integration enhances the students' understanding and application of medical concepts, making the learning process both comprehensive and applicable to real-world scenarios.

As our students progress through their education, the degree of clinical teaching intensifies. This gradual increase is deliberate, ensuring that by the time our students reach their final year, they are well-prepared to engage in extensive clerkships. Year V is exclusively devoted to these clerkships, offering students hands-on, practical experience in a variety of clinical settings. This exposure is crucial for the development of competent and empathetic future physicians who are equipped to meet the diverse needs of their patients and the healthcare system at large.



Harden's Integration Ladder

PMDC Seven Star Doctor Competencies

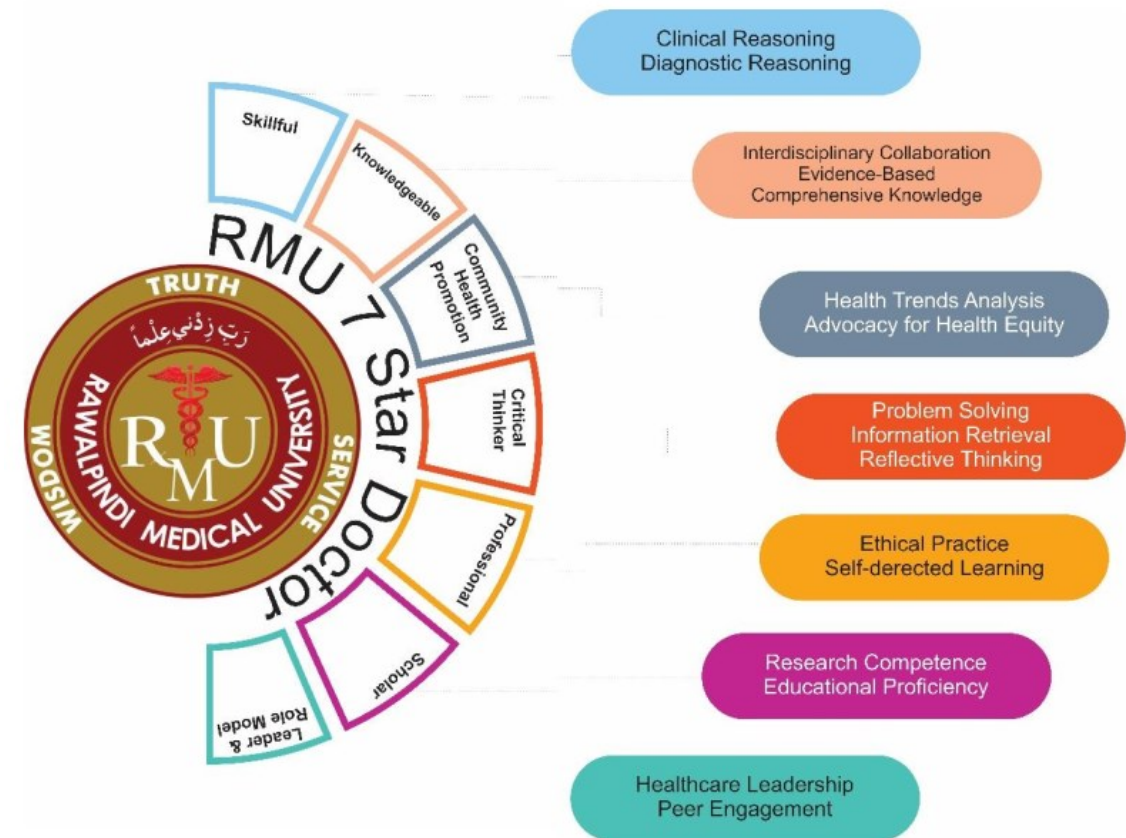
At RMU we aim to produce seven-star doctor according to PMDC Competencies having the generic competencies of “Skill, Knowledge, Community Health Promoter, Critical Thinker, Professional, Scholar, Leader and Role Model”, Rawalpindi Medical University has introduced modular integrated undergraduate curriculum as being first public sector university. These competencies are further outlined by various enabling traits specifying knowledge, skills, and attitude.

Contextualization in the curriculum

It involves incorporating both local needs and global standards. This ensures the curriculum's relevance to the local community while adhering to international benchmarks. For health professionals, this is crucial as it equips students to effectively serve diverse populations in real-world healthcare settings.

Content identification, contextualization, and validation during curriculum development require a balanced consideration of local and global requirements, overseen by relevant leaders and experts. To this end, Rawalpindi Medical University has engaged subject experts and medical educationists, planning to incorporate feedback from local stakeholders to address the current needs effectively.

In Pakistan, the shift towards contextualization is essential, particularly due to the country's unique healthcare challenges like infectious diseases, malnutrition, and maternal and child mortality, compounded by socioeconomic factors. The prevalence of various diseases, limited healthcare resources, and cultural diversity necessitate a customized approach to medical education.



RMU 7 Star Doctor

Contextualizing the curriculum is expected to positively influence graduate performance. By blending basic and clinical subjects, introducing early clinical exposure, and emphasizing practical, context-aware learning, graduates will be better equipped to tackle health challenges in their communities, enhancing their competence, confidence, and ability to deliver high-quality healthcare.

Context Facets of Curriculum 2024 at Rawalpindi Medical University

Rawalpindi Medical University adheres to globally recognized best practices in curriculum development. The Department of Medical Education at RMU has structured the process of syllabi identification, thematic structuring, content validation, and contextualization. This process integrates existing teaching and learning practices with global recommendations for change.

Key perspectives for the context of change include:

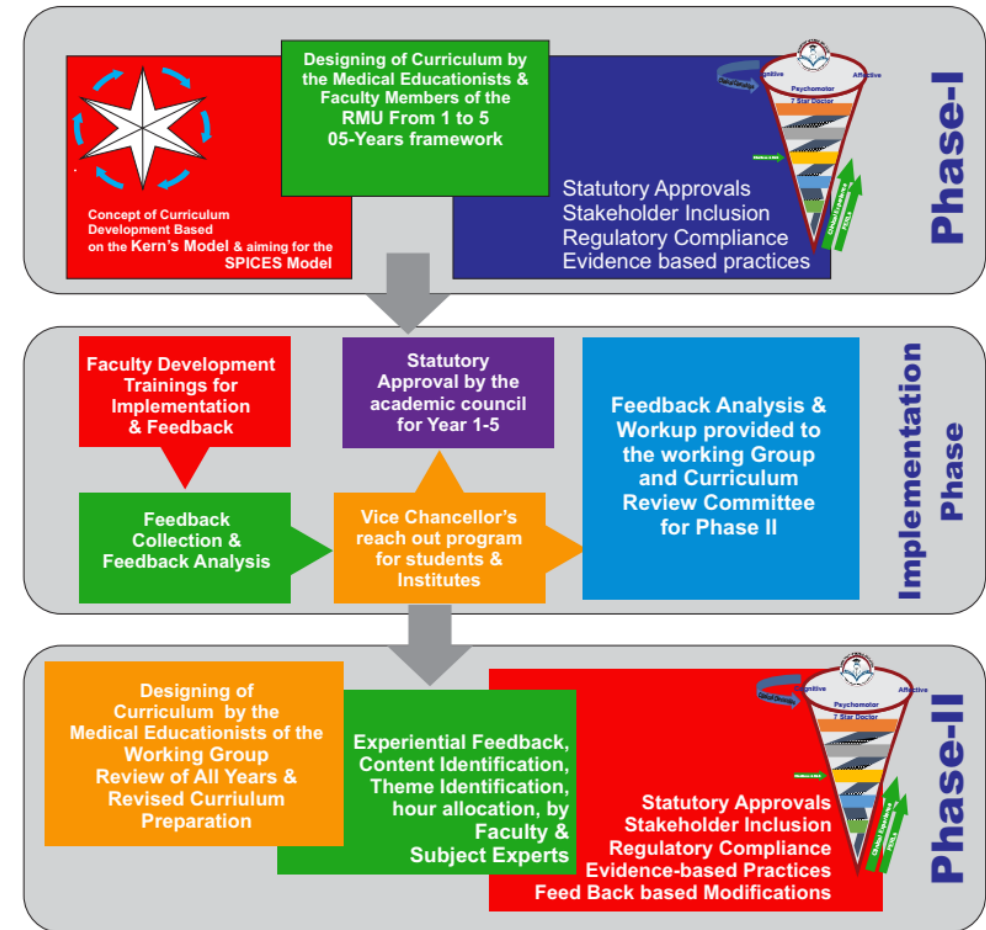
- The exponential growth in course content due to educational advancements, technological innovations, and scientific discoveries requires prioritization, removal of outdated concepts, and modern information transfer methods.
- Evolving societal expectations of healthcare workers necessitate balancing patient satisfaction with health system responsiveness. The curriculum should address societal needs, healthcare access, resource equity, and system awareness.
- The post-pandemic era's shift towards hybrid learning and online methodologies necessitates a curriculum that accommodates these new educational paradigms.
- The curriculum revision is aligned with global standards of Basic Medical Education and conforms to national regulations, ensuring international recognition and employability.
- The curriculum incorporates training in the affective domain to address societal expectations, legal awareness, and community interaction. This includes a dedicated 'spiral' for affective training, with assessments for the 'PERLs' domain.
- Student-centered approaches, such as Problem-Based Learning, electives, self-directed learning, and portfolio development, empower students in their educational journey.

Process of Curriculum Development

The curriculum development process at Rawalpindi Medical University was an intricate and well-orchestrated endeavor, meticulously designed to create an advanced and relevant curriculum. This process maintained a strong linkage with existing educational norms and professional practices while introducing innovative elements. Here's a more detailed breakdown of the process:

1. **Syllabi Development and Expert Consultation:** The first stage involved the formation of subject-specific advisory committees, engaging over 34 experts. Each committee focused on curating and refining the syllabi for their respective subjects. Their primary task was to incorporate all critical elements pertinent to each subject while discarding any obsolete or irrelevant content.
2. **Curricular Committee Review:** The next phase brought together a 26-member Curricular Steering Committee, consisting of medical educationists. This committee played a pivotal role in scrutinizing and endorsing the overarching structure for a 'Modular Integrated Curriculum' spanning five years. Their focus areas included the identification and placement of modules, clerkship planning, and ensuring that the curriculum aligned seamlessly with various assessment techniques.
3. **Theme Identification and Modular Design:** In this phase, 18 medical educators engaged in a dynamic and collaborative exercise. They meticulously arranged syllabi elements into specific modules according to these themes. This step was crucial in determining the topics for each learning objective and allocating appropriate hours for each curriculum component.

4. **Finalization of Modules:** A select group comprising Lead Medical Educationists and members from the Department of Medical Education undertook the final step of module finalization. This involved setting the structure, themes, time allocation, syllabi content, and emphasizing clinical relevance for each module.
5. **Statutory Approval and Integration:** The finalized modules and their associated assessment policies underwent a rigorous approval process through the Academic Council, and the Syndicate. Feedback and recommendations gathered during this statutory process were meticulously integrated into the curriculum guidelines.
6. **Adaptive and Feedback-Oriented Approach:** Recognizing the importance of adaptability and continuous improvement, the university incorporated a system for regular feedback and curricular evaluations. This system ensures that the curriculum remains dynamic, accommodating necessary updates and refinements as needed.
7. **Curriculum 2024 - A Modular Integrated Outcome-Based Approach:** The developed Curriculum is a testament to a comprehensive, outcome-based educational strategy. This strategy enables affiliated colleges to implement the curriculum effectively, respecting each institution's unique identity and vision, despite variations in available resources.
8. **Integrative and Contemporary Educational Strategies:** The curriculum emphasizes both horizontal integration across various disciplines and vertical integration throughout different educational stages. This integrative approach is in line with modern educational theories, like Meizrow's concept of transformative learning and strategies for early clinical exposure. Such an approach is aimed at promoting professional growth and practical knowledge application among students.



Phases of Curriculum Development

In essence, the curriculum development at Rawalpindi Medical University was a detailed, step-by-step process involving extensive expert input, iterative refinement, and a focus on adaptability and modern educational practices

Curricular Organization and Structure

RMU will follow the Correlation approach, corresponding to level 7 of Harden's levels of integration. The emphasis remains on disciplines or subjects, with subject-based courses occupying most of the curriculum time. Within this framework, an integrated teaching session or course is introduced, in addition to the subject-based teaching. This session brings together areas of interest common to each of the subjects. Although the teaching is discipline-based, topics are correlated and taught within a clinical context for better understanding and application of concepts. However, clinical teaching increases gradually with advancing years. The fifth year of the MBBS program is dedicated to clerkships.

Integrated Curriculum Design of RMU MBBS Program

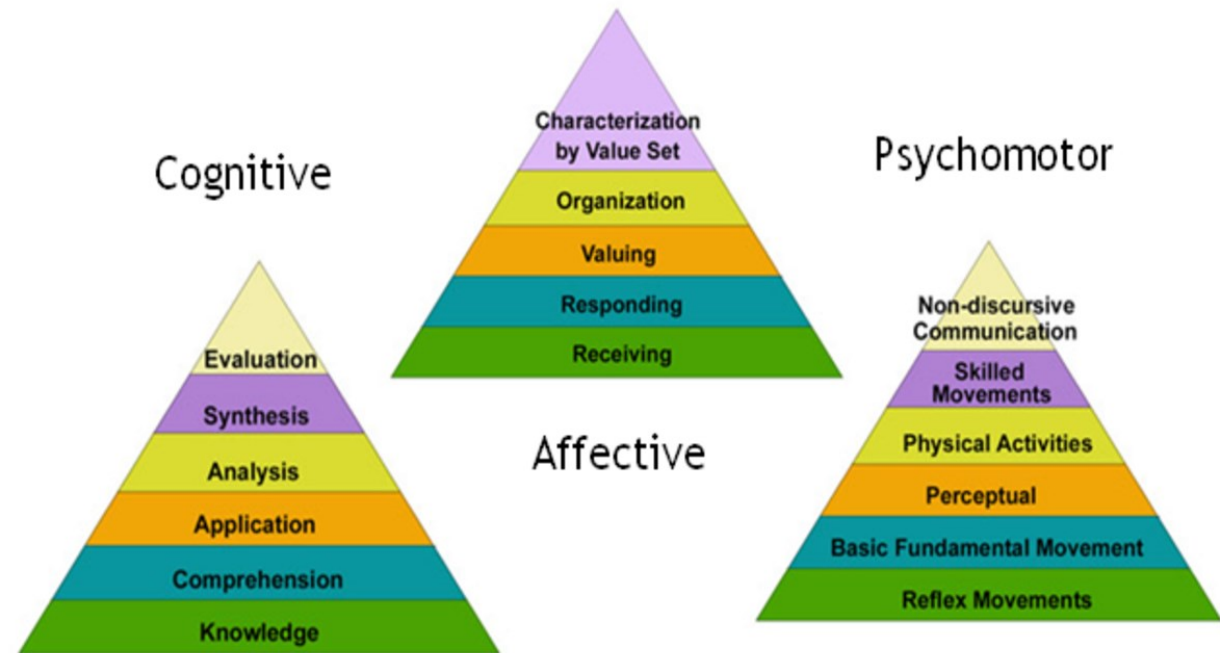
Two designs of the MBBS curriculum are acceptable by PMDC. System Based (Preferred) with horizontal and vertical integration. The curriculum of each Clinical Discipline must emphasize Health Promotion and Disease Prevention, besides Curative Health Care. RMU has opted for system based modular curriculum.

The Module: Module is the smallest unit of Curriculum both in the System- Based and Subject-Base (topic-based) Curricula. Modules are taught as a continuous block or as a longitudinal theme and assessments is carried out at the end of each module. The System-Based Curriculum made up of —Modules, where each module is based upon organ-system(s) of the body. In each module, the Basic and Clinical Sciences are taught and learned in an integrated manner.

Components of a Module:

1)Title of Module/System 2) Learning Objectives, 3) Allocated Time in weeks/Hours and Credit Hours, 4) the name of the Coordinator, 5) Teaching Faculty (regular/visiting) 6) Learning Sites, 8) Modes of Information Transfer, 9) List of the Recommended Books, 10) Assessment strategies, and 11) Strategies for Monitoring and Improvement.

Learning Objectives: Learning Objectives are defined for each module. They are Specific, Measurable, Achievable, Relevant to the desired competencies (Outcomes) of the PMDC Curriculum and Time bound (SMART), related to level of the learner and the three main domains.



Integrated Curriculum Design

Level of the Learner: While developing the curriculum, the learning objectives are according to the desired level of the learner, and formative and summative assessment is done to assess the knowledge, skills and attitudes to be achieved for that level.

Roles and Responsibilities:

- a. The RMU MBBS curriculum in the first four years is delivered in a System-Based Modular Format with clinical relevance and early clinical Exposure. However, in the third and fourth years, students will gain clinical exposure through rotations in the wards and outpatient departments (OPDs), and in the fifth year through clerkships.
- b. The curriculum is delivered by modular teams consisting of multidisciplinary basic science faculty and relevant clinical faculty.
- d. The planning and delivery is coordinated by Module Team who will guide module coordinators of their respective modules for efficient implementation.
- e. The Modular Coordinator is responsible for teaching and assessment during each module. The coordinator will be appointed by the Heads of Departments (HODs) in coordination with the Health Professions Education (HPE) team.
- f. The Clinical Coordinator is responsible for placement, teaching, and assessment during clinical rotations



➤ SECTION – III

RMU 12

Integrated Modular Curriculum 2026

Isolation to **Beyond Boundaries**

➤ **Competency Framework**

- **Undergraduate Competency Model**
- **Outcomes of the Curriculum**

RMU – 12 Integrated Modular MBBS Curriculum 2026
Isolation to Beyond Boundaries
Competency Framework

Competency

PMDC



Figure 1

References

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RMU Undergraduate Competency Model

The Rawalpindi Medical University (RMU) Undergraduate Competency Model is designed to prepare medical students to meet the evolving challenges of modern healthcare. Grounded in the principles of patient-centered care, ethical practice, and community engagement, this model outlines the core competencies that every RMU graduate must attain. These competencies are carefully aligned with the needs of Pakistan's healthcare system and the broader global context, ensuring that RMU graduates are not only skilled clinicians but also ethical leaders, compassionate caregivers, and innovative problem-solvers.

The RMU Undergraduate Competency Model emphasizes a holistic approach to medical education, integrating scientific knowledge with practical skills, critical thinking, and a deep commitment to lifelong learning. Each competency is complemented by specific sub-competencies that provide a clear roadmap for students' development, guiding them from foundational knowledge to advanced clinical practice.

Through this competency-based framework, RMU aims to cultivate graduates who are capable of delivering high-quality, safe, and effective care, while also advancing the health and well-being of the communities they serve. By adhering to these competencies, RMU students will be equipped to excel in diverse medical environments, adapt to the rapidly changing landscape of healthcare, and contribute positively to the society they serve.

Competency 1: Patient Care Deliverer

The "Patient Care Deliverer" competency focuses on the practical aspects of delivering patient care. It emphasizes the importance of applying clinical skills, knowledge, and compassion in providing high-quality healthcare to patients. Students are expected to develop a strong foundation in patient-centered care, practice-based learning, and a commitment to continuous improvement in their clinical practice.

- **Practice-Based Learning:** Students should engage in continuous learning through practical experience, applying evidence-based medicine and reflecting on their clinical practice to improve patient care.
 - Apply evidence-based medicine in clinical practice.
 - Reflect on clinical experiences to improve patient care.
 - Engage in self-directed learning to enhance clinical skills.
- **Service Orientation:** A commitment to serving others is fundamental to the practice of medicine. Students should prioritize the well-being of patients and the community, demonstrating a strong dedication to providing compassionate and effective care.
 - Demonstrate a commitment to patient-centered care.
 - Engage in community service activities.
 - Reflect on the role of service in medical practice.

Competency 2: Ethical & Professional

The "Ethical & Professional" competency encompasses the foundational principles of medical ethics and professional behavior. It requires students to uphold the highest standards of legal and ethical responsibility in their practice. They must demonstrate empathy, integrity, and accountability, treating all individuals with respect and maintaining a commitment to continuous improvement.

- **Professional & Ethical & Legal Responsibility:** Students are expected to understand and apply ethical principles and legal requirements in medical practice. They should be able to identify and analyze ethical dilemmas in healthcare settings and make decisions that prioritize patient well-being.
 - Explain ethical frameworks in medical decision-making.
 - Apply legal standards in patient care.
 - Demonstrate professionalism in all interactions.
- **Capacity for Improvement:** Students should continuously strive to improve their clinical skills, knowledge, and patient care practices through self-assessment and reflective learning.
 - Assess personal strengths and weaknesses.
 - Implement strategies for self-improvement.
 - Seek feedback from peers and mentors.
- **Empathy:** Understanding and sharing the feelings of patients is crucial for building trust and providing compassionate care. Students must develop the ability to empathize with patients from diverse backgrounds.
 - Demonstrate empathy in patient interactions.
 - Reflect on the emotional and psychological aspects of patient care.
 - Integrate empathy into clinical practice.
- **Integrity:** Students must practice medicine with honesty and adhere to moral and ethical principles, ensuring that their actions align with the values of the medical profession.
 - Maintain honesty in patient interactions.
 - Uphold ethical standards in clinical decision-making.
 - Demonstrate transparency in communication with patients and colleagues.

- **Accountability:** Medical students must be accountable for their actions, taking responsibility for their decisions and outcomes in patient care.
 - Take responsibility for clinical decisions.
 - Reflect on the outcomes of patient care.
 - Ensure accountability in teamwork.
- **Respect:** Respect for patients, colleagues, and the broader healthcare team is fundamental. Students should treat everyone with dignity and consideration, regardless of differences in background or beliefs.
 - Demonstrate respect in patient interactions.
 - Collaborate respectfully with team members.
 - Address cultural differences in a respectful manner.

Competency 3: Scholar & Life-Long Learner

The "Scholar & Life-Long Learner" competency highlights the importance of continuous learning and scholarly inquiry in medical practice. Students are encouraged to engage in scientific research, develop critical thinking skills, and commit to lifelong learning to stay current in their field and contribute to the advancement of medical knowledge.

- **Living Systems:** Students should have a deep understanding of living systems and their functions, enabling them to apply this knowledge to patient care.
 - Explain the principles of living systems.
 - Apply knowledge of living systems to clinical practice.
 - Evaluate the impact of living systems on health and disease.
- **Human Behavior:** Understanding human behavior is crucial for effective patient care and communication. Students should be able to analyze behavioral factors that influence health and apply this understanding in clinical settings.
 - Analyze the impact of behavior on health outcomes.
 - Apply behavioral principles in patient care.
 - Reflect on the role of behavior in health and disease.
- **Diagnose and Manage:** Students must be proficient in diagnosing and managing medical conditions, using evidence-based approaches to ensure the best possible outcomes for patients.
 - Diagnose medical conditions accurately.

- Develop management plans for patient care.
- Evaluate the effectiveness of treatment interventions.
- **Scientific Inquiry:** Engaging in scientific inquiry is essential for advancing medical knowledge. Students should be able to conduct research, critically appraise evidence, and contribute to the scientific community.
 - Conduct research on medical topics.
 - Critically appraise scientific literature.
 - Disseminate research findings effectively.
- **Quantitative Reasoning:** Quantitative reasoning skills are necessary for interpreting data and making informed decisions in medical practice. Students should be able to analyze and apply quantitative data in clinical settings.
 - Interpret quantitative data in clinical practice.
 - Apply statistical methods to medical research.
 - Reflect on the role of quantitative reasoning in decision-making.
- **Critical Thinker:** Developing critical thinking skills is vital for solving complex medical problems. Students should be able to analyze information, evaluate evidence, and make reasoned decisions in patient care.
 - Analyze clinical scenarios critically.
 - Evaluate evidence in medical practice.
 - Make informed decisions based on critical thinking.

Competency 4: Team Worker & Communicator

The "Team Worker & Communicator" competency emphasizes the importance of effective communication and teamwork in healthcare settings. Students are expected to develop strong oral and written communication skills, work collaboratively as part of a healthcare team, and demonstrate leadership when necessary. Reliability, adaptability, and resilience are key qualities that support their ability to function effectively in diverse and dynamic clinical environments.

- **Oral and Written Communication:** Students must be able to convey medical information clearly and effectively, both verbally and in writing, to patients, families, and colleagues.
 - Communicate medical information clearly.
 - Develop patient-centered communication strategies.

- Write accurate and comprehensive patient records.
- **Team Member:** Students should actively participate as members of the healthcare team, contributing to collective problem-solving and decision-making processes.
 - Collaborate effectively with team members.
 - Participate in interdisciplinary case discussions.
 - Contribute to team-based patient care.
- **Team Leader:** When required, students should be able to take on leadership roles within the healthcare team, guiding and coordinating the efforts of others.
 - Lead a healthcare team in clinical settings.
 - Make decisions as a team leader.
 - Facilitate effective team communication.
- **Reliability and Dependability:** Students must consistently demonstrate reliability and dependability in fulfilling their clinical responsibilities, ensuring that they are trusted members of the healthcare team.
 - Fulfill clinical duties reliably.
 - Demonstrate dependability in patient care.
 - Maintain consistency in performance under pressure.
- **Resilience & Adaptability:** Students need to develop resilience to cope with the challenges of medical practice and adapt to changes in clinical settings.
 - Demonstrate resilience in stressful situations.
 - Adapt to changes in clinical practice.
 - Reflect on challenges and adapt strategies accordingly.

Competency 5: Community Health Promoter

The "Community Health Promoter" competency focuses on the role of medical students in promoting health within the community. It involves educating and empowering communities, conducting assessments, and engaging with diverse populations to address public health challenges. Cultural competence and advocacy are essential in promoting health equity and improving community health outcomes.

- **Health Education and Promotion:** Students should be able to design and implement health education programs that address the specific needs of the community.
 - Develop health education materials.

- Implement community health promotion activities.
- Evaluate the effectiveness of health education programs.
- **Community Assessment and Engagement:** Students must be capable of assessing the health needs of communities and engaging with community members to identify and address public health issues.
 - Conduct community health assessments.
 - Engage with community stakeholders.
 - Identify public health priorities based on community needs.
- **Cultural Competence:** Understanding and respecting cultural differences is crucial in providing effective community health promotion. Students should be able to work with diverse populations and tailor health interventions accordingly.
 - Demonstrate cultural sensitivity in community interactions.
 - Adapt health interventions to cultural contexts.
 - Reflect on cultural influences in health behaviors.
- **Advocacy and Empowerment:** Students should advocate for policies and practices that promote community health and empower individuals and communities to take control of their health.
 - Advocate for community health initiatives.
 - Empower individuals to make informed health decisions.
 - Promote policies that address social determinants of health.

Competency 6: Quality & Safety Practitioner

The "Quality & Safety Practitioner" competency emphasizes the importance of patient safety and quality improvement in healthcare. Students are trained to understand and apply patient safety principles, comply with regulatory requirements, and collaborate with interdisciplinary teams to ensure the highest standards of care.

- **Patient Safety Principles:** Students must understand and apply patient safety principles to prevent medical errors and enhance the quality of care.
 - Identify potential safety risks in clinical practice.
 - Implement strategies to prevent medical errors.
 - Evaluate the effectiveness of patient safety interventions.

- **Regulatory Compliance:** Knowledge of and adherence to regulatory standards is essential in maintaining patient safety and quality care. Students must be familiar with relevant regulations and ensure compliance in their practice.
 - Understand and apply healthcare regulations.
 - Ensure compliance with legal and regulatory standards.
 - Reflect on the impact of regulations on patient safety.
- **Interdisciplinary Collaboration:** Effective collaboration with professionals from various disciplines is necessary to achieve optimal patient outcomes. Students should develop skills in working within interdisciplinary teams to enhance patient care.
 - Collaborate with interdisciplinary teams in patient care.
 - Contribute to interdisciplinary case discussions.
 - Reflect on the impact of interdisciplinary collaboration on patient outcomes.

Competency 7: Digital & Artificial Intelligence Literate

The "Digital & Artificial Intelligence Literate" competency prepares students to navigate the rapidly evolving landscape of digital health and artificial intelligence. Students are trained to use AI-based systems ethically and effectively in diagnosis and decision-making, ensuring that technological advancements are integrated into patient care responsibly.

- **Technology and AI-Based Diagnosis and Decision-Based Systems:** Students should be proficient in using technology and AI tools for diagnosis and decision-making, ensuring that these tools enhance patient care.
 - Use AI-based tools for diagnosis.
 - Evaluate the effectiveness of technology in clinical decision-making.
 - Integrate digital tools into patient care responsibly.
- **Ethical Usage of AI:** Ethical considerations are paramount when using AI in healthcare. Students must understand the ethical implications of AI and ensure that its application respects patient rights and autonomy.
 - Identify ethical issues in AI usage.
 - Apply ethical principles to AI-based decisions.
 - Reflect on the impact of AI on patient care.

This framework ensures that undergraduate medical students at Rawalpindi Medical University are well-prepared to excel as competent, ethical, and compassionate healthcare professionals. By meeting these competencies and their corresponding learning objectives, students will be equipped to navigate the complexities of modern medical practice and contribute meaningfully to patient care and community health.

Outcomes of the Curriculum

Outcomes in medical education are the specific knowledge, skills, and attitudes that learners are expected to demonstrate by the end of their educational program. These outcomes are typically framed in terms of the goals of the curriculum, which align with the needs of the healthcare system and patient care. Educational outcomes serve as benchmarks for assessment and evaluation of student progress and help ensure that training programs produce competent healthcare professionals.

Outcomes of the Undergraduate Integrated Modular Curriculum

The RMU-12 Model transforms medical education from isolated knowledge acquisition to embedded clinical practice, producing competent, ethical, and practice-ready physicians.

The RMU-12 Undergraduate Medical Program is 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.



RMU 12

Integrated Modular Curriculum 2026

Isolation to **Beyond Boundaries**

➤ **Structured Framework**



Five Year Structured Framework:

RMU – 12 Integrated Modular MBBS Curriculum 2026 Isolation to **Beyond Boundaries**



RMU-12
FROM FIRST YEAR TO FINAL YEAR

INTEGRATED MODULAR CURRICULUM 2026 ISOLATION TO **Beyond Boundaries**



About the Structured Framework

The five-year structured framework for the MBBS program at Rawalpindi Medical University follows a highly integrated approach in both horizontal and vertical alignment of subjects. In the first year, core subjects like Anatomy, Physiology, and Biochemistry are taught alongside foundational modules. The year is divided into blocks covering musculoskeletal systems (MSK I & II), blood and immunity, cardiovascular systems (CVS), and respiratory systems. These blocks are also spirally integrated with general education cluster courses such as Ethics and Artificial Intelligence, as well as early clinical exposure to provide a balanced mix of theory and clinical practice. In each block, core subjects are vertically integrated with preclinical subjects like Community Medicine, Pathology, and Pharmacology and clinical subjects like medicine, surgery, gynecology and pediatrics.

In the second year, students delve deeper into systems such as the gastrointestinal tract (GIT), renal system, reproductive system, and central nervous system (CNS). Vertical integration becomes more pronounced, with clinical exposure integrated into practical aspects of these modules. Horizontal integration continues with courses like Behavioral Sciences and Bioethics, and students continue to take spirally integrated courses like Family Medicine and Digital Literacy. The curriculum maintains continuity by revisiting previously covered topics through spiral integration, reinforcing concepts across the academic years.

In the third year, the MBBS curriculum at Rawalpindi Medical University introduces students to more advanced clinical and biomedical concepts. Key systems covered include the gastrointestinal (GIT) and hepatobiliary systems, parasitology, microbiology, and hematology. Horizontally, students continue to engage with clinical subjects like pathology, pharmacology, and community medicine. The curriculum remains horizontally integrated, combining clinical rotations with system-based learning ensuring that theoretical knowledge is continuously reinforced with practical clinical exposure. Spirally integrated subjects like research methodology and bioethics further complement the learning process by revisiting concepts from earlier years.

In the fourth year, the curriculum intensifies with modules in otorhinolaryngology (ENT), ophthalmology, endocrinology, population health, renal medicine, and psychiatry. Horizontal integration ensures that core clinical concepts are covered alongside biomedical sciences, while vertical integration deepens students' practical knowledge as they spend more time in clinical settings. Modules on population health and reproductive health introduce broader public health perspectives. Spirally integrated courses continue to reinforce learning outcomes, addressing essential soft skills, leadership, and ethics.

The final year focuses almost entirely on clinical clerkships in medicine and allied specialties, surgery and allied fields, gynecology, and pediatrics, representing the culmination of the horizontal and vertical integration model. Students apply their knowledge and skills comprehensively in real-world clinical environments. They work directly with patients under supervision, allowing them to gain hands-on experience. Spirally integrated subjects continue to emphasize ethical decision-making, professionalism, and patient safety. This year ensures that students are fully prepared for their future roles as competent, ethical, and compassionate healthcare providers.



RMU 12

Integrated Modular Curriculum 2026

Isolation to **Beyond Boundaries**

➤ **Academic Calendar**



Rawalpindi Medical University
Department of Medical Education (Main Campus)



DME/NO: 14

Date: 28-01-2026

Tentative Academic Planner for First Year MBBS (Batch-53)

2025 – 2026

Start of Session: 02nd February 2026

End of Session: 28th October 2026

| Blocks | Block-I | | | Block II | | | | | | Block III | | | Schedule of Send Up and Professional Examination | | | | | | | | | | | | | | | |
|--|--------------------------|---------------------|-------------------|--|-----------------------|----------------------------|--------------------|---|--------------------|----------------------------|----------------------------------|----------------------------|--|--|--|--------------------------|--|----------------------------------|-------------------|--|--|------------------|-------------------------|-----------------------|--|--------------------------|---------|---------|
| Module | Foundation-I | MSK-I (04 Weeks) | | MSK - II | | Hematology & Immunology -I | | | | CVS-I | Respiration-I | | Prep leaves for send up | Pre-Annual Assessment | Prep Leaves for Professional Examination | Professional Examination | | | | | | | | | | | | |
| | Foundation Module-I | Module Assessment | MSK-I | Student Week | Spring Vacation | MSK-I | Module Assessment | Block-I Assessment | MSK - II Module | | Module Assessments | Hematology & Immunology -I | | | | | Hematology & Immunology Module-I | Hematology & Immunology Module-I | Module Assessment | Block-II Assessment | General Education Cluster (GEC) Module | CVS Module-I | Module Assessment | Respiration Module-I | Module Assessment | Block Assessment | | |
| Dates | Duration in Weeks / Days | 05 Weeks | 06 Days | 1 st to 3 rd Weeks | 04 th Week | 06 Days | 03 Days | 1 st to 4 th Week | 06 Days | 01 st Week | 2 nd Week (3 Days) | Summer Vacation | 2 nd Week (3 days) | 3 rd & 4 th Week | 06 Days | 03 Days | 02 Weeks | 04 Weeks | 06 Days | 01 st to 3 rd Week | 06 Days | 03 Days | 10 Days | 12 Days | 21 Days | 20 Days | | |
| 2 nd Feb – 7 th March 2026 | 05 Weeks | Foundation Module-I | Module Assessment | MSK-I | Student Week | Module Assessment | Block-I Assessment | MSK - II Module | Module Assessments | Hematology & Immunology -I | Hematology & Immunology Module-I | Summer Vacation | Hematology & Immunology Module-I | Hematology & Immunology Module-I | Module Assessment | Block-II Assessment | General Education Cluster (GEC) Module | CVS Module-I | Module Assessment | Respiration Module-I | Module Assessment | Block Assessment | Prep leaves for send up | Pre-Annual Assessment | Prep Leaves for Professional Examination | Professional Examination | | |
| 9 th March – 14 th March 2026 | 06 Days | 05 Weeks | 06 Days | 1 st to 3 rd Weeks | 04 th Week | 06 Days | 03 Days | 1 st to 4 th Week | 06 Days | 01 st Week | 2 nd Week (3 Days) | Summer Vacation | 2 nd Week (3 days) | 3 rd & 4 th Week | 06 Days | 03 Days | 02 Weeks | 04 Weeks | 06 Days | 01 st to 3 rd Week | 06 Days | 03 Days | 10 Days | 12 Days | 21 Days | 20 Days | | |
| 16 th March – 04 th April 2026 | 06 Days | 06 Days | 06 Days | 06 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 06 th April – 11 th April 2026 | 04 th Week | 06 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 13 th April – 18 th April 2026 | 06 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 20 th April – 25 th April | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 27 th April – 02 nd May 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 04 th May – 06 th May 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 07 th May – 03 rd June 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 04 th June – 10 th June 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 11 th June – 17 th June 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 18 th June – 20 th June 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 22 nd June – 11 th July 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 13 th July – 15 th July 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 16 th July – 29 th July 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 30 th July – 05 th August 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 06 th Aug – 08 th Aug 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 10 th Aug – 22 nd Aug 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 24 th Aug – 19 th Sep 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 02 nd Sep – 26 th Sep 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 28 th Sep – 17 th Oct 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 19 th Oct – 24 th Oct 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 26 th Oct – 28 th Oct 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 29 th Oct – 08 th Nov 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 09 th Nov – 20 th Nov 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 21 st Nov – 11 th Dec 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |
| 12 th Dec – 31 st Dec 2026 | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days | 03 Days |

*Note: All dates are subject to change.



➤ SECTION – IV

RMU 12

Integrated Modular Curriculum 2026

Isolation to **Beyond Boundaries**

➤ **Teaching Strategies**

Teaching and Learning Methodologies / Strategies

Terms & Abbreviations

Contents

- Domains Of Learning
- Teaching And Learning Methodologies/Strategies
 - Clinico Concept Connect Session (C³6)
 - 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

Table 1. 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

Clinico - Concept Connect Session (C³6)

Introduction:

A Clinico -Concept Connect Session is a **case-based, concept-driven educational encounter** in which a carefully designed clinical scenario is used as the central anchor to explore and integrate relevant concepts from basic and clinical sciences. This **Session** is an integrated teaching–learning activity designed to bridge the gap between **foundational biomedical concepts** and their **real-world clinical application**. It serves as a structured platform where students actively connect basic science principles with clinical reasoning, patient presentation, and professional decision-making, thereby promoting deeper understanding and long-term retention of knowledge.

This session moves beyond traditional discipline-based teaching by fostering **conceptual integration, contextual learning, and early clinical exposure**, enabling students to appreciate the relevance of basic sciences in patient care from the outset of their medical training.

Rather than teaching facts in isolation, the session emphasizes:

- Understanding **why** a concept matters clinically
- Applying **core principles** to explain patient findings
- Developing **clinical reasoning skills** in a guided, safe learning environment

The focus remains on **conceptual clarity, clinical correlation, and professional competence**, rather than diagnosis-driven or management-heavy discussions.

Structure of the Clinico -Concept Connect Session

The session is structured into clearly defined phases to ensure alignment with learning outcomes and progressive student engagement:

1. Clinical Trigger (Case Introduction)

- A concise, authentic clinical scenario is presented.
- The case is selected to naturally elicit key underlying concepts.
- Information is disclosed in a focused manner to stimulate curiosity and inquiry.

2. Concept Mapping and Exploration

- Relevant foundational concepts (e.g., physiological mechanisms, biochemical pathways, structural–functional relationships) are identified.
- Students are guided to link clinical signs, symptoms, and investigations to these concepts.

C3: Clinico Concept Connect

C6: Bloom's Level C6 (Creation / Synthesis)

Learners integrate knowledge from basic, para-clinical, and clinical sciences to formulate differential diagnoses, management plans, or clinical reasoning pathways, demonstrating higher-order thinking and decision-making.

Reference: Anderson, L. W., & Krathwohl, D. R. (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives.

- Emphasis is placed on **mechanisms**, not memorization.

3. Integrated Discussion

- Faculty from relevant disciplines facilitate discussion collaboratively.
- Concepts are reinforced through clinical correlation and guided questioning.
- Students actively participate in explaining findings using scientific reasoning.

4. Application and Reflection

- Learners reflect on how conceptual understanding informs clinical thinking.
- Key take-home messages are summarized.
- Opportunities for self-directed learning and further exploration are highlighted.

Implementation Strategy

The Clinico -Concept Connect Session is implemented as a **planned, scheduled activity** within the integrated curriculum and follows these principles:

- **Faculty Collaboration:** Basic science and clinical faculty jointly design and facilitate sessions to ensure coherence and relevance.
- **Curriculum Alignment:** Each session is mapped to predefined learning outcomes, competencies, and entrustable professional activities.
- **Active Learning:** Small-group discussions, guided questioning, and concept linking are emphasized over didactic teaching.
- **Progressive Complexity:** Early sessions focus on core concepts, with increasing clinical depth as students advance.
- **Feedback and Reflection:** Structured feedback is provided to reinforce learning and improve reasoning skills.

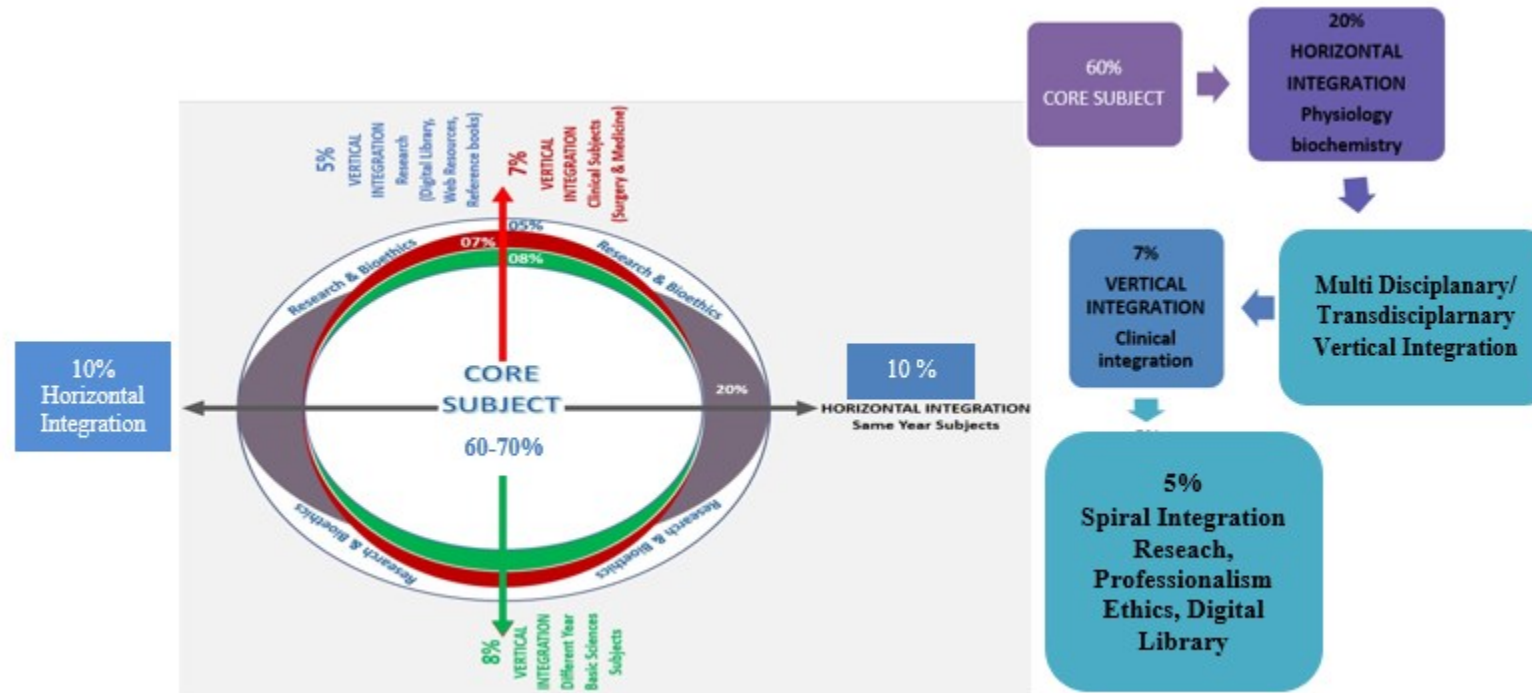
Educational Value

Through its integrated design, the Clinico -Concept Connect Session:

- Strengthens **conceptual understanding**
- Enhances **clinical reasoning and analytical skills**
- Encourages **horizontal and vertical integration**
- Promotes **student engagement and ownership of learning**
- Prepares learners to become **practice-ready, concept-driven clinicians**

Large Group Interactive Session (LGIS)

The large group interactive session is structured format of Prof Umar Model of Integrated lecture. It will be 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.



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 | Core Concepts of the topic | 60% |
| 4 | Horizontal Integration | 24% |
| 5 | Vertical Integration | 08% |
| 6 | Related Advance Research points | 08% |
| 7 | Related Ethical points | |
| 8 | Artificial Intelligence | |
| 9 | Family Medicine | |

Table 3. Steps of Implementation of Small Group Discussions

| | | |
|----------------|--|-----------------|
| Step 1 | Case presentation and 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 multi-disciplinary/transdisciplinary and interdisciplinary.
- 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 case scenarios that typically resemble real world examples.
- Case Scenarios must be multi-disciplinary/transdisciplinary and interdisciplinary
- 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 (Maastricht Medical School) | | Learning Domain |
|--|--|------------------------|
| Step 7 | Synthese & Report | C6 |
| Step 6 | Collect Information from outside | C6 |
| Step 5 | Generate learning Issues | C6 |
| Step 4 | Discuss and Organise Ideas | C4 |
| Step 3 | Brainstorming to Identify Explanations | C3 |
| Step 2 | Define the Problem | C1 |
| Step 1 | Clarify the Terms and Concepts of the Problem Scenario | C1 |
| Problem- Scenario | | |

Figure 2. PBL 7 Jumps Model

Self-Directed Learning (SDL) at Rawalpindi Medical University (RMU)

What is Self-Directed Learning (SDL)?

Self-Directed Learning (SDL) is a learning approach in which students take responsibility for their own learning. In SDL, students are expected to:

- Identify what they need to learn
- Set learning goals
- Use appropriate learning resources
- Study independently
- Evaluate their own understanding

Faculty members act as facilitators and guides, helping students stay on track and achieve the learning outcomes.

Why is SDL Important in Medical Education?

SDL is a key part of modern medical education because it helps students develop skills needed for **lifelong learning**. SDL is important because it:

- Encourages independent and active learning
- Builds critical thinking and problem-solving skills
- Improves the ability to search and use evidence-based medical information
- Helps students become responsible and reflective learners
- Prepares future doctors to keep learning throughout their careers

Medical knowledge is constantly changing, so SDL helps students stay updated even after graduation.

SDL at RMU (How It is Conducted)

Rawalpindi Medical University (RMU) has formally incorporated SDL into the MBBS curriculum from Second Year to Final Year.

RMU has developed structured curricula of Self-Directed Learning (SDL) across all professional years. These SDL curricula include:

- Approved SDL topics aligned with each module
- Clearly stated learning objectives for every topic
- A wide range of learning resources, including:
 - Textbook chapters
 - Research articles
 - Clinical guidelines
 - Online videos and interactive learning content
 - Resource links shared through official platforms

SDL at RMU is therefore a planned, organized, and curriculum-based learning activity, not just additional reading.

SDL Hours in the MBBS Program

SDL at RMU is implemented longitudinally across all professional years.

- The total SDL contribution is more than 500 hours
- These hours are distributed from Second Year to Final Year MBBS



- The purpose is to gradually develop independent learning skills throughout the program

Assessment of SDL at RMU

At RMU, SDL is not only a learning strategy but also an assessed component of the curriculum.

- Students are provided SDL topics with objectives and learning resources.
- Students study these topics independently.
- To ensure regular engagement, RMU conducts weekly online LMS-based assessments
- These assessments help students:
 - Stay consistent in learning
 - Test their understanding
 - Receive feedback for improvement

Thus, SDL learning progress is continuously monitored through the institutional LMS system.

Alignment with PM&DC and WFME Standards

SDL at RMU is aligned with national and international standards of medical education.

PM&DC

Pakistan Medical & Dental Council (PM&DC) emphasizes structured teaching, learning strategies, and internal assessment systems within undergraduate medical education.

WFME

World Federation for Medical Education (WFME) standards highlight the importance of:

- Student-centered learning
- Independent learning skills
- Use of diverse learning resources
- Continuous assessment and quality assurance

RMU's structured SDL program supports these global standards.

Practical Sessions/Skill Lab (SKL)

| Practical Session/ Skill Lab (SKL) | |
|---|---------------|
| Demonstration/ power point presentation 4-5 slide and relevant clinical videos where required | 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 | |

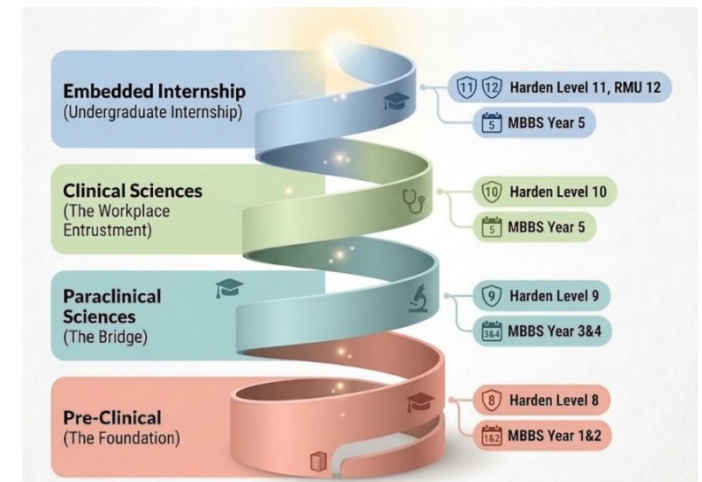


➤ SECTION – V

RMU 12 **Integrated Modular Curriculum 2026** **Isolation to **Beyond Boundaries****

➤ **Block-I**

- **Foundation Module-I**
- **Musculoskeletal Module-I**





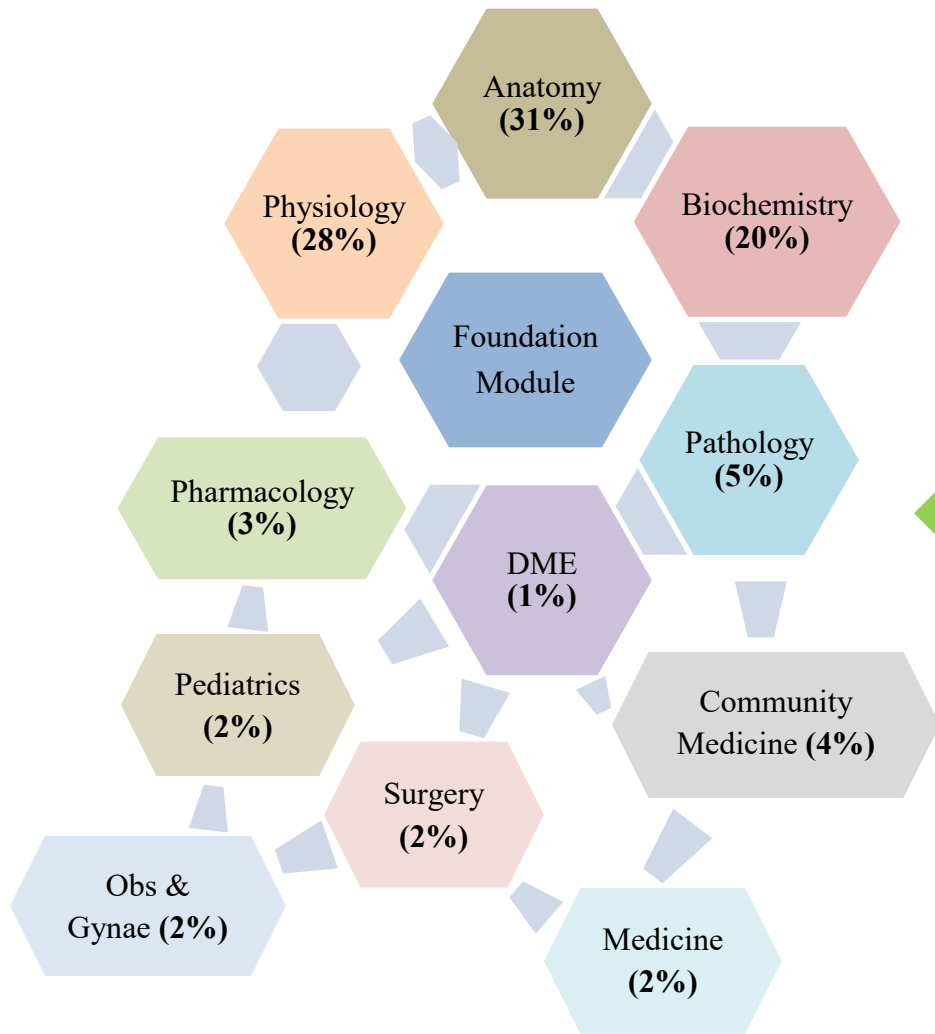
RMU 12

Integrated Modular Curriculum 2026

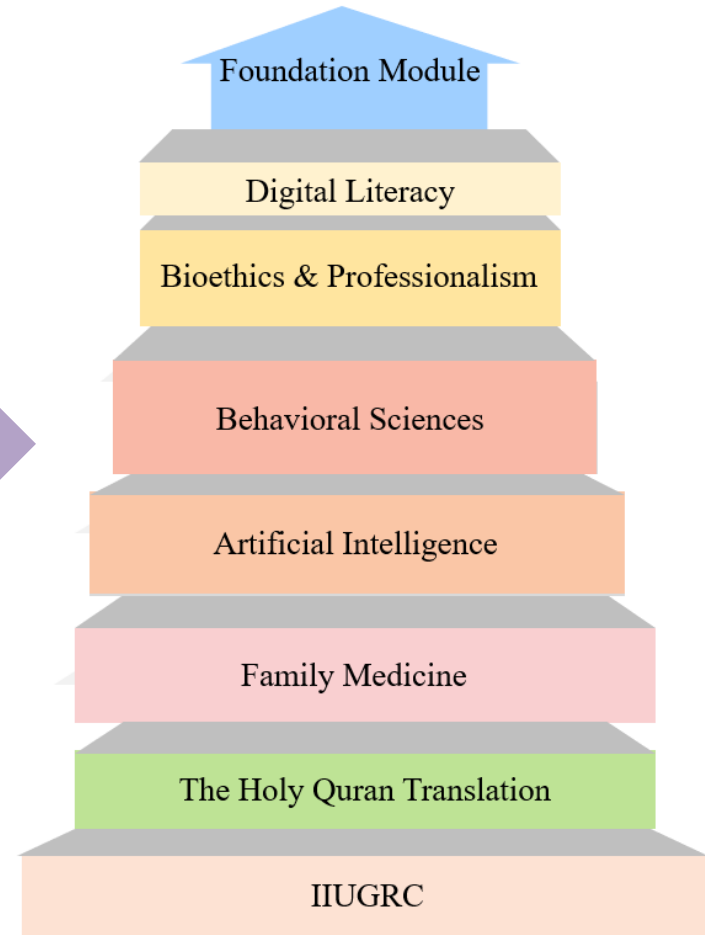
Isolation to *Beyond Boundaries*

Foundation Module-I

Multi Disciplinary Integration



Disciplines in Foundation Module - I



Spiral / General Education Cluster Courses (5%)

Discipline Wise Details of Modular Content

| Integration | | | | | | |
|--------------------|--|---|--|--|--|--|
| Block | Module | General Anatomy | Embryology | Histology | Gross Anatomy | |
| I | <ul style="list-style-type: none"> Anatomy | Introduction to General Anatomy | General Embryology <ul style="list-style-type: none"> Introduction to Human Development Oogenesis Spermatogenesis Female Reproductive Cycles Ovulation and Fertilization Cleavage and Blastocyst Formation Development of Mammary Gland | General Histology <ul style="list-style-type: none"> Types of Epithelium Specialization of Apical Cell Surface Intercellular Junctions and Adhesions Glandular Epithelium Mammary Gland | <ul style="list-style-type: none"> Anatomicomedical Terminologies I (position & planes) Anatomicomedical Terminologies II (Anatomical Terms and Axis of Movements) Anatomicomedical Terminologies III (Cell and Tissues) Anatomicomedical Terminologies IV (Skin & Body Systems) Clavicle Scapula Humerus Anterior Axioappendicular Muscles Posterior Axioappendicular Muscles Axilla Brachial Plexus Brachial Plexus Injuries Breast Sternoclavicular and Acromioclavicular Joints Radiograph and Surface Anatomy of Axioappendicular Region | |
| | <ul style="list-style-type: none"> Biochemistry | <ul style="list-style-type: none"> Cell and Cell Organelles, Cell Membrane and Transport Across Cell Membrane, Physicochemical Properties, Enzymes, Cancer, Nucleic Acid Chemistry, Genetics | | | | |
| | <ul style="list-style-type: none"> Physiology | <ul style="list-style-type: none"> Functional Organization of The Human Body and Control of the “Internal Environment The Cell and Its Functions Genetic Control of Protein Synthesis, Cell Function, And Cell Reproduction Transport of Substances Through the Cell Membrane | | | | |
| | Orientation Sessions | | | | | |

| | |
|--|--|
| <ul style="list-style-type: none"> • Welcome Address by VC, Introduction to RMU • Introduction to Department of Medical Education & Integrated Modular System. • Assessment Model of RMU And Continuous Internal Assessment • Research Model of RMU (IUGRC), Biomedical Ethics, & Family Medicine • Introduction to Digital Services RMU • Introduction to Anatomy Department • Introduction to Physiology Department • Introduction to Biochemistry • Introduction to Behavioral Sciences • Introduction to Pharmacology • Introduction to Pathology • Introduction to Community Medicine & Research Model of RMU | |
| Spiral Courses | |
| <ul style="list-style-type: none"> • Bioethics & Professionalism | <ul style="list-style-type: none"> • Introduction to history of medical ethics • Leadership Professionalism (DME) |
| <ul style="list-style-type: none"> • Family Medicine | <ul style="list-style-type: none"> • Introduction to Family Medicine & its application in health care system |
| <ul style="list-style-type: none"> • Integrated Under Graduate Research Innovation (IUGRC) | <ul style="list-style-type: none"> • Research I Introduction of health research process • Research II characteristic of research process • Research III Basis of ethics in health research • Research IV Basics of ethics in medical research |
| <ul style="list-style-type: none"> • Behavioral Sciences & Communication Skills | <ul style="list-style-type: none"> • Introduction to Behavioral Sciences • Stress in Medical Students & its Management |
| <ul style="list-style-type: none"> • Information Technology (IT) | <ul style="list-style-type: none"> • How to use Higher Education Commission (HEC) digital library. |
| <ul style="list-style-type: none"> • Community Medicine (Life Style and Prevention) | <ul style="list-style-type: none"> • Healthy Lifestyle: A Foundation for Medical Professionals |
| Vertical Integration | |
| <ul style="list-style-type: none"> • Pathology | <p>Clinically content relevant to Foundation Module - I</p> <ul style="list-style-type: none"> • Introduction to Pathology • Cellular Responses to Injury • Intracellular Accumulations • Pigments • Free Radicals/ Reactive Oxygen Species (Ros). • Oxidative Stress Irreversible Injury. • Necrosis Apoptosis (Irreversible Injury) |

| | | |
|--------------------------------------|---|---|
| | | <ul style="list-style-type: none"> Genetic Disorders |
| | <ul style="list-style-type: none"> Pharmacology | <ul style="list-style-type: none"> Introduction to Pharmacology Pharmacokinetic processes Receptors and signal transduction processes |
| | <ul style="list-style-type: none"> Community Medicine/Prevented Medicine | <ul style="list-style-type: none"> Introduction to Community Medicine & Research Model of RMU Immunization & Vaccination Health Determinants & Indicators Life Style Medicine Health Education & Communication |
| | <ul style="list-style-type: none"> Medicine | <ul style="list-style-type: none"> Introduction to Medicine and History of Medicine Chromosomal Aberrations Evidence based medicine |
| | <ul style="list-style-type: none"> Surgery | <ul style="list-style-type: none"> History taking & its importance CA Breast |
| | <ul style="list-style-type: none"> Obstetrics & Gynaecology | <ul style="list-style-type: none"> Infertility Invitro Fertilization |
| | <ul style="list-style-type: none"> Pediatrics | <ul style="list-style-type: none"> Medical Genetics & Dysmorphology |
| Early Clinical Exposure (ECE) | | |
| | Departments | Skill - 1: Hand Washing |
| | <ul style="list-style-type: none"> Medicine & Allied | Skill – 2: Wearing Gloves |
| | <ul style="list-style-type: none"> Surgery and Trauma | Skill – 3: Providing Basic Life Support in Adults |
| | <ul style="list-style-type: none"> Emergency Department | Skill – 4: Scrubbing for Operation Theatre |
| Clinical Relevance | | |
| | <ul style="list-style-type: none"> Medical Ethics Genetic Disorders Understanding cellular and molecular mechanisms in disease (e.g., cancer and diabetes) Importance of homeostasis in maintaining normal physiological function (e.g., dehydration and acid-base imbalances) Application of medical ethics in real-life scenarios, such as patient confidentiality Effective doctor-patient communication in history-taking and empathy | |

Foundation Module - I Team

Module Name : Foundation Module - I
 Duration of module : 06 Weeks
 Coordinator : Dr. Tayyaba Qureshi
 Co-coordinator : Dr. Zeneera Saqib
 Reviewed by : Module Committee

| Module Committee | | | Module Task Force Team | | |
|-------------------------|--|--------------------------------|--------------------------------|--|---|
| 1. | Vice Chancellor RMU | Prof. Dr. Muhammad Umar | 1. | Coordinator | Dr. Tayyaba Qureshi (Assistant Professor of Anatomy) |
| 2. | Director DME & Dean Basic Sciences | Prof. Dr. Ifra Saeed | 2. | DME Focal Person | Dr. Farzana Fatima |
| 3. | Additional Director (Assessment) DME | Dr. Arsalan Manzoor Mughal | 3. | Co-coordinator | Dr. Zenera Saqib (Senior Demonstrator of Anatomy) |
| 4. | Chairperson Physiology | Prof. Dr. Samia Sarwar | 4. | Co-Coordinator | Dr. Uzma Kiyani (Senior Demonstrator of Physiology) |
| 5. | Chairperson Anatomy | Prof. Dr. Ayesha Yousaf | 5. | Co-coordinator | Dr. Raja Khalid Yaqoob (Demonstrator of Biochemistry) |
| 6. | Chairperson Biochemistry | Dr. Aneela Jamil | | | |
| 7. | Focal Person Anatomy 1 st Year MBBS | Asso. Prof. Dr. Mohtashim Hina | | | |
| 8. | Focal Person Physiology | Dr. Sidra Hamid | DME Implementation Team | | |
| 9. | Focal Person Pharmacology | Dr. Zunera Hakim | 1. | Director DME | Prof. Dr. Ifra Saeed |
| 10. | Focal Person Pathology | Dr. Asiya Niazi | 2. | Implementation Incharge 1st & 2 nd Year MBBS | Dr. Arsalan Manzoor Mughal |
| 11. | Focal Person Behavioral Sciences | Dr. Saadia Yasir | | | Dr. Farzana Fatima |
| 12. | Focal Person Community Medicine | Dr. Afifa Kulsoom | 3. | Assistant Director DME | Dr. Farzana Fatima |
| 13. | Focal Person Quran Translation Lectures | Dr. Uzma Zafar | 4. | Editor | Muhammad Arslan Aslam |
| 14. | Focal Person Family Medicine | Dr. Sadia Khan | | | |

Module I - Foundation Module - I

Introduction

In the Foundation Module - I students will develop understanding of the basic concepts of cell Physiology, Biochemistry, Anatomy, Pathology, Pharmacology, Community medicine and study skills through an integrated course.

Rationale

The Foundation Module - I is designed to impart basic knowledge about the normal structure, organization, functions and development of human body. This knowledge will serve as a base on which the student will construct further knowledge about the etiology, pathogenesis and prevention of diseases; the principles of their therapeutics and management.

Module Outcomes

Each student will be able to:

Knowledge

- Acquire the basic science knowledge and terminology necessary to understand the development and functioning of normal structures of human body starting from biochemical level to organ system level, as well as the concepts of diseases in the community and drug dynamics.
Use technology based medical education including
- **Artificial Intelligence.**
Appreciate concepts & importance of:
- **Family Medicine**
- **Biomedical Ethics**
- **Research.**
- **Enterpreneurship**

Skills

- Identify different anatomical planes and correlate the importance of these with clinical medicine.
- Identify various apparatus used in lab.
- Preparation and identification of microscopic slides.
- Preparation of solutions of various strengths.
- **Basic Life Support (BLS)**
- **Early Clinical Exposure (ECE)**

Attitude

- Demonstrate **professional attitude, team-building spirit** and **good communication skills.**

This module will run in 6 weeks' duration. The content will be covered through introduction of topics. Instructional strategies are given in the timetable and learning objectives are given in the study guides. Study guides will be uploaded on the university website. Good luck

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

• **Learning Management System (LMS)**

- Anatomy (LMS)
- Physiology (LMS)
- Biochemistry (LMS)



➤ **Syllabus Foundation Module-I 2026**
First Year MBBS

Foundation – I Module – First Year MBBS

Duration of Module (Five Weeks)

| Sr No. | Themes | Duration |
|---------------|---|----------------------|
| 1. | Orientation | 1 st Week |
| 2. | The Cell Structure & Function | 2 nd Week |
| 3. | Control Systems and Communication in the Human Body | 3 rd Week |
| 4. | Genetics, Cell Division, and Human Development | 4 th Week |
| 5. | From Molecules to Medicine: Clinical Applications of Molecular Biology and Genetics | 5 th Week |

Theme 1: Orientation (1st Week)

| Themes | Rationale | General learning Objectives |
|-------------|---|--|
| Orientation | <p>The first week of the Orientation theme is designed to introduce first-year MBBS students to the academic environment, institutional structure, and educational philosophy of Rawalpindi Medical University. It familiarizes students with the integrated modular curriculum, assessment system, continuous internal assessment, and digital learning platforms to ensure clarity of expectations from the outset. Departmental introductions provide an overview of core basic science disciplines and promote early interdisciplinary understanding. Sessions on biomedical ethics, professionalism, family medicine, and community medicine support professional identity formation. Behavioral sciences and stress-management sessions facilitate psychological adjustment to medical education. Introductory exposure to basic scientific concepts and clinical relevance prepares students for structured learning ahead. Overall, this week ensures a smooth transition into medical education and lays a strong foundation for subsequent modules.</p> | <ul style="list-style-type: none"> • By the end of the first week, the student will be able to: • Describe the vision, mission, organizational structure, and allied teaching hospitals of Rawalpindi Medical University. • Explain the integrated modular curriculum, assessment model, and continuous internal assessment system of the MBBS program. • Demonstrate basic familiarity with RMU digital learning platforms, including LMS, CMS, and MS Teams. • Identify the scope and role of core basic science and clinical disciplines introduced during the orientation week. • Recognize the importance of professionalism, biomedical ethics, and effective communication in medical practice. • Appreciate the role of research, community medicine, and family medicine in undergraduate medical education and healthcare delivery. |
| Sub Theme | <p>Academic Council</p> | <ul style="list-style-type: none"> • By the end of this session, students will be able to understand the role, composition, and functions of the Academic Council and how it supports curriculum planning, assessment, and student welfare throughout the MBBS program. https://rmur.edu.pk/ |
| | <p>Infrastructure</p> | <ul style="list-style-type: none"> • By the end of this session, students will be able to identify and describe the key educational and clinical infrastructures (e.g., lecture halls, laboratories, libraries, simulation labs, hospitals/clinics) available at their institution and explain how to access and utilize these resources to support their learning and professional development. https://rmur.edu.pk/ |

| | | |
|--|----------------------|--|
| | Faculty | <ul style="list-style-type: none">• By the end of this session, students will be able to identify key faculty members and describe their roles, teaching responsibilities, and how to interact with them as academic and professional mentors throughout the MBBS program. https://rmur.edu.pk/ |
| | Roles and Regulation | <ul style="list-style-type: none">• By the end of this session, students will be able to understand key roles, responsibilities, and academic regulations governing their conduct, attendance, assessment requirements, and professional behaviour in the MBBS programme, and explain how adhering to these rules supports their success and professional development. https://rmur.edu.pk/ |

Specific Learning Objectives

| Theory | | | | | | | |
|---|--------------|---|--|--------------------------|----------------------------|------------------------------|----------------------------|
| Subject | Code | Topic | Learning Objectives At the End of One Hour the Lecture the Student Should Be Able To | Calgary Gauge | Learning Domain | Teaching Strategy | Assessment Tool |
| Anatomy (General Anatomy) | M1-FM-A-001 | Introduction to General Anatomy | <ul style="list-style-type: none"> • Define the term Anatomy and its various branches | Should Know | C1 | LGIS | MCQ SAQ OSVE OSPE |
| | | | <ul style="list-style-type: none"> • Define different terminologies related to Anatomy | Should Know | C1 | | |
| | | | <ul style="list-style-type: none"> • Describe different Anatomical planes and directions in relation to anatomical position | Must Know | C2 | | |
| | | | <ul style="list-style-type: none"> • Elaborate different phases in life span of man | Nice to Know | C2 | | |
| | | | <ul style="list-style-type: none"> • Define basic tissues of human body | Should Know | C1 | | |
| | | | <ul style="list-style-type: none"> • Compare the formation and functioning of basic tissues of the body | Must Know | C4 | | |
| | | | <ul style="list-style-type: none"> • Describe formation of different systems of body | Should Know | C2 | | |
| | | | <ul style="list-style-type: none"> • Understand the curative and preventive health care measures. | Nice to Know | C3 | | |
| | | | <ul style="list-style-type: none"> • Practice the principles of bioethics | Nice to Know | C3 | | |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> • Read relevant research article | Nice to know | C3 | | |
| <ul style="list-style-type: none"> • Use HEC digital library | Nice to know | C3 | | | | | |
| Anatomy (Embryology) | M1-FM-A-002 | Introduction to Human Development | <ul style="list-style-type: none"> • Discuss significance and importance of studying Embryology. | Should Know | C2 | LGIS | MCQ SAQ OSVE OSPE |
| | | | <ul style="list-style-type: none"> • Define different terminologies to describe developmental stages. | Must Know | C1 | | |
| | | | <ul style="list-style-type: none"> • Describe series of critical events that take place during embryonic development. | Must Know | C2 | | |
| | | | <ul style="list-style-type: none"> • Appreciate difference between embryonic and fetal period. | Must Know | C2 | | |
| | | | <ul style="list-style-type: none"> • Analyze common chromosomal abnormalities. | Should Know | C4 | | |
| | | | <ul style="list-style-type: none"> • Understand the curative and preventive health care measures. | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in | Nice to know | C3 | | |

| | | | | | | | |
|--|--------------|---|--|--------------|----|-----|----------------------------|
| | | | healthcare. | | | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Use HEC digital library. | Nice to know | C3 | | |
| | | | • Read relevant research article. | Nice to know | C3 | | |
| Anatomy (SGD) | M1-FM-A-0014 | Anatomicomedical Terminology I (Anatomical Position and Planes) | • Describe different anatomical planes of human body and correlate with radiological anatomy | Must Know | C2 | SGD | MCQ SAQ OSVE OSPE |
| | | | • Demonstrate anatomical position of human body | Nice to know | C3 | | |
| | | | • Apply the strategic use of artificial intelligence in healthcare | Nice to know | P | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Read a relevant research article | Nice to know | C3 | | |
| | M1-FM-A-0015 | Anatomicomedical Terminology -II (Anatomical Terms and Axis of Movements) | • Define different terms related to body parts | Must Know | C1 | SGD | MCQ SAQ OSVE OSPE |
| | | | • Describe axis of movement | Must Know | C2 | | |
| | | | • Demonstrate axis of movement | Must Know | P | | |
| | | | • Strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |
| | | | • Focus on provision of curative and preventive health care services | Nice to Know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Apply the strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |
| | | | • Understand the curative and preventive health care measures. | Nice to know | C3 | | |
| | | | • Read a relevant research article | Nice to know | C3 | | |
| | | | • Use HEC digital library | Nice to know | C3 | | |
| | M1-FM-A-0016 | Anatomicomedical Terminology -III (Cell and Tissues) | • Define cell | Must Know | C1 | SGD | MCQ SAQ OSVE OSPE |
| | | | • Define tissue | Must Know | C1 | | |
| | | | • Differentiate between basic tissues of human body | Must Know | C4 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| • Apply the strategic use of artificial intelligence in healthcare | | | Nice to know | C3 | | | |
| • Understand the curative and preventive health care services | | | Nice to know | C3 | | | |
| • Read a relevant research article | | | Nice to know | C3 | | | |
| • Use digital library | Nice to know | C3 | | | | | |

| | | | | | | | | |
|---------------------------|--------------|--|---|--|---|----|-------------|--------------------|
| Physiology (LGIS, SGD) | M1-FM-P-001 | Introduction to Physiology & Physiology Department | • Introduce faculty members | Must Know | A | C1 | LGIS SGD | SAQ MCQ VIVA |
| | | | • Define physiology | Must Know | A | C2 | | |
| | | | • Categorize different branches of physiology | Should Know | B | C4 | | |
| | | | • Explain the importance of physiology in medical and clinical sciences | Nice to Know | C | C1 | | |
| | M1-FM-P-002 | Cell physiology & Homeostasis | • Understand functional organization of human body from cell to systems | Must Know | A | C2 | LGIS SGD | SAQ MCQ VIVA |
| | | | • Differentiate between prokaryotes and eukaryotes. | Nice to Know | C | C4 | | |
| | | | • Discuss salient features of cell theory | Must Know | A | C2 | | |
| | | | • Define homeostasis | Must Know | A | C1 | | |
| | M1-FM-P-003 | Concept of Body Fluid and Internal Environment | • Describe distribution of total body water | Must Know | A | C1 | LGIS SGD | SAQ MCQ VIVA |
| | | | • Enlist the proportion of intra cellular and extra cellular fluids. | Must Know | A | C1 | | |
| | | | • Differentiate between ECF & ICF | Must Know | A | C4 | | |
| | | | • Recall Physical characteristics of normal ECF constituents | Must Know | A | C1 | | |
| | | | • Understand the concept of internal environment (which student can differentiate for unicellular and multi cellular organisms.) | Must Know | A | C2 | | |
| | M1-FM-P-0015 | Cell and homeostasis | • Understand functional organization of human body | Must Know | A | C2 | SGD | MCQ SAQ VIVA |
| | | | • Discuss homeostasis/control systems of the body | Must know | A | C2 | | |
| Physiology (SDL) | M1-FM-P-0019 | Concept of body fluids & internal environment. | <ul style="list-style-type: none"> • Introduction • Concept of extracellular and intracellular fluid • Homeostasis • Examples of control system | <ul style="list-style-type: none"> ❖ Ganong's Review of Medical Physiology.25TH Edition, General principles and Energy production in Medical Physiology (chapter01, Page03) ❖ Human Physiology by Dee Unglaub Silverthorn. 8TH Edition. Introduction to physiology, control systems and homeostasis, chapter no.1, page no.40.49 ❖ Physiology by Linda S. Costanzo 6th Edition. Cellular physiology, chapter 01. Page1 ❖ Textbook of Medical Physiology by Guyton & Hall. 14th Edition Introduction to Physiology. (Section 01, Chapter1, page03). | | | | |
| Physiology | M1-FM-P-0027 | | • Identification of different parts especially focusing lenses and their uses | Must know | A | C1 | Skill Lab | OSPE |

| (SKL) | | Introduction to Microscope | <ul style="list-style-type: none"> Focusing technique of different blood slides e.g Neubauer's chamber TLC & DLC slides | Should know | B | P | | |
|---------------------|-------------|-----------------------------|--|--------------|---|----|------|---------------------------|
| Biochemistry (LGIS) | M1-FM-B-001 | Cell and cell organelle-I | <ul style="list-style-type: none"> Explain composition of normal cell | Must Know | | C2 | LGIS | MCQ SAQ SEQ VIVA |
| | | | <ul style="list-style-type: none"> Describe methods to separate different organelles of cell | Should Know | | C2 | | |
| | | | <ul style="list-style-type: none"> Describe structure, functions and marker enzymes of mitochondria and Nucleus | Must Know | | C2 | | |
| | | | <ul style="list-style-type: none"> Analyze the relationship between defects in cell organelles and the resulting clinical conditions or congenital disorder | Should Know | | C4 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Practice principles of bioethics Understand the curative and preventive health care measure Read relevant research articles Use HEC digital library | Nice to know | | C3 | | |
| | M1-FM-B-002 | Cell membrane | <ul style="list-style-type: none"> Explain composition of cell membrane | Must Know | | C2 | LGIS | MCQ SAQ SEQ VIVA |
| | | | <ul style="list-style-type: none"> Understand fluid mosaic model | Must Know | | C2 | | |
| | | | <ul style="list-style-type: none"> Describe functions performed by each component | Must Know | | C2 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Practice principles of bioethics Understand the curative and preventive health care measure Read relevant research articles Use HEC digital library | Nice to know | | C3 | | |
| | M1-FM-B-003 | Functions of cell membranes | <ul style="list-style-type: none"> Discuss functions & importance of cell membrane | Should Know | | C2 | LGIS | MCQ SAQ SEQ VIVA |

| | | | | | | | |
|---|---|--|--|--------------|-------------|------|--|
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | | |
| Pharmacology | M1-FM-VI(Pharm)-001 | Introduction to Pharmacology | • Define pharmacology | C1 | LGIS | MCQs | |
| | | | • Discuss main branches of Pharmacology | C2 | | | |
| | | | • Define drug according to WHO | C1 | | | |
| | | | • Describe drug nomenclature | C1 | | | |
| | | | • Cite important drug references | C1 | | | |
| | | | • Describe the sources of drug | C2 | | | |
| | M1-FM-VI(Pharm)-002 | Pharmacokinetic processes | • Identify the four key processes of pharmacokinetics | C1 | LGIS | MCQs | |
| | | | • Define absorption, distribution, metabolism and excretion of drug | C1 | | | |
| | | | • Recognize the clinical importance of these pharmacokinetic processes | C1 | | | |
| | | | • Briefly discuss the factors affecting these processes | C2 | | | |
| | M1-FM-VI(Pharm)-003 | Receptors and signal transduction processes | • Define receptors and ligand | C1 | LGIS | MCQs | |
| | | | • Classify different types of receptors | C2 | | | |
| • Explain the mechanism of signal transduction | | | C2 | | | | |
| • Describe the concept of receptor affinity and specificity | | | C2 | | | | |
| M1-FM-VI(Pharm)-003 | Receptors and signal transduction processes | • Define the properties of agonists, antagonists and inverse agonist | C1 | LGIS | MCQs | | |
| | | • Define receptors and ligand | C1 | | | | |
| | | • Classify different types of receptors | C2 | | | | |
| | | • Explain the mechanism of signal transduction | C2 | | | | |
| | | • Describe the concept of receptor affinity and specificity | C2 | | | | |
| Pathology | M1-FM-VI(Path)-001 | Introduction to Pathology | Define the following terms: <ul style="list-style-type: none"> • Etiology • Pathogenesis • Morphology | C1 | LGIS SGD | MCQ | |

Spiral Courses (1st Week)

Biomedical Ethics & Professionalism

| Theory | | | | | |
|------------------|---|--|------------------------|--------------------------|------------------------|
| Code | Topic | Learning Objectives At the end of the lecture the student should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
| M1-FM-SI(BE)-001 | Introduction to History of Medical Ethics | <ul style="list-style-type: none"> • To appraise the historical perspective of Hippocratic oath • Understanding the beginnings of contemporary bioethics to address ethical dilemmas | C2 C2 | LGIS | MCQs |

Behavioral Sciences & Communication Skills

| Theory | | | | | |
|------------------|---|--|------------------------|--------------------------|------------------------|
| Code | Topic | Learning Objectives At the end of the lecture the student should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
| M1-FM-SI(BS)-001 | Introduction to Behavioral Sciences | <ul style="list-style-type: none"> • To describe Holistic and Traditional Allopathic medicine. | C1 | LGIS | MCQs |
| M1-FM-SI(BS)-002 | Stress in Medical Students & its Management | <ul style="list-style-type: none"> • Define stress and its types of stress • Enlist causes of stress among medical student effectively | C1 | | |

Family Medicine

| Theory | | | | | |
|--------------------|---|--|------------------------|--------------------------|------------------------|
| Code | Topic | Learning Objectives At the end of the lecture the student should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
| M1-FM-SI(FMed)-001 | Introduction to Family Medicine & its application in health care system | <ul style="list-style-type: none"> • Describe presenting complaints of patients with body aches | C3 | LGIS-1 | MCQs |
| | | <ul style="list-style-type: none"> • Discuss complications of body aches | | | |
| | | <ul style="list-style-type: none"> • Describe initial treatment of patients with body aches | | | |
| | | <ul style="list-style-type: none"> • Know when to refer patient to consultant/ Hospital | | | |

Community Medicine/Prevented Medicine

| Theory | | | | | |
|------------------|--|---|--|--------------------------|------------------------|
| Code | Topic | Learning Objectives At the end of the lecture the student should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
| M1-FM-VI(CM)-001 | Introduction Community Medicine & Research Model of RMU | <ul style="list-style-type: none"> • Define community medicine • Define preventive medicine • Differentiate public health and community medicine • Understand IUGRC implementation in RMU | C1 C1 C2 C1 | LGIS | MCQs |
| M1-FM-VI(CM)-002 | Immunization & Vaccination | <ul style="list-style-type: none"> • Understand immunizing agents and vaccine • Differentiate between functions of different types of immunoglobins • Understand the concepts of cold chain • Describe common minor vaccine reactions • Understand and memorize EPI program | C1 C1 C2 C1 C1 | LGIS | MCQs |
| M1-FM-VI(CM)-003 | Health Determinants & Indicators | <ul style="list-style-type: none"> • Explain dimensions and determinants of health and their role in achieving positive health • Discuss concept of health and wellbeing • Describe the importance of health indicators • Classify health indicators • Calculate Morbidity and Mortality • Describe Disability indicators • Compare indicators among countries | C1 C2 C1 C1 C3 C2 C2 | LGIS | MCQs |
| M1-FM-VI(CM)-004 | Health Education & Communication | <ul style="list-style-type: none"> • Define health communication and understand its types. • Explain role of sender, receiver, feedback and content of health message • Appreciate communication barriers • Explain various functions of health Communication • Understand the scope /contents of health education • Explain different approaches of health education • Community awareness programs under the umbrella of CHC (Centre for Health Communication) | C1 C2 C2 C2 C1 C2 | LGIS | MCQs |

Integrated Undergraduate Research Curriculum (IUGRC)

| Theory | | | | | |
|---------------------|--|--|----------------------------|--------------------------|------------------------|
| Code | Topic | Learning Objectives At the end of the lecture the student should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
| M1-FM-SI(IUGRC)-001 | IUGRC (Research 1) Introduction to Health Research Process and Researcher | <ul style="list-style-type: none"> • Define health research & concepts of health research methods • Discuss the value of research in health and human development • Elaborate fundamental types of health research • Conceptualize the drivers of research • Describe meanings of health research & health research methods • Differentiate among various types of health research | C1 C2 C2 C2 C2 | LGIS | MCQs |

Information Technology (IT)

| Theory | | | | |
|-----------------|------------------|--|--------------------------|------------------------|
| Code | Topic | Learning Objectives At the end of the lecture the student should be able to | Teaching Strategy | Assessment Tool |
| M1-FM-SI(IT)001 | RMU Goes digital | <ul style="list-style-type: none"> • Introduction to LMS, CMS and MS Teams. • Introduction to RMU website • How to use HEC digital library • How to use up to date website | LGIS | MCQs |

Theme 2: The Cell: Structure, Function, and Homeostasis (2nd Week)

| Themes | Rationale | General learning Objectives |
|-------------------------------|---|--|
| The Cell Structure & Function | Theme 2 builds upon the orientation week by introducing students to the cell as the fundamental structural and functional unit of the human body, forming the scientific basis of all subsequent learning in medicine. The integration of anatomy, histology, physiology, biochemistry, pathology, and community medicine enables students to understand normal cellular structure, membrane dynamics, organelle function, and mechanisms of transport in a coordinated manner. Emphasis on homeostasis and cellular control mechanisms provides insight into how normal physiological balance is maintained and how its disruption leads to disease. Early exposure to cellular responses to injury and basic pathological processes establishes a bridge between normal structure and disease. Practical sessions, SGDs, and CBL promote active learning and reinforce conceptual understanding. Overall, this theme lays a strong foundation for system-based learning by linking molecular and cellular processes to clinical relevance | <ul style="list-style-type: none"> By the end of this theme, the student will be able to: Describe the structure and function of the cell membrane, cell organelles, and intracellular components. Explain mechanisms of transport across the cell membrane and their physiological significance. Discuss the concept of homeostasis and cellular control systems involved in maintaining the internal environment. Correlate basic cellular structure and function with histological features and physiological processes. Recognize common cellular responses to injury and their relevance to disease processes. Apply foundational cellular concepts to simple clinical and pathological scenarios. |

Case based discussion for Multi-Disciplinary Clinico concept connect Session C³⁶ (Physiology, Biochemistry, Medicine, Family Medicine & Community Medicine)

Case 1: “When Cells Lose Balance: A Case of Dehydration and Disrupted Homeostasis”

A 19-year-old male medical student presents to the emergency department after prolonged exposure to hot weather and inadequate fluid intake. He complains of excessive thirst, dizziness, generalized weakness, and muscle cramps. On examination, he appears dehydrated, with dry mucous membranes, tachycardia, and reduced urine output. There is no significant past medical history.

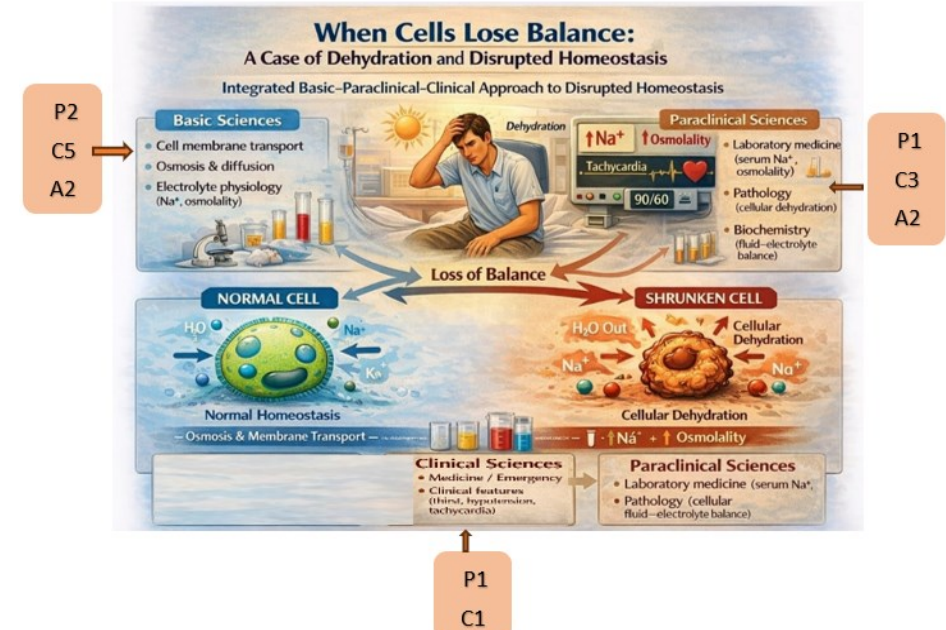
Laboratory Investigations

- Serum Sodium: Increased
- Plasma Osmolality: Elevated
- Serum Potassium: Normal to Mildly decreased
- Blood Urea Nitrogen (BUN): Mildly increased
- Serum Creatinine: Normal
- Urine Osmolality: Increased
- Urine Specific Gravity: High
- Urine Volume: Decreased

Educational relevance to theme

- Cell membrane structure and permeability

Theme 2 Clinico Concept Connect Session C³⁶



Harden Level 9 Multidisciplinary

- Osmosis and transmembrane water movement
- Body fluid compartments and cellular dehydration
- Homeostatic regulation of internal environment
- Early cellular responses to stress and injury

1. Multidisciplinary Integration (Harden Level 9)

Scenario 1: When Cells Lose Balance – Dehydration and Disrupted Homeostasis

How this case fits

At the multidisciplinary level, multiple disciplines contribute in parallel, with each discipline addressing the same patient problem (dehydration and loss of homeostasis) from its own disciplinary perspective, while reinforcing shared concepts such as osmosis, fluid balance, and compensatory mechanisms. The disciplinary identities remain distinct, and integration occurs through conceptual reinforcement rather than content merging.

Disciplines involved

Physiology: Body fluid compartments, osmosis, ADH regulation, and cellular dehydration

Biochemistry: Plasma osmolality, electrolyte balance, BUN changes in dehydration

Medicine: Clinical features, laboratory interpretation, and clinical assessment of dehydration

Family Medicine: Early recognition, preventive advice, and patient counseling

Community Medicine: Environmental risk factors, hydration awareness, and public health prevention

Justification

Each discipline independently addresses the same clinical scenario of dehydration, reinforcing the understanding of disrupted homeostasis from cellular to community levels without merging disciplinary content. This parallel contribution and reinforcement of learning outcomes fulfills the defining characteristics of multidisciplinary integration (Harden Level 9).

Specific Learning Objectives

| Theory | | | | | | | |
|--|--|---|--|----------------------|-------------------------|--------------------------------|----------------------------|
| Subject | Code | Demonstration/Dissection | At the End of The Demonstration Student Should Be Able To | Calgary Gauge | Learning Domains | Teaching Strategy | Assessment Tool |
| Aantomy (Histology) | M1-FM-A-0037 | Introduction to Microscope | • Identify different types of microscopes. | Must Know | C1 | Skill lab Demonstr ation | OSPE |
| | | | • Describe functions of different parts of microscope. | Must Know | C1 | | |
| | | | • Identify different types of lenses. | Must Know | C1 | | |
| | | | • Focus slides. | Should Know | P | | |
| Anatomy (Gross) | M1-FM-A-0017 | Anatomicomedical Terminology-IV (Skin and Body Systems) | • Describe general organization of different systems of body | Must Know | C2 | SGD | MCQ SAQ OSVE OSPE |
| | | | • Discuss concepts of skin and fascia | Must Know | C2 | | |
| | | | • Describe the classification of blood vessels | Must Know | C2 | | |
| | | | • Describe the concepts of divisions of nervous system | Must Know | C1 | | |
| | | | • Analyze the formation of spinal nerve | Should Know | C4 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Understand the curative and preventive health care measures. | Nice to know | C3 | | |
| | | | • Read a relevant research article | Nice to know | C3 | | |
| | • Apply strategic use of artificial intelligence in healthcare | Nice to know | C3 | | | | |
| | • Use HEC digital library | Nice to know | C3 | | | | |
| | M1-FM-A-0018 | Clavicle | • Determine the side | Must Know | C2 | SGD | MCQ SAQ OSVE OSPE |
| | | | • Demonstrate anatomical position, general features, attachments and articulations (medial and lateral). | Must Know | P | | |
| | | | • Relate the movement and dislocation with the pectoral girdle formation. | Must Know | C4 | | |
| | | | • Describe ossification in detail and Fracture Of clavicle. | Should Know | C3 | | |
| • Practice principles of bioethics | | | Nice to know | C3 | | | |
| • Apply the strategic use of artificial intelligence in healthcare | | | Nice to know | C3 | | | |

| | | | | | | | |
|--|--------------|---------|--|----------------|----|-----|------------------------------------|
| | | | <ul style="list-style-type: none"> Understand the curative and preventive health care measures. | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Use HEC digital library | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Read a relevant research article | Nice to know | C3 | | |
| | M1-FM-A-0019 | Scapula | <ul style="list-style-type: none"> Determine the side | Must Know | C2 | SGD | MCQ SAQ OSVE OSPE |
| | | | <ul style="list-style-type: none"> Demonstrate anatomical position, general features, attachments, and articulation. (clavicle and shoulder joints) | Must Know | P | | |
| | | | <ul style="list-style-type: none"> Relate the scapular anastomosis with its clinical significance | Must Know | C4 | | |
| | | | <ul style="list-style-type: none"> Demonstrate Scapular movements. | Must Know | P | | |
| | | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Focus on provision of curative and preventive health care services | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Use HEC digital library. | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Read a relevant research article | Nice to know | C3 | | |
| | M1-FM-A-0020 | Humerus | <ul style="list-style-type: none"> Determine the side | Must Know | C2 | SGD | MCQ SAQ OSVE OSPE OSCE |
| | | | <ul style="list-style-type: none"> Demonstrate anatomical position, general features, attachments and articulation (shoulder and elbow). | Must Know | P | | |
| | | | <ul style="list-style-type: none"> Correlate axillary, radial, median and ulnar nerve damage with respect to various fractures of humerus. | Should Know | C2 | | |
| | | | <ul style="list-style-type: none"> Relate the structure of humerus with significance of bicipital groove, angle of humeral torsion and carrying angle | Must Know | C4 | | |
| | | | <ul style="list-style-type: none"> Discuss the Ossification of Humerus | Should to know | C3 | | |
| | | | <ul style="list-style-type: none"> Defend different nerve injuries associated with the fractures of humerus. | Should Know | C5 | | |
| | | | <ul style="list-style-type: none"> Understand the curative and preventive health care measures. | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |

| | | | | | | | | |
|------------------------|--------------|---|---|--|----|----|-------------|--------------------|
| | | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | | |
| | | | <ul style="list-style-type: none"> Use HEC digital library | Nice to know | C3 | | | |
| | | | <ul style="list-style-type: none"> Read a relevant research article | Nice to know | C3 | | | |
| Anatomy (SDL) | M1-FM-A-0029 | Green Stick Fracture of Clavicle | <ul style="list-style-type: none"> Determine the side Demonstrate anatomical position, general features, attachments and articulations (medial and lateral). Describe Intramembranous development. Describe ossification in detail and Fracture of Clavicle Able to read a relevant research article | <ul style="list-style-type: none"> Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. Clavicle (Chapter 3, Page143,153,154). https://www.youtube.com/watch?v=Ykfzt-olaYs | | | | |
| | M1-FM-A-0030 | Applied Anatomy of Scapular Anastomosis and Its Clinical Significance | <ul style="list-style-type: none"> Determine the side Demonstrate anatomical position, general features, attachments and articulations (medial and lateral). Describe scapular anastomosis and its clinical significance Able to read a relevant research article | <ul style="list-style-type: none"> Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. Scapula (Chapter 3, Page143-145,154,171,172). https://www.youtube.com/watch?v=zFawNgaSL6E | | | | |
| Physiology (LGIS, SGD) | M1-FM-P-007 | Cell Membrane and Cell Organelles, I & II | <ul style="list-style-type: none"> Enlist functions of ER, golgi apparatus, lysosome & peroxosome, mitochondria | Must know | A | C1 | LGIS SGD | SAQ MCQ VIVA |
| | | | <ul style="list-style-type: none"> Compare and contrast RER & SER, lysosomes & peroxisomes | Must know | A | C4 | | |
| | | | <ul style="list-style-type: none"> Understand Docking mechanism | Should know | B | C2 | | |
| | | | <ul style="list-style-type: none"> Discuss physiological importance of mitochondria & ATP | Must Know | A | C2 | | |
| | | | <ul style="list-style-type: none"> Describe the structure of cell membrane: fluid mosaic model | Must Know | A | C1 | | |
| | | | <ul style="list-style-type: none"> Enlist functions of cell membrane | Must Know | A | C1 | | |
| | | | <ul style="list-style-type: none"> Enlist membrane bound and non-membrane bound organelles | Nice to know | C | C1 | | |
| | | | <ul style="list-style-type: none"> Differentiate between cytoplasm and cytosol | Nice to know | C | C4 | | |
| | M1-FM-P-0013 | Intracellular communication and cell junctions | <ul style="list-style-type: none"> Describe the structure of various intracellular connections | Must know | A | C1 | LGIS SGD | SAQ MCQ VIVA |
| | | | <ul style="list-style-type: none"> Give the physiological importance of cell junctions | Must know | A | C1 | | |

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|---------------------|--------------|--|--|--|-----------|----|-----------|---------------------------|----|
| | M1-FM-P-0014 | Signal Transduction | <ul style="list-style-type: none"> Describe the various 2nd messenger systems | Must know | A | C1 | LGIS | SAQ MCQ VIVA | |
| | | | <ul style="list-style-type: none"> Discuss physiological significance | Must Know | A | C2 | | | |
| | M1-FM-P-0014 | Body fluid compartments, Cell membrane and cell cytoskeleton | <ul style="list-style-type: none"> Discuss the functions of cell | Must Know | A | C2 | SGD | MCQ SAQ VIVA | |
| | | | | <ul style="list-style-type: none"> Describe cell cytoskeleton | Must know | A | | | C1 |
| | | | <ul style="list-style-type: none"> Categorize different components of cell cytoskeleton. | Must Know | A | C4 | | | |
| Physiology (SDL) | M1-FM-P-0020 | Cell membrane & classification of cell organelles | <ul style="list-style-type: none"> Structure of cell membrane Cell cytoskeleton Cytoplasm and various organelles Golgi Apparatus and its function Lysosomes and peroxisomes Secretory vesicles | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Editions, Overview of Cellular Physiology in Medical Physiology (chapter02, Page33) Human Physiology by DeeUnglaub Silver thorn. 8TH Edition.Compartmentation, chapter3, page95 Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.The cell (chapter01, section1 Page 03,18) <p>Textbook of Medical Physiology by Guyton & Hall.14th Edition. Introductionto Physiology. (Section1, chapter03, page31)</p> | | | | | |
| Physiology (SKL) | M1-FM-P-0028 | Introduction to Wintrobe&Westergen tube | <ul style="list-style-type: none"> Identify the wintrobe and westergen tubes | Must know | A | C1 | Skill Lab | OSPE | |
| | | | <ul style="list-style-type: none"> Must Know the differences between two tubes and uses in different methods | Must know | A | P | | | |
| Biochemistry (LGIS) | M1-FM-B-001 | Cell Organelle-II | <ul style="list-style-type: none"> Describe structure, functions and marker enzymes of ER & Golgi apparatus | Must Know | | C2 | LGIS | MCQ SAQ SEQ VIVA | |
| | | | <ul style="list-style-type: none"> Describe structure, functions and marker enzymes of lysosome, peroxisome & ribosome | Must Know | | C2 | | | |
| | | | <ul style="list-style-type: none"> Analyze the relationship between defects in cell organelles and the resulting clinical conditions or congenital disorder | Should Know | | C4 | | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Practice principles of bioethics Understand the curative and preventive health care measure Read relevant research articles Use HEC digital library | Nice to know | | C3 | | | |
| | M1-FM-B-004 | Transport across cell membrane | <ul style="list-style-type: none"> Explain transport of various substances by active and passive transport, diffusion, phagocytosis, endocytosis and exocytosis | Must Know | | C2 | | MCQ SAQ | |

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|--|--------------------|---|--|--|-------------|------|---------------------------|---------------------------|
| | | | <ul style="list-style-type: none"> • Correlate the clinical disorders with defective transport across cell membrane | Should Know | C3 | LGIS | SEQ VIVA | |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | | | |
| | M1-FM-B-005 | Osmosis, osmotic pressure and oncotic pressure (Physico chemical aspects-I) | <ul style="list-style-type: none"> • Define osmosis and osmotic pressure. | Must Know | C1 | LGIS | MCQ SAQ SEQ VIVA | |
| | | | <ul style="list-style-type: none"> • Discuss biochemical application of osmotic and oncotic pressure and methods to measure them. | Should Know | C2 | | | |
| | | | <ul style="list-style-type: none"> • Correlate oncotic pressure with clinical scenarios | Nice to Know | C3 | | | |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | | | |
| | M1-FM-B-006 | Water & PH | <ul style="list-style-type: none"> • Define pH, Pka, body buffer | Must Know | C1 | LGIS | MCQ SAQ SEQ VIVA | |
| | | | <ul style="list-style-type: none"> • Discuss water distribution in the body | Should Know | C2 | | | |
| | | | <ul style="list-style-type: none"> • Understand dehydration and overhydration | Nice to Know | C3 | | | |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to Know | C3 | | | |
| | Biochemistry (SGD) | M1-FM-B-027 | Cell & Cell membrane | <ul style="list-style-type: none"> • Explain Composition of Normal Cell & Cell Organelles | Should Know | C2 | SGD | MCQ SAQ SEQ VIVA |
| | | | | <ul style="list-style-type: none"> • Describe Composition of Cell Membrane | Should Know | C2 | | |
| | | | | <ul style="list-style-type: none"> • Understand Fluid Mosaic Model | Should Know | C2 | | |

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|--------------------|--------------------------------|--|--|---|----|-----------|------|
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | | |
| Biochemistry (SDL) | M1-FM-B-029 | Cell and cell organelles | • Explain composition of normal cell | <ul style="list-style-type: none"> ❖ Essentials of medical Biochemistry. Mushtaq Ahmad Vol – I 9th edition (chapter 1, page 3) ❖ https://youtu.be/0xe1s65IH0w?si=nMAFtXcYw3_U6eDz | | | |
| | | | • Describe methods to separate different organelles of cell | | | | |
| | | | • Describe structure, functions and marker enzymes of ER & Golgi apparatus | | | | |
| | | | • Describe structure, functions and marker enzymes of lysosome, peroxisome & ribosome | | | | |
| | | | • Describe structure, functions and marker enzymes of mitochondria and Nucleus | | | | |
| | | | • Illustrate the clinical conditions and congenital defects of cell organelles | | | | |
| M1-FM-B-030 | Cell membrane | • Explain composition of cell membrane | <ul style="list-style-type: none"> • Harper's illustrated biochemistry 32nd edition (chapter 40 page – 460) • https://youtu.be/RT61MUjogRo?si=ThIDQR_yn04mSLdu | | | | |
| | | • Understand fluid mosaic model | | | | | |
| | | • Describe functions performed by each component | | | | | |
| M1-FM-B-031 | Transport across cell membrane | • Explain transport of various substances by active and passive transport, diffusion, phagocytosis, endocytosis and exocytosis | <ul style="list-style-type: none"> • Harper's illustrated biochemistry 32nd edition (Chapter 40 page 467) • https://youtu.be/J5pWH1r3pgU?si=-sDY0IeOa7b-mzst | | | | |
| | | • Correlate the clinical disorders with defective transport across cell membrane | | | | | |
| Biochemistry (SKL) | M1-FM-B-040 | Introduction to Laboratory precautions and glassware | • Understand the use of laboratory glassware | Must Know | P | Skill Lab | OSPE |
| | | | • State precautions while working in the laboratory | Must Know | P | Skill Lab | OSPE |

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|-----------|--------------------|--|---|----|-------------|-----|
| Pathology | M1-FM-VI(Path)-002 | Introduction to Pathology & Cellular Responses to Injury | Define the following terms: <ul style="list-style-type: none"> • Etiology • Pathogenesis • Morphology | C2 | LGIS SGD | MCQ |
| | | | <ul style="list-style-type: none"> • Discuss cellular responses to injury for: • Reversible injury • Adaptation • Irreversible injury • Cell death | C2 | | |
| | M1-FM-VI(Path)-003 | Intracellular Accumulations | <ul style="list-style-type: none"> • Describe types of intracellular accumulations with clinical examples: • Lipids/ fat • Protein • Glycogen • Pigments | C2 | LGIS SGD | MCQ |
| | | | <ul style="list-style-type: none"> • Explain mechanism of intracellular accumulations. | C2 | | |
| | | | <ul style="list-style-type: none"> • Enlist causes of fatty change | C1 | | |
| | | | <ul style="list-style-type: none"> • Describe the pathogenesis of fatty liver | C1 | | |

Spiral Courses (2nd Week)
Community Medicine

| Theory | | | | | |
|------------------|--------------------|--|------------------------|--------------------------|------------------------|
| Code | Topic | Learning Objectives At the end of the lecture the student should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
| M1-FM-VI(CM)-004 | Lifestyle Medicine | <ul style="list-style-type: none"> • Understand the Role of Lifestyle Factors in Health • Assess and Diagnose Lifestyle-related Health Risks • Implement Lifestyle Interventions for Disease Prevention and Management • Understand the Multidisciplinary Approach in Lifestyle Medicine | C1 C2 C3 C2 | LGIS | MCQs |

Integrated Undergraduate Research Curriculum (IUGRC)

| Theory | | | | | |
|---------------------|---|---|----------------------------------|--------------------------|------------------------|
| Code | Topic | Learning Objectives At the end of the lecture the student should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
| M1-FM-SI(IUGRC)-002 | IUGRC (Research 2) Characteristics of Research Process and Health Research Process | <ul style="list-style-type: none"> • Elaborate various characteristics of a health research process • Differentiate research from a non-research activity • Elaborate ingredients of researcher • Discuss the criteria for selection of a research topic • Elaborate the types of variables • Differentiate between qualitative and quantitative data | C1 C2 C2 C2 C2 C2 | LGIS | MCQs |
| M1-FM-SI(IUGRC)-003 | IUGRC (Research 3) Basics of Ethics in Health Research | <ul style="list-style-type: none"> • Elaborate the value of ethics in conduct of Health Research • Explain basic ethical principles of health research • Explain ethics of research methods • Interpret the application of data collection ethics | C2 C2 C2 C2 | LGIS | MCQs |
| M1-FM-SI(IUGRC)-004 | IUGRC (Research 4) | <ul style="list-style-type: none"> • Narrate responsibility for ethics in HR | C1 | LGIS | MCQs |

| | | | | | |
|--|---|--|-------------------------------|--|--|
| | <p>Basics of Ethics in Medical Research</p> | <ul style="list-style-type: none"> • Explain Nuremburg code and importance of ethics in current research trends • . Elaborate General ethical principles including explanation of basic principles of Beneficence, non-maleficence, respect and justice • Discuss the Declaration of Helsinki | <p>C2</p> <p>C2</p> <p>C2</p> | | |
|--|---|--|-------------------------------|--|--|

Multidisciplinary (Hardens Level 9) Clinico-Concept Connect (C³6) Sessions for 2nd Week

| Session | Topic | Department | At the End of The Demonstration Student Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|--|---|--------------------|---|-----------------|-------------------|-----------------|
| Clinico-Concept Connect (C ³ 6) Sessions -I | A Case of Dehydration and Disrupted Homeostasis | Physiology | <ul style="list-style-type: none"> Explain the normal distribution of body fluids among intracellular and extracellular compartments and changes occurring during dehydration. | C2 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Explain the physiological regulation of water balance including thirst mechanism and antidiuretic hormone (ADH). | C2 | LGIS | MCQ |
| | | Biochemistry | <ul style="list-style-type: none"> Explain the biochemical basis of plasma osmolality and the role of sodium in maintaining osmotic balance. | C2 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Interpret raised serum sodium and plasma osmolality in the context of water deficit. | C3 | LGIS | MCQ |
| | | Medicine | <ul style="list-style-type: none"> Analyse clinical features of dehydration by interpreting patient history and physical examination findings. | C4 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Recognize dehydration as a reversible condition if identified and managed early. | C2 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Explain the rationale for initial assessment and monitoring of a dehydrated patient. | C2 | LGIS | MCQ |
| | | Family Medicine | <ul style="list-style-type: none"> Explain the importance of early recognition of dehydration at the primary care level. | C2 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Evaluate common risk factors for dehydration in young adults and determine their relative impact on hydration status. | C5 | LGIS | MCQ |
| | | Community Medicine | <ul style="list-style-type: none"> Describe dehydration as a public health problem, especially in hot climates. | C2 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Evaluate community-based preventive strategies for reducing dehydration-related morbidity. | C5 | LGIS | MCQ |

Theme 3: Control Systems and Communication in the Human Body (3rd Week)

| Themes | Rationale | General learning Objectives |
|--|---|--|
| Control Systems and Communication in the Human Body | <p>This theme introduces students to the mechanisms by which the human body maintains coordination, regulation, and internal stability through integrated control and communication systems. Building on prior knowledge of cellular function, membrane transport, and homeostasis, the theme integrates physiology, anatomy, histology, biochemistry, pathology, and clinical disciplines to explain how cells, tissues, and organs communicate and respond to internal and external stimuli. Emphasis is placed on cellular control mechanisms, receptors and signal transduction, feedback systems, and intracellular communication, as reflected in the timetable. Clinical correlations such as genetic disorders, cellular injury, and applied anatomy help students appreciate how disruption of control systems leads to disease. This theme establishes a foundation for understanding nervous and endocrine regulation in later system-based modules.</p> | <ul style="list-style-type: none"> • By the end of this theme, the student will be able to: • Explain the principles of control systems involved in maintaining internal homeostasis. • Describe mechanisms of cellular and intercellular communication, including receptors and signal transduction pathways. • Differentiate between negative and positive feedback mechanisms and their physiological significance. • Correlate anatomical and histological features with functional aspects of communication and control systems. • Recognize the effects of disruption of control systems at cellular and tissue levels. • Apply basic concepts of regulation and communication to introductory clinical and pathological scenarios. |
| <p>Case based discussion for Multi-Disciplinary Clinico concept connect session C³⁶ (Physiology, Biochemistry, Endocrinology, Pathology, Medicine & Community Medicine)</p> <p>Clinical Case Scenario 2: Disruption of Integrated Control and Communication Systems</p> <p>A 46-year-old man presents to the medical outpatient department with complaints of excessive thirst, frequent urination, persistent fatigue, and gradual unintentional weight loss over the last five months. He reports drinking large amounts of water throughout the day and waking multiple times at night to urinate. He also describes episodes of blurred vision and difficulty concentrating at work. There is a strong family history of metabolic disease, with both parents diagnosed with type 2 diabetes mellitus.</p> <p>On physical examination, the patient appears tired and mildly dehydrated. His pulse rate is 98 beats per minute, blood pressure is 140/88 mmHg, and respiratory rate is normal. His skin appears dry, with reduced skin turgor. Cardiovascular, respiratory, and abdominal examinations are unremarkable. Neurological examination reveals no focal deficits.</p> <p>Initial laboratory investigations show persistently elevated fasting blood glucose levels and an increased HbA1c, indicating poor long-term glycemic control. Serum electrolyte levels are within normal limits. Further biochemical evaluation reveals normal to elevated circulating insulin levels, suggesting that insulin is being produced but is ineffective at the cellular level. This points toward impaired insulin receptor function and defective intracellular signal transduction, resulting in reduced glucose uptake by peripheral tissues.</p> <p>The failure of insulin-mediated signaling disrupts normal cellular communication and feedback mechanisms, leading to sustained hyperglycemia. This breakdown in control systems affects multiple organs and tissues, producing systemic symptoms such as polyuria, polydipsia, fatigue, and weight loss.</p> | | |

This case highlights how normal regulation of blood glucose depends on effective communication between cells through receptors, second messengers, and feedback loops. Impaired receptor function and altered signal transduction prevent appropriate cellular responses, demonstrating loss of homeostasis. The case integrates principles from physiology (endocrine regulation), biochemistry (hormone action and signaling pathways), pathology (metabolic dysfunction), and clinical medicine, illustrating how disruption of control systems leads to disease.

Educational relevance to theme

- Receptor-mediated cellular communication
- Intracellular signal transduction pathways
- Negative feedback mechanisms in endocrine regulation
- Integration of cellular control with whole-body homeostasis
- Clinical consequences of disrupted control and communication systems

2. Multidisciplinary Integration (Harden Level 9)

Scenario 2: Disruption of Integrated Control and Communication Systems (Type 2 Diabetes Mellitus)

How this case fits

At the multidisciplinary level, the case of poorly controlled type 2 diabetes mellitus is explored by multiple disciplines working in parallel, each contributing discipline-specific insights into disrupted cellular communication, endocrine control, and systemic consequences. The focus remains on a single patient problem, while disciplinary boundaries are maintained.

Disciplines involved

Physiology: Endocrine regulation of glucose homeostasis and feedback mechanisms

Biochemistry: Insulin receptor signaling, second messengers, and impaired glucose uptake

Endocrinology: Hormonal regulation, insulin resistance, and feedback control failure

Pathology: Pathogenesis of insulin resistance and metabolic dysfunction

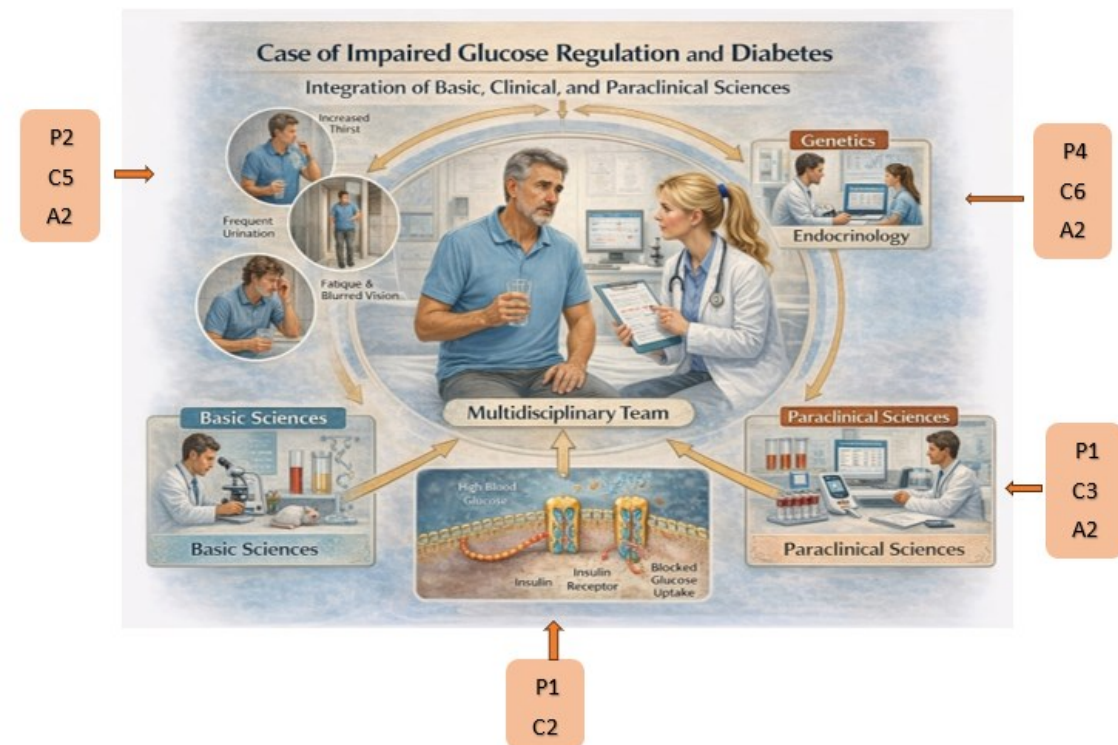
Medicine: Clinical features, diagnostic criteria, and interpretation of glycemic indices

Community Medicine: Lifestyle risk factors, diabetes burden, and prevention strategies

Justification

Each discipline independently analyzes the same patient with diabetes mellitus, emphasizing its own conceptual framework while reinforcing shared themes of control systems, receptor function, and homeostasis. The absence of content merging and the presence of parallel disciplinary contributions confirm alignment with multidisciplinary integration as defined in Harden Level 9.

Theme 3 Clinico Concept Connect Session C³⁶



Harden Level 9 Multidisciplinary

Specific Learning Objectives

| Theory | | | | | | | |
|--|--------------|---------------------------------|---|----------------------|-------------------------|--------------------------|----------------------------|
| Subject | Code | Demonstration/Dissection | At the End of The Demonstration Student Should Be Able To | Calgary Gauge | Learning Domains | Teaching Strategy | Assessment Tool |
| Anatomy (Histology) | M1-FM-A-009 | Types of Epithelium | <ul style="list-style-type: none"> • Define Epithelium | Must Know | C1 | LGIS | MCQ SAQ OSVE OSPE |
| | | | <ul style="list-style-type: none"> • Discuss general features of Epithelial cells (basal, apical and lateral surfaces) | Must Know | C2 | | |
| | | | <ul style="list-style-type: none"> • Classify epithelium | Must Know | C2 | | |
| | | | <ul style="list-style-type: none"> • Explain the histological structure of simple epithelium | Must Know | C2 | | |
| | | | <ul style="list-style-type: none"> • Describe the location and functions of simple epithelium | Must Know | C2 | | |
| | | | <ul style="list-style-type: none"> • Classify stratified epithelium. | Must Know | C2 | | |
| | | | <ul style="list-style-type: none"> • Describe the functions and distribution of stratified epithelium | Must Know | C1 | | |
| | | | <ul style="list-style-type: none"> • Differentiate between stratified and pseudostratified epithelium | Must Know | C4 | | |
| | | | <ul style="list-style-type: none"> • Describe characteristics of transitional epithelium | Must Know | C2 | | |
| | | | <ul style="list-style-type: none"> • Correlate clinical aspects of different types of epithelia | Should Know | C3 | | |
| | | | <ul style="list-style-type: none"> • To understand the bio-physiological aspects of different types of epithelia | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |
| <ul style="list-style-type: none"> • Understand the curative and preventive health care | Nice to know | C3 | | | | | |

| | | | | | | | |
|----------------------|--|--|---|--------------|--|------|----------------------------|
| | | | measures. | | | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Read a relevant research article | Nice to know | C3 | | |
| | | | • Use HEC digital library | Nice to know | C3 | | |
| | M1-FM-A-0010 | Specializations of Apical Cell Surface | • Enumerate different apical modifications of cells | Must Know | C1 | LGIS | MCQ SAQ OSVE OSPE |
| | | | • Describe histological structure of each apical modification. | Must Know | C2 | | |
| | | | • Discuss functions of each type of apical modifications | Must Know | C2 | | |
| | | | • Correlate clinical aspects of Specializations of apical cell surfaces | Should Know | C3 | | |
| | | | • Analyze the functional modification in relation to the specializations of apical cell surface | Nice to know | C4 | | |
| | | | • Enlist causes of infertility. | Should Know | C1 | | |
| | | | • Apply the strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Understand the curative and preventive health care measures. | Nice to know | C3 | | |
| | | | • Read a relevant research article | Nice to know | C3 | | |
| | | | • Use HEC digital library | Nice to know | C3 | | |
| Anatomy (Embryology) | | | M1-FM-A-003 | Oogenesis | • Discuss role of female hormones during oogenesis | | |
| | • Describe different stages of oogenesis | Must Know | | | C2 | | |

| | | | | | | | |
|---------|--------------|-------------------|---|--------------|----|------|----------------------------|
| | | | <ul style="list-style-type: none"> Correlate clinical aspects of gametogenesis | Must Know | C3 | | |
| | | | <ul style="list-style-type: none"> To understand the bio-physiological aspects of gametogenesis | Must Know | C2 | | |
| | | | <ul style="list-style-type: none"> Understand the curative and preventive health care measures. | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Practice the principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Use HEC digital library | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Read a relevant research article | Nice to know | C3 | | |
| | M1-FM-A-004 | Spermatogenesis | <ul style="list-style-type: none"> Define spermatogenesis. | Should Know | C1 | LGIS | MCQ SAQ OSVE OSPE |
| | | | <ul style="list-style-type: none"> Describe different phases of spermatogenesis | Should Know | C2 | | |
| | | | <ul style="list-style-type: none"> Discuss stages of spermiogenesis | Should Know | C2 | | |
| | | | <ul style="list-style-type: none"> Relate the functions of male hormones with the process of spermatogenesis | Should know | C3 | | |
| | | | <ul style="list-style-type: none"> Understand the curative and preventive health care measures. | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Practice the principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Able to read a relevant research article | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Use HEC digital library | Should Know | C3 | | |
| Anatomy | M1-FM-A-0038 | Simple epithelium | <ul style="list-style-type: none"> Classify epithelium. | Must Know | C2 | | OSPE |

| | | | | | | | |
|--------------------|--------------|------------------------------------|---|--------------|----|----------------------------|----------------------------|
| (Histology) | | | <ul style="list-style-type: none"> • Illustrate different types of simple epithelium | Must Know | P | Skill lab Demonstration | |
| | | | <ul style="list-style-type: none"> • Identify types of simple epithelium. | Must Know | P | | |
| | | | <ul style="list-style-type: none"> • Write two points of identification | Should Know | C1 | | |
| Anatomy (Gross) | M1-FM-A-0021 | Anterior Axioappendicular Region | <ul style="list-style-type: none"> • Describe Superficial fascia with cutaneous nerves and vessels of anterior axioappendicular region • Tabulate muscles of the anterior axioappendicular region | Must Know | C2 | Skill lab SGD | MCQ SAQ OSVE OSPE |
| | | | <ul style="list-style-type: none"> • Analyze different movements of anterior axioappendicular region in relation with the action of individual muscle | Should Know | C4 | | |
| | | | <ul style="list-style-type: none"> • Strategic use of artificial intelligence in healthcare | Nice to Know | C3 | | |
| | | | <ul style="list-style-type: none"> • Understand the curative and preventive health care measures • Practice principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare | Nice to Know | C3 | | |
| | | | <ul style="list-style-type: none"> • Use HEC digital library | Nice to Know | C3 | | |
| | | | <ul style="list-style-type: none"> • Read a relevant research article | Nice to know | C3 | | |
| | M1-FM-A-0022 | Posterior Axioappendicular Muscles | <ul style="list-style-type: none"> • Tabulate muscles of the pectoral region (origin, insertion, nerve supply, action and applied). | Must Know | C2 | Skill lab SGD | MCQ SAQ OSVE OSPE |
| | | | <ul style="list-style-type: none"> • Identify and describe the | Must Know | C2 | | |

| | | | | | | | | | | |
|------------------------|--------------|---|--|---|----|----|-------------|--------------------|--|--|
| | | | pectoral and claviopectoral fascia | | | | | | | |
| | | | <ul style="list-style-type: none"> • Use HEC digital library | Nice to Know | C3 | | | | | |
| | | | <ul style="list-style-type: none"> • Understand the curative and preventive health care measures | Nice to know | C3 | | | | | |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare | Nice to Know | C3 | | | | | |
| | | | <ul style="list-style-type: none"> • Read a relevant research article | Nice to Know | C3 | | | | | |
| Anatomy (SDL) | M1-FM-A-0031 | Applied Anatomy of injury to serratus Anterior | <ul style="list-style-type: none"> • Describe Superficial fascia with cutaneous nerve and vessels of anterior axioappendicular region. • Understand the bio-physiological aspects of anterior axioappendicular region. • Able to read a relevant research article and use digital library | <ul style="list-style-type: none"> ❖ Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. Anterior axioappendicular muscles (Chapter 3, Page 168,169). https://teachmeanatomy.info/ | | | | | | |
| | M1-FM-A-0032 | Applied Anatomy of Posterior axioappendicular muscles | <ul style="list-style-type: none"> • Tabulate Muscles of the pectoral region (origin, insertion, nerve supply, action and applied). • Identify and describe the pectoral and claviopectoral fascia. • Able to read a relevant research article and use digital library | <ul style="list-style-type: none"> ❖ Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. Posterior axioappendicular muscles (Chapter 3, Page 170,171). https://teachmeanatomy.info/ | | | | | | |
| Physiology (LGIS, SGD) | M1-FM-P-004 | Homeostatic Control System I | <ul style="list-style-type: none"> • Describe the characteristic of control system of the body. | Must Know | A | C1 | LGIS SGD | SAQ MCQ VIVA | | |
| | | | <ul style="list-style-type: none"> • Analyze four control mechanisms of body | Must Know | A | C4 | | | | |

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|---|--|--|--|-------------|----|----|---------------|--------------------|
| | | | <ul style="list-style-type: none"> Understand the mechanism of positive feedback, negative feedback, feed forward control and adaptive control with examples. | Must Know | A | C2 | | |
| M1-FM-P-005 | Homeostatic Control System II | <ul style="list-style-type: none"> Recall control mechanisms | | Should Know | B | C1 | LGIS SGD | SAQ MCQ VIVA |
| | | <ul style="list-style-type: none"> Give examples | | | | C1 | | |
| | | <ul style="list-style-type: none"> Compare and contrast feed forward and adaptive mechanisms | Nice to Know | C | C4 | | | |
| | | <ul style="list-style-type: none"> Define gain of control system | Must Know | A | C1 | | | |
| | | <ul style="list-style-type: none"> Comprehend gain of the control system | Must Know | A | C2 | | | |
| | | <ul style="list-style-type: none"> Calculate gain of the feedback system and understand the significance of sign in the formula | Nice To know | C | C3 | | | |
| M1-FM-P-006 | Cellular organelles and cell functions | <ul style="list-style-type: none"> Describe cytoskeleton & cell locomotion | | Must Know | A | C1 | LGIS Group | SAQ MCQ VIVA |
| | | <ul style="list-style-type: none"> Discuss functions of cilia and amoeboid movement | | Must Know | A | C2 | | |
| | | <ul style="list-style-type: none"> Describe the mechanism of ATP generation | Should Know | B | C1 | | | |
| | | <ul style="list-style-type: none"> Enlist three major processes of ATP consumption in the body | Should Know | B | C1 | | | |
| | | <ul style="list-style-type: none"> Understand cell ingestion and other independent roles of cell | Should know | B | C2 | | | |
| | | <ul style="list-style-type: none"> Discuss vaults | Nice to know | C | C2 | | | |
| | | <ul style="list-style-type: none"> Understand basic concepts about DNA and RNA | Should know | B | C2 | | | |
| | | <ul style="list-style-type: none"> Compare various types of RNA and their functions | Must know | A | C4 | | | |
| | | <ul style="list-style-type: none"> Enlist and Draw steps of mitosis and meiosis | Nice to know | C | C2 | | | |
| <ul style="list-style-type: none"> Comprehend role of different parts of chain of DNA as genes like TATA box | Nice to know | C | | | | | | |

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|---------------------|--------------|--|--|--|----|------|------------------|---------------|
| | M1-FM-P-0012 | Genetics Transcription & Translation | <ul style="list-style-type: none"> Define & Explain Genetics, Transcription & Translation | Must Know | A | | LGIS PBL | SAQ MCQs VIVA |
| Physiology (SGD) | M1-FM-P-0018 | Intracellular communication and cell junction, signal transduction | <ul style="list-style-type: none"> Describe the structure and function of various intracellular connections Discuss second messenger system | Must know | A | C2 | SGD | A |
| Physiology (SDL) | M1-FM-P-0021 | Intracellular communication and cell junction | <ul style="list-style-type: none"> Receptors and its types Cellular signaling and various mechanisms Signal transduction Hormone receptors and their activation Second messenger mechanisms | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition., Overview of Cellular Physiology in Medical Physiology (chapter02, Page33-44) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Compartmentation, chapter 3, page109 Physiology by Linda S. Costanzo 6th Edition. Gastrointestinal Physiology Physiological Basis of Medical Practice by Best & Taylor's.13th Edition The cell (chapter01, Page14) Text book of Medical Physiology by Guyton & Hall.14th Edition. Introduction to Endocrinology. (Section14, Page 920) | | | | |
| Physiology (SKL) | M1-FM-P-0029 | Apparatus identification (Introduction to Neubauer's chamber, Red Blood Cell (RBC) pipettes & White Blood Cell (WBC) pipette | <ul style="list-style-type: none"> Complete study of Neubauer's slide, calculation of volumes of corner squares and central squares | Must know | A | P | Skill Lab | OSPE |
| | | | <ul style="list-style-type: none"> Important differentiating points between WBC & RBC's pipettes | Must know | A | C1 | | |
| | | | <ul style="list-style-type: none"> How to dilute the two pipettes | Should know | B | P | | |
| | | | <ul style="list-style-type: none"> Must Know the composition of diluting fluids | Must know | A | C1 | | |
| Biochemistry (LGIS) | M1-FM-B-007 | (Physico chemical aspects-II & Physico chemical aspects-III) Phenomenon of viscosity, surface tension, | <ul style="list-style-type: none"> Define phenomenon of viscosity, surface tension, emulsification and adsorption | Must Know | C1 | LGIS | MCQ SAQ SEQ VIVA | |
| | | | <ul style="list-style-type: none"> Explain Biochemical applications and methods to | Should Know | C2 | | | |

| | | | | | | | |
|--|-------------|--|--|-------------|----|------|---------------------------|
| | | emulsification and adsorption | measure them | | | | |
| | M1-FM-B-008 | (Physico chemical aspects-II & Physico chemical aspects-III) Donnan equilibrium, adsorption and ion exchange resins | <ul style="list-style-type: none"> Define Donnan equilibrium, adsorption and ion exchange resins. | Must Know | C1 | LGIS | MCQ SAQ SEQ VIVA |
| <ul style="list-style-type: none"> Describe their effects on tissue fluids and biochemical importance | | | Should Know | C2 | | | |
| <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Practice principles of bioethics Understand the curative and preventive health care measure Read relevant research articles Use HEC digital library | | | Nice to know | C3 | | | |
| | M1-FM-B-009 | Cancer | <ul style="list-style-type: none"> Explain biochemical basis of cancer | Must Know | C2 | LGIS | MCQ SAQ SEQ VIVA |
| <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Practice principles of bioethics Understand the curative and preventive health care measure Read relevant research articles Use HEC digital library | | | Nice to know | C3 | | | |
| Biochemistry (SGD) | M1-FM-B-028 | Physico chemical aspects of cell | <ul style="list-style-type: none"> Define osmosis and osmotic pressure. Discuss biochemical application of osmotic and oncotic pressure and methods to measure them. | Should Know | C1 | SGD | MCQ SAQ SEQ VIVA |
| | | | | Should Know | C2 | | |

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|--|-------------|--|--|---|----|--|--|
| | | | <ul style="list-style-type: none"> • Correlate oncotic pressure with clinical scenarios | Nice to Know | C3 | | |
| | | | <ul style="list-style-type: none"> • Define phenomenon of viscosity, surface tension. | Should Know | C1 | | |
| | | | <ul style="list-style-type: none"> • Explain Biochemical applications and methods to measure them. | Should Know | C2 | | |
| | | | <ul style="list-style-type: none"> • Define Donnan equilibrium, adsorption and ion exchange resins. | Should Know | C1 | | |
| | | | <ul style="list-style-type: none"> • Describe their effects on tissue fluids and biochemical importance | Should Know | C2 | | |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | | |
| Biochemistry (SDL) | M1-FM-B-032 | Physicochemical Aspects Osmosis, osmotic pressure and oncotic pressure | <ul style="list-style-type: none"> • Define osmosis and osmotic pressure. | <ul style="list-style-type: none"> ❖ Essentials of medical Biochemistry. Mushtaq Ahmad Vol – I 9th edition (Chapter 02 page 46) ❖ https://youtu.be/dcAxPYUGgDs?si=ct5KOQGg24Nqv_xwJ | | | |
| | | | <ul style="list-style-type: none"> • Discuss biochemical application of osmotic and oncotic pressure and methods to measure them. | | | | |
| | | | <ul style="list-style-type: none"> • Correlate oncotic pressure with clinical scenarios | | | | |
| | M1-FM-B-033 | Phenomenon of viscosity, surface tension | <ul style="list-style-type: none"> • Define phenomenon of viscosity, surface tension. | <ul style="list-style-type: none"> ❖ Essentials of medical Biochemistry. Mushtaq Ahmad Vol – I 9th edition (Chapter 02 page 52, 55) ❖ https://youtu.be/zMzqiAuOSz0?si=hbiWv0HpHjsGsWFf ❖ https://youtu.be/UVcyea3ZH54?si=IUGBmNzV_YLU_YbML | | | |
| | | | <ul style="list-style-type: none"> • Explain Biochemical applications and methods to measure them. | | | | |
| | M1-FM-B-034 | Donnan equilibrium, adsorption and ion exchange resins | <ul style="list-style-type: none"> • Define Donnan equilibrium, adsorption and ion exchange resins. | <ul style="list-style-type: none"> • Essentials of medical Biochemistry. Mushtaq Ahmad Vol – I 9th edition (Chapter 02 page 50) • https://youtu.be/MhSfQio8mp0?si=ISnOkPan6Jp49trz | | | |
| <ul style="list-style-type: none"> • Describe their effects on tissue | | | | | | | |

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|--|--------------------|--|--|---|---|-----------|------|
| | | | fluids and biochemical importance | | | | |
| | M1-FM-B-035 | Cancer | <ul style="list-style-type: none"> Explain biochemical basis of cancer | <ul style="list-style-type: none"> Essentials of medical Biochemistry. Mushtaq Ahmad Vol – I 9th edition (Chapter 6 page 168) Harper’s Illustrated Biochemistry, 32nd edition (Chapter 56, page 689) https://youtu.be/6IsVBHGhESw?si=Msxf3n9b-YXE4-yy | | | |
| Biochemistry (SKL) | M1-FM-B-041 | Introduction of Laboratory equipment’s | <ul style="list-style-type: none"> Describe parts and working of different laboratory equipments | Should Know | P | Skill Lab | OSPE |
| Medicine | M1-FM-VI(Med)-004 | Evidence based medicine | <ul style="list-style-type: none"> Define evidence-based medicine | C1 | | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Discuss its applications | C2 | | | |
| | | | <ul style="list-style-type: none"> Discuss components of EBM | C2 | | | |
| Pathology | M1-FM-VI(Path)-004 | Pigments | <ul style="list-style-type: none"> Classify pigments | C2 | | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Explain the mechanism of pigment production and deposition in various clinical settings | C2 | | | |
| | | | <ul style="list-style-type: none"> Describe the morphological features (gross/ microscopic) with deposition of following pigments: Lipofuscin, Melani, Hemosiderin, Bilirubin, Anthracosis | C1 | | | |
| | M1-FM-VI(Path)-005 | Free Radicals/ Reactive Oxygen Species (Ros). Oxidative Stress | <ul style="list-style-type: none"> Define ROS/free radicals | C1 | | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Enlist oxygen derived free radicals | C1 | | | |
| <ul style="list-style-type: none"> Describe mechanism of generation of free radicals | C2 | | | | | | |
| <ul style="list-style-type: none"> Describe mechanism of removal of free radicals(antioxidants) | C2 | | | | | | |
| <ul style="list-style-type: none"> Describe the pathologic effects of free radicals | C2 | | | | | | |

Multidisciplinary (Hardens Level 9) Clinico-Concept Connect (C³6) Sessions for 3rd Week

| Session | Topic | Department | At the End of The Demonstration Student Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|---|--|--------------------|---|-----------------|-------------------|-----------------|
| Clinico-Concept Connect (C ³ 6) Sessions -II | Disruption of Integrated Control and Communication Systems | Physiology | <ul style="list-style-type: none"> Describe the normal physiological regulation of blood glucose levels by insulin and counter-regulatory hormones. | C1 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Correlate clinical features such as polyuria and polydipsia with loss of endocrine control mechanisms. | C3 | LGIS | MCQ |
| | | Biochemistry | <ul style="list-style-type: none"> Explain how defective receptor signaling leads to impaired glucose transport and hyperglycemia. | C2 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Interpret biochemical findings (elevated glucose, increased HbA1c, normal/elevated insulin) in the context of insulin resistance. | C3 | LGIS | MCQ |
| | | Endocrinology | <ul style="list-style-type: none"> Evaluate the role of endocrine glands and hormones in maintaining integrated metabolic regulation under normal and pathological conditions. | C5 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Design a conceptual model illustrating how endocrine glands and hormones interact to achieve integrated metabolic regulation. | C6 | LGIS | MCQ |
| | | Pathology | <ul style="list-style-type: none"> Describe the pathological basis of insulin resistance and type 2 diabetes mellitus. | C1 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Explain how sustained hyperglycemia leads to cellular and tissue-level metabolic dysfunction. | C2 | LGIS | MCQ |
| | | Medicine | <ul style="list-style-type: none"> Identify key clinical features suggestive of type 2 diabetes mellitus from history and examination. | C1 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Evaluate the clinical significance and limitations of laboratory parameters used to assess glycemic control in the diagnosis and management of diabetes mellitus. | C5 | LGIS | MCQ |
| | | Community Medicine | <ul style="list-style-type: none"> Describe diabetes mellitus as a major non-communicable disease burden at the community level. | C1 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Explain the role of lifestyle factors and family history in the development of insulin resistance. | C4 | LGIS | MCQ |

Theme 4: Genetics, Cell Division, and Human Development (4th Week)

| Themes | Rationale | General learning Objectives |
|---|---|--|
| Genetics, Cell Division, and Human Development | <p>This theme focuses on the genetic and cellular mechanisms that govern human growth, development, and reproduction, integrating concepts from genetics, biochemistry, physiology, anatomy, embryology, histology, pathology, and clinical disciplines as outlined in the fourth-week timetable. Building upon earlier themes on cellular structure, control systems, and communication, this theme explains how DNA replication, transcription, translation, and regulated cell division ensure normal development and maintenance of the human body. Topics such as gametogenesis, fertilization, embryological development, and tissue differentiation provide insight into the origin of normal human form and function. Integration with pathology and clinical subjects (medicine, pediatrics, obstetrics & gynecology) introduces students to the basis of genetic and developmental disorders, emphasizing the clinical relevance of basic sciences. This theme lays a critical foundation for understanding inherited diseases, congenital anomalies, and molecular mechanisms of disease encountered in later clinical training.</p> | <p>By the end of this theme, the student will be able to:</p> <ul style="list-style-type: none"> • Describe the structure and function of nucleic acids and their role in genetic information transfer. • Explain the processes of DNA replication, transcription, and translation and their regulation. • Describe the cell cycle, mitosis, meiosis, and programmed cell death, and their significance in development and disease. • Explain the processes of gametogenesis, fertilization, and early embryonic development. • Correlate embryological and histological development with normal structure and function of tissues and organs. • Recognize the basic mechanisms underlying genetic and developmental disorders and their clinical relevance. |
| <p>Case based discussion for Multi-Disciplinary Clinico concept connect session C³6 (Anatomy, Biochemistry, Physiology, Peads, Gynae & Obs)</p> <p>Case 3 “Disorder of Growth and Development”</p> <p>A 4-year-old boy is brought to the pediatric outpatient department by his parents with concerns regarding poor growth and delayed development. The parents report that the child has been noticeably shorter than his peers since early childhood. They are particularly concerned that he started walking later than expected, speaks only a few single words, and has difficulty keeping up with other children during play.</p> <p>The child was born at term via normal vaginal delivery. Antenatal history is unremarkable, with no exposure to infections, drugs, or radiation. There is no history of birth asphyxia. The parents deny any chronic illness, recurrent infections, or feeding difficulties. Family history is non-contributory.</p> <p>On general physical examination, the child appears alert but has a small build for his age. His height and weight are both below the 5th percentile. Facial examination reveals mild dysmorphic features, including a flattened nasal bridge and epicanthic folds. Muscle bulk appears reduced, and the child demonstrates hypotonia with delayed motor coordination. Speech is limited for age. Cardiovascular, respiratory, and abdominal examinations are normal. No organomegaly is detected.</p> <p>Developmental assessment shows delay in gross motor, fine motor, and speech milestones, while social interaction is relatively preserved.</p> <p>Clinical Signs and Symptoms</p> <p>Symptoms</p> <p>Delayed walking and speech development</p> <p>Poor linear growth compared to peers</p> | | |

Easy fatigability during physical activity
 Delayed achievement of developmental milestones

Physical Signs

Short stature (height < 5th percentile)
 Low weight for age
 Mild facial dysmorphism
 Hypotonia (reduced muscle tone)
 Delayed motor coordination
 Normal vital signs

No cardiac murmurs or respiratory distress

Laboratory and Diagnostic Investigations

Complete Blood Count (CBC): Within normal limits

Serum Electrolytes: Normal

Thyroid Function Tests: Normal

Growth Hormone Levels: Within normal range

Serum IGF-1: Mildly reduced

Bone Age (X-ray of left hand and wrist): Delayed compared to chronological age

Karyotype Analysis: Abnormal (consistent with chromosomal disorder)

Developmental Screening Tests: Delay in cognitive and motor domains

Echocardiography: Normal cardiac anatomy

Educational Relevance to Theme

This case highlights how genetic regulation, cell division, differentiation, and tissue specialization are essential for normal human growth and development. Disruption at the cellular and genetic level leads to impaired growth, delayed maturation, and abnormal development, emphasizing the clinical relevance of basic sciences in understanding developmental disorders.

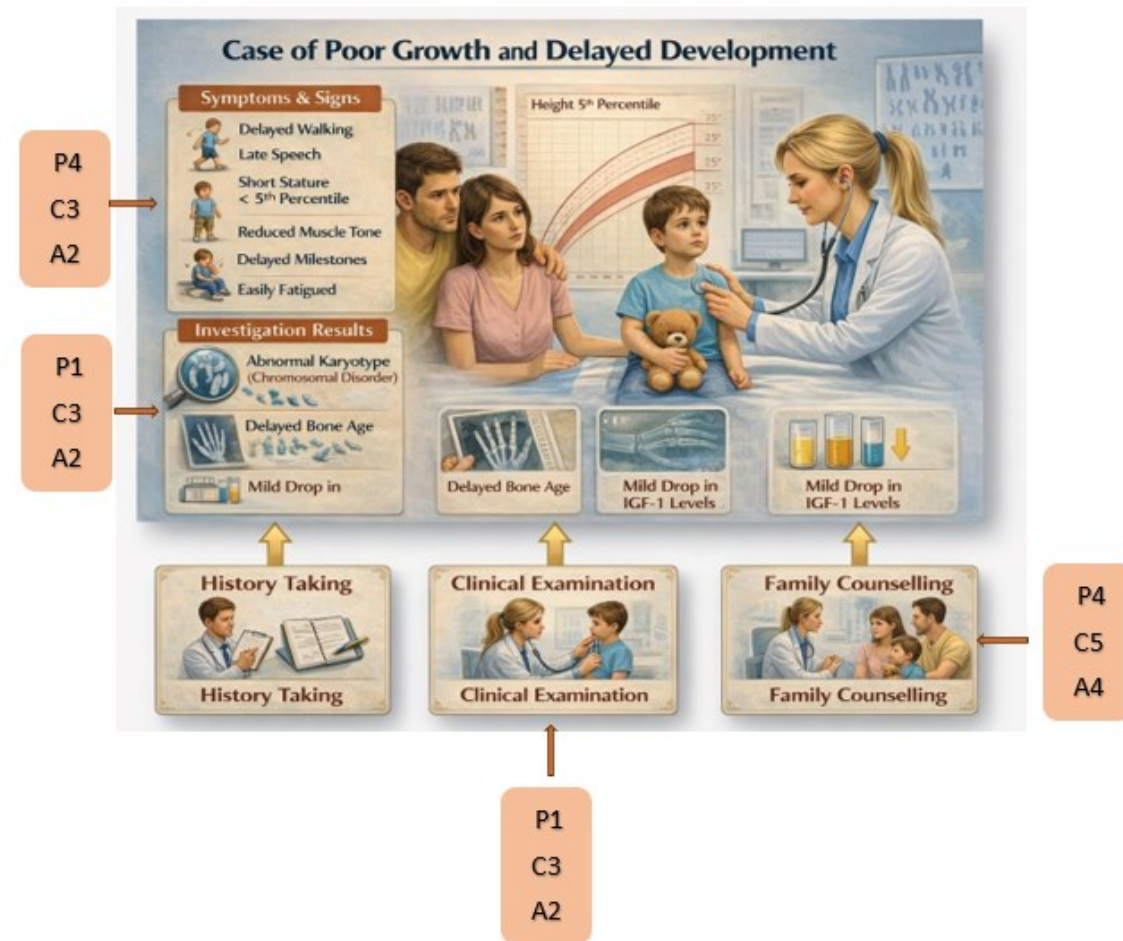
3. Multidisciplinary Integration (Harden Level 9)

Scenario 3: Disorder of Growth and Development

How this case fits

At the multidisciplinary level, this case of a child presenting with short stature and global developmental delay is explored by multiple disciplines working in parallel, with each discipline addressing the same patient problem from its own conceptual and professional perspective. The case allows

Theme 4 Clinico Concept Connect Session C³6



Harden Level 9 Multidisciplinary

integration of genetic, biochemical, physiological, developmental, and clinical aspects of growth and maturation while maintaining clear disciplinary boundaries.

Disciplines involved

Anatomy: Structural development, dysmorphic facial features, musculoskeletal growth, and delayed skeletal maturation

Biochemistry: Role of growth factors (IGF-1), molecular regulation of cell growth and differentiation

Physiology: Regulation of growth and development, endocrine control of growth hormone–IGF axis

Pediatrics: Clinical assessment of growth parameters, developmental milestones, and pediatric growth disorders

Gynecology & Obstetrics: Antenatal influences on fetal growth and development, genetic counseling considerations

Justification

Each discipline independently analyzes the same clinical problem of impaired growth and delayed development, reinforcing key concepts such as genetic regulation, endocrine control, and tissue maturation without merging disciplinary content. The parallel contribution of disciplines, with shared reference to a single patient scenario, meets the defining characteristics of multidisciplinary integration as described in Harden Level 9.

Specific Learning Objectives

| Theory | | | | | | | |
|---|---------------------------|--------------------------------------|--|--------------------------|-----------------------------|------------------------------|----------------------------|
| Subject | Code | Demonstration/ Dissection | At the End of The Demonstration Student Should Be Able To | Calgary Gauge | Learning Domains | Teaching Strategy | Assessment Tool |
| Anatomy (Embryology) | M1-FM-A-005 | Female Reproductive Cycles | • Understand Ovarian and Uterine cycle | Must Know | C1 | LGIS | MCQ SAQ OSVE OSPE |
| | | | • Correlate Ovarian and Uterine cycles | Must Know | C3 | | |
| | | | • Describe different phases of Ovarian and Uterine cycles | Must Know | C2 | | |
| | | | • Enumerate female sex hormones | Must Know | C1 | | |
| | | | • Discuss functional significance of female reproductive hormones in reproductive cycles | Must Know | C2 | | |
| | | | • Defend the case of anovulatory cycle in a female | Must Know | C4 | | |
| | | | • Understand the bio-physiological aspects female reproductive cycle | Nice to know | C2 | | |
| | | | • Focus on provision of curative and preventive health care services | Nice to know | C3 | | |
| | | | • Read a relevant research article | Nice to know | C3 | | |
| | | | • Apply the strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |
| | • Use HEC digital library | Nice to know | C3 | | | | |
| | M1-FM-A-006 | Ovulation and Fertilization | • Describe follicular development, ovulation and subsequent events in ovary | Must Know | C2 | LGIS | MCQ SAQ OSVE OSPE |
| | | | • Give an account on role of luteinizing hormone in ovulation | Must Know | C1 | | |
| | | | • Discuss capacitation in female genital tract | Must Know | C2 | | |
| | | | • Describe different phases and results of fertilization | Should Know | C2 | | |
| | | | • Analyze different causes of infertility. | Should Know | C4 | | |
| | | | • Compare different technologies of assisted fertilization | Should Know | C4 | | |
| | | | • Discuss different techniques of assisted reproduction with special emphasis on IVF | Should Know | C3 | | |
| | | | • Discuss the bio-physiological aspects of ovulation and fertilization | Nice to know | C2 | | |
| • Focus on provision of curative and preventive | Nice to know | C3 | | | | | |

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| | | | health care services. | | | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Apply the strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |
| | | | • Understand the curative and preventive health care measures. | Nice to know | C3 | | |
| | | | • Read a relevant research article | Nice to know | C3 | | |
| | | | • Use HEC digital library | Nice to know | C3 | | |
| Aantomy (Histology) | M1-FM-A-0011 | Intercellular Junctions and Adhesions | • Enumerate different cell junctions | Must Know | C1 | LGIS | MCQ SAQ OSVE OSPE |
| | | | • Describe histological structure of different cell junctions | Must Know | C2 | | |
| | | | • Differentiate between different types of cell junctions on the basis of their function and clinical conditions. | Should Know | C4 | | |
| | | | • Apply the strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Understand the curative and preventive health care measures. | Nice to know | C3 | | |
| | | | • Read a relevant research article | Nice to know | C3 | | |
| | | | • Use HEC digital library | Nice to know | C3 | | |
| | M1-FM-A-0012 | Glandular Epithelium | • Define gland. | Must Know | C1 | LGIS | MCQ SAQ OSVE OSPE |
| | | | • Compare between exocrine and endocrine glands with examples. | Must Know | C2 | | |
| | | | • Classify glands on the basis of morphology, secretory product, and mode of secretion. | Must Know | C2 | | |
| | | | • Understand the bio-physiological aspects of glands. | Should know | C2 | | |
| | | | • Practice principles of bioethics. | Nice to know | C3 | | |
| | | | • Apply the strategic use of artificial intelligence in healthcare. | Nice to know | C3 | | |
| | | | • Understand the curative and preventive health care measures. | Nice to know | C3 | | |
| • Read a relevant research article | | | Nice to know | C3 | | | |
| M1-FM-A-0039 | | • Classify stratified epithelium. | Must Know | C1 | Skill lab | OSPE | |

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| | | Stratified epithelium /Transitional Epithelium | <ul style="list-style-type: none"> • Illustrate different types of stratified epithelium • Discuss functions of stratified epithelium • Enlist sites of specific type of epithelium • Identify epithelium under microscope • Write two points of identification | Must Know | C1 | Demonstration | | | |
| | | | <ul style="list-style-type: none"> • Discuss functions of stratified epithelium | Must Know | C2 | | | | |
| | | | <ul style="list-style-type: none"> • Enlist sites of specific type of epithelium | Must Know | C2 | | | | |
| | | | <ul style="list-style-type: none"> • Identify epithelium under microscope | Must Know | C1 | | | | |
| | | | <ul style="list-style-type: none"> • Write two points of identification | Should Know | P | | | | |
| Aantomy (Gross) | M1-FM-A-0023 | Axilla | <ul style="list-style-type: none"> • Define axilla | Must Know | C2 | Skill lab SGD | MCQ SAQ OSVE OSPE | | |
| | | | <ul style="list-style-type: none"> • Describe its boundaries. | Must Know | C2 | | | | |
| | | | <ul style="list-style-type: none"> • Enumerate the Contents of axilla, (axillary artery with its branches, axillary vein and tributaries, axillary lymphatics, lymph nodes and brachial plexus). | Must Know | C2 | | | | |
| | | | <ul style="list-style-type: none"> • Defend the involvement of axillary lymph nodes with different clinical condition | Should Know | C5 | | | | |
| | | | <ul style="list-style-type: none"> • Practice principles of bioethics | Nice to Know | C3 | | | | |
| | | | <ul style="list-style-type: none"> • Understand the curative and preventive health care measures | Nice to know | C3 | | | | |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare | Nice to Know | C3 | | | | |
| | | | <ul style="list-style-type: none"> • Read a relevant research article | Nice to Know | C3 | | | | |
| | M1-FM-A-0024 | Brachial Plexus | <ul style="list-style-type: none"> • Use HEC digital library | Nice to Know | C3 | | | | |
| | | | <ul style="list-style-type: none"> • Describe the formation of brachial plexus its roots and trunks. | Must Know | C2 | | | Skill lab SGD | MCQ SAQ OSVE OSPE |
| | | | <ul style="list-style-type: none"> • Analyze how the presentation of brachial plexus injuries varies with the level of injury. | Must Know | C4 | | | | |
| | | | <ul style="list-style-type: none"> • Understand the curative and preventive health care measures | Nice to Know | C3 | | | | |
| | | | <ul style="list-style-type: none"> • Practice principles of bioethics | Nice to Know | C3 | | | | |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare | Nice to Know | C3 | | | | |
| <ul style="list-style-type: none"> • Read a research article on brachial plexus | Nice to Know | C3 | | | | | | | |
| Anatomy (SDL) | M1-FM-A-0033 | Applied Anatomy of Axilla | <ul style="list-style-type: none"> • Use HEC digital library | Nice to Know | C3 | | | | |
| | | | <ul style="list-style-type: none"> • Define axilla • Describe its boundaries • Enumerate the Contents of axilla, (axillary artery with its branches, axillary vein and tributaries, | ❖ Clinical Oriented Anatomy by Keith L. Moore.8 TH Edition. Axilla (Chapter 3, Page 183-190,197,198). ❖ https://teachmeanatomy.info/ https://www.youtube.com/watch?v=uSMugI_NNjc | | | | | |

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| | | | axillary lymphatics, lymph nodes and brachial plexus). | | | | | |
| | M1-FM-A-0034 | Erb's paralysis | <ul style="list-style-type: none"> Describe the formation of brachial plexus its roots and trunks. Describe the origin and root values of different nerves arising Able to read a research article on brachial plexus Able to use digital library | ❖ Clinical Oriented Anatomy by Keith L. Moore.8 TH Edition. Brachial plexus (Chapter 3, Page 191-196). https://www.youtube.com/watch?v=1qgqrXlpr1Y | | | | |
| | M1-FM-A-0035 | Klumpke's paralysis | <ul style="list-style-type: none"> Describe the different neurological deficits arising as a result of damaged to roots, trunks and branches of brachial plexus at different levels. Able to read a research article on brachial plexus | ❖ Clinical Oriented Anatomy by Keith L. Moore.8 TH Edition. Brachial plexus injuries (Chapter 3, Page 199-200). ❖ https://teachmeanatomy.info/ https://www.youtube.com/watch?v=c9giLkkgYA0 | | | | |
| Physiology (LGIS, SGD) | M1-FM-P-008 | Cell membrane Ion channels, Transport across the cell membrane: Diffusion | <ul style="list-style-type: none"> Enlist various types of ion channels | Must Know | A | C1 | LGIS SGD | SAQ MCQ VIVA |
| | | | <ul style="list-style-type: none"> Enumerate modes of transport mechanism across the cell membrane | Must know | A | C1 | | |
| | | | <ul style="list-style-type: none"> Define and discuss factors affecting diffusion | Should know | B | C1 | | |
| | | | <ul style="list-style-type: none"> Compare the energy systems used by different transport mechanism | Must Know | A | C4 | | |
| | M1-FM-P-009 | Transport across cell membrane: Osmosis | <ul style="list-style-type: none"> Recall transport mechanism across the cell membrane with special emphasis on osmosis and osmotic pressure | Should Know | B | C1 | LGIS SGD | SAQ MCQ VIVA |
| | | | <ul style="list-style-type: none"> Recall factors affecting osmosis | Should know | B | C1 | | |
| | | | <ul style="list-style-type: none"> Comprehend the concept of moles and osmoles | Nice to know | C | C2 | | |
| | | | <ul style="list-style-type: none"> Recall osmolarity of body fluids | Should know | B | C1 | | |
| | | | <ul style="list-style-type: none"> Discuss tonicity | Should know | B | C2 | | |
| | | | <ul style="list-style-type: none"> Discriminate concept of isotonic, hypertonic and hypotonic | Must Know | A | C4 | | |
| M1-FM-P-0010 | Transport across cell membrane: Active transport I & II | <ul style="list-style-type: none"> Define active transport | Must Know | A | C1 | LGIS SGD | SAQ MCQ VIVA | |
| | | <ul style="list-style-type: none"> Classify active transport | Must know | A | C2 | | | |
| | | <ul style="list-style-type: none"> Comprehend various types of active transport with examples with special emphasis on Na-K pump | Must know | A | C2 | | | |
| M1-FM-P-0011 | | <ul style="list-style-type: none"> Describe structure of nucleus and ribosome | Nice to know | C | C1 | LGIS | SAQ | |

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| | | Structure of nucleus and ribosomes, Cell Division | • Discuss vaults | Nice to know | C | C2 | PBL | MCQs VIVA |
| | | | • Understand basic concepts about DNA and RNA | Should know | B | C2 | | |
| | | | • Compare various types of RNA and their functions | Must know | A | C4 | | |
| | | | • Enlist and Draw steps of mitosis and meiosis | Nice to know | C | C2 | | |
| | | | • Comprehend role of different parts of chain of DNA as genes like TATA box | Nice to know | C | C2 | | |
| | | | | | | C1 | | |
| | M1-FM-P-0012 | Genetics Transcription & Translation | • Define & Explain Genetics, Transcription & Translation | Must Know | A | C1 | LGIS PBL | SAQ MCQs VIVA |
| | | | • Describe Genetic control of protein synthesis | Must Know | A | C1 | | |
| | | | • Differentiate between apoptosis & Necrosis | Should know | B | C4 | | |
| | | Cellular control mechanism, Cell cycle, Programmed cell death | • Describe different cellular control mechanisms regarding gene regulation | Should know | B | C1 | LGIS PBL | SAQ MCQs VIVA |
| • Explain Cell differentiation, apoptosis and cellular changes in cancer | Should know | | B | C2 | | | | |
| Physiology (SGD) | M1-FM-P-0018 | Intracellular communication and cell junction, signal transduction | • Describe the structure and function of various intracellular connections | Must know | A | C1 | SGD | MCQ SAQ VIVA |
| | | | • Discuss second messenger system | | | C2 | | |
| | | | • Assess the effects of genetic mutations of cell junctions. | | | C4 | | |
| | M1-FM-P-0017 | Transport across cell membrane | • Describe the structure of cell membrane | Must know | A | C1 | SGD | MCQ SAQ VIVA |
| | | | • Enlist various ion channels | | | C1 | | |
| | | | • Discuss transport mechanism across the cell membrane with special emphasis on diffusion and osmosis | | | C2 | | |
| | | | • Compare primary and secondary active transport | | | C4 | | |
| | | | • Explain the types of active transport | | | C2 | | |
| Physiology (SKL) | M1-FM-P-0030 | Apparatus identification (Introduction to centrifuge machine) | • Be aware with the electrical connections of centrifuge machine and to control different speeds | Nice to know | C | P, A | Skill Lab | OSPE |

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| Biochemistry (LGIS) | M1-FM-B-010 | Nucleic Acid Chemistry-I | <ul style="list-style-type: none"> • Explain structure and biological importance of DNA, types of DNA | Must Know | C2 | LGIS | MCQ SAQ SEQ VIVA |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | | |
| | M1-FM-B-011 | Nucleic Acid Chemistry-II | <ul style="list-style-type: none"> • Explain structure, types and functions of RNA • Differentiate between DNA & RNA | Must Know | C2 | LGIS | MCQ SAQ SEQ VIVA |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | | |
| | M1-FM-B-012 | Replication | <ul style="list-style-type: none"> • Describe mechanism of replication of prokaryotes & Eukaryotes | Must Know | C2 | LGIS | MCQ SAQ SEQ VIVA |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | | |
| | M1-FM-B-013 | DNA damage & Repair | <ul style="list-style-type: none"> • Describe mechanism of DNA damage & Repair | Must Know | C2 | LGIS | MCQ SAQ SEQ VIVA |
| | | | <ul style="list-style-type: none"> • Analyze the consequences of defective DNA repair mechanisms and correlate them with clinical disorders | Nice to Know | C4 | | |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |

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| | | | <ul style="list-style-type: none"> • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | | | | |
| M1-FM-B-018 | Enzymes Introduction | <ul style="list-style-type: none"> • Define Enzymes. | Should Know | C1 | LGIS | MCQ SAQ SEQ VIVA | |
| | | <ul style="list-style-type: none"> • Explain general functions of enzymes. | Should Know | C2 | | | |
| | | <ul style="list-style-type: none"> • Differentiate between coenzyme and cofactors | Must Know | C2 | | | |
| M1-FM-B-019 | Classification of enzymes | <ul style="list-style-type: none"> • Discuss different classes of Enzymes | Should Know | C2 | LGIS | MCQ SAQ SEQ VIVA | |
| | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | | | |
| M1-FM-B-020 | Mechanism of enzyme action | <ul style="list-style-type: none"> • Describe different mechanisms of enzyme action. | Should Know | C2 | LGIS | MCQ SAQ SEQ VIVA | |
| M1-FM-B-021 | Properties of Enzymes | <ul style="list-style-type: none"> • Elaborate the Properties of Enzymes such as specificity for substrate and stereo specificity. | Should Know | C2 | LGIS | MCQ SAQ SEQ VIVA | |
| | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | | | |
| M1-FM-B-022 | Factors affecting Enzyme action | <ul style="list-style-type: none"> • Discuss different factors which increase or decrease the activity of enzymes | Should Know | C2 | LGIS | MCQ SAQ SEQ VIVA | |

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| | M1-FM-B-023 | MM Equation | <ul style="list-style-type: none"> • Explain Michaelis–Menten Kinetics. • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Must know | C2 | LGIS | MCQ SAQ SEQ VIVA |
| | | | | Nice to know | C3 | | |
| Biochemistry (SDL) | M1-FM-B-036 | Nucleotide Derivatives and their importance | <ul style="list-style-type: none"> • Explain the structure and nomenclature of nucleotides, biomedical importance of natural and synthetic analogues | <ul style="list-style-type: none"> • Lippincott’s Illustrated Reviews: Biochemistry, 8th edition (Chapter 22) https://youtu.be/SeOrvA9ikW8?si=T3p3hruJ_XW-8OEV | | | |
| | M1-FM-B-037 | Causes and Repair of DNA Damage | <ul style="list-style-type: none"> • Describe mechanism of DNA damage & repair • Apply knowledge of DNA repair mechanisms in related clinical cases | <ul style="list-style-type: none"> • Lippincott’s Illustrated Reviews: Biochemistry, 8th edition (Chapter 30) https://youtu.be/oRfK85gPAVA?si=b_x7lHqFH7hri02v https://youtu.be/EGexwTfwHjs?si=Lt_TpScDvAxUgidO | | | |
| Biochemistry (SKL) | M1-FM-B-042 | Physiochemical Aspects of Cell – Surface Tension and Emulsion | <ul style="list-style-type: none"> • Demonstrate mechanism of surface tension and emulsification | Should Know | P | Skill Lab | OSPE |
| Pathology | M1-FM-VI(Path)-006 | Irreversible Injury. Necrosis | <ul style="list-style-type: none"> • Define necrosis | C1 | LGIS | MCQ | |
| | | | <ul style="list-style-type: none"> • Enlist patterns/types with clinical examples | C1 | | | |
| | | | <ul style="list-style-type: none"> • Describe morphological changes (gross and microscopic) in necrosis | C2 | | | |

Multidisciplinary (Hardens Level 9) Clinico-Concept Connect (C³⁶) Sessions for 4th Week

| Session | Topic | Department | At the End of The Demonstration Student Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
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| Clinico-Concept Connect (C ³ 6) Sessions -III | Disorder of Growth and Development | Anatomy, | <ul style="list-style-type: none"> • Explain the basic principles of human genetics (DNA, genes, chromosomes, and mutations) | C2 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> • Identify the anatomical consequences of genetic abnormalities leading to dysmorphic features and congenital malformations, during diagram-based questions and structured assessments. | C1 | LGIS | MCQ |
| | | Biochemistry | <ul style="list-style-type: none"> • Recognize common dysmorphic facial and bodily features in children and relate these features to underlying genetic and anatomical abnormalities (e.g., chromosomal aneuploidy, single-gene disorders) in image-based spotters or case vignettes, achieving correct identification in at least 3 out of 4 examples. | C2 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> • Classify genetic disorders according to inheritance patterns (autosomal dominant, autosomal recessive, and X-linked) and explain their biochemical and anatomical basis using simple clinical examples in written or oral assessments. | C2 | LGIS | MCQ |
| | | Pediatrics | <ul style="list-style-type: none"> • Apply basic principles of medical genetics to pediatric case scenarios, demonstrating integrated understanding of clinical presentation (Pediatrics), structural anomalies (Anatomy), and molecular defects (Biochemistry) by accurately analyzing structured case-based questions. | C3 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> • Demonstrate awareness of the importance of early diagnosis, genetic counseling, and prevention strategies in pediatric genetic disorders by appropriately responding to short clinical scenarios or reflective questions, highlighting the role of multidisciplinary care | C3 | LGIS | MCQ |
| | | Anatomy | <ul style="list-style-type: none"> • Describe the gross anatomy, blood supply, nerve supply, and anatomical relationships of the male and female reproductive organs relevant to fertility. | C2 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> • Explain the anatomical basis of infertility by correlating structural abnormalities of the male | C2 | LGIS | MCQ |

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| | | | and female reproductive systems with impaired reproductive function | | | |
| Clinico-Concept Connect (C ³ 6) Sessions -IV | Infertility | Physiology, | <ul style="list-style-type: none"> Describe the normal physiological regulation of the male and female reproductive systems, including the hypothalamic-pituitary-gonadal axis, and relate it to normal fertility. | C2 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Explain the physiological basis of ovulation, spermatogenesis, fertilization, and implantation, highlighting how disruption at any level can lead to infertility. | C2 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Classify infertility into primary and secondary types and outline common physiological and gynecological causes using simple clinical correlations. | C2 | LGIS | MCQ |
| | | Gynecology & Obstetrics | <ul style="list-style-type: none"> Correlate menstrual cycle physiology and hormonal patterns with common ovulatory disorders leading to female infertility. | C3 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Identify basic male and female factors contributing to infertility and relate them to underlying physiological dysfunctions (e.g., hormonal imbalance, anovulation, impaired spermatogenesis). | C1 | LGIS | MCQ |
| | | | <ul style="list-style-type: none"> Apply fundamental concepts of reproductive physiology to simple clinical scenarios of infertility, demonstrating early integration of physiology with gynecological practice. | C3 | LGIS | MCQ |

Theme 5: From Molecules to Medicine: Clinical Applications of Molecular Biology and Genetics (5th Week)

| Themes | Rationale | General learning Objectives |
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| From Molecules to Medicine: | This theme translates foundational knowledge of molecular biology and genetics into a clinical context, enabling students to | By the end of this theme, the student will be able to: |

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| <p>Clinical Applications of Molecular Biology and Genetics</p> | <p>understand how molecular mechanisms underpin health and disease. Building on earlier themes related to genetics, cell division, and human development, this week integrates biochemistry, anatomy, physiology, pathology, and clinical disciplines to demonstrate how alterations at the molecular level result in disease processes. Key concepts such as gene expression, enzyme regulation, molecular signaling, and genetic variation are correlated with clinical conditions including metabolic disorders, genetic diseases, infertility, and cancer, as outlined in the timetable. The inclusion of applied anatomy, pathology, and early clinical exposure emphasizes the relevance of molecular mechanisms in diagnosis, prognosis, and therapeutic decision-making. Overall, this theme bridges the gap between basic molecular sciences and clinical medicine, fostering early clinical reasoning and preparing students for evidence-based and precision medicine in later phases of the MBBS curriculum.</p> | <ul style="list-style-type: none"> • Explain the molecular basis of gene expression, including transcription, translation, and regulation of enzymes. • Describe the role of enzymes, cofactors, and inhibitors in normal metabolic processes and disease states. • Correlate molecular and genetic abnormalities with common clinical conditions such as metabolic disorders, infertility, and cancer. • Understand basic molecular mechanisms underlying inherited and acquired genetic diseases. • Apply principles of molecular biology and genetics to interpret simple clinical and laboratory scenarios. • Appreciate the relevance of molecular medicine in diagnosis, prognosis, and therapeutic decision-making. |
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Case based discussion for Multi-Disciplinary Clinico concept connect session C³⁶ (Anatomy, Biochemistry, Medicine & Surgery)

Case 4

A 22-year-old woman presents to the outpatient clinic with complaints of progressive fatigue, muscle weakness, and episodes of dizziness, especially after prolonged fasting. She reports difficulty in tolerating exercise and occasionally experiences nausea. There is no history of fever, infection, or chronic illness. Her family history reveals that one of her siblings has a similar condition.

On physical examination, the patient appears thin but alert. Vital signs are stable. Mild muscle weakness is noted on neurological examination. No organomegaly or lymphadenopathy is present.

Initial laboratory investigations show low fasting blood glucose levels with otherwise normal electrolytes. Further biochemical analysis reveals reduced activity of a key metabolic enzyme involved in glucose metabolism. Molecular studies demonstrate a mutation affecting the gene responsible for encoding this enzyme, leading to impaired enzyme function

Laboratory and Molecular Investigations

Fasting Blood Glucose: Decreased

Serum Electrolytes: Within normal limits

Liver Function Tests: Normal

Enzyme Activity Assay: Reduced activity of a glucose-metabolizing enzyme

Genetic Analysis: Point mutation in the gene encoding the enzyme

Family Screening: Similar mutation identified in sibling

Educational Relevance to Theme

This case illustrates how alterations at the molecular and genetic level directly lead to clinical disease, emphasizing the application of molecular biology concepts such as gene expression, enzyme regulation, and genetic mutations in understanding patient presentations. It highlights the transition from basic molecular mechanisms to clinical medicine, reinforcing the importance of molecular diagnostics and personalized treatment approaches.

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| Aantomy (Embryology) | M1-FM-A-007 | Cleavage and Formation of Blastocyst | • Define cleavage | Must Know | C1 | LGIS | MCQ SAQ OSVE OSPE |
| | | | • Define compaction | Must Know | C1 | | |
| | | | • Describe blastocyst formation | Must Know | C2 | | |
| | | | • Understand the bio-physiological aspects of cleavage and blastocyst | Must Know | C2 | | |
| | | | • Compare different clinical conditions associated with cleavage and blastocyst formation | Should Know | C4 | | |
| | | | • Apply the strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |
| | | | • Understand the curative and preventive health care measures. | Nice to know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Read a relevant research article | Nice to know | C3 | | |
| | | | • Use HEC digital library | Nice to know | C3 | | |
| Anatomy (Histology) | M1-FM-A-0013 | Development and Histology of Mammary Gland | • Describe the Sources of development of mammary gland | Must Know | C2 | LGIS | MCQ SAQ OSVE OSPE |
| | | | • Discuss the ultra structure of mammary gland | Must Know | C2 | | |
| | | | • Relate different stages of activity of mammary gland with its histological structure | Must Know | C3 | | |
| | | | • Understand the bio-physiological aspects of mammary gland | Should Know | C1 | | |
| | | | • Correlate clinical conditions of mammary glands. | Should Know | C2 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Apply the strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |
| | | | • Understand the curative and preventive health care measures. | Nice to know | C3 | | |
| | | | • Read a relevant research article | Nice to know | C3 | | |
| | • Use HEC digital library | Nice to know | C2 | | | | |
| M1-FM-A-0040 | Mammary gland | • Illustrate the different stages of activity of mammary gland | Must Know | C2 | Skill Lab | OSPE | |
| | | • Identify the slides of different stages of mammary gland | Should Know | P | | | |
| M1-FM-A-0025 | Brachial Plexus Injuries | • Defend the different neurological deficits | Must Know | C5 | | MCQ | |

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|--------------------|--------------|---|--|--------------|----|------------------|-----------------------------|
| Anatomy (Gross) | | | arising as a result of damaged to roots, trunks and branches of brachial plexus at different levels. | | | SGD | SAQ OSVE OSPE OSCE |
| | | | <ul style="list-style-type: none"> Differentiate the clinical conditions on the basis of the level of injury and presentation of patient. | Must Know | C4 | | |
| | | | <ul style="list-style-type: none"> Read a research article on brachial plexus | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Understand the curative and preventive health care measures | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Read a relevant research article | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Use HEC digital library | Nice to know | C3 | | |
| | M1-FM-A-0026 | Breast | <ul style="list-style-type: none"> Describe the extent of breast | Must Know | C2 | Skill lab SGD | MCQ SAQ OSVE OSPE |
| | | | <ul style="list-style-type: none"> Describe the relations of breast | Must Know | C2 | | |
| | | | <ul style="list-style-type: none"> Describe structure of gland. | Must Know | C2 | | |
| | | | <ul style="list-style-type: none"> Discuss the blood supply, venous drainage and lymphatics. | Must Know | C2 | | |
| | | | <ul style="list-style-type: none"> Defend the diagnosis of breast carcinoma on the basis of clinical picture and lymphatic spread. | Should know | C5 | | |
| | | | <ul style="list-style-type: none"> Discuss congenital anomalies of breast | Should know | C3 | | |
| | | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Understand the curative and preventive health care measures | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Read a relevant research article | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare | Nice to Know | | | |
| | M1-FM-A-0027 | Sternoclavicular and acromioclavicular joints | <ul style="list-style-type: none"> Classify joints and discuss the attachment of capsule and ligaments and discuss the different movement on these joints along with muscles involved in these movements. | Must Know | C2 | SGD | MCQ SAQ OSVE OSPE |
| | | | <ul style="list-style-type: none"> Describe neurovascular supply. | Must Know | C2 | | |

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|------------------|--------------|--|--|--|----|-----|------------------------------------|
| | | | <ul style="list-style-type: none"> Understand the curative and preventive health care measures Practice principles of bioethics Apply the strategic use of artificial intelligence in healthcare Read a relevant research article Use HEC digital library | Nice to know | C3 | | |
| | M1-FM-A-0028 | Surface Anatomy & Radiology | <ul style="list-style-type: none"> Discuss the surface anatomy of axioappendicular region. Create videos of marking of clinically important landmarks on the simulated patient/ models. Interpret the normal radiologic appearance of bones in axioappendicular region. Apply the strategic use of artificial intelligence in healthcare Practice principles of bioethics Understand the curative and preventive health care measures Read a relevant research article Use HEC digital library | Must Know | C2 | SGD | MCQ SAQ OSVE OSPE OSCE |
| | | | | Must know | C6 | | |
| | | | | Must Know | C3 | | |
| | | | | Nice to know | C3 | | |
| | | | | Nice to know | C3 | | |
| | | | | Nice to know | C3 | | |
| | | | | Nice to know | C3 | | |
| | | | | Nice to know | C3 | | |
| Anatomy (SDL) | M1-FM-A-0036 | Carcinoma of Breast | <ul style="list-style-type: none"> Describe the extent of breast Describe the relations of breast Describe structure of gland. Discuss related clinical | <ul style="list-style-type: none"> Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. Breast (Chapter 4, Page 315-318,323-326). https://www.youtube.com/watch?v=OW0qQnT5GoA | | | |
| Physiology (SDL) | M1-FM-P-0017 | Transport across cell membrane | <ul style="list-style-type: none"> Describe the physiological significance of Apoptosis and necrosis. – Cellular control mechanism and cell cycle. | Should know | C3 | SGD | MCQ SAQ |
| | M1-FM-P 0024 | Genetics, Transcription and Translation | <ul style="list-style-type: none"> Building blocks of DNA Genetic code Process of transcription and translation Types of RNA Cell division | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition, General principles and Energy production in Medical Physiology (Chapter01, Page63) Textbook of Medical Physiology by Guy ton & Hall.14th Edition. (Section01, Chapter03, Page31) | | | |
| | M1-FM-P-0026 | Transport across cell membrane and its various types | <ul style="list-style-type: none"> Types of transport across cell membrane Diffusion and osmosis | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition, Overview of Cellular Physiology in 6th Medical Physiology (Chapter02, Page45) | | | |

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|---|--------------|---|--|---|----|------|---------------------------|------|
| | | (osmosis, diffusion, primary and secondary active transport) | <ul style="list-style-type: none"> • Concept of gating of channels • Primary active transport • Secondary active transport | <ul style="list-style-type: none"> ❖ Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Membrane dynamics chapter 5, page 160 ❖ Physiology by Linda S. Costanzo 6th Edition. Cellular physiology, chapter 1, page 5 ❖ Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. Properties and functions of cell membrane, chapter 2, page 18 ❖ Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Membrane Physiology. (Section 02, Chapter 04, Page 51) | | | | |
| | M1-FM-P-0030 | Apparatus identification (Introduction to centrifuge machine) | <ul style="list-style-type: none"> • Be aware with the electrical connections of centrifuge machine and to control different speeds | Nice to know | C | P, A | Skill Lab | OSPE |
| Biochemistry (LGIS) | M1-FM-B-014 | Transcription | <ul style="list-style-type: none"> • Describe mechanism of Transcription of prokaryotes & Eukaryotes | Must Know | C2 | LGIS | MCQ SAQ SEQ VIVA | |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | | | |
| | M1-FM-B-015 | Translation | <ul style="list-style-type: none"> • Discuss genetic code | Must Know | C2 | LGIS | MCQ SAQ SEQ VIVA | |
| | | | <ul style="list-style-type: none"> • Differentiate the mechanisms of action of antibiotics acting at various stages of protein synthesis (translation) | Should Know | C4 | | | |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | | | |
| | M1-FM-B-016 | Mutation | <ul style="list-style-type: none"> • Describe different types of mutations with examples | Should Know | C2 | | MCQ | |
| <ul style="list-style-type: none"> • Differentiate the effects of frameshift | | | Should Know | C4 | | | | |

| | | | | | | | |
|-------------|---|--|--|--------------|------|---------------------------|--------------------|
| | | | <p>mutations from point mutations on the reading frame and protein synthesis.</p> <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | LGIS | SAQ SEQ VIVA |
| M1-FM-B-017 | Recombinant DNA/ PCR (Polymerase Chain Reaction) | <ul style="list-style-type: none"> • Define PCR | Should Know | C1 | LGIS | MCQ SAQ SEQ VIVA | |
| | | <ul style="list-style-type: none"> • Apply the steps of PCR to amplify a specific DNA sequence for diagnostic or research purposes c3 | Should Know | C3 | | | |
| | | <ul style="list-style-type: none"> • Discuss Recombinant DNA technology | Must Know | C2 | | | |
| | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | | | |
| M1-FM-B-024 | Enzyme inhibitors | <ul style="list-style-type: none"> • Describe enzyme inhibitors. | Must Know | C2 | LGIS | MCQ SAQ SEQ VIVA | |
| | | <ul style="list-style-type: none"> • Differentiate competitive, non-competitive, and uncompetitive enzyme inhibition based on their effects on Km, Vmax, and Lineweaver–Burk plots. | Must Know | C4 | | | |
| | | <ul style="list-style-type: none"> • Justify the choice of a competitive or irreversible inhibitor in the treatment of a specific metabolic disorder | Should Know | C5 | | | |
| M1-FM-B-025 | Enzyme Regulation | <ul style="list-style-type: none"> • Explain enzyme regulation | Must Know | C2 | LGIS | MCQ SAQ | |
| | | <ul style="list-style-type: none"> • Explain how the activity of the regulatory enzymes can be modulated for benefit of body | Should Know | C2 | | | |

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|--|-------------|---|--|---|----|-----------|---------------------------|
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | | SEQ VIVA |
| | M1-FM-B-026 | Diagnostic role of Enzymes | <ul style="list-style-type: none"> • Compare enzyme profiles in myocardial infarction, skeletal muscle injury, and liver disease | Must Know | C4 | LGIS | MCQ SAQ SEQ VIVA |
| | | | <ul style="list-style-type: none"> • Justify the selection of specific enzymes for monitoring disease progression or therapeutic response. | Should Know | C5 | | |
| | | | <ul style="list-style-type: none"> • Interpret the role of Enzyme as medicine and their effects on body. | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Practice principles of bioethics • Understand the curative and preventive health care measure • Read relevant research articles • Use HEC digital library | Nice to know | C3 | | |
| Biochemistry (SDL) | M1-FM-B-038 | Clinical Applications of PCR & Recombinant DNA Technology | <ul style="list-style-type: none"> • Define PCR | <ul style="list-style-type: none"> ❖ Lippincott's Illustrated Reviews: Biochemistry, 8th edition (Chapter 34) ❖ https://youtu.be/iQsu3Kz9NYo?si=c0wEVtwTfUJMN7Z ❖ https://youtu.be/OpU_CQ0pFyQ?si=zyQ0d530Op9Af-BS | | | |
| | | | <ul style="list-style-type: none"> • Explain mechanism and indications of PCR | | | | |
| <ul style="list-style-type: none"> • Discuss Recombinant DNA technology | | | | | | | |
| | M1-FM-B-039 | Diagnostics Role of Enzyme | <ul style="list-style-type: none"> • Interpret the role of Enzyme in diagnosis and their effects on body. | <ul style="list-style-type: none"> ❖ Essentials of medical Biochemistry. Mushtaq Ahmad Vol – I 9th edition (Chapter 06 page 169) ❖ Lippincott Illustrated reviews of biochemistry 8th edition (Chapter 05 page 69) ❖ https://youtu.be/1OWiw8olxwQ?si=GMgOchRdpKCCcPDjB | | | |
| Biochemistry (SKL) | M1-FM-B-043 | Physiochemical aspects of cell-Adsorption & Tonicity | <ul style="list-style-type: none"> • Demonstrate effects of solutions of different tonicity on red cells (isotonic, | Should Know | P | Skill Lab | OSPE |

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|-----------|--------------------|-------------------|---|-------------|------|------|--|
| | | | hypotonic and hypertonic) | | | | |
| | | | <ul style="list-style-type: none"> Illustrate process of adsorption. | Should Know | P | | |
| Pathology | M1-FM-VI(Path)-008 | Genetic Disorders | <ul style="list-style-type: none"> Classify human genetic disorders | C1 | LGIS | MCQs | |
| | | | <ul style="list-style-type: none"> Define mutation | C1 | | | |
| | | | Define the following inheritance pattern: <ul style="list-style-type: none"> Autosomal dominant Autosomal recessive X-linked | C1 | | | |
| | | | <ul style="list-style-type: none"> Describe diseases associated with consanguineous marriages | C1 | | | |
| | | | <ul style="list-style-type: none"> Correlate anatomical structures of the breast with common patterns of tumor spread, particularly lymphatic spread to axillary lymph nodes. | C3 | LGIS | MCQs | |
| | | | <ul style="list-style-type: none"> Identify common risk factors and early warning signs of breast carcinoma, emphasizing the importance of early detection and screening. | C1 | LGIS | MCQs | |
| | | | <ul style="list-style-type: none"> Relate basic pathological changes in breast tissue to clinical presentation, such as lump formation, skin changes, and nipple involvement. | C3 | LGIS | MCQs | |
| | | | <ul style="list-style-type: none"> Demonstrate awareness of the principles of prevention, early diagnosis, and multidisciplinary management of breast cancer, highlighting the relevance of anatomy and pathology in surgical decision-making. | C3 | LGIS | MCQs | |

Transdisciplinary (Hardens Level 11) Clinico-Concept Connect (C³6) Sessions for 5th Week

| Session | Topic | Department | At the End of The Demonstration Student Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|-------------------------|---------------------------------|------------|--|-----------------|-------------------|-----------------|
| Clinico-Concept Connect | Carcinoma of Breast (CA Breast) | Anatomy, | <ul style="list-style-type: none"> Describe the normal gross and microscopic anatomy of the breast, including lobes, ducts, lymphatic drainage, and blood supply, relevant to the spread of breast carcinoma. | C2 | LGIS | MCQs |

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| (C ³ 6) Sessions -V | | | <ul style="list-style-type: none"> Explain the basic pathological basis of carcinoma of the breast, including the concept of benign versus malignant tumors and common histological types at an introductory level. | C2 | LGIS | MCQs |
| | | Surgery | <ul style="list-style-type: none"> Correlate anatomical structures of the breast with common patterns of tumor spread, particularly lymphatic spread to axillary lymph nodes. | C3 | LGIS | MCQs |
| | | | <ul style="list-style-type: none"> Identify common risk factors and early warning signs of breast carcinoma, emphasizing the importance of early detection and screening. | C1 | LGIS | MCQs |
| | | Pathology | <ul style="list-style-type: none"> Relate basic pathological changes in breast tissue to clinical presentation, such as lump formation, skin changes, and nipple involvement. | C3 | LGIS | MCQs |
| | | Community Medicine | <ul style="list-style-type: none"> Demonstrate awareness of the principles of prevention, early diagnosis, and multidisciplinary management of breast cancer, highlighting the relevance of anatomy and pathology in surgical decision-making. | C3 | LGIS | MCQs |
| Clinico- Concept Connect (C ³ 6) Sessions -VI | Molecular Basis of Inherited Metabolic Dysfunction | Anatomy | <ul style="list-style-type: none"> Describe the anatomical structures of organs involved in glucose metabolism, particularly liver and skeletal muscle. | C1 | LGIS | MCQs |
| | | | <ul style="list-style-type: none"> Correlate muscle weakness and exercise intolerance with anatomical sites affected by impaired glucose metabolism. | C3 | LGIS | MCQs |
| | | Biochemistry | <ul style="list-style-type: none"> Explain how genetic mutations alter enzyme structure and function leading to metabolic dysfunction. | C2 | LGIS | MCQs |
| | | | <ul style="list-style-type: none"> Interpret biochemical and molecular investigations in a patient with inherited enzyme deficiency. | C3 | LGIS | MCQs |
| | | Medicine | <ul style="list-style-type: none"> Explain perioperative metabolic considerations in patients with inherited enzyme deficiencies. | C2 | LGIS | MCQs |
| | | Surgery | <ul style="list-style-type: none"> Explain perioperative metabolic considerations in patients with inherited enzyme deficiencies. | C2 | LGIS | MCQs |
| | | | <ul style="list-style-type: none"> Apply principles of multidisciplinary management when surgical intervention or diagnostic procedures are required. | C3 | LGIS | MCQs |

Anatomy LGIS Syllabus of Learning Management System (LMS)

| Theory | | | | |
|---------------|--------------|---|----------------------------|---------------------------|
| Code | Topic | Learning Objectives At the End of One Hour the Lecture the Student Should Be Able To | Learning Domain | Learning Resources |
| | | <ul style="list-style-type: none"> Define the term Anatomy and its various | C1 | |

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|---------------------------|-----------------------------------|--|----|--|
| M1-FM-A-0041 | Introduction to General Anatomy | branches | | <ol style="list-style-type: none"> 1. Clinically Oriented Anatomy by Keith Moore 9th edition. 2. Cunningham's Manual of Practical Anatomy by G.J. Romanes, 16th edition, Vol-I, II and III |
| | | • Define different terminologies related to Anatomy | C1 | |
| | | • Describe different Anatomical planes and directions in relation to anatomical position | C2 | |
| | | • Elaborate different phases in life span of man | C2 | |
| | | • Define basic tissues of human body | C1 | |
| | | • Discuss general outlines and functions of basic tissues | C2 | |
| | | • Describe formation of different systems of body | C2 | |
| | | • Understand the curative and preventive health care measures. | C3 | |
| | | • Practice the principles of bioethics | C3 | |
| | | • Apply the strategic use of artificial intelligence in healthcare | C3 | |
| | | • Read relevant research article | C3 | |
| • Use HEC digital library | C3 | | | |
| Embryology | | | | |
| M1-FM-A-0042 | Introduction to Human Development | • Discuss significance and importance of studying Embryology. | C2 | <ol style="list-style-type: none"> 1. Clinically Oriented Anatomy by Keith Moore 9th edition. 2. Cunningham's Manual of Practical Anatomy by G.J. Romanes, 16th edition, Vol-I, II and III |
| | | • Define different terminologies to describe developmental stages. | C1 | |
| | | • Describe series of critical events that take place during embryonic development. | C2 | |
| | | • Appreciate difference between embryonic and fetal period. | C2 | |
| | | • Discuss common chromosomal abnormalities. | C2 | |
| | | • Understand the curative and preventive health care measures. | C3 | |
| | | • Apply the strategic use of artificial intelligence in healthcare. | C3 | |
| | | • Practice principles of bioethics | C3 | |

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|--------------|-----------------|--|----|--|
| | | <ul style="list-style-type: none"> • Use HEC digital library. | C3 | |
| | | <ul style="list-style-type: none"> • Read relevant research article. | C3 | |
| M1-FM-A-0043 | Oogenesis | <ul style="list-style-type: none"> • Discuss role of female hormones during oogenesis | C2 | 1. Clinically Oriented Anatomy by Keith Moore 9 th edition. 2. Cunningham's Manual of Practical Anatomy by G.J. Romanes, 16 th edition, Vol-I, II and III |
| | | <ul style="list-style-type: none"> • Describe different stages of oogenesis | C2 | |
| | | <ul style="list-style-type: none"> • Correlate clinical aspects of gametogenesis | C3 | |
| | | <ul style="list-style-type: none"> • To understand the bio-physiological aspects of gametogenesis | C2 | |
| | | <ul style="list-style-type: none"> • Understand the curative and preventive health care measures. | C3 | |
| | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare | C3 | |
| | | <ul style="list-style-type: none"> • Practice the principles of bioethics | C3 | |
| | | <ul style="list-style-type: none"> • Use HEC digital library | C3 | |
| | | <ul style="list-style-type: none"> • Read a relevant research article | C3 | |
| M1-FM-A-0044 | Spermatogenesis | <ul style="list-style-type: none"> • Define spermatogenesis. | C1 | 1. Clinically Oriented Anatomy by Keith Moore 9 th edition. 2. Cunningham's Manual of Practical Anatomy by G.J. Romanes, 16 th edition, Vol-I, II and III |
| | | <ul style="list-style-type: none"> • Describe different phases of spermatogenesis | C2 | |
| | | <ul style="list-style-type: none"> • Discuss stages of spermiogenesis | C2 | |
| | | <ul style="list-style-type: none"> • Elaborate functions of male hormones during spermatogenesis | C2 | |
| | | <ul style="list-style-type: none"> • Understand the curative and preventive health care measures. | C3 | |
| | | <ul style="list-style-type: none"> • Practice the principles of bioethics | C3 | |
| | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare | C3 | |
| | | <ul style="list-style-type: none"> • Able to read a relevant research article | C3 | |
| | | <ul style="list-style-type: none"> • Use HEC digital library | C3 | |

Anatomy SGDs Syllabus of Learning Management System (LMS)

| Code | Demonstration/Dissection | At the End of The Demonstration Student Should Be Able To | Learning Domains | Learning Resources |
|------|--------------------------------|---|------------------|------------------------------------|
| | Anatomicomedical Terminology I | <ul style="list-style-type: none"> • Describe different anatomical planes of human body and correlate with radiological anatomy • Demonstrate anatomical position of human body | C2 | Clinical Oriented Anatomy by Keith |

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|-------------------------|---|--|---------------|--|
| M1-FM-A-0045 | (Anatomical Position and Planes) | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Practice principles of bioethics Read a relevant research article | P C3 C3 | L. Moore.8TH Edition. |
| M1-FM-A-0046 | Anatomicomedical Terminology -II (Anatomical Terms and Axis of Movements) | Define different terms related to body parts | C1 | Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. |
| | | Describe axis of movement | C2 | |
| | | Demonstrate axis of movement | P | |
| | | Strategic use of artificial intelligence in healthcare | C3 | |
| | | Focus on provision of curative and preventive health care services | C3 | |
| | | Practice principles of bioethics | C3 | |
| | | Apply the strategic use of artificial intelligence in healthcare | C3 | |
| | | Understand the curative and preventive health care measures. | C3 | |
| | | Read a relevant research article | C3 | |
| Use HEC digital library | C3 | | | |
| M1-FM-A-0047 | Anatomicomedical Terminology -III (Cell and Tissues) | Define cell | C1 | Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. |
| | | Define tissue | C1 | |
| | | Describe basic tissues of human body | C2 | |
| | | Practice principles of bioethics | C3 | |
| | | Apply the strategic use of artificial intelligence in healthcare | C3 | |
| | | Understand the curative and preventive health care services | C3 | |
| | | Read a relevant research article | C3 | |
| Use digital library | C3 | | | |
| M1-FM-A-0048 | | Describe general organization of different systems of body | C2 | Clinical Oriented Anatomy by Keith |
| | | Discuss concepts of skin and fascia | C2 | |
| | | Describe the classification of blood vessels | C2 | |
| | | Describe the concepts of divisions of nervous system | C1 | |

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|--------------|---|--|--------|--|
| | Anatomicomedical Terminology-IV (Skin and Body Systems) | <ul style="list-style-type: none"> Describe the formation of spinal nerve | C2 | L. Moore.8TH Edition. |
| | | <ul style="list-style-type: none"> Practice principles of bioethics | C3 | |
| | | <ul style="list-style-type: none"> Understand the curative and preventive health care measures. | C3 | |
| | | <ul style="list-style-type: none"> Read a relevant research article Apply strategic use of artificial intelligence in healthcare | C3 | |
| | | <ul style="list-style-type: none"> Use HEC digital library | C3 | |
| M1-FM-A-0049 | Clavicle | <ul style="list-style-type: none"> Determine the side | C2 | Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. |
| | | <ul style="list-style-type: none"> Demonstrate anatomical position, general features, attachments and articulations (medial and lateral). | P | |
| | | <ul style="list-style-type: none"> Describe Intramembranous development and cleido-cranial dysostosis. | C3 | |
| | | <ul style="list-style-type: none"> Elaborate pectoral girdle formation movement and dislocation. | C3 | |
| | | <ul style="list-style-type: none"> Describe ossification in detail and Fracture Of clavicle. | C2, C3 | |
| | | <ul style="list-style-type: none"> Practice principles of bioethics | C3 | |
| | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare | C3 | |
| | | <ul style="list-style-type: none"> Understand the curative and preventive health care measures. | C3 | |
| | | <ul style="list-style-type: none"> Use HEC digital library | C3 | |
| | | <ul style="list-style-type: none"> Read a relevant research article | C3 | |
| M1-FM-A-0050 | Scapula | <ul style="list-style-type: none"> Determine the side | C2 | Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. |
| | | <ul style="list-style-type: none"> Demonstrate anatomical position, general features, attachments, and articulation. (clavicle and shoulder joints) | P | |
| | | <ul style="list-style-type: none"> Describe scapular anastomosis and its clinical significance | C3 | |
| | | <ul style="list-style-type: none"> Demonstrate Scapular movements. | P | |
| | | <ul style="list-style-type: none"> Practice principles of bioethics | C3 | |
| | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare | C3 | |

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|--------------|----------------------------------|---|----|--|
| | | <ul style="list-style-type: none"> Focus on provision of curative and preventive health care services | C3 | |
| | | <ul style="list-style-type: none"> Use HEC digital library. | C3 | |
| | | <ul style="list-style-type: none"> Read a relevant research article | C3 | |
| M1-FM-A-0051 | Humerus | <ul style="list-style-type: none"> Determine the side | C2 | Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. |
| | | <ul style="list-style-type: none"> Demonstrate anatomical position, general features, attachments and articulation (shoulder and elbow). | P | |
| | | <ul style="list-style-type: none"> Describe the importance of anatomical and surgical neck of humerus | C2 | |
| | | <ul style="list-style-type: none"> Correlate axillary, radial, median and ulnar nerve damage with respect to various fractures of humerus. | C2 | |
| | | <ul style="list-style-type: none"> Describe Significance of bicipital groove, angle of humeral torsion and carrying angle | C2 | |
| | | <ul style="list-style-type: none"> Discuss Ossification and fractures | C3 | |
| | | <ul style="list-style-type: none"> Understand the curative and preventive health care measures. | C3 | |
| | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare | C3 | |
| | | <ul style="list-style-type: none"> Practice principles of bioethics | C3 | |
| | | <ul style="list-style-type: none"> Use HEC digital library | C3 | |
| | | <ul style="list-style-type: none"> Read a relevant research article | C3 | |
| M1-FM-A-0052 | Anterior Axioappendicular Region | <ul style="list-style-type: none"> Describe Superficial fascia with cutaneous nerve and vessels of anterior axioappendicular region and tabulate muscles of the anterior axioappendicular region | C2 | Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. |
| | | <ul style="list-style-type: none"> Understand the bio-physiological aspects of anterior axioappendicular region. | C1 | |
| | | <ul style="list-style-type: none"> Strategic use of artificial intelligence in healthcare | C3 | |
| | | <ul style="list-style-type: none"> Understand the curative and preventive health care measures Practice principles of bioethics | C3 | |
| | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence | C3 | |

| | | | | |
|--------------|------------------------------------|--|----|--|
| | | in healthcare | | |
| | | • Use HEC digital library | C3 | |
| | | • Read a relevant research article | C3 | |
| M1-FM-A-0053 | Posterior Axioappendicular Muscles | • Tabulate muscles of the pectoral region (origin, insertion, nerve supply, action and applied). | C2 | Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. |
| | | • Identify and describe the pectoral and clavipectoral fascia | C2 | |
| | | • Use HEC digital library | C3 | |
| | | • Understand the curative and preventive health care measures | C3 | |
| | | • Apply the strategic use of artificial intelligence in healthcare | C3 | |
| | | • Read a relevant research article | C3 | |

Anatomy Histology Syllabus of Learning Management System (LMS)

| Code | Practical | At the End of The Practical Student Should Be Able To | Learning Domain | Learning Resources |
|--------------|----------------------------|--|-----------------|--|
| M1-FM-A-0054 | Introduction to Microscope | • Identify different types of microscopes. | C1 | 1. B. Young J. W. Health Wheather's Functional Histology 6th edition. 2. Medical Histology by Prof. Laiq Hussain 7th edition. 3. https://www.udemy.com/course/histology/ |
| | | • Describe functions of different parts of microscope. | C1 | |
| | | • Identify different types of lenses. | C1 | |
| | | • Focus slides. | P | |
| M1-FM-A-0055 | Simple epithelium | • Classify epithelium. | C2 | 1. B. Young J. W. Health Wheather's Functional Histology 6th edition. 2. Medical Histology by Prof. Laiq Hussain 7th edition. https://www.udemy.com/course/histology/ |
| | | • Illustrate different types of simple epithelium | P | |
| | | • Identify types of simple epithelium. | P | |
| | | • Write two points of identification | C1 | |

Physiology Syllabus of Learning Management System (LMS)

| Code | Topics | Learning Objectives | Calgary Model |
|------|--------|---------------------|---------------|
|------|--------|---------------------|---------------|

| | | | |
|--------------|---|--|-------------------------|
| M1-FM-P-0031 | Concept of body fluids & internal environment. | Introduction Concept of extracellular and intracellular fluid Homeostasis Examples of control system | Must Know |
| M1-FM-P-0032 | Cell membrane & classification of cell organelles | Structure of cell membrane Cell cytoskeleton Cytoplasm and various organelles Golgi Apparatus and its function Lysosomes and peroxisomes Secretory vesicles | Must Know |
| M1-FM-P-0033 | Intracellular communication and cell junction | Receptors and its types Cellular signaling and various mechanisms Signal transduction Hormone receptors and their activation Second messenger mechanisms | Nice to know |
| M1-FM-P-0034 | Receptors and signal transduction | Receptors and its types Cellular signaling and various mechanisms Signal transduction Hormone receptors and their activation Second messenger mechanisms | Nice to know |
| M1-FM-P-0035 | Homeostasis Control System-I(Negative Feedback System, Concept of Error and Gain) | Control systems of body Negative and positive feedback mechanism and their examples Apoptosis and necrosis | Must Know |
| M1-FM-P-0036 | Genetics, Transcription and Translation | Building blocks of DNA Genetic code Process of transcription and translation Types of RNA Cell division | Must Know |
| M1-FM-P-0037 | Structure of Nucleus, Ribosomes and Cell Division | Structure of Nucleus Ribosomes Mitosis & Overview of cancer | Must Know |
| M1-FM-P-0038 | Transport across cell membrane and its various types | Types of transport across cell membrane Diffusion and osmosis Concept of gating of channels | Must Know / Should know |

| | | | |
|--|--|--|--|
| | (osmosis, diffusion, primary and secondary active transport) | Primary active transport Secondary active transport | |
|--|--|--|--|

Biochemistry LGIS Syllabus of Learning Management System (LMS)

| Theory | | | | |
|---------------|--|---|----------------------------------|--|
| Code | Topic | Learning Objectives At the End of One Hour the Lecture the Student Should Be Able To | Learning Domain | Learning Resources |
| M1-FM-B-0039 | Cell and cell organelles | <ul style="list-style-type: none"> • Explain composition of normal cell • Describe methods to separate different organelles of cell • Describe structure, functions and marker enzymes of ER & Golgi apparatus • Describe structure, functions and marker enzymes of lysosome, peroxisome & ribosome • Describe structure, functions and marker enzymes of mitochondria and Nucleus. • Illustrate the clinical conditions and congenital defects of cell organelles | C2 C2 C2 C2 C2 C3 | Essentials of medical Biochemistry. Mushtaq Ahmad Vol – I 9 th edition (chapter 1, page 3) |
| M1-FM-B-0040 | Cell membrane | <ul style="list-style-type: none"> • Explain composition of cell membrane • Understand fluid mosaic model • Describe functions performed by each component | C2 C2 C2 | Harper's illustrated biochemistry 32 nd edition (chapter 40 page - 460) |
| M1-FM-B-0041 | Functions of cell membranes | <ul style="list-style-type: none"> • Discuss functions & importance of cell membrane | C2 | |
| M1-FM-B-0042 | Transport across cell membrane | <ul style="list-style-type: none"> • Explain transport of various substances by active and passive transport, diffusion, phagocytosis, endocytosis and exocytosis • Correlate the clinical disorders with defective transport across cell membrane | C2 C3 | Harper's illustrated biochemistry 32 nd edition (chapter 40 page - 467) |
| M1-FM-B-0043 | Osmosis, osmotic pressure and oncotic pressure | <ul style="list-style-type: none"> • Define osmosis and osmotic pressure. • Discuss biochemical application of osmotic and oncotic pressure and methods to measure them. • Correlate oncotic pressure with clinical scenarios | C1 C2 C3 | Essentials of medical Biochemistry. Mushtaq Ahmad Vol – I 9 th edition (Chapter 02 page 46) |

| | | | | |
|--------------|---|--|----------------|---|
| M1-FM-B-0044 | Phenomenon of viscosity, surface tension, emulsification and adsorption | <ul style="list-style-type: none"> Define phenomenon of viscosity, surface tension, emulsification and adsorption Explain Biochemical applications and methods to measure them | C1 C2 | Essentials of medical Biochemistry. Mushtaq Ahmad Vol – I 9 th edition (Chapter 02 page 52, 55) |
| M1-FM-B-0045 | Donnan equilibrium, adsorption and ion exchange resins | <ul style="list-style-type: none"> Define Donnan equilibrium, adsorption and ion exchange resins. Describe their effects on tissue fluids and biochemical importance | C1 C2 | Essentials of medical Biochemistry. Mushtaq Ahmad Vol – I 9 th edition |
| M1-FM-B-0046 | Water and pH | <ul style="list-style-type: none"> Define pH, Pka, body buffer Discuss water distribution in the body Understand dehydration and overhydration | C1 C2 C3 | |
| M1-FM-B-0047 | Enzymes Introduction | <ul style="list-style-type: none"> Define Enzymes. Explain general functions of enzymes. Differentiate between coenzyme and cofactors | C1 C2 C2 | |
| M1-FM-B-0048 | Mechanism of enzyme action | <ul style="list-style-type: none"> Describe different mechanisms of enzyme action. | C2 | Essentials of medical Biochemistry. Mushtaq Ahmad Vol – I 9 th edition (Chapter 06 page 169) Lippincott Illustrated reviews of biochemistry 8 th edition (Chapter 05 page 69) |
| M1-FM-B-0049 | Classification of enzymes | <ul style="list-style-type: none"> Discuss different classes of Enzymes | C2 | |
| M1-FM-B-0050 | Properties of Enzymes | <ul style="list-style-type: none"> Elaborate the Properties of Enzymes such as specificity for substrate and stereo specificity. | C2 | |
| M1-FM-B-0051 | Factors affecting Enzyme action | <ul style="list-style-type: none"> Discuss different factors which increase or decrease the activity of enzymes | C2 | |
| M1-FM-B-0052 | Enzyme inhibitors | <ul style="list-style-type: none"> Describe enzyme inhibitors and how the activity of the regulatory enzymes can be modulated for benefit of body | C2 | |
| M1-FM-B-0053 | Enzyme Regulation | <ul style="list-style-type: none"> Explain enzyme regulation | C2 | |
| M1-FM-B-0054 | Diagnostic role of Enzymes | <ul style="list-style-type: none"> Interpret the role of measuring activity of different enzymes in the diagnosis and prognosis of different diseases | C3 | |
| | | <ul style="list-style-type: none"> Interpret the role of Enzyme as medicine and their effects on body. | C3 | |
| M1-FM-B-0055 | Nucleic acids chemistry | <ul style="list-style-type: none"> Explain structure and biological importance of DNA, types of DNA Differentiate between DNA & RNA Explain structure, types and functions of RNA | C2 C2 C2 | Essentials of medical Biochemistry. Mushtaq Ahmad Vol – I 9 th edition (Chapter 02 page 50) |
| M1-FM-B-0056 | Replication | <ul style="list-style-type: none"> Describe mechanism of replication of prokaryotes & Eukaryotes | C2 | |
| M1-FM-B-0057 | Transcription | <ul style="list-style-type: none"> Describe mechanism of Transcription of prokaryotes & Eukaryotes | C2 | |

| | | | | |
|--------------|------------------------------------|---|----------------|--|
| M1-FM-B-0058 | Translation | <ul style="list-style-type: none"> • Discuss genetic code • Describe mechanism of Translation in prokaryotes & Eukaryotes • Illustrate mechanism of action of antibiotics at different stages of translation | C2 C2 C3 | Lippincott Illustrated reviews of biochemistry 8 th edition |
| M1-FM-B-0059 | DNA damage & Repair | <ul style="list-style-type: none"> • Describe mechanism of DNA damage & Repair • Apply knowledge of DNA repair mechanisms in related clinical cases | C2 C3 | |
| M1-FM-B-0060 | Mutations | <ul style="list-style-type: none"> • Describe different types of mutations with examples | C2 | |
| M1-FM-B-0061 | PCR and Recombinant DNA technology | <ul style="list-style-type: none"> • Define PCR • Explain mechanism and indications of PCR • Discuss Recombinant DNA technology | C1 C2 C2 | |
| M1-FM-B-0062 | Cancer | <ul style="list-style-type: none"> • Explain biochemical basis of cancer | C2 | Essentials of medical Biochemistry. Mushtaq Ahmad Vol – I 9 th edition (Chapter 6 page 168) |

Biochemistry SGDs Syllabus of Learning Management System (LMS)

| Code | Topic | Learning Objectives At the End of One Hour the Lecture the Student Should Be Able To | Learning Domain | Learning Resources |
|--------------|---------------------------------|--|-----------------|---|
| M1-FM-B-0063 | Cell and Cell Membrane | Explain Composition of Normal Cell & Cell Organelles | C2 | Essentials of medical Biochemistry. Mushtaq Ahmad Vol – I 9 th edition (chapter 1, page 3) |
| | | Describe Composition of Cell Membrane Understand Fluid Mosaic Model | C2 | |
| M1-FM-B-0064 | Physicochemical Aspects of Cell | Define osmosis and osmotic pressure. Discuss biochemical application of osmotic and oncotic pressure and methods to measure them. | C1 C2 C3 | Essentials of medical Biochemistry. Mushtaq Ahmad Vol – I 9 th edition (chapter 1) |
| | | Correlate oncotic pressure with clinical scenarios | | |
| | | Define phenomenon of viscosity, surface tension. Explain Biochemical applications and methods to measure them. | C1 C2 | |
| | | Define Donnan equilibrium, adsorption and ion exchange resins. Describe their effects on tissue fluids and biochemical importance | C1 C2 | |

Transdisciplinary, Interdisciplinary & Multidisciplinary Case Based Learning (CBL)

| Subject | Topic | Learning Objectives At the end of the lecture the student should be able to | Learning Domain |
|----------------|--|--|------------------------|
| Anatomy | • Fracture of clavicle | Apply basic knowledge of subject to study clinical case. | C3 |
| | • Winging of scapula due to long thoracic nerve injury | Apply basic knowledge of subject to study clinical case. | C3 |
| Physiology | • Down's syndrome | Apply basic knowledge of subject to study clinical case. | C3 |
| | • Smoker's cough | Apply basic knowledge of subject to study clinical case. | C3 |
| Biochemistry | • Enzymes | Apply basic knowledge of subject to study clinical case. | C3 |
| | • Genetics/PCR | Apply basic knowledge of subject to study clinical case. | C3 |



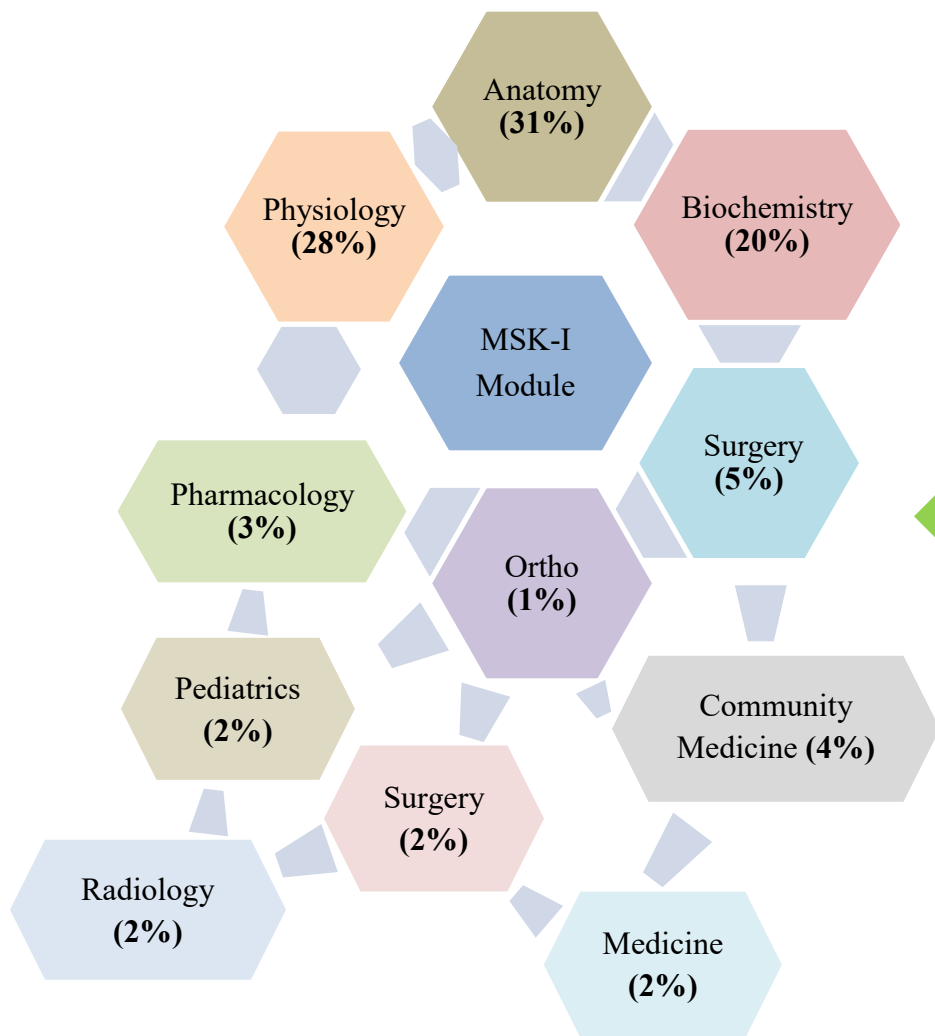
RMU 12

Integrated Modular Curriculum 2026

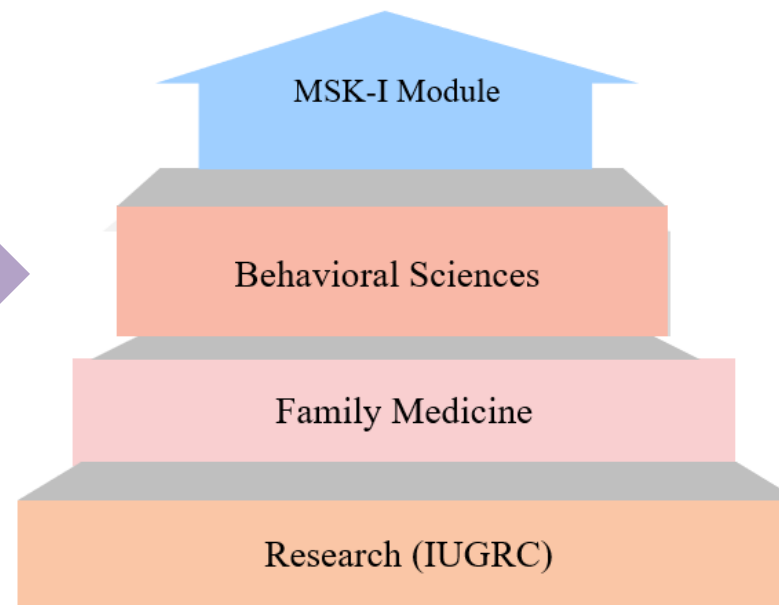
Isolation to **Beyond Boundaries**

Musculoskeletal Module-I

Multi-Disciplinary Integration



Disciplines in MSK-I Module



Spiral / General Education Cluster Courses (5%)

Discipline Wise Details of Modular Content

| Integration Themes | | | | | | |
|--|---|--|--|--|--------------------------|--|
| Block | Module | General Anatomy | Embryology | Histology | Gross Anatomy | |
| I | <ul style="list-style-type: none"> • Anatomy | Skeletal System <ul style="list-style-type: none"> • Bones • Joints | General Embryology Second Week of Human Development till Placenta & Fetal Membranes | General Histology <ul style="list-style-type: none"> • Connective Tissue • Cartilage • Bone | Shoulder joint till Hand | |
| | <ul style="list-style-type: none"> • Biochemistry | <ul style="list-style-type: none"> • Minerals, Vitamins (A, D, E, ascorbic acid, thiamin and niacin), Introduction & Classification of Amino Acids | | | | |
| | <ul style="list-style-type: none"> • Physiology | <ul style="list-style-type: none"> • NMJ, Introduction Concept of Motor Unit. Neuromuscular Transmission, Synthesis & Fate of Acetylcholine • Drugs Acting On NMJ, Myasthenia Gravis, Lambert Eaton Syndrome • Structure of Neurons. Classification of Neurons & Nerve Fibers • Nernst Potential, RMP • Recording & Propagation of Action Potential & Factors Effecting Nerve Conduction & Hyperpolarized State • Stimulus & Response & Types of Stimuli, Stages of Action Potential | | | | |
| | Spiral Courses | | | | | |
| | <ul style="list-style-type: none"> • Research Club Activity (1 – 3) | <ul style="list-style-type: none"> • Synopsis Writing • Questionnaire Development • Manuscript Writing Workshop | | | | |
| | <ul style="list-style-type: none"> • Family Medicine | <ul style="list-style-type: none"> • Approach to a patient with Body aches | | | | |
| | <ul style="list-style-type: none"> • Behavioral Sciences | <ul style="list-style-type: none"> • Healthcare models and their clinical application • Relevance of ethics in life of a doctor | | | | |
| | Vertical Integration | | | | | |
| | <ul style="list-style-type: none"> • Surgery/ Ortho | <ul style="list-style-type: none"> • Shoulder Dislocation • Tennis elbow, Fracture of olecranon, Radius and Ulna (Surgery) | | | | |
| | <ul style="list-style-type: none"> • Community Medicine | <ul style="list-style-type: none"> • Musculoskeletal Disorders • Prevention of Accidents | | | | |
| <ul style="list-style-type: none"> • Medicine | <ul style="list-style-type: none"> • Osteoporosis • Osteomalacia, Rickets & Polyarthritis | | | | | |
| <ul style="list-style-type: none"> • Pharmacology | <ul style="list-style-type: none"> • Drugs Acting On Neuromuscular Junction • Analgesics | | | | | |
| <ul style="list-style-type: none"> • Pediatrics | <ul style="list-style-type: none"> • Poliomyelitis | | | | | |

MSK - I Module Team

Module Name : MSK - I Module
 Duration of module : 05 Weeks
 Coordinator : Dr. Summiya Bashir
 Co-coordinator : Dr. Nida Fatima
 Reviewed by : Module Committee

| Module Committee | | | Module Task Force Team | | |
|-------------------------|--|--------------------------------|--------------------------------|--|---|
| 1. | Vice Chancellor RMU | Prof. Dr. Muhammad Umar | 1. | Coordinator | Dr. Summyia Bashir (Assistant Professor of Anatomy) |
| 2. | Director DME & Dean Basic Sciences | Prof. Dr. Ifra Saeed | 2. | DME Focal Person | Dr. Farzana Fatima |
| 3. | Additional Director (Assessment) DME | Dr. Arsalan Manzoor Mughal | 3. | Co-coordinator | Dr. Nida Fatima (Demonstrator of Anatomy) |
| 4. | Chairperson Physiology | Prof. Dr. Samia Sarwar | 4. | Co-Coordinator | Dr. Fahd Anwar (Demonstrator of Physiology) |
| 5. | Chairperson Anatomy | Prof. Dr. Ayesha Yousaf | 5. | Co-coordinator | Dr. Romessa Naeem (Demonstrator of Biochemistry) |
| 6. | Chairperson Biochemistry | Dr. Aneela Jamil | | | |
| 7. | Focal Person Anatomy 1 st Year MBBS | Asso. Prof. Dr. Mohtashim Hina | | | |
| 8. | Focal Person Physiology | Dr. Sidra Hamid | DME Implementation Team | | |
| 9. | Focal Person Pharmacology | Dr. Zunera Hakim | 1. | Director DME | Prof. Dr. Ifra Saeed |
| 10. | Focal Person Pathology | Dr. Syeda Aisha | 2. | Implementation Incharge 1st & 2 nd Year MBBS | Dr. Arsalan Manzoor Mughal |
| 11. | Focal Person Behavioral Sciences | Dr. Zona Tahir | | | Dr. Farzana Fatima |
| 12. | Focal Person Community Medicine | Dr. Afifa Kulsoom | 3. | Assistant Director DME | Dr. Farzana Fatima |
| 13. | Focal Person Quran Translation Lectures | Dr. Fahd Anwar | 4. | Editor | Muhammad Arslan Aslam |
| 14. | Focal Person Family Medicine | Dr. Sadia Khan | | | |

Module II – MSK - I Module

Rationale

This module deals with locomotor system. This module describes the structural organization, functions, and congenital anomalies of musculoskeletal system. It explains the mechanism of neuromuscular transmission, its biochemical basis and the importance of Ca⁺⁺ in the body. 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

- Explain the development & structure of musculoskeletal system.
- Explain the physiological and biochemical factors affecting Neuro Muscular transmission.
- Apply the knowledge of the basic sciences to understand common fractures.
- Appreciate concepts & importance of

Artificial Intelligence

Family Medicine

Biomedical Ethics

Research.

Skills

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

Attitude

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

This module will run in 5 weeks duration. Instructional strategies are given in the time table and learning objectives are given in the study guides. Study guides will be uploaded on the university website. Good luck!

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

• **Learning Management System (LMS)**

- Anatomy (LMS)
- Physiology (LMS)
- Biochemistry (LMS)



➤ **Syllabus Musculoskeletal Module-I 2026**
First Year MBBS

MSK-I Module – First Year MBBS

Duration of Module (Four Weeks)

| Sr No. | Themes | Duration |
|---------------|--|----------------------|
| 1. | A Patient with Shoulder/Arm Pain with Weakness | 1 st Week |
| 2. | Elbow & Forearm Pain After Trauma/Overuse. | 2 nd Week |
| 3. | A Patient Hand Pain, Swelling & Instability | 3 rd Week |
| 4. | Hand Numbness/Tingling with Grip Dysfunction | 4 th Week |

Theme 1: A Patient with Shoulder/Arm Pain with Weakness (1st Week)

| Theme | Rationale | General Learning Objectives |
|--|---|--|
| A Patient with Shoulder/Arm Pain with Weakness | Shoulder pain with weakness is a common musculoskeletal presentation encountered in outpatient and emergency settings. Understanding this symptom requires integration of shoulder joint anatomy, biomechanics, nerve supply, and neuromuscular physiology. This theme links gross anatomy of the shoulder region, physiology of neuromuscular transmission, and biochemical aspects of bone and mineral metabolism with clinical conditions such as shoulder dislocation, rotator cuff injury, and nerve lesions, enabling students to correlate structural abnormalities with clinical presentation and early management. | <p>At the end of this theme, students should be able to:</p> <ul style="list-style-type: none"> •Describe the anatomy and applied anatomy of the shoulder joint, rotator cuff muscles, and axillary nerve. •Explain the basic physiology of muscle contraction and neuromuscular transmission. •Discuss the role of calcium, phosphate, and vitamin D in bone strength and musculoskeletal health. •Correlate clinical findings of shoulder pain and weakness with underlying anatomical injury. •Interpret basic investigations such as shoulder X-ray for dislocation. •Appreciate the multidisciplinary approach involving orthopedics, medicine, and rehabilitation. |
| <p>CASE 1: Shoulder/Arm Pain with Weakness</p> <p>A 26-year-old male presented to the Orthopedic OPD with severe pain in the right shoulder for the last two days and difficulty lifting his arm. The pain started suddenly after lifting a heavy object, followed by a popping sensation and immediate restriction of movement. Since then, he has been unable to abduct the arm properly and finds difficulty in routine activities such as combing hair or wearing clothes. There is no history of fever or trauma elsewhere. He has no previous history of shoulder dislocation, diabetes, or any chronic illness. Family history is non-contributory. He works as a manual laborer with poor dietary calcium intake and has no history of smoking or alcohol use. He has taken occasional analgesics for pain but is not on any long-term medication.</p> <p>Examination</p> <p>GPE: Young male in pain, conscious and oriented. Pulse 88/min, BP 118/76 mmHg, Temp 98.6°F, RR 16/min. No pallor or jaundice.</p> <p>Local Examination: Shoulder contour appears flattened with anterior tenderness. Abduction and external rotation are painful and restricted. Sensation over the lateral shoulder is reduced, and deltoid muscle power is weak, suggesting axillary nerve involvement.</p> <p>Systemic Examination: CVS, Respiratory, Abdomen and CNS unremarkable.</p> | | |

Entrustable Professional Activities (EPAs)

EPA-1: Obtain a focused musculoskeletal history in shoulder pain

EPA-2: Perform basic shoulder examination (ROM + neurovascular check)

EPA-3: Explain anatomical basis of weakness and sensory loss

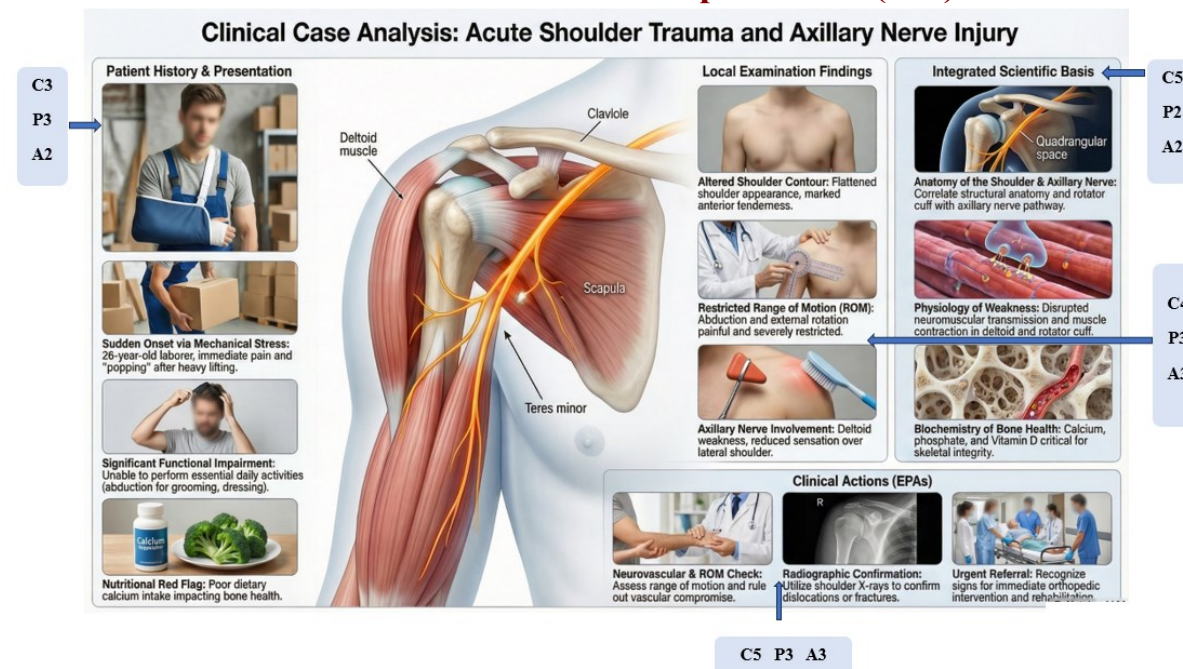
EPA-4: Recognize dislocation requiring urgent referral

EPA-5: Identify role of X-ray in confirming diagnosis

Justification

This theme integrates Anatomy, Physiology, Biochemistry, Pharmacology, Orthopedics, and Medicine around a single clinical presentation (shoulder pain with weakness), promoting early clinical reasoning.

Theme 1: Clinico – concept connect (C³6) Sessions



Harden Level 9 Multidisciplinary

Specific Learning Objectives

| Theory | | | | | | | |
|--|----------------|--|--|----------------------|------------------------|--------------------------|--------------------------------------|
| Subject | Code | Topic | Learning Objectives At the end of session students should be able to | Calgary Gauge | Learning Domain | Teaching Strategy | Assessment Tool |
| Embryology | | | | | | | |
| Anatomy (Embryology) | M2-MSK-I-A-001 | Formation of Bilaminar Embryonic Disc (2 nd week of Human Development) | • Describe formation of Amniotic Cavity, embryonic disc and Umbilical vesicle | Must know | C2 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | • Discuss development of chorionic sac | Must know | C2 | | |
| | | | • Outline the process of implantation | Must know | C1 | | |
| | | | • Describe changes in Gravid Endometrium | Must know | C2 | | |
| | | | • Understand the Bio-physiological aspects of gravid endometrium | Must know | C2 | | |
| | | | • Correlate with the clinical conditions | Should know | C3 | | |
| | | | • focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | • read relevant research article | Nice to know | C3 | | |
| | M2-MSK-I-A-002 | Gastrulation Establishment of Body Axis and Fate Map (3 rd week) | • Discuss process of gastrulation with special reference to primitive streak | Must know | C2 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | • Describe the fate of primitive streak | Must know | C2 | | |
| | | | • Evaluate establishment of body axis | Must know | C4 | | |
| | | | • Draw fate map and discuss its importance in future development | Must know | C2 | | |
| | | | • Connect the Biophysiological aspects of gastrulation | Must know | C4 | | |
| | | | • Describe congenital abnormalities associated with gastrulation | Should know | C3 | | |
| | | | • Read a relevant Research article | Should know | C3 | | |
| | | | • Corelate with the clinical conditions | Nice know | C3 | | |
| | | | • focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| • Apply strategic use of AI in health care | Nice to know | C3 | | | | | |
| | | Connective | • Define connective tissue | Must know | C1 | | |

| | | | | | | | |
|---|---|--|--|--------------|------|--------------------------------------|--------------------------------------|
| Anatomy (Histology) | M2-MSK-I-A-0011 | tissue I Cells of connective tissue Embryonic connective tissue / mucoid Connective Tissue | <ul style="list-style-type: none"> Classify connective tissue | Must know | C4 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | <ul style="list-style-type: none"> Enlist and explain types of cells in CT | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Enumerate sites and connect the function of each type of cell of connective tissue | Must know | C4 | | |
| | | | <ul style="list-style-type: none"> Understand the Biophysiological aspects of connective tissue | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Draw and label histological structure of mucoid CT. | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Describe fibers in mucoid CT | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Correlate clinical conditions of CT | Should know | C3 | | |
| | | | <ul style="list-style-type: none"> focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Read relevant research articles | Nice to know | C3 | | |
| M2-MSK-I-A-0012 | Connective tissue II Loose areolar connective tissue & its types Reticular CT | <ul style="list-style-type: none"> Enumerate examples and location of reticular, connective tissue | Must know | C1 | LGIS | SAQs MCQs VIVA VOCE OSPE | |
| | | <ul style="list-style-type: none"> Illustrate histological structure of loose and reticular connective tissue | Must know | C2 | | | |
| | | <ul style="list-style-type: none"> Analyze clinical aspects of loose and reticular CT | Should know | C4 | | | |
| | | <ul style="list-style-type: none"> focus on provision of curative and preventive health care measures | Nice to know | C3 | | | |
| | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | | |
| | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | Nice to know | C3 | | | |
| | | <ul style="list-style-type: none"> read relevant research article | Nice to know | C3 | | | |
| Anatomy (Gross SGD) | M2-MSK-I-A-0021 | Shoulder Joint | <ul style="list-style-type: none"> Classify the joint (according to type, shape and movement) | Must know | C2 | SGD, Skill Lab | MCQs SEQs OSVE OSPE OSCE |
| | | | <ul style="list-style-type: none"> Discuss the attachments of capsule and ligament | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Enlist the intra-articular structure (tendon of biceps brachii) | Must know | C1 | | |
| | | | <ul style="list-style-type: none"> Describe attachment of glenoidal labrum with its significance in relation to synovial membrane | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Discuss the neurovascular supply | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Discuss factors indispensable for stability of joint | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Discuss the movements at shoulder joint | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Enlist related bursae. | Must know | C1 | | |
| <ul style="list-style-type: none"> Defend the related clinicals (shoulder | Should know | C4 | | | | | |

| | | | | | | | | | |
|---------------|-----------------|---|---|--------------|----|---|--------------------------------------|--|--|
| | | | dislocation, rotator cuff injuries, Glenoid Labrum tears, Frozen shoulder) | | | | | | |
| | | | <ul style="list-style-type: none"> Analyze the clinical conditions | Should know | C4 | | | | |
| | | | <ul style="list-style-type: none"> focus on provision of curative and preventive health care measures | Nice to know | C3 | | | | |
| | | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | | | |
| | | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | Nice to know | C3 | | | | |
| | M2-MSK-I-A-0022 | Flexor & Extensor compartment & Neurovascular organization of the arm | <ul style="list-style-type: none"> Tabulate muscles of flexor & extensor compartment with their origin, insertion, nerve supply and actions | Must should | C2 | SGD, Skill Lab | MCQs SEQs OSVE OSPE OSCE | | |
| | | | <ul style="list-style-type: none"> Describe Neurovascular organization of arm. | Must should | C2 | | | | |
| | | | <ul style="list-style-type: none"> Synthesize the outline of Brachial artery and Musculo cutaneous nerve in a simulated patient or model | Must know | C6 | | | | |
| | | | <ul style="list-style-type: none"> Correlate with the clinical conditions (biceps tendinitis, dislocation of tendon of biceps brachii) | Should know | C3 | | | | |
| | | | <ul style="list-style-type: none"> Analyze consequences of injury to radial nerve (wrist drop), venipuncture in cubital fossa) | Should know | C4 | | | | |
| | | | <ul style="list-style-type: none"> Synthesize the outline of Radial nerve and ulnar nerve on a simulated patient or model | Must know | C6 | | | | |
| | | | <ul style="list-style-type: none"> Analyze the clinical conditions | Should know | C4 | | | | |
| | | | <ul style="list-style-type: none"> focus on provision of curative and preventive health care measures | Should know | C3 | | | | |
| | | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | | | |
| | | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | Nice to know | C3 | | | | |
| | | | <ul style="list-style-type: none"> Read a relevant research article | Nice to know | C3 | | | | |
| Anatomy (SDL) | M2-MSK-I-A-0035 | Shoulder Dislocation | <ul style="list-style-type: none"> Classify the joint (according to type, shape and movement) Discuss the attachments of capsule and ligament Enlist heintra-articular structure (tendon of biceps brachii) Describe attachment of glenoidal labrum with its significance in relation to synovial membrane Discuss the neurovascular supply Discuss factors indispensable for stability of joint Discuss the movement sat shoulder joint Enlist related bursae. Explain the related clinicals (shoulder dislocation, rotator cuff injuries, Glenoid Labrum tears, Frozen shoulder) | | | <ul style="list-style-type: none"> Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. (Chapter 3, Page 266- 271,284-285). https://teachmeanatomy.info/upper-limb/joints/shoulder | | | |
| | | | <ul style="list-style-type: none"> Tabulate muscles of flexor compartment with the irorigin, | | | | | | |

| | | | | | | | | |
|-------------------|-----------------|--|---|-------------|--|-----------|-----------|---------------------|
| | M2-MSK-I-A-0036 | Biceps Tendinitis, Popeye's Arm | <ul style="list-style-type: none"> insertion, nerve supply and actions Describe Neurovascular organization of arm, Explain the related clinicals (biceps tendinitis, Popeye's Arm) | | <ul style="list-style-type: none"> Clinical Oriented Anatomy by Keith L. Moore. 8TH Edition. (Chapter 3, Page 201-211, 211-214). https://teachmeanatomy.info/upper-limb/muscles/anterior-forearm/ | | | |
| Anatomy (SKL) | M2-MSK-I-A-0050 | <u>Connective Tissue-I</u> <ul style="list-style-type: none"> Embryonic connective tissue / mucoid Connective Tissue Loose areolar connective tissue Reticular Connective Tissue Adipose Connective Tissue | <ul style="list-style-type: none"> Identify mucoid connective tissue under microscope | Must know | P | Skill Lab | OSPE MCQs | |
| | | | <ul style="list-style-type: none"> Illustrate histological structure of mucoid connective tissue | Should know | C2 | | | |
| | | | <ul style="list-style-type: none"> Write two points of identification | Should know | C1 | | | |
| | | | <ul style="list-style-type: none"> Identify reticular and adipose connective tissue under microscope | Should know | C2 | | | |
| | | | <ul style="list-style-type: none"> Illustrate histological structure of reticular and adipose connective tissue | Should know | C2 | | | |
| | | | <ul style="list-style-type: none"> Write two points of identification | Should know | C1 | | | |
| | | | <ul style="list-style-type: none"> Focus the slide | Must know | P | | | |
| Physiology (LGIS) | M2-MSK-I-P-001 | Structure of Neuron | <ul style="list-style-type: none"> Describe different parts of neuron | Must know | A | C1 | LGIS SDL | SAQs MCQs VIVA VOCE |
| | M2-MSK-I-P-002 | Classification of Neurons and nerve fibers, NGF | <ul style="list-style-type: none"> Describe the classification of neurons and nerve fibers | Must know | A | C1 | LGIS SDL | SAQs MCQs VIVA VOCE |
| | | | <ul style="list-style-type: none"> Describe NGF; given their roles | Should know | B | C1 | | |
| Physiology (SGD) | M2-MSK-I-P-0017 | Discussion regarding | <ul style="list-style-type: none"> Discuss difficulties regarding questions, MCQs of Foundation Module | Should know | B | C2 | LGIS SDL | SAQs MCQs |

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|------------------|-----------------|--|--|---|-----------|----|----------|---------------------|
| | | previous module | | | | | | VIVA VOCE |
| | M2-MSK-I-P-0018 | RMP, measurement & effects, of electrolyte on RMP | <ul style="list-style-type: none"> Define resting membrane potential of nerves. | Should know | B | C1 | LGIS SDL | SAQs MCQs VIVA VOCE |
| Physiology (SDL) | M2-MSK-I-P-0024 | Structure of neurons Classification of neurons & nerve fibers | <ul style="list-style-type: none"> Structure of neurons Myelinate Dand unmyelinated nerve fibers. Neuroglia Difference between neurons and glial cells | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition physiology Excitable Tissue; Nerve (Chapter 04, Page 85-90) Textbook of Medical Physiology by Guyton & Hall. 14thEdition. Introduction to Physiology. (Unit2, Chapter 05 Membrane Physiology Page74) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. Section 01. Physiology of Body Fluids. (Chapter 03, Page 37) | | | | |
| | M2-MSK-I-P-0025 | Nernst potential, RMP | <ul style="list-style-type: none"> Basic physics of membrane potential, Nernst equation, Goldman Equation Origin of RMP indifferent cell types. | <ul style="list-style-type: none"> Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Chapter no. 05 membrane dynamics Page no.188) Textbook of Medical Physiology by Guyton & Hall.14th Edition Membrane Potential and action potential. (Unit 2,Chapter 05 Page 63) Ganong's Review of Medical Physiology. 25TH Edition, Excitable Tissue; Nerve (Chapter 04, Page 90) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. Section 01. Properties and function of cell membrane. (Chapter 02, Page 31,41-43) | | | | |
| Physiology (SKL) | M2-MSK-I-P-0031 | Estimation of hemoglobin Practical I | <ul style="list-style-type: none"> Apparatus identification Detail procedure Precautions Aseptic measures taken during blood sampling | P, A | Skill lab | | | OSPE |
| Biochemistry | | | <ul style="list-style-type: none"> Classify Minerals | Must know | C1 | | LGIS | MCQ |

| | | | | | | | |
|--|----------------|---|--|--------------|----|------|---------------------------|
| (LGIS) | M2-MSK-I-B-001 | Introduction & Classification of Minerals / Calcium and Phosphate | <ul style="list-style-type: none"> State Daily Requirements of Calcium & Phosphate in different conditions | Should know | C2 | | SAQ SEQ VIVA |
| | | | <ul style="list-style-type: none"> Discuss Sources & Biochemical functions of Calcium & Phosphate | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Apply knowledge of calcium and phosphate requirements to identify individuals at risk of deficiency or excess. | Should know | C3 | | |
| | | | <ul style="list-style-type: none"> Analyze the biochemical and physiological causes of: <ul style="list-style-type: none"> Hypercalcemia and hypocalcemia Hyperphosphatemia and hypophosphatemia Differentiate between clinical features of hypercalcemia and hypocalcemia based on underlying mechanisms | Nice to know | C4 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Use HEC digital library Practice principles of bioethics Understand the curative and preventive health care measures | Nice to know | C3 | | |
| | M2-MSK-I-B-003 | Vitamins & Their Classification/ Vitamin D | <ul style="list-style-type: none"> Define vitamins Classify Vitamins | Must know | C1 | LGIS | MCQ SAQ SEQ VIVA |
| | | | <ul style="list-style-type: none"> Describe the general characteristics of water-soluble and fat-soluble vitamins. | Should Know | C2 | | |
| | | | <ul style="list-style-type: none"> Enlist dietary sources of vitamin D | Should Know | C1 | | |
| | | | <ul style="list-style-type: none"> Describe the biochemical functions of vitamin D | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Analyze the biochemical basis and clinical manifestations of vitamin D | Should Know | C4 | | |
| <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Use HEC digital library Practice principles of bioethics Understand the curative and preventive health care measures | Nice to know | C3 | | | | | |

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|--------------------|------------------------|---|--|-------------|---|-----------|------|
| Biochemistry (SDL) | M2-MSK-I-B-0010 | Hypercalcemia | <ul style="list-style-type: none"> Discuss causes of Hypercalcemia Explain Biochemical Basis Describe effects of Hypercalcemia | Should Know | <ul style="list-style-type: none"> Textbook of Lippincott 8th Edition Chapter # 29 page#447 https://www.ncbi.nlm.nih.gov/books/NBK218735 https://youtu.be/34FTvJZCrt4 https://youtu.be/nko-JXU-c28?si=tYUj8dpbh381Gavk | | |
| | M2-MSK-I-B-011 | Hypocalcemia | <ul style="list-style-type: none"> Discuss Biochemical functions of Calcium Discuss causes of Hypocalcemia Describe effects of Hypocalcemia | Should Know | <ul style="list-style-type: none"> Textbook of Lippincott 8th Edition Chapter # 29 page #447 https://www.ncbi.nlm.nih.gov/books/NBK279023/ https://youtu.be/qAeWKCXDniw https://youtu.be/t4dfHSTLInM?si=gdlUoCfvq8FHIPB | | |
| Biochemistry (SKL) | M2-MSK-I-B-0018 | Quantitative Analysis (Serum calcium & Serum Ascorbic Acid) | <ul style="list-style-type: none"> Perform quantitative estimation of serum calcium and serum ascorbic acid using standard laboratory procedures. | Should Know | P | Skill Lab | OSPE |
| Pharmacology | M2-MSK-I-VI(Pharm)-001 | Drugs Acting On Neuromuscular Junction | <ul style="list-style-type: none"> Give the stepwise mechanism of neuromuscular transmission | C1 | LGIS | MCQs | |
| | | | <ul style="list-style-type: none"> Classify drugs acting on neuromuscular junction | C1 | | | |
| | | | <ul style="list-style-type: none"> Explain the mechanism of action, clinical uses, adverse drug affects and contraindications of neuromuscular stimulants | C2 | | | |
| | | | <ul style="list-style-type: none"> Describe the mechanism of action, clinical uses, adverse effects and contraindications of neuromuscular blockers | C2 | | | |
| Surgery/Ortho | M2-MSK-I-VI(S)-001 | Shoulder Dislocation | <ul style="list-style-type: none"> Discuss the possible sites of shoulder dislocation | C2 | LGIS | MCQs | |
| | | | <ul style="list-style-type: none"> Discuss the consequences of dislocation | C2 | | | |
| | | | <ul style="list-style-type: none"> Management concepts | C2 | | | |

Spiral Courses (1st Week)

Integrated Undergraduate Research Curriculum (IUGRC)

| Theory | | | | | |
|------------------------|---|---|-------------------------|--|--------------------------------|
| Code | Topic | Learning Objectives | Cognitive Domain | Teaching Strategy | Mode of Assessment |
| M2-MSK-I-SI(IUGRC)-001 | Research Club Activity 1 Synopsis Writing | <ul style="list-style-type: none"> Organize research idea or general thought into a topic that can be configured into research problem | C3 | Research Club Activity Teaching strategy (LGIS on campus) (SDL/PAL off campus) | Manuscript submission at SJRMC |
| | | <ul style="list-style-type: none"> Formulating a research question according to FINER Criteria | C3 | | |
| | | <ul style="list-style-type: none"> Formulate appropriate research questioning using PEO/PICO/PICOT format | C2 | | |
| | | <ul style="list-style-type: none"> Understand the concept of literature review | C2 | | |
| | | <ul style="list-style-type: none"> Cognizant with concept of publication ethics | C3 | | |
| | | Outline steps of synopsis writing according to SJRMC Guidelines | C2 | | |

Behavioral Sciences

| Theory | | | | | |
|----------------------|--|--|------------------------|--------------------------|------------------------|
| Code | Topic | Learning Objectives | Learning Domain | Teaching Strategy | Assessment Tool |
| | | At the end of the lecture the student should be able to | | | |
| M2-MSK-I -SI(BS)-001 | Healthcare models and their clinical application • Bio-psychosocial model • Integrated health care Model • Public health care model | <ul style="list-style-type: none"> To define bio-psychosocial model of health care | C1 | LGIS | MCQs |
| | | <ul style="list-style-type: none"> To describe Integrated model of healthcare | C2 | LGIS | MCQs |
| | | <ul style="list-style-type: none"> To describe Public health care model | C2 | LGIS | MCQs |
| | | <ul style="list-style-type: none"> To describe Holistic and Traditional Allopathic medicine. | C2 | LGIS | MCQs |
| | | <ul style="list-style-type: none"> To obtain information from the patient according to bio-psychosocial model | C1 | LGIS | MCQs |
| | | <ul style="list-style-type: none"> Elaborate the importance of health belief model in clinical setting | C1 | LGIS | MCQs |

Family Medicine

| Theory | | | | | |
|---------------------|---|---|------------------------|--------------------------|------------------------|
| Code | Topic | Learning Objectives At the end of the lecture the student should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
| M2-MSK-I-SI(FM)-001 | Breaking Down Barriers: Effective Pain Management Strategies in Family Medicine | <ul style="list-style-type: none"> Understand the importance of effective pain management in family medicine | C3 | LGIS | MCQs |
| | | <ul style="list-style-type: none"> Identify common barriers to effective pain management | | | |
| | | <ul style="list-style-type: none"> Learn evidence-based pain management strategies for common conditions. | | | |

Multidisciplinary (Hardens Level 9) Clinico-Concept Connect (C³6) Sessions for 1st Week

| Session | Topic | Department | Educational Relevance | At the End of The Demonstration Student Should Be Able To | Learning Domain | Assessment Tool |
|--|--|-------------------|---|---|------------------------|------------------------|
| \Clinico-Concept Connect (C ³ 6) Sessions – I | A Patient with Shoulder and Arm Pain with Weakness | Anatomy | Understanding shoulder anatomy helps students explain injury mechanisms and recognize nerve damage, enabling accurate clinical assessment of shoulder trauma. | <ul style="list-style-type: none"> Analyze shoulder joint anatomy and axillary nerve course to explain dislocation and deltoid weakness. | C4 | MCQs |
| | | | | <ul style="list-style-type: none"> Correlate axillary nerve injury with loss of shoulder contour, impaired abduction, and sensory deficit. | C5 | MCQs |
| | | Physiology | Knowledge of shoulder biomechanics allows students to interpret movement loss and understand functional impairment resulting from nerve or muscle injury. | <ul style="list-style-type: none"> Analyze the biomechanics of shoulder abduction involving supraspinatus and deltoid. | C4 | MCQs |
| | | | | <ul style="list-style-type: none"> Evaluate effects of nerve injury on muscle tone and motor control. | C5 | MCQs |
| | | Biochemistry | Recognizing the role of calcium and vitamin D highlights the importance of nutrition in musculoskeletal health and recovery after injury. | <ul style="list-style-type: none"> Analyze the role of calcium and vitamin D in neuromuscular function and bone strength. | C4 | MCQs |
| | | | | <ul style="list-style-type: none"> Design a nutrition plan to support bone and muscle recovery. | C5 | MCQs |
| | | Pharmacology | Understanding analgesic mechanisms supports safe and rational pain management in acute musculoskeletal conditions. | <ul style="list-style-type: none"> Analyze NSAID mechanisms in pain and inflammation control | C4 | MCQs |
| | | | | <ul style="list-style-type: none"> Formulate a rational drug plan for acute shoulder injury. | C5 | MCQs |
| | | Orthopedics | Developing diagnostic and management skills prepares students to identify shoulder dislocation and | <ul style="list-style-type: none"> Differentiate anterior shoulder dislocation from rotator cuff tear using clinical signs. | C5 | MCQs |
| | | | | <ul style="list-style-type: none"> Recognize cases requiring referral and imaging. | C5 | MCQs |

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| | | | initiate timely treatment to prevent complications. | <ul style="list-style-type: none"> • Counsel regarding physiotherapy and ergonomic prevention. | C4 | MCQs |
| | | Medicine | Integrating neurological findings with clinical care fosters holistic patient management and promotes functional recovery through multidisciplinary approaches. | <ul style="list-style-type: none"> • Localize axillary nerve injury and differentiate from cervical radiculopathy. | C5 | MCQs |
| | | | | <ul style="list-style-type: none"> • Formulate a multidisciplinary rehabilitation approach. | C6 | MCQs |

Theme 2: Elbow & Forearm Pain After Trauma/Overuse (2nd Week)

| Theme | Rationale | General Learning Objectives |
|--|--|--|
| Elbow & Forearm Pain After Trauma/Overuse. | Elbow and forearm pain are frequently seen in outpatient practice, particularly due to repetitive strain injuries and minor trauma. This theme integrates anatomy of the elbow joint, forearm compartments, physiology of nerve conduction, and biochemical support of connective tissue and bone. Clinical conditions such as tennis elbow, fractures, and nerve entrapment provide early clinical relevance for first-year students. | At the end of this theme, students should be able to: <ul style="list-style-type: none"> • Describe the gross anatomy of the elbow joint and forearm compartments. • Explain the physiology of action potential propagation and nerve conduction. • Discuss the role of minerals and vitamin D in skeletal integrity. • Correlate overuse injuries with anatomical structures involved. • Understand the role of basic investigations such as X-ray in trauma. • Appreciate preventive strategies and ergonomics in musculoskeletal disorders. |
| <p>CASE 2: Elbow & Forearm Pain after Trauma/Overuse</p> <p>A 35-year-old female school teacher presented to the OPD with gradually progressive pain over the outer side of her right elbow for the past three weeks. The pain worsens with repetitive activities such as writing on the board, lifting a cup, and shaking hands. She denies swelling, numbness, or any major trauma. She has no history of diabetes, arthritis, or chronic illness. Family history is non-contributory. She is a non-smoker and her work involves repetitive strain of the forearm muscles. She has taken occasional NSAIDs for pain relief but is not on any regular medication.</p> <p>Examination</p> <p>GPE: Average-built female, alert and oriented. Pulse 78/min, BP 120/80 mmHg, Temp 98.4°F, RR 14/min.</p> <p>Local Examination: Elbow appears normal on inspection. Localized tenderness is present over the lateral epicondyle. Pain is reproduced on resisted wrist extension and grip strength is mildly reduced.</p> <p>Systemic Examination: CVS, Respiratory, Abdomen and CNS normal.</p> | | |

Entrustable Professional Activities (EPAs)

EPA-1: Take focused history of trauma vs overuse elbow pain

EPA-2: Perform basic elbow examination and identify tenderness

EPA-3: Correlate pain with involved muscle attachments

EPA-4: Recognize when imaging is needed in trauma

EPA-5: Counsel patient on rest and ergonomic prevention


Justification

This theme integrates Anatomy, Physiology, Biochemistry and Orthopedics through elbow pain as a clinical presentation.

Theme 2: Clinico – concept connect (C³6) Sessions

Clinical Case Analysis: Lateral Elbow Pain and Repetitive Strain

Patient Profile & History



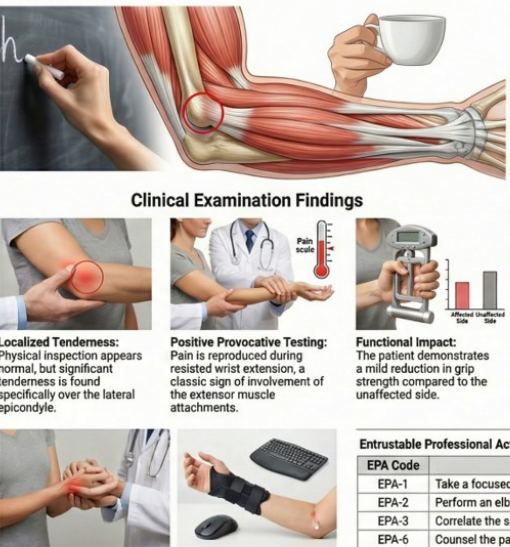
Patient Demographics:
A 35-year-old female school teacher presenting with a 3-week history of gradually progressive right elbow pain.

Aggravating Factors:
Pain is triggered by repetitive daily activities, specifically writing on a board, lifting a cup, and shaking hands.

Unmonitored Factors:
Divariness of procurat by repetitive daily active hands.

Occupation-Related Strain:
As a teacher, her work involves significant repetitive strain of the forearm muscles without a history of acute trauma.

Clinical Examination Findings

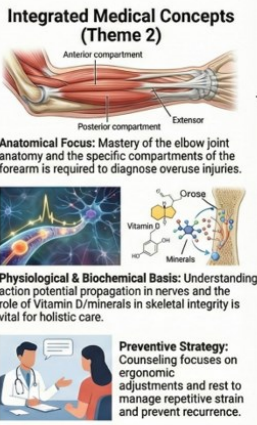


Localized Tenderness:
Physical inspection appears normal, but significant tenderness is found specifically over the lateral epicondyle.

Positive Provocative Testing:
Pain is reproduced during resisted wrist extension, a classic sign of involvement of the extensor muscle attachments.

Functional Impact:
The patient demonstrates a mild reduction in grip strength compared to the unaffected side.

Integrated Medical Concepts (Theme 2)



Anatomical Focus: Mastery of the elbow joint anatomy and the specific compartments of the forearm is required to diagnose overuse injuries.

Physiological & Biochemical Basis: Understanding action potential propagation in nerves and the role of Vitamin D/minerals in skeletal integrity is vital for holistic care.

Preventive Strategy: Counseling focuses on ergonomic adjustments and rest to manage repetitive strain and prevent recurrence.

↑

C4 P4 A3

Entrustable Professional Activities (EPAs) relevant to this specific elbow case.

| EPA Code | Description fo Case 2 |
|----------|---|
| EPA-1 | Take a focused history distinguishing trauma from overuse. |
| EPA-2 | Perform an elbow exam to idetify specific points of tenderness. |
| EPA-3 | Correlate the site of pain with secific muscle attachments. |
| EPA-6 | Counsel the patient on rest an ergonomic prevention strategies |

Harden Level 10 Interdisciplinary

Specific Learning Objectives

| Theory | | | | | | | |
|------------------------------------|----------------|---|---|----------------------|------------------------|--------------------------|--------------------------------------|
| Subject | Code | Topic | Learning Objectives At the end of session students should be able to | Calgary Gauge | Learning Domain | Teaching Strategy | Assessment Tool |
| Anatomy (Embryology) | M2-MSK-I-A-003 | Notochord Formation (3 rd week) | • Define notochord | Must know | C1 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | • Delineate different stages of notochord formation | Must know | C1 | | |
| | | | • Discuss the importance of notochord in development of central nervous system | Must know | C2 | | |
| | | | • Describe role of notochord in development of axial Skeleton | Must know | C1 | | |
| | | | • Describe the fate of notochord | Must know | C2 | | |
| | | | • Analyze clinical conditions of notochord formation | Should know | C4 | | |
| | | | • Focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | • read relevant research article | Nice to know | C3 | | |
| | M2-MSK-I-A-004 | Neurulation (3 rd week) | • Define neurulation | Must know | C1 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | • Describe formation of neural plate and neural tube | Must know | C2 | | |
| | | | • Discuss neural crest formation | Must know | C2 | | |
| | | | • Enlist derivatives of neural crest cells | Must know | C1 | | |
| | | | • Understand the bio-physiological aspects of Neurulation | Must know | C2 | | |
| | | | • Discuss neural tube defects | Should know | C3 | | |
| | | | • Compare & contrast different types of spina bifida | Should know | C4 | | |
| | | | • Discuss the importance of folic acid in the prevention of spina bifida | Should know | C2 | | |
| | | | • Analyze the clinical conditions | Should know | C4 | | |
| | | | • focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| • Practice principles of bioethics | Nice to know | C3 | | | | | |

| | | | | | | | |
|---------------------|-----------------|--|--|--------------|----|------|--------------------------------------|
| | | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> read relevant research article | Nice to know | C3 | | |
| | M2-MSK-I-A-005 | Development and Differentiation of Somites | <ul style="list-style-type: none"> Enumerate three germ layers and their derivatives | Must know | C1 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | <ul style="list-style-type: none"> Describe different divisions of mesoderm | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Describe development of somites and their differentiation | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Explain different stages of somite development | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Understand the Biophysiological aspects of Somite differentiation | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Evaluate clinical aspects of somite differentiation | Should know | C4 | | |
| | | | <ul style="list-style-type: none"> Focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Read relevant research article | Nice to know | C3 | | |
| | M2-MSK-I-A-006 | Early Development of Cardiovascular System & highlights of 4th-8th week | <ul style="list-style-type: none"> Describe early development of cardiovascular system and chorionic villi | Must know | C2 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | <ul style="list-style-type: none"> Discuss development of intraembryonic coelom | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Define angiogenesis and vasculogenesis. | Must know | C1 | | |
| | | | <ul style="list-style-type: none"> Analyze clinical aspects of angiogenesis | Must know | C3 | | |
| | | | <ul style="list-style-type: none"> Summarize the main developmental events and changes in external form of the embryo during the 4th to 8th weeks | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Evaluate the clinical conditions | Should know | C5 | | |
| | | | <ul style="list-style-type: none"> focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | | |
| | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | Nice to know | C3 | | | |
| | | <ul style="list-style-type: none"> read relevant research article | Nice to know | C3 | | | |
| Anatomy (Histology) | M2-MSK-I-A-0013 | Connective tissue III Adipose CT | <ul style="list-style-type: none"> Enumerate examples and location of adipose and dense CT. | Must know | C1 | | |
| | | | <ul style="list-style-type: none"> Draw, describe and label histological structure of all types of connective tissue | Must know | C2 | | |

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|---|-----------------|--|--|--------------|----|-------------------|--------------------------------------|
| | | Dense regular and irregular connective | • Compare & contrast between dense regular and irregular connective tissue microscopically | Must know | C4 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | • Defend clinical aspects of loose and reticular CT | Should know | C5 | | |
| | | | • focus on provision of curative and preventive health care | Nice to know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | • read relevant research article | Nice to know | C3 | | |
| | M2-MSK-I-A-0014 | Cartilage | • Classify cartilage | Must know | C2 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | • Enlist sites of hyaline, fibro and elastic cartilage | Must know | C1 | | |
| | | | • Appreciate microscopic structure of Hyaline, Elastic & | Must know | C2 | | |
| | | | • Debate about the histological features of three cartilages | Must know | C5 | | |
| | | | • Describe the structure of perichondrium | Must know | C2 | | |
| | | | • Describe the arrangement of layers in articular cartilage | Must know | C2 | | |
| | | | • Understand the Biophysiological aspects of cartilage | Must know | C2 | | |
| | | | • Analyze with clinical conditions | Should know | C4 | | |
| • focus on provision of curative and preventive health care | Nice to know | C3 | | | | | |
| • Practice principles of bioethics | Nice to know | C3 | | | | | |
| • Apply strategic use of AI in health care | Nice to know | C3 | | | | | |
| • read relevant research article | Nice to know | C3 | | | | | |
| Anatomy (General Anatomy) | M2-MSK-I-A-0018 | Bone-II Classification & Blood supply) | • Classify bones based on different criteria | Must know | C2 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | • Describe the growing end hypothesis | Must know | C2 | | |
| | | | • Describe blood supply of bones | Must know | C2 | | |
| | | | • Analyze role of bones in estimation of sex, age and stature. | Must know | C4 | | |
| | | | • Evaluate the clinical conditions. | Should know | C4 | | |
| | | | • Focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | • Read relevant research article | Nice to know | C3 | | |
| Anatomy (Gross Anatomy) | M2-MSK-I-A-0023 | Ulna | • Determine the side | Must know | C1 | SGD, Skill Lab | MCQs SEQs OSVE |
| | | | • Demonstrate anatomical position | Must know | P | | |
| | | | • Discuss general features, attachments and articulations | Must know | C2 | | |

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|------------------------------------|-----------------|-----------------------------------|---|--------------|----|-------------------|--------------------------------------|
| | | | • Describe ossification | Must know | C2 | | OSPE |
| | | | • Elaborate interosseous membrane and its importance | Must know | C2 | | |
| | | | • Analyze the clinical conditions | Should know | C4 | | |
| | | | • focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | • Read a relevant research article | Nice to know | C3 | | |
| | M2-MSK-I-A-0024 | Radius | • Determine the side | Must know | C1 | SGD, Skill Lab | MCQs SEQs OSVE OSPE OSCE |
| | | | • Demonstrate its anatomical position | Must know | P | | |
| | | | • Discuss general features, attachments and articulations | Must know | C2 | | |
| | | | • Describe its ossification | Must know | C2 | | |
| | | | • Describe the interosseous membrane and its importance | Must know | C2 | | |
| | | | • Analyze the clinical conditions | Should know | C4 | | |
| | | | • focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | • Read a relevant research article | Nice to know | C3 | | |
| | M2-MSK-I-A-0025 | Flexor compartment of the forearm | • Tabulate muscles of flexor compartment with their origin, insertion, nerve supply and actions | Must know | C2 | SGD, Skill Lab | MCQs SEQs OSVE OSPE OSCE |
| | | | • Correlate with clinical conditions associated with flexor compartment | Should know | C3 | | |
| | | | • Synthesize the outline of Median Nerve, Radial Artery and Ulnar Artery of forearm in a simulated patient or Model | Should know | C6 | | |
| | | | • Describe nerves and vessels of forearm (formation, commencement, course, branches and relations) | Must know | C2 | | |
| | | | • Evaluate associated clinical conditions (Median nerve injury, pronator syndrome, cubital tunnel syndrome) | Must know | C5 | | |
| | | | • focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Apply strategic use of AI in health care | Nice to know | C3 | | |
| • Read a relevant research article | | | Nice to know | C3 | | | |

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|--|--|-------------------------------------|--|--|---|-------------------|--------------------------------------|
| | M2-MSK-I-A-0026 | Extensor compartment of the forearm | <ul style="list-style-type: none"> • Tabulate muscles of extensor compartment with origin, insertion, nerve supply and actions | Must know | C2 | SGD, Skill Lab | MCQs SEQs OSVE OSPE OSCE |
| | | | <ul style="list-style-type: none"> • Connect clinical conditions associated with extensor compartment of forearm (Tennis elbow) | Should know | C4 | | |
| | | | <ul style="list-style-type: none"> • Describe nerves and vessels of forearm (formation, commencement, course, branches and relations) | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> • Synthesize the outline of Radial Nerve and Ulnar Nerve on a simulated patient or model | Must know | C6 | | |
| | | | <ul style="list-style-type: none"> • Analyze the clinical conditions | Should know | C4 | | |
| | | | <ul style="list-style-type: none"> • focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> • Practice principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> • Read a relevant research article | Nice to know | C3 | | |
| | | | M2-MSK-I-A-0027 | Elbow joint, Proximal and distal radioulnar joints | <ul style="list-style-type: none"> • Describe the type of joint with its articular surfaces | | |
| | <ul style="list-style-type: none"> • Discuss the capsule, synovial membrane and ligaments of the joints | Must know | | | C2 | | |
| | <ul style="list-style-type: none"> • Enumerate the related bursae, | Must know | | | C1 | | |
| | <ul style="list-style-type: none"> • Describe axis and plane of movements | Must know | | | C2 | | |
| | <ul style="list-style-type: none"> • Enumerate muscles producing movements at elbow joint. | Must know | | | C1 | | |
| | <ul style="list-style-type: none"> • Connect with the associated clinical conditions (Elbow joint dislocation and student's elbow) | Should know | | | C4 | | |
| | <ul style="list-style-type: none"> • Describe type of radioulnar joints, articular surfaces, capsular attachments, synovial membrane and ligaments. | Must know | | | C2 | | |
| | <ul style="list-style-type: none"> • Describe movements of supination and pronation with special reference to axes | Must know | | | C2 | | |
| | <ul style="list-style-type: none"> • Enumerate the muscles producing these movements | Must know | | | C1 | | |
| | <ul style="list-style-type: none"> • Analyze clinical aspects of joint | Should know | | | C4 | | |
| | Anatomy (SDL) | M2-MSK-I-A-0039 | Colle's Fracture/ Smith's Fracture | <ul style="list-style-type: none"> • Determine the side | <ul style="list-style-type: none"> • Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. (Chapter 3, Page148). | | |
| <ul style="list-style-type: none"> • Demonstrate it anatomical position | | | | | | | |

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|-------------------|-----------------|---|---|--|----|-----------|-----------|---------------------|
| | | | <ul style="list-style-type: none"> • Discuss general features, attachments and articulations • Describe its ossification • Describe the interosseous membrane and its importance • Correlate the clinical aspects • Tabulate muscles of flexor compartment with their origin, insertion, nerves Supply and actions | <ul style="list-style-type: none"> • https://teachmeanatomy.info/upper-limb/bones/radius/ | | | | |
| | M2-MSK-I-A-0040 | Golfer's Elbow | <ul style="list-style-type: none"> • Describe clinical conditions associated with flexor compartment (Golfer's Elbow) | <ul style="list-style-type: none"> • Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. (Chapter 3, Page215-234,236,240) • https://teachmeanatomy.info/upper-limb/muscles/anterior-forearm/ | | | | |
| | M2-MSK-I-A-0041 | Tennis Elbow | <ul style="list-style-type: none"> • Tabulate muscles of extensor compartment with origin, insertion, nerve supply and actions | <ul style="list-style-type: none"> • Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. (Chapter 3, Page215-234,236,240). • https://teachmeanatomy.info/upper-limb/muscles/posterior-forearm/ | | | | |
| Anatomy (SDL) | M2-MSK-I-A-0051 | <u>Connective Tissue-II</u> <ul style="list-style-type: none"> • Dense regular connective tissue • Dense irregular connective tissue | <ul style="list-style-type: none"> • Identify dense regular and irregular connective tissue under microscope | Must know | P | Skill Lab | OSPE MCQs | |
| | | | <ul style="list-style-type: none"> • Illustrate histological structure of dense regular and irregular connective tissue | Should know | C2 | | | |
| | | | <ul style="list-style-type: none"> • Write two points of identification | Should know | C1 | | | |
| | | | <ul style="list-style-type: none"> • Differentiate between dense regular and irregular connective tissue microscopically | Should know | C2 | | | |
| | | | <ul style="list-style-type: none"> • Focus the slide | Must know | P | | | |
| Physiology (LGIS) | M2-MSK-I-P-003 | Stimulus and Response & Types of Stimuli | <ul style="list-style-type: none"> • Define stimulus | Must know | A | C1 | LGIS | SAQs MCQs VIVA VOCE |
| | | | <ul style="list-style-type: none"> • Describe various types of stimuli and response | Must know | A | C1 | | |
| | M2-MSK-I-P-004 | Concept of degeneration and regeneration | <ul style="list-style-type: none"> • Explain degeneration and regeneration of nerve fibers | Must know | A | C2 | LGIS | SAQs MCQs VIVA VOCE |
| | M2-MSK-I-P-005 | Properties of nerve fibers | <ul style="list-style-type: none"> • Discuss the properties of nerve fibers | Must know | A | C2 | LGIS | SAQs MCQs |

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|------------------------|-----------------|--|---|--------------|---|-----------|------|---|--|
| | | | | | | | | VIVA VOCE | |
| | M2-MSK-I-P-006 | Graded Potential, Comparison with action potential | <ul style="list-style-type: none"> Define graded Potential with examples Compare between graded potential and action potential | Must know | A | C1 | LGIS | SAQs MCQs VIVA VOCE | |
| | | | | Must know | A | C2 | | | |
| Physiology (SGD) | M2-MSK-I-P-0019 | Drugs acting on NMJ excitation contraction coupling | <ul style="list-style-type: none"> Drugs acting on NMJ | Nice to know | C | C1 | SGD | MCQs SEQs SAQs Viva Voce OSPE | |
| | | | <ul style="list-style-type: none"> Excitation contraction coupling | Must know | A | C1 | | | |
| | M2-MSK-I-P-0020 | Synapse and synaptic transmission & EBSP, IPSP properties of chemical synapse | <ul style="list-style-type: none"> Describe synapse and its types | Must know | A | C1 | SGD | MCQs SEQs SAQs Viva Voce OSPE | |
| Physiology (SDL) | M2-MSK-I-P-0025 | <ul style="list-style-type: none"> Basic physics of membrane potential, Nernst equation, Goldman Equation Origin of RMP indifferent cell types. | <ul style="list-style-type: none"> Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Chapter no. 05 membrane dynamics Page no.188) Textbook of Medical Physiology by Guyton & Hall.14th Edition Membrane Potential and action potential. (Unit 2,Chapter 05 Page 63) Ganong's Review of Medical Physiology. 25TH Edition, Excitable Tissue; Nerve (Chapter 04, Page 90) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. Section 01. Properties and function of cell membrane. (Chapter 02, Page 31,41-43) | | | | | | |
| Physiology (SKL) | M2-MSK-I-P-0032 | Estimation of hematocrit Practical I | <ul style="list-style-type: none"> Hct definition How to measure Precautions | P, A | | Skill lab | | OSPE | |
| Biochemistry (LGIS) | M2-MSK-I-B-002 | Fluoride, Magnesium & Sulphur Copper, Zinc, Selenium, Iodine, Manganese | <ul style="list-style-type: none"> List the dietary sources of fluoride, magnesium, sulphur, copper, zinc, selenium, iodine, and manganese | Must know | | C1 | LGIS | MCQ SAQ SEQ VIVA | |
| | | | <ul style="list-style-type: none"> Explain the biochemical functions of each mineral in the human body. | Must Know | | C2 | | | |
| | | | <ul style="list-style-type: none"> Apply knowledge of trace elements to explain clinical features resulting from their deficiency or excess. | Nice to Know | | C3 | | | |
| | | | <ul style="list-style-type: none"> Analyze the impact of iodine deficiency on thyroid hormone levels and metabolic rate. | Nice to Know | | C4 | | | |

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|--|---|--|--|---|-----------|--|---------------------------|
| | | | <ul style="list-style-type: none"> Critically assess the risks and benefits of fluoride supplementation in community water supplies. | Nice to Know | C5 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Use HEC digital library Practice principles of bioethics Understand the curative and preventive health care measures | Nice to know | C3 | | |
| | M2-MSK-I-B-004 | Vitamin A & E | <ul style="list-style-type: none"> Enlist dietary sources of vitamin A& E | Should Know | C1 | LGIS | MCQ SAQ SEQ VIVA |
| | | | <ul style="list-style-type: none"> Describe the biochemical functions of vitamin A& E | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Analyze the biochemical basis and clinical manifestations of vitamin A &E | Should Know | C4 | | |
| | | | <ul style="list-style-type: none"> Evaluate the toxic effects of hypervitaminosis A and relate them to excessive intake. | Nice to know | C5 | | |
| | M2-MSK-I-B-0008 | Introduction and Classification of Vitamins & Vitamin E | <ul style="list-style-type: none"> Define vitamins Classify Vitamins | Must know | C1 | SGD | MCQ SAQ SEQ VIVA |
| | | | <ul style="list-style-type: none"> Discuss sources, functions & clinical significance of vitamin E | Must Know | C2 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Use HEC digital library Practice principles of bioethics Understand the curative and preventive health care measures | Nice to know | C3 | | |
| | Biochemistry (SDL) | M2-MSK-I-B-012 | Wilson's Disease | <ul style="list-style-type: none"> Recall sources & daily requirements of Copper | Must know | <ul style="list-style-type: none"> Textbook of Lippincott 8th Edition Chapter # 29 page #449 https://pubmed.ncbi.nlm.nih.gov/ https://youtu.be/dChD9B1ofQY?si=26JyEk-2Rats4m2H | |
| <ul style="list-style-type: none"> Discuss their biochemical functions of Copper | | | | Must Know | | | |
| <ul style="list-style-type: none"> Correlate abnormal copper accumulation with the clinical manifestations of Wilson's disease. | | | | Should Know | | | |
| M2-MSK-I-B-013 | | Clinical Role of Fluoride, Magnesium & Sulphur , Zinc, Selenium, Iodine, Manganese | <ul style="list-style-type: none"> Enlist Sources of these minerals | Must Know | | | |
| | <ul style="list-style-type: none"> Discuss Biochemical functions of these minerals. Correlate deficiency or excess of fluoride, magnesium, sulphur, zinc, selenium, iodine, and manganese with common clinical conditions | | Must Know Nice to Know | | | | |
| Biochemistry (SKL) | M2-MSK-I-B-019 | | <ul style="list-style-type: none"> Perform the Biuret and Ninhydrin tests on given samples | Should Know | P | Skill | OSPE |

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|--------------------|---------------------|--|--|----------------|------|------|--|
| | | Color test for detection of amino acids (Biuret test & Ninhydrin Test) | <ul style="list-style-type: none"> Use test results to identify the presence of proteins or free amino acids. | Should Know | P | | |
| Surgery/Ortho | M2-MSK-I-VI(S)-002 | Tennis elbow, Fracture of Olecranon, radius, ulna | <ul style="list-style-type: none"> Describe: Tennis elbow | C2 | LGIS | MCQs | |
| | | | <ul style="list-style-type: none"> Discuss fractures of radius and ulna | C2 | | | |
| | | | <ul style="list-style-type: none"> Describe the common sites of fracture | C2 | | | |
| | | | <ul style="list-style-type: none"> Management concepts | C2 | | | |
| | | | <ul style="list-style-type: none"> Describe: Tennis elbow | C2 | | | |
| Community Medicine | M2-MSK-I-VI(CM)-002 | Prevention of Accidents | <ul style="list-style-type: none"> Categorize different types of accidents Describe risk factors involved in accidents Describe steps involved in prevention of different types of accidents. | C1 C2 C2 | LGIS | MCQs | |

Interdisciplinary (Hardens Level 10) **Clinico-Concept Connect (C³6) Sessions for 2nd Week**

| Session | Topic | Department | Educational Relevance | At the End of The Demonstration Student Should Be Able To | Learning Domain | Assessment Tool |
|--|--|-------------------|--|---|------------------------|------------------------|
| \Clinico-Concept Connect (C ³ 6) Sessions – II | Elbow & Forearm Pain after Trauma/Overuse | Anatomy | Elbow pain involves forearm extensor muscle attachments at the lateral epicondyle. | • Describe the anatomy of the elbow joint and lateral epicondyle. | C2 | MCQs |
| | | | | • Identify muscles attached to the lateral epicondyle. | C2 | MCQs |
| | | | | • Explain the anatomical basis of pain during wrist extension. | C3 | MCQs |
| | | Physiology | Pain perception and muscle fatigue contribute to functional limitation. | • Explain nerve conduction and pain transmission pathways. | C2 | MCQs |
| | | | | • Correlate repetitive muscle activity with fatigue and pain. | C4 | MCQs |
| | | Biochemistry | Tendon integrity depends on collagen and mineral metabolism. | • Discuss the role of vitamin D and calcium in musculoskeletal support. | C4 | MCQs |
| | | | | • Explain biochemical basis of connective tissue repair. | C3 | MCQs |
| | | Orthopedics | Tennis elbow is a common outpatient orthopedic condition. | • Outline conservative management strategies. | C5 | MCQs |
| | | | | • Recognize cases requiring referral and imaging. | C5 | MCQs |
| | | | | • Counsel regarding physiotherapy and ergonomic prevention. | C6 | MCQs |

Theme 3: A Patient Hand Pain, Swelling & Instability (3rd Week)

| Theme | Rationale | General Learning Objectives |
|--|---|--|
| A Patient Hand Pain, Swelling & Instability | Hand and wrist injuries are common after falls and trauma, and early recognition is essential to prevent long-term disability. This theme integrates anatomy of carpal bones, physiology of nerve and muscle function, and biochemical basis of bone health with clinical conditions such as scaphoid fractures, wrist dislocations, and inflammatory swelling. | <p>At the end of this theme, students should be able to:</p> <ul style="list-style-type: none"> • Describe the anatomy of wrist joint and carpal bones with applied importance. • Explain the basic physiology of nerve conduction and motor function in the hand. • Discuss vitamin D deficiency and its relationship with bone fragility. • Correlate clinical tenderness and swelling with underlying fracture risk. • Appreciate the role of early imaging and orthopedic referral. |
| <p>CASE 3: Hand Pain, Swelling & Instability</p> <p>A 22-year-old female presented to the Emergency OPD after falling on an outstretched hand. She complained of severe pain and swelling around the wrist with inability to grip objects properly. The pain persisted despite analgesics and she felt instability when attempting wrist movement. There is no history of fever or previous joint disease. She has no chronic illness and family history is non-contributory. She is a university student with no smoking or drug use. She has taken only over-the-counter painkillers since the injury.</p> <p>Examination</p> <p>GPE: Young female in discomfort, conscious and oriented. Pulse 90/min, BP 110/70 mmHg, Temp 98.2°F.</p> <p>Local Examination: Wrist is swollen with marked tenderness in the anatomical snuffbox. Wrist extension is painful and restricted, raising suspicion of scaphoid fracture.</p> <p>Systemic Examination: CVS, Respiratory and CNS normal.</p> | | |

Entrustable Professional Activities (EPAs)

EPA-1: Obtain focused history after fall/trauma

EPA-2: Perform basic elbow examination and identify tenderness

EPA-3: Correlate pain with involved muscle attachments

EPA-4: Recognize when imaging is needed in trauma

EPA-5: Counsel patient on rest and ergonomic prevention

Justification

This theme integrates Anatomy, Physiology, Biochemistry and Orthopedics through elbow pain as a clinical presentation.

Theme 3: Clinico – concept connect (C³6) Sessions



Harden Level 9 Multidisciplinary

Specific Learning Objectives

| Theory | | | | | | | |
|--|----------------------------------|-------------------|---|----------------------|------------------------|--------------------------|--------------------------------------|
| Subject | Code | Topic | Learning Objectives At the end of session students should be able to | Calgary Gauge | Learning Domain | Teaching Strategy | Assessment Tool |
| Anatomy (Embryology) | M2-MSK-I-A-007 | Folding of Embryo | • Enlist different phases of embryonic development | Must know | C1 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | • Describe folding of the embryo in median plane | Must know | C2 | | |
| | | | • Describe folding of the embryo in horizontal plane | Must know | C2 | | |
| | | | • Discuss results of folding | Must know | C2 | | |
| | | | • Compare & contrast Omphalocele and Gastroschisis | Should know | C4 | | |
| | | | • Analyze the clinical conditions | Should know | C4 | | |
| | | | • focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Apply strategic use of AI in health care | Nice to know | C3 | | |
| | • read relevant research article | Nice to know | C3 | | | | |
| | M2-MSK-I-A-008 | Fetal period | • Describe different criteria for fetal age estimation | Must know | C2 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | • Discuss the trimesters of pregnancy with their importance | Must know | C2 | | |
| | | | • Describe highlights of fetal period | Must know | C2 | | |
| | | | • Differentiate between embryonic and fetal period | Must know | C2 | | |
| | | | • Tabulate growth in length and weight during fetal period | Must know | C2 | | |
| | | | • Enumerate and discuss factors influencing fetal growth | Must know | C2 | | |
| | | | • Define the term perinatology | Must know | C1 | | |
| | | | • Analyze procedures for assessing fetal well-being | Should know | C4 | | |
| | | | • Evaluate clinical aspects of fetal period | Should know | C4 | | |
| • focus on provision of curative and preventive health care measures | | | Nice to know | C3 | | | |
| • Practice principles of bioethics | Nice to know | C3 | | | | | |

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| | M2-MSK-I-A-009 | Placenta | <ul style="list-style-type: none"> Apply strategic use of AI in health care | Nice to know | C3 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | <ul style="list-style-type: none"> read relevant research article | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Discuss Implantation and establishment of the embryo within the uterus | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Describe the differentiation of the uterine lining into decidua | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Describe the development of a placenta | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Describe fetal – maternal circulation | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Discuss the bio-physiological aspects of placenta | Should know | C2 | | |
| | | | <ul style="list-style-type: none"> Analyze the clinical conditions associated with placenta | Should know | C4 | | |
| | | | <ul style="list-style-type: none"> focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | Nice to know | C3 | | |
| Anatomy (Histology) | M2-MSK-I-A-0015 | Bone-I (Cells & Types) | <ul style="list-style-type: none"> Describe structure and functions of bone cells | Must know | C2 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | <ul style="list-style-type: none"> Discuss periosteum and endosteum | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Discuss types of bones | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Compare & contrast the histological features of spongy and compact bone | Must know | C4 | | |
| | | | <ul style="list-style-type: none"> Describe structure of osteon. | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Understand the Biophysiological aspects of bone | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Analyze clinical aspects of bone | Should know | C4 | | |
| | | | <ul style="list-style-type: none"> focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> read relevant research article | Nice to know | C3 | | |
| | M2-MSK-I-A-0016 | Bone-II | <ul style="list-style-type: none"> Describe osteogenesis | Must know | C2 | LGIS | SAQs MCQs |
| | | <ul style="list-style-type: none"> Discuss bone growth, remodeling and repair | Must know | C2 | | | |

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| | | (Ossification) | <ul style="list-style-type: none"> • Evaluate histological changes in bones in osteoporosis, rickets, osteomalacia, osteopetrosis and bone tumors | Must know | C4 | | VIVA VOCE OSPE |
| | | | <ul style="list-style-type: none"> • Analyze the clinical conditions. | Should know | C4 | | |
| | | | <ul style="list-style-type: none"> • focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> • Practice principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> • read relevant research article | Nice to know | C3 | | |
| Anatomy (General Anatomy) | M2-MSK-I-A- 0019 | Joints-I (Types) | <ul style="list-style-type: none"> • Define joints | Must know | C1 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | <ul style="list-style-type: none"> • Classify fibrous joints with examples | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> • Classify cartilaginous joints with examples | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> • Classify synovial joints with examples | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> • Understand the Bio-physiological aspects of joints | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> • Analyze the clinical conditions | Should know | C4 | | |
| | | | <ul style="list-style-type: none"> • focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> • Practice principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> • read relevant research article | Nice to know | C3 | | |
| Gross Anatomy SGD | M2-MSK-I-A- 0028 | Hand | <ul style="list-style-type: none"> • Understand the arrangement of carpal bones | Must know | C1 | SGD, Skill Lab | MCQs SEQs OSVE OSPE OSCE |
| | | | <ul style="list-style-type: none"> • Identify the salient features of carpal bone. | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> • Discuss the special blood supply of scaphoid bone. | Must know | C3 | | |
| | | | <ul style="list-style-type: none"> • Describe the mid carpal joint. | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> • Discuss the 1st carpometacarpal joint including the type of the joint capsule synovial membrane and ligaments with axis of the movement and the muscles producing the movements | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> • Analyze with the clinical conditions. | Should know | C4 | | |
| | | | <ul style="list-style-type: none"> • focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> • Practice principles of bioethics | Nice to know | C3 | | |

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| | | | • Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | • Read relevant research article | Nice to know | C3 | | |
| | M2-MSK-I-A-0029 | Wrist joint | • Describe the type of joint with its articular surfaces | Must know | C2 | SGD, Skill Lab | MCQs SEQs OSVE OSPE OSCE |
| | | | • Discuss the capsule, synovial membrane and ligaments of the joint | Must know | C2 | | |
| | | | • Enumerate the related bursae | Must know | C1 | | |
| | | | • Describe axis and plane of movements | Must know | C2 | | |
| | | | • Enumerate muscles producing movements at joint | Must know | C1 | | |
| | | | • Evaluate wrist fractures & Dislocations | Must know | C4 | | |
| | | | • Analyze the clinical conditions | Should know | C4 | | |
| | | | • focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | • Read a relevant research article | Nice to know | | | |
| | M2-MSK-I-A-0030 | Anastomosis around wrist joint | • Discuss the blood vessels involved in the formation of anastomosis around the wrist joint | Must know | C2 | SGD, Skill Lab | MCQs SEQs OSVE OSPE OSCE |
| | | | • Explain the importance of anastomosis. | Must know | C2 | | |
| | | | • Analyze the clinical conditions | Should know | C4 | | |
| | | | • focus on provision of curative and preventive health care measures Able to focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | • Read a relevant research article | Nice to know | | | |
| M2-MSK-I-A-0031 | Dorsum of Hand, Flexor retinaculum Extensor retinaculum | • Describe the muscles of dorsum of hand | Must know | C2 | SGD, | MCQs SEQs OSVE OSPE OSCE | |
| | | • Discuss the Dorsal digital expansion | Must know | C2 | | | |
| | | • Describe the attachment of flexor retinaculum with structures related to it. | Must know | C2 | | | |
| | | • Synthesize the outline of flexor and extensor retinacula on a simulated patient or a model. | Must know | C6 | | | |

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| | | | <ul style="list-style-type: none"> • Describe the Guyon's canal. | Must know | C2 | Skill Lab | | |
| | | | <ul style="list-style-type: none"> • Describe the formation of the carpal tunnel and evaluate applied anatomy. | Must know | C4 | | | |
| | | | <ul style="list-style-type: none"> • Describe the attachment of extensor retinaculum and its various compartments with structures passing through it. | Must know | C2 | | | |
| | | | <ul style="list-style-type: none"> • Evaluate the De Quervain's disease. | Should know | C4 | | | |
| | | | <ul style="list-style-type: none"> • Analyze the clinical conditions. | Should know | C4 | | | |
| | | | <ul style="list-style-type: none"> • focus on provision of curative and preventive health care measures | Nice to know | C3 | | | |
| | | | <ul style="list-style-type: none"> • Practice principles of bioethics | Nice to know | C3 | | | |
| | | | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | Nice to know | | | | |
| | | | <ul style="list-style-type: none"> • Read a relevant research article | Nice to know | C3 | | | |
| Anatomy (SDL) | M2-MSK-I-A-0044 | Avascular Necrosis of Scaphoid Bone | <ul style="list-style-type: none"> • Understand the arrangement of carpal bones • Identify the salient features of carpal bone. • Discuss the special blood supply of scaphoid bone. • Describe the midcarpal joint. • Discuss the 1st carpometacarpal joint including the type of the joint capsules synovial Membrane and ligaments with axis of the movement and the muscles producing the movements • Read relevant research article • Use Digital Library | <ul style="list-style-type: none"> • Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. Chapter 3, Page148-151,278-283). • https://teachmeanatomy.info/upper-limb/muscles/hand/ | | | | |
| | M2-MSK-I-A-0045 | Wrist dislocation | <ul style="list-style-type: none"> • Describe the type of joint with its articular surfaces | <ul style="list-style-type: none"> • Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. (Chapter 3, Page278). • https://www.kenhub.com/en/library/anatomy/the-wrist-joint | | | | |
| Anatomy (SKL) | M2-MSK-I-A-0052 | <u>Cartilage</u> <ul style="list-style-type: none"> • Hyaline cartilage • Elastic cartilage • Fibrocartilage | <ul style="list-style-type: none"> • Identify all three types of cartilages under microscope | Must know | P | Skill Lab | OSPE MCQs | |
| | | | <ul style="list-style-type: none"> • Illustrate microscopic structure of all three cartilages | Should know | C2 | | | |
| | | | <ul style="list-style-type: none"> • Discuss the structure of perichondrium | Should know | C1 | | | |
| | | | <ul style="list-style-type: none"> • Write two points of identification | Should know | C1 | | | |
| | | | <ul style="list-style-type: none"> • Enlist sites of hyaline, fibro and elastic cartilage | Should know | C1 | | | |
| | | | <ul style="list-style-type: none"> • Focus the slide | Must know | P | | | |
| | | | <ul style="list-style-type: none"> • Identify all three types of cartilages under microscope | Must know | P | | | |

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| Physiology (LGIS) | M2-MSK-I-P-007 | Nernst Potential RMP | <ul style="list-style-type: none"> Understand the concept of Nernst potential and equilibrium potential for different ions | Must know | A | C2 | LGIS SDL | SAQs MCQs VIVA VOCE |
| | | | <ul style="list-style-type: none"> Define resting membrane potential of nerves. | Must know | A | C1 | | |
| | | | <ul style="list-style-type: none"> Explain the factors which determine the level of RMP | Should know | B | C2 | | |
| | | | <ul style="list-style-type: none"> Differences between electrical and chemical synapse | Must know | A | C2 | | |
| | M2-MSK-I-P-008 | RMP: & Measurement & effect of Electrolytes, | <ul style="list-style-type: none"> Describe the terms polarized and hyperpolarized | Should know | B | C1 | LGIS | SAQs MCQs VIVA VOCE |
| | | | <ul style="list-style-type: none"> Describe the role of various ions for these states | Should know | B | C1 | | |
| | M2-MSK-I-P-009 | Stages of Action Potential I&II | <ul style="list-style-type: none"> Define and draw action potential | Must know | A | C1 | LGIS | SAQs MCQs VIVA VOCE |
| | | | <ul style="list-style-type: none"> Describe different phases of action potential | Must know | A | C1 | | |
| | M2-MSK-I-P-0010 | Recording of Action Potential Propagation of Action Potential & Factors effecting nerve conduction Polarization and hyperpolarization state | <ul style="list-style-type: none"> Briefly describe the method of recording resting membrane potential and action potential | Should know | B | C1 | LGIS | SAQs MCQs VIVA VOCE |
| | | | <ul style="list-style-type: none"> Describe the mechanism of propagation of action potential | Must know | A | C1 | | |
| <ul style="list-style-type: none"> Describe various factor that effect nerve conduction | | | Should know | B | C1 | | | |
| M2-MSK-I-P-0011 | Refractory Period, Different types of Action Potentials | <ul style="list-style-type: none"> Define refractory period and discuss its types | Must know | A | C1 | LGIS SDL | SAQs MCQs VIVA VOCE | |
| | | <ul style="list-style-type: none"> Describe various types of action potential | Must know | A | C1 | | | |
| Physiology (SGD) | M2-MSK-I-P-0020 | Synapse and synaptic transmission & EBSP, IPSP | <ul style="list-style-type: none"> Describe synapse and its types | Must know | A | C1 | SGD | SAQs MCQs VIVA VOCE |
| | | | <ul style="list-style-type: none"> Differences between electrical and chemical synapse | Must know | A | C2 | | |

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| | | properties of chemical synapse | | | | | | |
| | M2-MSK-I-P-0021 | Nernst potential | <ul style="list-style-type: none"> • Concept of Nernst potential • Equilibrium Potential for different types | Must know | A | C1 | SGD | SAQs MCQs VIVA VOCE |
| Physiology (SDL) | M2-MSK-I-P-0028 | Concept of degeneration & regeneration | <ul style="list-style-type: none"> • Introduction • Axonal Degeneration • Wallerian Degeneration | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition, overview of cell physiology in medical physiology (chapter 6, page 133) • A & P Anatomy and physiology Tortora, Chapter 12 Nervous tissue And Homeostasis Page 447 • Ganong's Review of Medical Physiology.25TH Edition, overview of cell physiology in medical physiology (Chapter 4, page 97) | | | | |
| | M2-MSK-I-P-0029 | Stimulus & response & types of stimuli, Stages of action potential | <ul style="list-style-type: none"> • Neuron action potential, • Stages of Propagation of AP • Conduction Rates • ALL-OR-NONE Principle | <ul style="list-style-type: none"> • Textbook of Medical Physiology by Guyton & Hall.14th Edition.Introduction to Physiology. (Unit 2, Chapter 05 Membrane Potential and action potential Page 71) • Ganong's Review of Medical Physiology.25TH Edition, Excitable Tissue; Nerve (Chapter 04,Page 93) • Physiology by Linda S. Costanzo 6thEdition. cellular Physiology (Chapter 01. Page 25) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. Section 01. Properties and function of cell membrane. (Chapter 03,Page 45,47-51) | | | | |
| | M2-MSK-I-P-0033 | ESR Practical I | <ul style="list-style-type: none"> • Procedure • Precautions • Clinical importance of ESR, normal values | P,A | Skill lab | | OSPE | |
| Biochemistry (LGIS) | M2-MSK-I-B-002 | Fluoride, Magnesium & Sulphur | <ul style="list-style-type: none"> • List the dietary sources of fluoride, magnesium, Sulphur, copper, zinc, selenium, iodine, and manganese | Must know | C1 | LGIS | MCQ SAQ | |
| | | | <ul style="list-style-type: none"> • Explain the biochemical functions of each mineral in | Must Know | C2 | | | |

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| | | Copper, Zinc, Selenium, Iodine, Manganese | the human body. | | | | SEQ VIVA |
| | | | <ul style="list-style-type: none"> Apply knowledge of trace elements to explain clinical features resulting from their deficiency or excess. | Nice to Know | C3 | | |
| | | | <ul style="list-style-type: none"> Analyze the impact of iodine deficiency on thyroid hormone levels and metabolic rate. | Nice to Know | C4 | | |
| | | | <ul style="list-style-type: none"> Critically assess the risks and benefits of fluoride supplementation in community water supplies. | Nice to Know | C5 | | |
| | M2-MSK-I-B-004 | Vitamin A & E | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Use HEC digital library Practice principles of bioethics Understand the curative and preventive health care measures | Nice to know | C3 | LGIS | MCQ SAQ SEQ VIVA |
| | | | <ul style="list-style-type: none"> Enlist dietary sources of vitamin A& E | Should Know | C1 | | |
| | | | <ul style="list-style-type: none"> Describe the biochemical functions of vitamin A& E | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Analyze the biochemical basis and clinical manifestations of vitamin A &E | Should Know | C4 | | |
| | | | <ul style="list-style-type: none"> Evaluate the toxic effects of hypervitaminosis A and relate them to excessive intake. | Nice to know | C5 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Use HEC digital library Practice principles of bioethics Understand the curative and preventive health care measures | Nice to know | C3 | | |
| Biochemistry (SDL) | M2-MSK-I-B-014 | Rickets | <ul style="list-style-type: none"> Describe the role of vitamin D in calcium and phosphate homeostasis and bone mineralization. | Must Know | <ul style="list-style-type: none"> Textbook of Lippincott 8th Edition Chapter # 28 page #423,432-436,441,444 Textbook of Harper 32nd Edition Chapter # 44 page# 538-540 https://byjus.com/chemistry https://youtu.be/00_7cr8WVHU?si=ZcipynU8qHcMsAit | | |
| | | | <ul style="list-style-type: none"> Apply knowledge of calcium–phosphate–vitamin D metabolism to explain clinical features of rickets such as bone deformities and delayed growth. | Should Know | | | |
| | | | <ul style="list-style-type: none"> Interpret basic laboratory findings associated with rickets | Should Know | | | |
| | M2-MSK-I-B-015 | Applied Biochemistry of | <ul style="list-style-type: none"> Enlist Sources of Vitamin A & E | Must Know | <ul style="list-style-type: none"> Textbook of Lippincott 8th Edition Chapter # 28 page #432-436, | | |

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| | | Vitamin A and E | <ul style="list-style-type: none"> Describe Deficiency Effects of Vitamin A & E | Should Know | 441,444 <ul style="list-style-type: none"> Textbook of Harper 32nd Edition Chapter # 44 page# 537-538 & 540 https://youtu.be/7ZFr9xiAt94 https://youtu.be/AJV8qBUvbkc?si=bs8i69MhNFb40Rmm https://youtu.be/AKR1g4aHNb4?si=kZzoOBJxQLUBdo3f | | |
| | | | <ul style="list-style-type: none"> Explain Toxic Effects of Vitamin A | Nice to Know | | | |
| Biochemistry (SKL) | M2-MSK-I-B-020 | Color test for detection of amino acids <ul style="list-style-type: none"> Xanthoproteic Test Million-Nasse's Test | <ul style="list-style-type: none"> Perform the Xanthoproteic and Millon–Nasse's tests on given samples. | Should Know | P | Skill | OSPE |
| | | | <ul style="list-style-type: none"> Use the results to identify the presence of aromatic amino acids and tyrosine-containing proteins | Should Know | P | | |
| Medicine | M2-MSK-I-VI(M)-003 | Osteomalacia, rickets Polyarthritis | <ul style="list-style-type: none"> Enlist causes of rickets | C1 | LGIS | | MCQs |
| | | | <ul style="list-style-type: none"> Discuss changes in bones in osteomalacia | C2 | | | |
| | | | <ul style="list-style-type: none"> Describe clinical features of osteomalacia& rickets | C2 | | | |
| | | | <ul style="list-style-type: none"> Enlist investigations for of osteomalacia& rickets | C1 | | | |
| | | | <ul style="list-style-type: none"> Discuss management of osteomalacia& rickets | C2 | | | |
| Community Medicine | M2-MSK-I-VI(CM)-001 | Musculoskeletal Disorders | <ul style="list-style-type: none"> Explain causes of low back pain | C2 | LGIS | | MCQs |
| | | | <ul style="list-style-type: none"> Describe prevention of low back pain | C2 | | | |
| | | | <ul style="list-style-type: none"> Describe work related musculoskeletal disorders addition with its burden/epidemiology | C2 | | | |
| | | | <ul style="list-style-type: none"> Identify risk factors of Musculoskeletal disorders MSD at workplace | C1 | | | |
| | | | <ul style="list-style-type: none"> Identify risk factors related to MSD due to excessive mobile usage. | C1 | | | |
| <ul style="list-style-type: none"> Describe prevention of exposure to risk factors related to workplace | C1 | | | | | | |
| <ul style="list-style-type: none"> Describe the application of ergonomics in MSD related to the above disorders. | C1 | | | | | | |
| Pharmacology | M2-MSK-I-VI(Pharm)-003 | Analgesics | <ul style="list-style-type: none"> Define and classify analgesics into opioid and non-opioid groups with examples. | C1 | LGIS | | MCQs |
| | | | <ul style="list-style-type: none"> List the mechanisms of action, therapeutic uses, and common adverse effects of major analgesic drugs. | C1 | | | |

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| | | | <ul style="list-style-type: none"> Explain the mechanism of action of opioids and NSAIDs in pain relief. | C2 | | |
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Spiral Courses (3rd Week)
Integrated Undergraduate Research Curriculum (IUGRC)

| Theory | | | | | |
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| Code | Topic | Learning Objectives | Cognitive Domain | Teaching Strategy | Mode of Assessment |
| M2-MSK-I-SI(IUGRC)-002 | Research Club Activity 2 Questionnaire Development | <ul style="list-style-type: none"> Understand about questionnaires used in research Categorize types of questions used in research their advantages and disadvantages Identify Designs and stages of development of questionnaire Interpret Simple rules for writing a good questionnaire Appraise Parts and Layout of questionnaire | C2 C2 C3 C2 C3 | Research Club Activity Teaching strategy (LGIS on campus) (SDL/PAL off campus) | Manuscript submission at SJRMC |

Multidisciplinary (Hardens Level 9) Clinico-Concept Connect (C³6) Sessions for 3rd Week

| Session | Topic | Department | Educational Relevance | At the End of The Demonstration Student Should Be Able To | Learning Domain | Assessment Tool |
|---|-----------------------------------|--------------|---|---|-----------------|-----------------|
| Clinico-Concept Connect (C ³ 6) Sessions – III | Hand Pain, Swelling & Instability | Anatomy | Wise Educational Relevance with Specific Learning Objectives | • Describe carpal bones with emphasis on scaphoid. | C2 | MCQs |
| | | | | • Identify anatomical snuffbox boundaries. | C2 | MCQs |
| | | | | • Explain blood supply of scaphoid bone. | C3 | MCQs |
| | | Physiology | Pain and restricted movement affect hand function. | • Explain physiology of pain perception after injury. | C2 | MCQs |
| | | | | • Correlate wrist instability with impaired grip. | C4 | MCQs |
| | | Biochemistry | Bone fragility may be influenced by vitamin D deficiency. | • Discuss role of calcium and vitamin D in bone strength. | C4 | MCQs |
| | | | | • Explain biochemical basis of fracture risk. | C3 | MCQs |
| | | Orthopedics | Early recognition prevents long-term disability. | • Recognize need for urgent immobilization. | C5 | MCQs |
| | | | | • Interpret imaging findings in wrist fractures. | C5 | MCQs |
| | | Radiology | Radiology objectives help students understand when imaging is useful, prevent unnecessary investigations, and support cost-effective, evidence-based diagnosis of elbow pain. | • Analyze the role of X-ray and ultrasound in assessing lateral elbow pain and excluding other pathologies. | C4 | MCQs |
| • Propose an appropriate imaging pathway, identifying when imaging is unnecessary and when USG or MRI is indicated. | C5 | | | MCQs | | |

Theme 4: A Patient Hand Pain, Swelling & Instability (4th Week)

| Theme | Rationale | General Learning Objectives |
|--|---|---|
| Hand Numbness/Tingling with Grip Dysfunction | Numbness and tingling in the hand are common complaints in primary care, often due to nerve compression syndromes. This theme integrates anatomy of carpal tunnel, physiology of nerve impulse transmission, and biochemical contribution of B vitamins with clinical relevance of carpal tunnel syndrome and neuropathies. | <p>At the end of this theme, students should be able to:</p> <ul style="list-style-type: none"> • Describe the anatomy of carpal tunnel and median nerve distribution. • Explain the physiology of sensory and motor nerve function. • Discuss the biochemical basis of neuropathy due to vitamin deficiency. • Correlate tingling and grip weakness with nerve compression. • Appreciate early referral and ergonomic prevention. |
| <p>CASE 4: Hand Numbness/Tingling with Grip Dysfunction</p> <p>A 40-year-old office worker presented to the Family Medicine OPD with tingling and numbness in the thumb, index and middle fingers for the last two months. The symptoms worsen at night and often wake her from sleep. She also reports weak grip and dropping objects while performing daily tasks. She has no history of trauma, diabetes or arthritis. Family history is non-contributory. She works long hours on a computer with repetitive wrist movements. She has taken occasional analgesics but no regular medication.</p> <p>Examination</p> <p>GPE: Middle-aged female, stable vitals, conscious and oriented.</p> <p>Local Examination: Sensation is reduced in median nerve distribution, and wrist flexion reproduces tingling. Mild thenar wasting is noted, suggesting chronic median nerve compression.</p> <p>Systemic Examination: CVS, Respiratory and CNS normal.</p> <p>Entrustable Professional Activities (EPAs)</p> <p>EPA-1: Perform basic sensory and motor hand exam</p> <p>EPA-2: Explain nerve compression in simple language</p> | | |

EPA-3: Counsel on ergonomic prevention

EPA-4: Recognize progressive weakness needing referral

Justification

This theme integrates Anatomy, Physiology, Biochemistry and Orthopedics through elbow pain as a clinical presentation.

Theme 4: Clinico – concept connect (C³6) Sessions

Clinical Breakdown of Case 4: Median Nerve Compression and Grip Dysfunction

The Patient Profile & Clinical History



40-Year-Old Office Worker

Patient presents with a 2-month history of tingling and numbness specifically in the thumb, index, and middle fingers.

Nocturnal Symptom Worsening

The numbness and tingling are severe enough to wake the patient from sleep, a classic indicator of carpal tunnel involvement.

Functional Grip Dysfunction

The patient reports a weak grip and frequently dropping objects during daily tasks and work activities.



Clinical Examination & Diagnosis



Median Nerve Distribution

Physical exam confirms reduced sensation specifically in the areas of the hand innervated by the median nerve.



Provocative Testing

Wrist flexion (clinical maneuver) successfully reproduces the tingling sensation, indicating nerve irritability.



Visible Thenar Wasting

Muscle atrophy at the base of the thumb (thenar eminence) suggests the compression has become a chronic condition.

The Anatomical & Physiological Basis



Anatomy of the Carpal Tunnel

The carpal tunnel serves as a narrow passageway for the median nerve; repetitive wrist movement can cause compression within this space.



Nerve Impulse Transmission

Compression disrupts the basic physiology of sensory and motor nerve function, leading to the "pins and needles" sensation.



Biochemical Contribution

B vitamins play a critical role in nerve health; deficiencies can exacerbate the biochemical basis of neuropathy.

Management & Prevention



Ergonomic Intervention

Counseling focuses on workplace modifications and ergonomic prevention to reduce repetitive wrist strain.



Clinical Referral

Progressive weakness or persistent thenar wasting necessitates early referral to surgery or specialized family medicine.

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C4 P3 A3

Harden Level 9 Multidisciplinary

Specific Learning Objectives

| Theory | | | | | | | |
|---|----------------------------------|---|---|----------------------|--------------|--------------------------|--------------------------------------|
| Subject | Code | Topic | Learning Objectives At the end of session students should be able to | Calgary Gauge | C/P/A | Teaching Strategy | Assessment Tool |
| Anatomy (Embryology) | M2-MSK-I-A-0010 | Fetal Membranes and Multiple Pregnancies | • Enlist membranes developing during pregnancy | Must know | C1 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | • Discuss origin, composition, location, function and fate of yolk sac | Must know | C2 | | |
| | | | • Explain origin, composition, location, function and fate of Amnion | Must know | C2 | | |
| | | | • Describe formation of umbilical cord and its structure | Must know | C2 | | |
| | | | • Define Allantois along with its importance and function | Must know | C1 | | |
| | | | • Compare & contrast different types of twins | Must know | C4 | | |
| | | | • Analyze clinical aspects of fetal membranes | Must know | C4 | | |
| | | | • Evaluate the clinical conditions of twin pregnancy | Should know | C4 | | |
| | | | • focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | • Practice principles of bioethics | Nice to know | C3 | | |
| | | | • Apply strategic use of AI in health care | Nice to know | C3 | | |
| | • read relevant research article | Nice to know | C3 | | | | |
| | M2-MSK-I-A-0011 | Teratogenesis | • Define Teratology | Must know | C1 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | • Discuss the important principles of teratogenesis. | Must know | C2 | | |
| | | | • Describe diseases associated with chromosomal behaviour during cell division | Must know | C2 | | |
| | | | • List common teratogens and the birth defects caused by them. | Must know | C2 | | |
| | | | • Analyze the clinical conditions | Should know | C4 | | |
| | | | • Discuss key research articles & role of AI | Nice to know | C3 | | |
| | | | • focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| • Describe the core bioethical principles | Nice to know | C3 | | | | | |
| Anatomy (General Anatomy) | M2-MSK-I-A-0020 | Joints-II (Movements) | • Describe structure of synovial joint | Nice to know | C2 | LGIS | SAQs MCQs VIVA VOCE OSPE |
| | | | • Classify synovial joints | Nice to know | C2 | | |
| | | | • Explain movements around synovial joints | Must know | C2 | | |
| | | | • Evaluate Degenerative joint diseases | Must know | C4 | | |

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| | | | <ul style="list-style-type: none"> Describe the involvement of anatomical structure of the articular cartilage in Degenerative joint disease | Must know | C3 | | |
| | | | <ul style="list-style-type: none"> Analyze the clinical conditions. | Must know | C4 | | |
| | | | <ul style="list-style-type: none"> focus on provision of curative and preventive health care measures | Should know | C3 | | |
| | | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> read relevant research article | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Tabulate the muscles forming the thenar and hypothenar eminence. | Must know | C2 | SGD, Skill Lab | MCQs SEQs OSVE OSPE OSCE |
| | | | <ul style="list-style-type: none"> Discuss Lumbricals, Palmar and dorsal interossei with their attachments and actions. | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Discuss the formation of superficial and deep arterial arches | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Synthesize the outline of superficial and deep arterial arches on a simulated patient or model. | Must know | C6 | | |
| | | | <ul style="list-style-type: none"> Analyze the clinical conditions. | Should know | C4 | | |
| | | | <ul style="list-style-type: none"> focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | Nice to know | C3 | | |
| <ul style="list-style-type: none"> Read a relevant research article | Nice to know | C3 | | | | | |
| Anatomy (Gross SGD) | M2-MSK-I-A-0032 | Palm of hand-I Muscles & Neurovascular organization | <ul style="list-style-type: none"> Tabulate the muscles forming the thenar and hypothenar eminence. | Must know | C2 | SGD, Skill Lab | MCQs SEQs OSVE OSPE OSCE |
| | | | <ul style="list-style-type: none"> Discuss Lumbricals, Palmar and dorsal interossei with their attachments and actions. | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Discuss the formation of superficial and deep arterial arches | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Map the outline of superficial and deep arterial arches on a simulated patient or model. | Must know | P | | |
| | | | <ul style="list-style-type: none"> Correlate with the clinical conditions. | Should know | C3 | | |
| | | | <ul style="list-style-type: none"> focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | Nice to know | C3 | | |

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| | | | <ul style="list-style-type: none"> Read a relevant research article | Nice to know | C3 | | |
| | M2-MSK-I-A-0033 | Palm of hand-II Fascial spaces of hand Grip | <ul style="list-style-type: none"> Discuss the formation and attachments of palmar aponeurosis. | Must know | C2 | SGD, Skill Lab | MCQs SEQs OSVE OSPE OSCE |
| | | | <ul style="list-style-type: none"> Describe the formation of palmar spaces and its divisions | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Describe the thenar and mid palmar spaces. | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Define pulp spaces | Must know | C1 | | |
| | | | <ul style="list-style-type: none"> Evaluate anatomy of pulp space with its common clinical conditions | Must know | C4 | | |
| | | | <ul style="list-style-type: none"> Describe dorsal subcutaneous spaces | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Demonstrate surgical incisions. | Must know | C3 | | |
| | | | <ul style="list-style-type: none"> Describe different types of grips | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Analyze the clinical conditions. | Should know | C4 | | |
| | | | <ul style="list-style-type: none"> focus on provision of curative and preventive health care measures | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Practice principles of bioethics | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | Nice to know | C3 | | |
| | M2-MSK-I-A-0034 | Cutaneous Innervation & Dermatomes of upper limb, Force & weight transmission | <ul style="list-style-type: none"> Discuss the cutaneous innervation & dermatomes of upper limb. | Must know | C2 | SGD, Skill Lab | MCQs SEQs OSVE OSPE OSCE |
| | | | <ul style="list-style-type: none"> Identify the structures present at different levels of cross section; mid humeral shaft, end of humeral shaft, elbow joint, superior radioulnar joint, mid forearm, wrist joint, proximal shafts of metacarpals. | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Discuss the surface anatomy of axioappendicular region. | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Create videos of marking of clinically important landmarks on the simulated patient/ models | Must know | C6 | | |
| | | | <ul style="list-style-type: none"> Interpret the normal radiologic appearance of bones in axioappendicular region. | Must know | C3 | | |
| | | | <ul style="list-style-type: none"> Correlate with the clinical conditions | Should know | C3 | | |
| | | | <ul style="list-style-type: none"> Read a relevant research article | Nice to know | C3 | | |
| Anatomy (SDL) | M2-MSK-I-A-0047 | Carpal Tunnel | <ul style="list-style-type: none"> Describe the muscles of dorsum of hand Discuss the Dorsal digital expansion Describe the attachment of flexor retinaculum with structures related to it. Describe the Guyon's canal. | <ul style="list-style-type: none"> Clinical Oriented Anatomy by Keith L. Moore.8TH Edition. (Chapter 3, Page159,224-226). https://teachmeanatomy.info/upper-limb/muscles/hand/ | | | |

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| | | | <ul style="list-style-type: none"> Describe the formation of the carpal tunnel and its applied anatomy. | <ul style="list-style-type: none"> Clinical Oriented Anatomy by Keith L. Moore. 8TH Edition. (Chapter 3, Pag243-256). https://teachmeanatomy.info/upper-limb/muscles/hand/ | | | | |
| | | | <ul style="list-style-type: none"> Describe the attachment of extensor retinaculum and its various compartments with structures passing through it. | | | | | |
| | | | <ul style="list-style-type: none"> Discuss the De Quervain's disease. | | | | | |
| | M2-MSK-I-A-0048 | Dupuytren's contracture | <ul style="list-style-type: none"> Tabulate the muscles forming the thenar and hypothenar eminence. Discuss Lumbricals, Palmar and dorsal interossei with their attachments and actions. Discuss the formation of superficial and deep arterial arches Discuss the clinicals associated with palm | | | | | |
| Anatomy (SKL) | M2-MSK-I-A-0053 | <u>Bone</u> <ul style="list-style-type: none"> Compact Bone Spongy Bone | <ul style="list-style-type: none"> Identify compact and spongy bone under microscope | Must know | P | Skill Lab | | OSPE MCQs |
| | | | <ul style="list-style-type: none"> Illustrate microscopic structure of compact bone and spongy bone | Must know | C2 | | | |
| | | | <ul style="list-style-type: none"> Write two points of identification | Must know | C1 | | | |
| | | | <ul style="list-style-type: none"> Focus the slide | Must know | P | | | |
| Physiology (LGIS) | M2-MSK-I-P-0012 | Synapse and synaptic transmission | <ul style="list-style-type: none"> Describe synapse and its types | Must know | A | C1 | LGIS | SAQs MCQs VIVA VOCE |
| | M2-MSK-I-P-0013 | EPSP, IPSP, Properties of chemical synapse Properties of Chemical synaptic | <ul style="list-style-type: none"> Discuss in detail various properties of chemical synapse | Should know | B | C2 | LGIS | SAQs MCQs VIVA VOCE |
| | | | <ul style="list-style-type: none"> Discuss in detail various properties of chemical synapse | Must know | A | C2 | LGIS | SAQs MCQs VIVA VOCE |
| | M2-MSK-I-P-0014 | NMJ, Synthesis and release of Ach Excitation- Contraction coupling | <ul style="list-style-type: none"> Describe the physiologic anatomy of neuromuscular junction. | Must know | A | C1 | LGIS SDL | SAQs MCQs VIVA VOCE |
| <ul style="list-style-type: none"> Recall Synthesis and release of Ach | | | Should know | B | C1 | | | |
| <ul style="list-style-type: none"> Describe the mechanism of transmission of impulses from nerve endings to skeletal muscle fibers | | | Should know | B | C1 | | | |
| | | | <ul style="list-style-type: none"> Describe briefly the biochemistry of acetyl choline | Nice to know | C | C1 | | |

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| | M2-MSK-I-P-0015 | Drugs acting on NMJ, Excitation-Contraction coupling | <ul style="list-style-type: none"> Enlist drugs that enhance and block transmission at neuromuscular junction | Must know | A | C1 | LGIS SDL | SAQs MCQs VIVA VOCE |
| | | | <ul style="list-style-type: none"> Describe mechanism of excitation contraction coupling | Must know | A | C1 | | |
| | M2-MSK-I-P-0016 | Myasthenia Gravis, Lambert Eaton Syndrome | <ul style="list-style-type: none"> Describe the salient features of myasthenia gravis and Lambert Eaton syndrome | Must know | A | C1 | LGIS | SAQs MCQs VIVA VOCE |
| Physiology (SGD) | M2-MSK-I-P-0022 | Neuro muscular function (NMJ) | <ul style="list-style-type: none"> Transmission Across NMJ | Should know | B | C1 | SGD | MCQs SAQs Viva Voce OSPE |
| | | | <ul style="list-style-type: none"> Diseases of NMJ | Must know | A | C2 | | |
| | M2-MSK-I-P-0023 | Nerve growth factor (NGF) | <ul style="list-style-type: none"> Describe NGF | Should know | B | C1 | SGD | MCQs SAQs Viva Voce OSPE |
| | | | <ul style="list-style-type: none"> Give their role | Should know | B | C1 | | |
| <ul style="list-style-type: none"> Explain De-generation and Re-Generation of nerve fibers | Should know | B | C2 | | | | | |
| Physiology (SDL) | M2-MSK-I-P-0024 | Structure of neurons Classification of neurons & nerve fibers | <ul style="list-style-type: none"> Structure of neurons Myelinate Dand unmyelinated nerve fibers. Neuroglia Difference between neurons and glial cells | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition physiology Excitable Tissue; Nerve (Chapter 04, Page 85-90) Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Introduction to Physiology. (Unit2, Chapter 05 Membrane Physiology Page74) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. Section 01. Physiology of Body Fluids. (Chapter 03, Page 37) | | | | |
| Physiology (SKL) | M2-MSK-I-P-0034 | Preparation of DLC | <ul style="list-style-type: none"> Preparation of slide – practice How to make blood film How to stain it after preparation Help of teaching aid identification of cells | P, A | Skill lab | | OSPE | |
| Biochemistry (LGIS) | M2-MSK-I-B-005 | Niacin & Thiamine | <ul style="list-style-type: none"> Enlist dietary sources of Niacin & Thiamine | Should Know | C1 | LGIS | MCQ SAQ SEQ VIVA | |
| | | | <ul style="list-style-type: none"> Explain the biochemical functions of niacin and thiamine in energy metabolism | Must know | C2 | | | |
| | | | <ul style="list-style-type: none"> Apply knowledge of niacin and thiamine metabolism to explain clinical features of pellagra and beriberi. | Should Know | C3 | | | |

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| | | | <ul style="list-style-type: none"> Analyze the impact of chronic alcoholism on thiamine deficiency and related neurological complications. | Nice to Know | C4 | | |
| | | | <ul style="list-style-type: none"> Assess the biochemical and clinical rationale for thiamine administration before glucose infusion in malnourished patients. | Nice to Know | C5 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Use HEC digital library Practice principles of bioethics Understand the curative and preventive health care measures | Nice to know | C3 | | |
| | M2-MSK-I-B-006 | Vitamin C | <ul style="list-style-type: none"> Enlist dietary sources of Vitamin C | Should Know | C1 | LGIS | MCQ SAQ SEQ VIVA |
| | | | <ul style="list-style-type: none"> Explain the biochemical functions of vitamin C | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Apply knowledge of vitamin C functions to explain clinical features of scurvy. | Should Know | C3 | | |
| | | | <ul style="list-style-type: none"> Analyze the relationship between vitamin C deficiency and connective tissue abnormalities. | Nice to Know | C4 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Use HEC digital library Practice principles of bioethics Understand the curative and preventive health care measures | Nice to know | C3 | | |
| | M2-MSK-I-B-007 | Classification & Structure of Amino Acids | <ul style="list-style-type: none"> Describe the general structure of amino acids | Must Know | C2 | LGIS | MCQ SAQ SEQ VIVA |
| | | | <ul style="list-style-type: none"> Classify amino acids based on polarity, nutritional importance and glucogenic/ketogenic properties. | Must Know | C2 | | |
| | | | <ul style="list-style-type: none"> Explain isomerism of amino acids with examples (D- and L-forms). | Must know | C2 | | |
| | | | <ul style="list-style-type: none"> Differentiate amino acids based on side-chain properties and their impact on protein structure and behavior. | Nice to Know | C4 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in | Nice to know | C3 | | |

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| | | | <ul style="list-style-type: none"> healthcare Use HEC digital library Practice principles of bioethics Understand the curative and preventive health care measures | | | | |
| | M2-MSK-I-B-009 | Minerals | <ul style="list-style-type: none"> Discuss Sources, Functions of Phosphate, Iodine, Fluoride, Copper, Zinc, Selenium, Magnesium, Sulphur and Cobalt. | Should Know | C2 | SGD | MCQ SAQ SEQ VIVA |
| | | | <ul style="list-style-type: none"> Apply knowledge of mineral functions to explain clinical features arising from their deficiency or excess | Nice to know | C3 | | |
| | | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Use HEC digital library Practice principles of bioethics Understand the curative and preventive health care measures | Nice to know | C3 | | |
| Biochemistry (SDL) | M2-MSK-I-B-016 | Deficiency manifestation of Thiamine | <ul style="list-style-type: none"> Describe Biochemical functions of Thiamine Explain deficiency effects of Thiamine | Must Know Must Know | <ul style="list-style-type: none"> Textbook of Lippincott 8th Edition Chapter # 28 Page #429,430 Textbook of Harper 32nd Edition Chapter # 44 page# 541-542 https://www.ncbi.nlm.nih.gov/ https://youtu.be/WAkXS8lgoA0 | | |
| | M2-MSK-I-B-017 | Deficiency manifestation of Niacin | <ul style="list-style-type: none"> Describe Biochemical functions Niacin Explain deficiency effects of Niacin | Must Know Must Know | <ul style="list-style-type: none"> Textbook of Lippincott 8th Edition Chapter # 28and 1 Page #1-5 &429-431 Textbook of Harper 32nd Edition Chapter # 44 page# 542-543 https://microbenotes.com/ https://youtu.be/JICqOf30Fqg?si=zqDOyYsIA28RUI4N | | |
| Biochemistry (SKL) | M2-MSK-I-B-021 | Color test for detection of amino acids Arginine by Sakaguchi's Test | <ul style="list-style-type: none"> Perform Sakaguchi's test and the Aldehyde test on given samples to detect the presence of arginine and tryptophan, respectively. | Should Know | P | Skill | OSPE |

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| | | Tryptophan by Aldehyde Test | | | | | |
| Medicine | M2-MSK-I-VI(M)-001 | Osteoporosis | • Enlist causes Osteoporosis | C2 | LGIS | MCQs | |
| | | | • Discuss changes in bones in Osteoporosis | C2 | | | |
| | | | • Describe clinical features | C2 | | | |
| | | | • Enlist investigation | C3 | | | |
| | | | • Discuss management | C2 | | | |
| Pediatrics | M2-MSK-I-VI(Peads)-001 | Poliomyelitis | • Define poliomyelitis and describe the morphology, classification, and types of Poliovirus. | C1 | LGIS | MCQs | |
| | | | • Explain the pathogenesis and transmission of poliomyelitis, including the mechanism of viral spread to the central nervous system and development of paralysis. | C2 | | | |
| | | | • Describe the laboratory diagnosis, prevention, and vaccines used for poliomyelitis, including differences between Oral Polio Vaccine and Inactivated Polio Vaccine | C2 | | | |

Spiral Courses (4th Week)

Integrated Undergraduate Research Curriculum (IUGRC)

| Theory | | | | | |
|------------------------|--|--|----------------------------------|--|--------------------------------|
| Code | Topic | Learning Objectives | Cognitive Domain | Teaching Strategy | Mode of Assessment |
| M2-MSK-I-SI(IUGRC)-004 | Research Club Activity 3 Manuscript Writing Workshop | At the end of session students will be able to: <ul style="list-style-type: none"> • Interpret & apply basic principles of manuscript writing of research report • Perceive authorships requirements or rules of drafting manuscript of a research report for publication in indexed journal • Write discussion section of draft • Explain conclusion, recommendation and acknowledge part of research report • clarify types of citations included in discussion section | C3 C2 C2 C2 | Research Club Activity Teaching strategy (LGIS on campus) (SDL/PAL off campus) | Manuscript submission at SJRMC |

Behavioral Sciences

| Theory | | | | | |
|----------------------|---|---|------------------------|------------------------------|------------------------------|
| Code | Topic | Learning Objectives <i>At the end of the lecture the student should be able to</i> | Learning Domain | Teaching Strategy | Assessment Tool |
| M2-MSK-I -SI(BS)-002 | Relevance of ethics in life of a doctor | <ul style="list-style-type: none"> • Relevance of ethics in life of a doctor • Guiding principles of medical ethics • To address the common ethical issues • To address the common ethical dilemmas in health professional life | C3 C3 C3 | LGIS LGIS LGIS | MCQs MCQs MCQs |

Multidisciplinary (Hardens Level 9) **Clinico-Concept Connect (C³6) Sessions for 4th Week**

| Session | Topic | Department | Educational Relevance | At the End of The Demonstration Student Should Be Able To | Learning Domain | Assessment Tool |
|---|--|-----------------|--|--|-----------------|-----------------|
| \Clinico-Concept Connect (C ³ 6) Sessions – IV | Hand Numbness/Tingling with Grip Dysfunction | Anatomy | Carpal tunnel syndrome results from compression of the median nerve within the anatomical boundaries of the wrist. | <ul style="list-style-type: none"> Describe the anatomical boundaries of the carpal tunnel: <ul style="list-style-type: none"> Carpal bones Flexor retinaculum | C2 | MCQs |
| | | | | <ul style="list-style-type: none"> Identify the structures passing through the carpal tunnel, especially the median nerve. | C2 | MCQs |
| | | | | <ul style="list-style-type: none"> Explain the anatomical basis of sensory loss in: <ul style="list-style-type: none"> Thumb Index finger Middle finger | C3 | MCQs |
| | | | | <ul style="list-style-type: none"> Correlate thenar muscle wasting with median nerve motor involvement. | C4 | MCQs |
| | | Physiology | Tingling and numbness reflect disruption of normal sensory impulse transmission due to nerve compression. | <ul style="list-style-type: none"> Explain the physiology of sensory nerve conduction and impulse propagation. | C2 | MCQs |
| | | | | <ul style="list-style-type: none"> Differentiate between sensory and motor nerve dysfunction. | C3 | MCQs |
| | | | | <ul style="list-style-type: none"> Correlate chronic nerve compression with weakness and loss of fine movements. | C4 | MCQs |
| | | | | <ul style="list-style-type: none"> Describe the mechanism of nocturnal worsening of symptoms. | C2 | MCQs |
| | | Biochemistry | Nutritional deficiencies, particularly vitamin B complex deficiency, can worsen neuropathic symptoms. | <ul style="list-style-type: none"> Discuss the biochemical role of vitamin B12 and other B vitamins in nerve health. | C4 | MCQs |
| | | | | <ul style="list-style-type: none"> Explain metabolic causes of peripheral neuropathy. | C2 | MCQs |
| | | | | <ul style="list-style-type: none"> Relate nutritional imbalance to impaired nerve regeneration. | C3 | MCQs |
| | | Family Medicine | Family Medicine objectives emphasize early recognition of occupational disorders, preventive counseling, and comprehensive primary care management to reduce disability and improve quality of life. | <ul style="list-style-type: none"> Analyze occupational risks, symptoms, and signs to diagnose carpal tunnel syndrome and distinguish it from other neuropathies. | C5 | MCQs |
| | | | | <ul style="list-style-type: none"> Develop a primary care management plan including ergonomics, splinting, medications, patient education, and referral criteria. | C5 | MCQs |
| | | Surgery | Carpal tunnel syndrome | <ul style="list-style-type: none"> Recognize classic clinical features of carpal tunnel syndrome. | C4 | MCQs |

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| | | | is a common outpatient condition requiring early diagnosis, ergonomic counseling, and referral when severe. | <ul style="list-style-type: none"> • Outline stepwise management: <ul style="list-style-type: none"> • Wrist splinting • Ergonomic modification • Surgical decompression in advanced case | C4 | MCQs |
| | | | | <ul style="list-style-type: none"> • Identify red flag signs such as progressive weakness and muscle wasting. | C4 | MCQs |

Anatomy Syllabus of Learning Management System (LMS)

| Code | Topic | Learning Objectives At the end of session students should be able to | Learning Domain | Learning Resources |
|------------------------------------|---|--|-----------------|---|
| M2-MSK-I-A-0054 | Formation of Bilaminar Embryonic Disc (2 nd week of Human Development) | • Describe formation of Amniotic Cavity, embryonic disc and Umbilical vesicle | C2 | <ul style="list-style-type: none"> • Embryology:- KLM Embryology Developing Human 11th Edition • USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| | | • Discuss development of chorionic sac | C2 | |
| | | • Outline the process of implantation | C1 | |
| | | • Describe changes in Gravid Endometrium | C2 | |
| | | • Understand the Bio-physiological aspects of gravid endometrium | C2 | |
| | | • Corelate with the clinical conditions | C3 | |
| | | • focus on provision of curative and preventive health care measures | C3 | |
| | | • Practice principles of bioethics | C3 | |
| | | • Apply strategic use of AI in health care | C3 | |
| | | • read relevant research article | C3 | |
| M2-MSK-I-A-0055 | Gastrulation Establishment of Body Axis and Fate Map (3 rd week) | • Discuss process of gastrulation with special reference to primitive streak | C2 | <ul style="list-style-type: none"> • Embryology :- KLM Embryology Developing Human 11th Edition • USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| | | • Describe the fate of primitive streak | C2 | |
| | | • Discuss establishment of body axis | C2 | |
| | | • Draw fate map and discuss its importance in future development | C2 | |
| | | • Understand the Biophysiological aspects of gastrulation | C2 | |
| | | • Describe congenital abnormalities associated with gastrulation | C3 | |
| | | • Corelate with the clinical conditions | C3 | |
| | | • focus on provision of curative and preventive health care measures | C3 | |
| | | • Practice principles of bioethics | C3 | |
| | | • Apply strategic use of AI in health care | C3 | |
| • Read a relevant Research article | C3 | | | |
| M2-MSK-I-A-0056 | Notochord Formation (3 rd week) | • Define notochord | C1 | <ul style="list-style-type: none"> • Embryology :- KLM Embryology Developing Human 11th Edition • USMLE Q Bank Step 1 |
| | | • Delineate different stages of notochord formation | C1 | |
| | | • Discuss the importance of notochord in development of central nervous system | C2 | |
| | | • Describe role of notochord in development of axial Skeleton | C1 | |
| | | • Describe the fate of notochord | C2 | |
| | | • Correlate with clinical conditions of notochord formation | C3 | |

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| | | <ul style="list-style-type: none"> • focus on provision of curative and preventive health care measures | C3 | (Volume 1) 2023-2034 |
| | | <ul style="list-style-type: none"> • Practice principles of bioethics | C3 | |
| | | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | |
| | | <ul style="list-style-type: none"> • read relevant research article | C3 | |
| M2-MSK-I-A-0057 | Neurulation (3 rd week) | <ul style="list-style-type: none"> • Define neurulation | C1 | <ul style="list-style-type: none"> • Embryology :- KLM Embryology Developing Human 11th Edition • USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| | | <ul style="list-style-type: none"> • Describe formation of neural plate and neural tube | C2 | |
| | | <ul style="list-style-type: none"> • Discuss neural crest formation | C2 | |
| | | <ul style="list-style-type: none"> • Enlist derivatives of neural crest cells | C1 | |
| | | <ul style="list-style-type: none"> • Understand the bio-physiological aspects of Neurulation | C2 | |
| | | <ul style="list-style-type: none"> • Discuss neural tube defects | C3 | |
| | | <ul style="list-style-type: none"> • Discuss different types of spina bifida | C3 | |
| | | <ul style="list-style-type: none"> • Discuss the importance of folic acid in the prevention of spina bifida | C2 | |
| | | <ul style="list-style-type: none"> • Corelate with the clinical conditions | C3 | |
| | | <ul style="list-style-type: none"> • focus on provision of curative and preventive health care measures | C3 | |
| | | <ul style="list-style-type: none"> • Practice principles of bioethics | C3 | |
| | | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | |
| | | <ul style="list-style-type: none"> • read relevant research article | C3 | |
| M2-MSK-I-A-0058 | Development and Differentiation of Somites | <ul style="list-style-type: none"> • Enumerate three germ layers and their derivatives | C1 | <ul style="list-style-type: none"> • Embryology :- KLM Embryology Developing Human 11th Edition • USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| | | <ul style="list-style-type: none"> • Describe different divisions of mesoderm | C2 | |
| | | <ul style="list-style-type: none"> • Describe development of somites and their differentiation | C2 | |
| | | <ul style="list-style-type: none"> • Explain different stages of somite development | C2 | |
| | | <ul style="list-style-type: none"> • Understand the Biophysiological aspects of Somite differentiation | C2 | |
| | | <ul style="list-style-type: none"> • Correlate clinical aspects of somite differentiation | C3 | |
| | | <ul style="list-style-type: none"> • Focus on provision of curative and preventive health care measures | C3 | |
| | | <ul style="list-style-type: none"> • Practice principles of bioethics | C3 | |
| | | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | |
| | | <ul style="list-style-type: none"> • Read relevant research article | C3 | |
| M2-MSK-I-A-0059 | Development and Differentiation of Somites | <ul style="list-style-type: none"> • Enumerate three germ layers and their derivatives | C1 | <ul style="list-style-type: none"> • Embryology :- KLM Embryology Developing Human 11th Edition • USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| | | <ul style="list-style-type: none"> • Describe different divisions of mesoderm | C2 | |
| | | <ul style="list-style-type: none"> • Describe development of somites and their differentiation | C2 | |
| | | <ul style="list-style-type: none"> • Explain different stages of somite development | C2 | |
| | | <ul style="list-style-type: none"> • Understand the Biophysiological aspects of Somite differentiation | C2 | |
| | | <ul style="list-style-type: none"> • Correlate clinical aspects of somite differentiation | C3 | |
| | | <ul style="list-style-type: none"> • Focus on provision of curative and preventive health care measures | C3 | |
| | | <ul style="list-style-type: none"> • Practice principles of bioethics | C3 | |

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| | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | C3 | |
| | | <ul style="list-style-type: none"> Read relevant research article | C3 | |
| M2-MSK-I-A-0060 | Early Development of Cardiovascular System & highlights of 4th-8th week | <ul style="list-style-type: none"> Describe early development of cardiovascular system and chorionic villi | C2 | <ul style="list-style-type: none"> Embryology :- KLM Embryology Developing Human 11th Edition USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| | | <ul style="list-style-type: none"> Discuss development of intraembryonic coelom | C2 | |
| | | <ul style="list-style-type: none"> Define angiogenesis and vasculogenesis. | C1 | |
| | | <ul style="list-style-type: none"> Correlate clinical aspects of angiogenesis | C3 | |
| | | <ul style="list-style-type: none"> Summarize the main developmental events and changes in external form of the embryo during the 4th to 8th weeks | C2 | |
| | | <ul style="list-style-type: none"> Corelate with the clinical conditions | C3 | |
| | | <ul style="list-style-type: none"> focus on provision of curative and preventive health care measures | C3 | |
| | | <ul style="list-style-type: none"> Practice principles of bioethics | C3 | |
| | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | C3 | |
| | | <ul style="list-style-type: none"> read relevant research article | C3 | |
| M2-MSK-I-A-0061 | Folding of Embryo | <ul style="list-style-type: none"> Enlist different phases of embryonic development | C1 | <ul style="list-style-type: none"> Embryology :- KLM Embryology Developing Human 11th Edition USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| | | <ul style="list-style-type: none"> Describe folding of the embryo in median plane | C2 | |
| | | <ul style="list-style-type: none"> Describe folding of the embryo in horizontal plane | C2 | |
| | | <ul style="list-style-type: none"> Discuss results of folding | C2 | |
| | | <ul style="list-style-type: none"> Discuss Omphalocele and Gastroschisis | C3 | |
| | | <ul style="list-style-type: none"> Corelate with the clinical conditions | C3 | |
| | | <ul style="list-style-type: none"> focus on provision of curative and preventive health care measures | C3 | |
| | | <ul style="list-style-type: none"> Practice principles of bioethics | C3 | |
| | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | C3 | |
| | | <ul style="list-style-type: none"> read relevant research article | C3 | |
| M2-MSK-I-A-0062 | Fetal period | <ul style="list-style-type: none"> Describe different criteria for fetal age estimation | C2 | <ul style="list-style-type: none"> Embryology :- KLM Embryology Developing Human 11th Edition USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| | | <ul style="list-style-type: none"> Discuss the trimesters of pregnancy with their importance | C2 | |
| | | <ul style="list-style-type: none"> Describe highlights of fetal period | C2 | |
| | | <ul style="list-style-type: none"> Differentiate between embryonic and fetal period | C2 | |
| | | <ul style="list-style-type: none"> Tabulate growth in length and weight during fetal period | C2 | |
| | | <ul style="list-style-type: none"> Enumerate and discuss factors influencing fetal growth | C2 | |
| | | <ul style="list-style-type: none"> Define the term perinatology | C1 | |
| | | <ul style="list-style-type: none"> Enlist and briefly describe procedures for assessing fetal well-being | C3 | |
| | | <ul style="list-style-type: none"> Correlate clinical aspects of fetal period | C3 | |
| | | <ul style="list-style-type: none"> focus on provision of curative and preventive health care measures | C3 | |
| | | <ul style="list-style-type: none"> Practice principles of bioethics | C3 | |
| | | <ul style="list-style-type: none"> Apply strategic use of AI in health care | C3 | |
| | | <ul style="list-style-type: none"> read relevant research article | C3 | |
| | | <ul style="list-style-type: none"> Discuss Implantation and establishment of the embryo within the | C2 | |

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| M2-MSK-I-A-0063 | Placenta | uterus | | <ul style="list-style-type: none"> • Embryology :- KLM Embryology Developing Human 11th Edition • USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| | | • Describe the differentiation of the uterine lining into decidua | C2 | |
| | | • Describe the development of a placenta | C2 | |
| | | • Describe fetal – maternal circulation | C2 | |
| | | • Discuss the bio-physiological aspects of placenta | C2 | |
| | | • Correlate the clinical conditions associated with placenta | C3 | |
| | | • focus on provision of curative and preventive health care measures | C3 | |
| | | • Practice principles of bioethics | C3 | |
| | | • Apply strategic use of AI in health care | C3 | |
| M2-MSK-I-A-0064 | Fetal Membranes and Multiple Pregnancies | • read relevant research article | C3 | <ul style="list-style-type: none"> • Embryology :- KLM Embryology Developing Human 11th Edition • USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| | | • Enlist membranes developing during pregnancy | C1 | |
| | | • Discuss origin, composition, location, function and fate of yolk sac | C2 | |
| | | • Explain origin, composition, location, function and fate of Amnion | C2 | |
| | | • Describe formation of umbilical cord and its structure | C2 | |
| | | • Define Allantois along with its importance and function | C1 | |
| | | • Discuss different types of twins | C2 | |
| | | • Correlate clinical aspects of fetal membranes | C3 | |
| | | • Correlate with the clinical conditions of twin pregnancy | C3 | |
| | | • focus on provision of curative and preventive health care measures | C3 | |
| | | • Practice principles of bioethics | C3 | |
| | | • Apply strategic use of AI in health care | C3 | |
| Histology LGIS | | | | |
| M2-MSK-I-A-0065 | Connective tissue I Cells of connective tissue Embryonic connective tissue / mucoid Connective Tissue | • Define connective tissue | C1 | <ul style="list-style-type: none"> • Histology :-Junqueira's Basic Histology 18th Edition • USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| | | • Classify connective tissue | C2 | |
| | | • Enlist and explain types of cells in CT | C2 | |
| | | • Enumerate sites and describe the function of each type of cell of connective tissue | C2 | |
| | | • Understand the Biophysiological aspects of connective tissue | C2 | |
| | | • Draw and label histological structure of mucoid CT. | C2 | |
| | | • Describe fibers in mucoid CT | C2 | |
| | | • Correlate clinical conditions of CT | C3 | |
| | | • focus on provision of curative and preventive health care measures | C3 | |
| | | • Practice principles of bioethics | C3 | |
| | | • Apply strategic use of AI in health care | C3 | |
| M2-MSK-I-A-0066 | Connective tissue II | • read relevant research articles | C3 | |
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| | Loose aerolar connective tissue & its types Reticular CT | <ul style="list-style-type: none"> Enumerate examples and location of reticular, connective tissue Illustrate histological structure of loose and reticular connective tissue Correlate clinical aspects of loose and reticular CT focus on provision of curative and preventive health care measures Practice principles of bioethics Apply strategic use of AI in health care read relevant research article | C1 C2 C3 C3 C3 C3 C3 | <ul style="list-style-type: none"> Histology :-Junqueira's Basic Histology 18th Edition USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| M2-MSK-I-A-0067 | Connective tissue III Adipose CT Dense regular and irregular connective | <ul style="list-style-type: none"> Enumerate examples and location of adipose and dense CT. Draw, describe and label histological structure of all types of connective tissue. Differentiate between dense regular and irregular connective tissue microscopically Correlate clinical aspects of loose and reticular CT focus on provision of curative and preventive health care measures Practice principles of bioethics Apply strategic use of AI in health care read relevant research article | C1 C2 C2 C3 C3 C3 C3 C3 | <ul style="list-style-type: none"> Histology :-Junqueira's Basic Histology 18th Edition USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| M2-MSK-I-A-0068 | Cartilage | <ul style="list-style-type: none"> Classify cartilage Enlist sites of hyaline, fibro and elastic cartilage Appreciate microscopic structure of Hyaline, Elastic and Fibrocartilage Differentiate between three cartilages Describe the structure of perichondrium Describe the arrangement of layers in articular cartilage Understand the Biophysiological aspects of cartilage Correlate with clinical conditions focus on provision of curative and preventive health care measures Practice principles of bioethics Apply strategic use of AI in health care read relevant research article | C2 C1 C2 C2 C2 C2 C2 C3 C3 C3 C3 | <ul style="list-style-type: none"> Histology :-Junqueira's Basic Histology 18th Edition USMLE Q Bank Step 1 (Volume 1) 2023-2034 Histology :-Junqueira's Basic Histology 18th Edition USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| M2-MSK-I-A-0069 | Bone-I (Cells & Types) | <ul style="list-style-type: none"> Describe structure and functions of bone cells Discuss periosteum and endosteum Discuss types of bones Describe the histological features of spongy and compact bone Describe structure of osteon. Understand the Biophysiological aspects of bone Correlate clinical aspects of bone focus on provision of curative and preventive health care | C2 C2 C2 C2 C2 C2 C3 C3 | <ul style="list-style-type: none"> Histology :-Junqueira's Basic Histology 18th Edition USMLE Q Bank Step 1 (Volume 1) 2023-2034 |

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| | | measures | | |
| | | • Practice principles of bioethics | C3 | |
| | | • Apply strategic use of AI in health care | C3 | |
| | | • read relevant research article | C3 | |
| M2-MSK-I-A-0070 | Bone-II (Ossification) | • Describe osteogenesis | C2 | <ul style="list-style-type: none"> • Histology :-Junqueira's Basic Histology 18th Edition • USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| | | • Discuss bone growth, remodeling and repair | C2 | |
| | | • Describe histological changes in bones in osteoporosis, rickets, osteomalacia, osteopetrosis and bone tumors | C3 | |
| | | • Correlate with the clinical conditions. | C3 | |
| | | • focus on provision of curative and preventive health care measures | C3 | |
| | | • Practice principles of bioethics | C3 | |
| | | • Apply strategic use of AI in health care | C3 | |
| | | • read relevant research article | C3 | |
| General Anatomy LGIS | | | | |
| M2-MSK-I-A-0071 | Bone-I (General Features) | • Describe the functions of bone and skeleton | C2 | <ul style="list-style-type: none"> • Gross Anatomy :- KLM clinically oriented anatomy edition 10 • USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| | | • Identify general features of bone | C2 | |
| | | • Differentiate between maceration and decalcification of bones | C2 | |
| | | • Correlate with clinical conditions of bone | C3 | |
| | | • focus on provision of curative and preventive health care measures | C3 | |
| | | • Practice principles of bioethics | C3 | |
| | | • Apply strategic use of AI in health care | C3 | |
| | | • read relevant research article | C3 | |
| M2-MSK-I-A-0072 | Bone-II Classification & Blood supply) | • Classify bones based on different criteria | C2 | <ul style="list-style-type: none"> • Gross Anatomy:- KLM clinically oriented anatomy edition 10 • USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
| | | • Describe the growing end hypothesis | C2 | |
| | | • Describe blood supply of bones | C2 | |
| | | • Appreciate role of bones in estimation of sex, age and stature. | C2 | |
| | | • Correlate with the clinical conditions. | C3 | |
| | | • focus on provision of curative and preventive health care measures | C3 | |
| | | • Practice principles of bioethics | C3 | |
| | | • Apply strategic use of AI in health care | C3 | |
| | | • read relevant research article | C3 | |
| M2-MSK-I-A-0073 | Joints-I (Types) | • Define joints | C1 | <ul style="list-style-type: none"> • Gross Anatomy:- KLM clinically oriented anatomy edition 10 |
| | | • Classify fibrous joints with examples | C2 | |
| | | • Classify cartilaginous joints with examples | C2 | |
| | | • Classify synovial joints with examples | C2 | |
| | | • Understand the Bio-physiological aspects of joints | C2 | |

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| | | <ul style="list-style-type: none"> Correlate with the clinical conditions focus on provision of curative and preventive health care measures Practice principles of bioethics Apply strategic use of AI in health care read relevant research article | C3 | <ul style="list-style-type: none"> USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
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| | | | C3 | |
| | | | C3 | |
| M2-MSK-I-A-0074 | Joints-II (Movements) | <ul style="list-style-type: none"> Describe structure of synovial joint Classify synovial joints Explain movements around synovial joints Enlist Degenerative joint diseases Describe the involvement of anatomical structure of the articular cartilage in Degenerative joint disease Correlate with the clinical conditions. focus on provision of curative and preventive health care measures Practice principles of bioethics Apply strategic use of AI in health care read relevant research article | C2 | <ul style="list-style-type: none"> Gross Anatomy: - KLM clinically oriented anatomy edition 10 USMLE Q Bank Step 1 (Volume 1) 2023-2034 |
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Physiology Syllabus of Learning Management System (LMS)

| Code | Topics | Learning Objectives | Calgary Model | Mode of Assessment | Tool of Assessment |
|-----------------|--|---|------------------|--------------------|--------------------|
| M2-MSK-I-P-0035 | Structure of neurons Classification of neurons & nerve fibers | <ul style="list-style-type: none"> Structure of neurons Myelinated and unmyelinated nerve fibers. Neuroglia Difference between neurons and glial cells | Nice to know (C) | SDL | MCQs |
| M2-MSK-I-P-0036 | Nernst potential, RMP | <ul style="list-style-type: none"> Basic physics of membrane potential, Nernst equation, Goldman Equation Origin of RMP in different cell types. | Must Know (A) | LGIS&SDL | MCQs |
| M2-MSK-I-P-0037 | Properties of nerve fibers | <ul style="list-style-type: none"> Rhythmicity of Excitable tissues, Characteristics of signal transmission, Types of refractory period Concept of excitation | Nice to know (C) | SDL | MCQs |

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| M2-MSK-I-P-0038 | Measurement of RMP & effect of electrolytes on RMP | <ul style="list-style-type: none"> • Measurement of RMP • Effect of electrolytes on RMP • Role of Na/K pump | Must Know (A) | LGIS&SDL | MCQs |
| M2-MSK-I-P-0039 | Concept of degeneration & regeneration | <ul style="list-style-type: none"> • Introduction • Axonal Degeneration • Wallerian Degeneration | Nice to know (C) | SDL | MCQs |
| M2-MSK-I-P-0040 | Stimulus & response & types of stimuli, Stages of action potential | <ul style="list-style-type: none"> • Neuron action potential, • Stages of Propagation of AP • Conduction Rates • ALL-OR-NONE Principle | Nice to know (C) | SDL | MCQs |
| M2-MSK-I-P-0041 | A, Refractory period, types of action potential. Graded potential comparison with action potential B. Recording & propagation of action potential & factors effecting nerve conduction & hyperpolarized state | <ul style="list-style-type: none"> • Threshold Potential • Action potential • Types of Action Potential • Propagation of Action Potential • Hyperpolarization • Factors effecting Action potential | Must Know (A) | LGIS&SDL | MCQs |

Biochemistry Syllabus of Learning Management System (LMS)

| Code | Topic | Learning Objectives At the End of Lecture Students Should Be Able To | Learning Domain | Calgary Gauge | Learning Resources |
|--------------------------------|---|---|-----------------|--------------------------|--|
| Minerals & Vitamins | | | | | |
| M2-MSK-I-B-0025 | Minerals classification and Introduction. Calcium Phosphate | <ul style="list-style-type: none"> • Classify Minerals • State Daily Requirements of Calcium in different conditions | C1 C2 | Should Know | • Textbook of Lippincott 8 th Edition |
| | | <ul style="list-style-type: none"> • Discuss Types & Sources of Calcium phosphate | C2 | Should Know | |
| | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Use HEC digital library • Practice principles of bioethics • Understand the curative and preventive health care measures | C3 | Nice to know | |
| M2-MSK-I-B-0026 | Biochemical Role of Calcium & Phosphate | <ul style="list-style-type: none"> • Discuss causes of Hypercalcemia & Hypocalcemia • Describe effects of Hypercalcemia & Hypocalcemia • State Daily Requirements of Phosphate • Discuss Biochemical functions of Phosphate | C2 C2 | Must Know Should Know | • Textbook of Lippincott 8 th Edition |
| | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Use HEC digital library • Practice principles of bioethics • Understand the curative and preventive health care measures | C3 | Nice to know | |
| | | | | | |
| M2-MSK-I-B-0027 | Fluoride, Magnesium, Sulphur | <ul style="list-style-type: none"> • Elaborate Biochemical functions of Fluoride, Sulphur & Magnesium • Describe Deficiency Effects | C2 C1 | Should Know Must Know | • Textbook of Lippincott 8 th Edition |
| | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Use HEC digital library • Practice principles of bioethics • Understand the curative and preventive health care measures | C3 | Nice to know | |
| | | | | | |
| M2-MSK-I-B-0028 | Iodine, Copper, Zinc, Selenium, Manganese | <ul style="list-style-type: none"> • Recall sources & daily requirements • Discuss their biochemical functions | C1 | Should Know | • Textbook of Lippincott 8 th Edition |
| | | <ul style="list-style-type: none"> • Describe Deficiency Effects | C2 | Must know | |

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|-----------------|--|--|--------------|---|---|
| | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Use HEC digital library • Practice principles of bioethics • Understand the curative and preventive health care measures | C3 | Nice to know | |
| M2-MSK-I-B-0029 | Vitamins & Their Classification Vitamin A and E | <ul style="list-style-type: none"> • Classify Vitamins & Water-Soluble Vitamins • Enlist Sources of Vitamin A & E • Describe Biochemical functions of Vitamin A & E • Describe Deficiency Effects of Vitamin A & E • Explain Toxic Effects of Vitamin A | C2 C1 | Should Know Should Know Must Know | <ul style="list-style-type: none"> • Textbook of Lippincott 8th Edition • Textbook of Harper 32nd Edition |
| | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Use HEC digital library • Practice principles of bioethics • Understand the curative and preventive health care measures | C3 | Nice to know | |
| M2-MSK-I-B-0030 | Vitamin D | <ul style="list-style-type: none"> • Enlist Sources of Vit.D • Explain Steps of activation of Vit.D in the body • Describe Biochemical functions of Vit.D • • Explain Deficiency effects of Vit.D • Explain Toxic effects of Vit.D | C1 C2 | Should Know Must Know | <ul style="list-style-type: none"> • Textbook of Harper 32nd Edition |
| | | <ul style="list-style-type: none"> • Apply the strategic use of artificial intelligence in healthcare • Use HEC digital library • Practice principles of bioethics • Understand the curative and preventive health care measures | C3 | Nice to know | |
| | | | | | |
| M2-MSK-I-B-0031 | Vitamin C | <ul style="list-style-type: none"> • Enlist Sources of Vit.C • Describe Biochemical functions of Vit.C | C1 | Should Know | <ul style="list-style-type: none"> • Textbook of Harper 32nd Edition |
| | | <ul style="list-style-type: none"> • Explain Deficiency effects of Vit.C | C2 | Must know | |
| | | <ul style="list-style-type: none"> • Explain Toxic effects of Vit.C | C2 | | |

| | | | | | |
|-----------------|---|--|----|--------------------------|--|
| | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Use HEC digital library Practice principles of bioethics Understand the curative and preventive health care measures | C3 | Nice to know | |
| M2-MSK-I-B-0032 | Niacin & Thiamine | <ul style="list-style-type: none"> Enlist Sources Describe Biochemical functions Explain Deficiency effects | C1 | Should Know Must Know | Textbook of Harper 32 nd Edition |
| | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Use HEC digital library Practice principles of bioethics Understand the curative and preventive health care measures | C2 | Nice to know | |
| M2-MSK-I-B-0033 | Classification & Structure of Amino Acids | <ul style="list-style-type: none"> Classification & Structure of Amino Acids & Isomerism of Amino Acids | C2 | Should Know | Textbook of Lippincott 8 th Edition |
| | | <ul style="list-style-type: none"> Apply the strategic use of artificial intelligence in healthcare Use HEC digital library Practice principles of bioethics Understand the curative and preventive health care measures | C3 | Nice to know | |
| M2-MSK-I-B-0034 | Hypercalcemia | <ul style="list-style-type: none"> Discuss causes of Hypercalcemia Explain Biochemical Basis Describe effects of Hypercalcemia | C3 | Must Know | <ul style="list-style-type: none"> Textbook of Lippincott 8th Edition Chapter # 29 page#466-467 Textbook of Harper 32nd Edition Chapter # 44 page# 540 https://www.ncbi.nlm.nih.gov/books/NBK218735 https://youtu.be/34FTvJZCrt4 |
| M2-MSK-I-B-0035 | Hypocalcemia | <ul style="list-style-type: none"> Discuss causes of Hypocalcemia Describe effects of Hypocalcemia State Daily Requirements of Phosphate Discuss Biochemical functions of Calcium | C3 | Must Know | <ul style="list-style-type: none"> Textbook of Lippincott 8th Edition Chapter # 29 page #466-467 https://www.ncbi.nlm.nih.gov/books/NBK279023/ https://youtu.be/qAeWKCXDniw |
| M2-MSK-I-B-0036 | Clinical Role of Fluoride, Magnesium, Sulphur | <ul style="list-style-type: none"> Elaborate Biochemical Basis Enlist Sources of Fluoride, Sulphur. Describe causes of deficiency | C2 | Must Know | <ul style="list-style-type: none"> Textbook of Lippincott 8th Edition Chapter # 29 page #468 https://www.ncbi.nlm.nih.gov/ https://youtu.be/PTOJNdtuXro |
| M2-MSK-I-B-0037 | Wilson's Disease | <ul style="list-style-type: none"> Recall sources & daily | C2 | Should Know | <ul style="list-style-type: none"> Textbook of Lippincott 8th Edition Chapter # 29 |

| | | | | | |
|-----------------|---|---|----|------------------------------|---|
| | | requirements of Copper • Discuss their biochemical functions of Copper • Describe Deficiency Effects | | Must Know | page #449-454 • https://youtu.be/1i9fSQSvYI0 • https://pubmed.ncbi.nlm.nih.gov/ |
| M2-MSK-I-B-0038 | Applied Biochemistry of Vitamin A and E | • Classify Fat- & Water-Soluble Vitamins • Enlist Sources of Vitamin A & E • Describe Deficiency Effects of Vitamin A & E • Explain Toxic Effects of Vitamin A | C3 | Should Know Must Know | • Textbook of Lippincott 8 th Edition Chapter # 28 page #423,432-436,441,444 • Textbook of Harper 32 nd Edition Chapter # 44 page# 528-529 • https://byjus.com/chemistry • https://youtu.be/7ZFr9xiAt94 |
| M2-MSK-I-B-0039 | Rickets | • Enlist Sources of Vit.D • Describe Biochemical functions of Vit.D • Explain Deficiency effects of Vit.D • Explain Toxic effects of Vit.D | C3 | Should Know Must Know | • Textbook of Lippincott 8 th Edition Chapter # 28 page # 437-440 • Textbook of Harper 32 nd Edition Chapter # 44 page# 530-532 • https://byjus.com/chemistry • https://youtu.be/6xhE5e16X0c |
| M2-MSK-I-B-0040 | Deficiency Manifestation of Vitamin A | • Explain Deficiency effects of vitamin A | C3 | Must Know | • Textbook of Lippincott 8 th Edition Chapter # 28 Page #435,439 • Textbook of Harper 32 nd Edition Chapter # 44 page# 530-532 • https://www.ncbi.nlm.nih.gov/ • https://youtu.be/ZCINiQX-mxU |
| M2-MSK-I-B-0041 | Deficiency manifestation of Thiamine | • Explain Deficiency effects | C3 | Must Know | • Textbook of Lippincott 8 th Edition Chapter # 28 Page #429,430 • Textbook of Harper 32 nd Edition Chapter # 44 page# 534 • https://www.ncbi.nlm.nih.gov/ • https://youtu.be/WAkXS8lgoA0 |
| M2-MSK-I-B-0042 | Deficiency manifestation of Niacin | • Describe Biochemical functions Niacin a • Explain deficiency effects of Niacin | C3 | Should Know Must Know | • Textbook of Lippincott 8 th Edition Chapter # 28 and 1 Page #1-5 & 429-431 • Textbook of Harper 32 nd Edition Chapter # 44 page# 534-535 • https://microbenotes.com/ • https://youtu.be/9pwBUTlcxHk |

Transdisciplinary, Interdisciplinary & Multidisciplinary Case Based Learning (CBL)

| Subject | Topic | Learning Objectives At the end of the lecture the student should be able to | Learning Domain |
|----------------|-------------------------|--|------------------------|
| Anatomy | • Shoulder Dislocation | Apply basic knowledge of subject to study clinical case. | C1 |
| | • Wrist Drop | Apply basic knowledge of subject to study clinical case. | C3 |
| Physiology | • Paresthesia | Apply basic knowledge of subject to study clinical case. | C3 |
| | • Insecticide poisoning | Apply basic knowledge of subject to study clinical case. | C3 |
| Biochemistry | • Night Blindness | Apply basic knowledge of subject to study clinical case. | C3 |
| | • Rickets | Apply basic knowledge of subject to study clinical case. | C3 |



➤ SECTION – VI

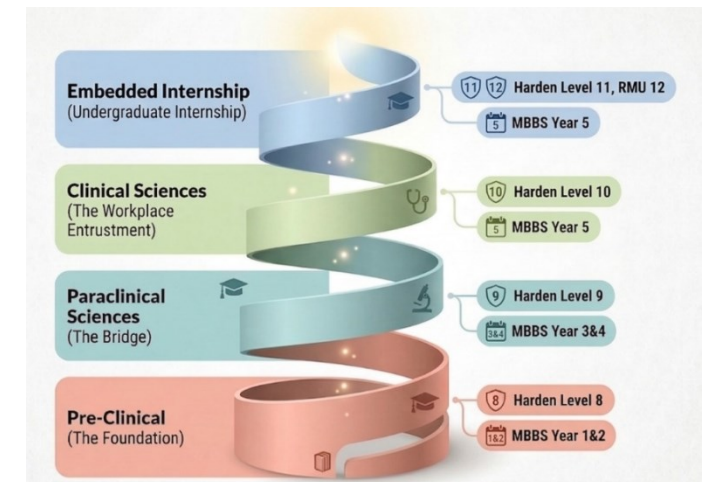
RMU 12

Integrated Modular Curriculum 2026

Isolation to **Beyond Boundaries**

➤ Block-II

- **Musculoskeletal Module-II**
- **Hematology & Immunology Module-I**





RMU 12

Integrated Modular Curriculum 2026

Isolation to **Beyond Boundaries**

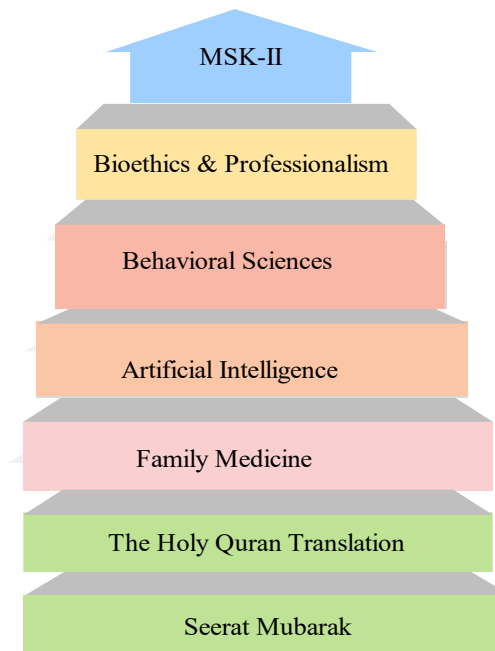
Musculoskeletal Module-II

***Uploading InProgress....**

Integration of Disciplines in Musculoskeletal-II Module



Spiral / General Education Cluster Courses



Discipline Wise Details of Modular Content

| Block | Module | General Anatomy | Embryology | Histology | Gross Anatomy | |
|---------------------------------------|-------------------------------|---|---|--|--|--|
| II | • Anatomy | <ul style="list-style-type: none"> • Muscles • Skin | <ul style="list-style-type: none"> • Development of Axial Skeleton • Development of limbs • Development of muscles | General Histology <ul style="list-style-type: none"> • Muscles • Skin • Skin appendages | Gluteal Region to Lateral compartment of leg | |
| | • Biochemistry | <ul style="list-style-type: none"> • Protein chemistry, Protein separation techniques, Collagen and Elastin | | | | |
| | • Physiology | <ul style="list-style-type: none"> • Sarcotubular system, excitation contraction coupling mechanism inskeletal 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 | | | | |
| | Spiral Courses | | | | | |
| | • Bioethics & Professionalism | <ul style="list-style-type: none"> • Introduction to Professional Ethics and PM&DC Code of Conduct • History of Medical Ethics | | | | |
| | • Behavioural Sciences | <ul style="list-style-type: none"> • Communication Skills • Rights and Responsibilities of patients and doctors | | | | |
| | • Artificial Intelligence | <ul style="list-style-type: none"> • Introduction to Atificial Intelligence | | | | |
| | • Family Medicine | <ul style="list-style-type: none"> • Communication and consultation skills in Family Medicine Practice | | | | |
| | • The Holy Quran Translation | <ul style="list-style-type: none"> • Imaniat-I • Ibadat-II • Ibadat-III • Immaniat-II • Immaniat-III • Ibadat-IV | | | | |
| | • Seerat Mubarak | <ul style="list-style-type: none"> • Importance of Hadees and Sunnah | | | | |
| Vertical Integration | | | | | | |
| Fractures of Lower Limb (Orthopedics) | | | | | | |

| | |
|--|--|
| x-rays of hipbone lower limb (Radiology) | |
| Early Clinical Exposure (ECE) | |
| <ul style="list-style-type: none"> • Clinical Rotations | <ul style="list-style-type: none"> • Cases of myopathies/ muscular dystrophy • Polymyositis/Muscle atrophy • Muscle enzyme interpretation <p style="text-align: right;">} Medicine</p> <ul style="list-style-type: none"> • Burns and Plastic Surgery • Management of superficial and deep burns <p style="text-align: right;">} Surgery</p> <ul style="list-style-type: none"> • X-Ray of Hip Bone and Hip Joint • X ray of pelvis • X ray of long Bones <p style="text-align: right;">} Radiology</p> |

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 | | | Module Task Force Team | | |
|-------------------------|---|--------------------------------|--------------------------------|---|--|
| 1. | Vice Chancellor RMU | Prof. Dr. Muhammad Umar | 1. | Coordinator | Dr. Fahd Anwar (Demonstrator of Physiology) |
| 2. | Chairperson Anatomy & Dean Basic Sciences | Prof. Dr. Ayesha Yousaf | 2. | DME Focal Person | Dr. Farzana Fatima |
| 3. | Director DME | Prof. Dr. Ifra Saeed | 3. | Co-coordinator | Dr. Sajjad Hussain (Senior Demonstrator of Anatomy) |
| 4. | Chairperson Physiology | Prof. Dr. Samia Sarwar | 4. | Co-Coordinator | Dr. Almas (Senior Demonstrator Biochemistry) |
| 5. | Chairperson Biochemistry | Dr. Aneela Jamil | 5. | Co-coordinator | Dr. Fared Ullah Khan (Senior Demonstrator Physiology) & Clinical Co- Coordinator |
| 6. | Focal Person Anatomy First Year MBBS | Asso. Prof. Dr. Mohtashim Hina | DME Implementation Team | | |
| 7. | Focal Person Physiology | Dr. Sidra Hamid | | | |
| 8. | Focal Person Biochemistry | Dr. Aneela Jamil | 1. | Director DME | Prof. Dr. Ifra Saeed |
| 9. | Focal Person Pharmacology | Dr. Zunera Hakim | 2. | Assistant Director DME | Dr. Farzana Fatima |
| 10. | Focal Person Pathology | Dr. Asiya Niazi | 3. | Implementation Incharge 1st & 2 nd Year MBBS | Prof. Dr. Ifra Saeed Dr. Farzana Fatima |
| 11. | Focal Person Behavioral Sciences | Dr. Saadia Yasir | 4. | Editor | Muhammad Arslan Aslam |
| 12. | Focal Person Community Medicine | Dr. Afifa Kulsoom | | | |
| 13. | Focal Person Quran Translation Lectures | Dr. Fahad Anwar | | | |
| 14. | Focal Person Family Medicine | Dr. Sadia Khan | | | |

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.
 - **Artificial 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

Learning Objectives, Teaching Strategies & Assessments

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



Syllabus of Musculoskeletal (MSK-II) Module

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) | <ul style="list-style-type: none"> • Classify muscles with examples according to <ol style="list-style-type: none"> 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 the clinical conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | C1 C3 C3 C3 C3 C3 C3 C3 | LGIS | MCQ SAQ VIVA |
| Histology (Skeletal Muscle) | <ul style="list-style-type: none"> • Classify muscle on histological basis. • Describe histological structure of skeletal muscles • Discuss ultrastructure of skeletal muscles • Understand the contraction mechanisim • Correlate the clinical conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | C1 C2 C2 C2 C3 C3 C3 C3 | LGIS | MCQ SAQ VIVA |
| General Anatomy (Muscle II) | <ul style="list-style-type: none"> • 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 the clinical conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care | C2 C2 C1 C2 C3 C3 C3 C3 | LGIS | MCQ SAQ VIVA |

| | | | | |
|--|---|--|------|--------------------|
| | <ul style="list-style-type: none"> • Read relevant research article | C3 | | |
| Histology (Cardiac & Smooth Muscles) | <ul style="list-style-type: none"> • 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 the clinical conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | C2 C2 C2 C2 C3 C3 C3 C3 C3 C3 | LGIS | MCQ SAQ VIVA |
| Histology (Skin) | <ul style="list-style-type: none"> • 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 the clinical conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | C1 C2 C2 C2 C3 C3 C3 C3 C3 | LGIS | MCQ SAQ VIVA |
| Embryology (Development Of Axial Skeleton) | <ul style="list-style-type: none"> • Discuss the cartilagenous stage of vertebral column • Discuss the bony stage of vertebral column • Describe development of ribs and sternum. • Correlate the clinical conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | C2 C2 C2 C3 C3 C3 C3 C3 C3 | LGIS | MCQ SAQ VIVA |

| | | | | |
|--|--|--|-------------|-----------------------------|
| <p>Histology (Skin Appendages)</p> | <ul style="list-style-type: none"> • Describe appendages of skin • Discuss histological structure of hair • Discuss histological structure of nail • Discuss histological structure of glands of skin • Correlate the clinical conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | <p>C2 C2 C2 C2 C3 C3 C3 C3 C3 C3</p> | <p>LGIS</p> | <p>MCQ SAQ VIVA</p> |
| <p>Embryology (Development of limbs)</p> | <ul style="list-style-type: none"> • Enlist different stages of limb development • Discuss early and late stage of limb development • Correlate congenital anomalies of limb development • Correlate the clinical conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | <p>C1 C2 C3 C3 C3 C3 C3 C3</p> | <p>LGIS</p> | <p>MCQ SAQ VIVA</p> |
| <p>Embryology (Development Of Muscles)</p> | <ul style="list-style-type: none"> • 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 the clinical conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | <p>C2 C2 C3 C3 C3 C3 C3 C3</p> | <p>LGIS</p> | <p>MCQ SAQ VIVA</p> |
| <p>General Anatomy (Skin)</p> | <ul style="list-style-type: none"> • 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 the clinical conditions • Understand the preventive and curative health care measures | <p>C1 C2 C2 C1 C2 C3 C3 C3</p> | <p>LGIS</p> | <p>MCQ SAQ VIVA</p> |

| | | | | |
|--|--|----------------|--|--|
| | <ul style="list-style-type: none"> Practice the principles of Bioethics Apply strategic use of AI in health care Read relevant research article | C3 C3 C3 | | |
|--|--|----------------|--|--|

Physiology Large Group Interactive Session (LGIS)

| Topic | Learning Objectives At The End Of Lecture Students Should Be Able To: | Learning Domain | Assessment Tool | References | Learning Resources |
|---|---|-----------------|--------------------|--|---|
| Introduction to muscle physiology, Structure of Sarcomere | <p>Explain the physiologic anatomy of skeletal muscle</p> <p>Draw and label the sarcomere</p> | C2 | MCQ SAQ VIVA | <ul style="list-style-type: none"> 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 Unglaub Silver thorn. 8TH Edition. Muscle (Chapter 12, Page 411) Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Contraction of Skeletal muscle. Section 02. (Chapter 06, Page 79) | <ol style="list-style-type: none"> https://youtu.be/8iklTDlra5Q https://www.sciencedirect.com/science/article/abs/pii/S0197018687901070 https://teachmeanatomy.com/histology/tissue-structure/muscle-histology/skeletal-muscle/ |

| | | | | | |
|--|--|------------------|-----------------------------|---|--|
| <p>Sarcotubular system, excitation contraction coupling mechanism in skeletal muscle</p> | <p>Discuss the sliding filament model of muscle contraction. Describe the structure sarcotubular system and its importance in muscle contraction</p> | <p>C2 C2</p> | <p>MCQ SAQ VIVA</p> | <ul style="list-style-type: none"> • 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) | <ol style="list-style-type: none"> 1. https://www.sciencedirect.com/science/article/abs/pii/S0197018687901070 2. https://youtu.be/8iklTDlr_a5Q https://link.springer.com/article/10.1007/s12551-013-0135-x |
|--|--|------------------|-----------------------------|---|--|

| | | | | | |
|---|--|------------------|-----------------------------|--|--|
| <p>Molecular Mechanism of skeletal muscle contraction, Rigor mortis, Muscular dystrophies</p> | <p>Define motor unit Discuss recruitment and its effect on force of contraction Discuss Molecular Mechanism of skeletal muscle contraction</p> | <p>C1 C2</p> | <p>MCQ SAQ VIVA</p> | <ul style="list-style-type: none"> • 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) | <ol style="list-style-type: none"> 1. https://youtu.be/RTnKBt2sDf0 2. https://youtu.be/NvV2xTrShvg |
| <p>Length tension curve, Load and velocity of contraction, diseases of muscle</p> | <p>Draw and describe Length duration curve Load and velocity of contraction</p> | <p>C2</p> | <p>MCQ SAQ VIVA</p> | <ul style="list-style-type: none"> • 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) | <ol style="list-style-type: none"> 1. https://www.urmc.rochester.edu/encyclopedia/content.aspx?ContentTypeID=85&ContentID=P00792 2. https://www.sciencedirect.com/topics/engineering/length-tension-curve |

| | | | | | |
|---|---|-----------|----------------------------------|--|--|
| <p>Energetics, efficiency and types of contraction, heat production in muscle</p> | <p>Elaborate Energetic and efficiency of contraction. Discuss heat production in nerve and muscle</p> | <p>C3</p> | <p>MCQ SAQ VIV A</p> | <ul style="list-style-type: none"> • 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) | <ol style="list-style-type: none"> 1. https://www.sciencedirect.com/topics/engineering/length-tension-curve 2. https://youtu.be/3ntulKD4kvY |
| <p>Properties of skeletal muscles, Tetanus & Fatigue</p> | <p>Discuss various properties of skeletal muscle in detail Tetanus and fatigue</p> | <p>C2</p> | <p>MCQ SAQ VIVA</p> | <ul style="list-style-type: none"> • 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) | <ol style="list-style-type: none"> 1. https://youtu.be/v5NmLaAQVo 2. https://www.sciencedirect.com/science/article/abs/pii/S2387020622003485 |

| | | | | | |
|--|---|----------------|------------------------|---|--|
| Introduction to CVS | Introduction to Cardiovascular system. Classify blood vessels | C1 | MCQ SAQ VIVA | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition.Section 05,Cardiovascular physiology (Chapter 29, Page 519) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Cardiovascular 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) | <ol style="list-style-type: none"> 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 | C1 C2 | MCQ SAQ VIVA | <ul style="list-style-type: none"> • 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) | <ol style="list-style-type: none"> 1. https://www.kenhub.com/en/library/anatomy/smooth-musculature 2. https://youtu.be/qEVRoKuo4U |
| 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 | C1 C2 C1 | MCQ SAQ VIV A | <ul style="list-style-type: none"> • 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) | <ol style="list-style-type: none"> 1. https://youtu.be/L2Gf9cj7jBw 2. https://www.sciencedirect.com/topics/medicine-and-dentistry/cardiac-action-potential |

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| | detail Discuss propagation of electrical activity in cardiac muscle | C2 | | <ul style="list-style-type: none"> Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 09, Page 114) | |
| Mechanism of smooth muscle contraction & its control | Explain the chemical and physical basis of smooth muscle contraction | C2 | MCQ SAQ VIVA | <ul style="list-style-type: none"> Ganong's Review of Medical 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) | <ol style="list-style-type: none"> https://www.kenhub.com/en/library/anatomy/smooth-musculature https://youtu.be/qEVRoKuo4U |
| Regulation of myocardial activity | Describe the regulation of pumping activity of heart | C1 | MCQ SAQ VIVA | <ul style="list-style-type: none"> Textbook of Medical Physiology by Guyton & Hall.14th Edition. Excitation and Contraction of Smooth muscle. Section 02. (Chapter 09, Page 123) | <ol style="list-style-type: none"> https://pubmed.ncbi.nlm.nih.gov/1661829/ https://www.sciencedirect.com/topics/medicine-and-dentistry/cardiac-action-potential |
| Comparison of 3 types of muscle | <ul style="list-style-type: none"> Discuss differences among three types of muscle in detail | C2 | MCQ SAQ VIV A | <ul style="list-style-type: none"> Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Muscle (Chapter 12, Page 444) | <ol style="list-style-type: none"> https://training.seer.cancer.gov/anatomy/muscular/types.html https://youtu.be/eShBZ3-RxHA |
| Excitatory & Conducting system of heart | <ul style="list-style-type: none"> Describe the conductive system of heart in detail Enlist the various components of conductive system of heart Describe the mechanism of production of | C1 C1 C1 | MCQ SAQ | <ul style="list-style-type: none"> Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Muscle (Chapter 12, Page 488) | <ol style="list-style-type: none"> https://youtu.be/TnFoJ7Hhi-M https://teachmeanatomy.info/thorax/organs/heart/conducting- |

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| | action potential in SA node, AV node, ventricles.also describe its propagation | | VIV A | <ul style="list-style-type: none"> 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) | system/ |
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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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Discuss Importance of proteins Classify proteins Describe Functions of proteins | C1 C2 C2 | LGIS | MCQs, SAQs & Viva |
| Primary structure of proteins | <ul style="list-style-type: none"> Describe Primary structure of protein Discuss Peptide bond | C2 C2 | LGIS | MCQs, SAQs & Viva |
| Secondary structure of proteins | <ul style="list-style-type: none"> Enlist Types of secondary structure. Describe Secondary structure of proteins. Elaborate Significance of secondary structure | C1 C2 C2 | LGIS | MCQs, SAQs & Viva |
| Tertiary and quaternary structure | <ul style="list-style-type: none"> Describe Tertiary and quaternary structure of proteins Understand the forces stabilizing protein structure | C2 C2 | LGIS | MCQs, SAQs & Viva |

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| Protein folding And denaturation | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 | P | Skill Lab | MCQ SEQ VIVA OSPE |
| | • Identify bony features of ilium. | C1 | | |
| | • Describe the muscular, ligamentous, and capsular attachments. | C2 | | |
| | • Discuss the ventral and dorsal auricular surfaces, ossification. | C2 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read relevant research article | C3 | | |

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| Hip Bone-II | <ul style="list-style-type: none"> • 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 conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | <p>P C1 C2 C2 C3 C3 C3 C3 C3 C3</p> | Skill Lab | <p>MCQ SEQ VIVA OSPE</p> |
| Femur | <ul style="list-style-type: none"> • Demonstrate the anatomical position of bone • Demonstrate different parts • Describe proximal and distal articulations • State angle of femoral torsion. • Correlate the clinical conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | <p>P C1 C2 C1 C3 C3 C3 C3 C3</p> | Skill Lab | <p>MCQ SEQ VIVA OSPE</p> |
| Femur and Patella | <ul style="list-style-type: none"> • 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 conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | <p>P C2 C2 C2 C1 C3 C3 C3 C3 C3</p> | Skill Lab | <p>MCQ SEQ VIVA OSPE</p> |

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| Anterolateral Compartment of Thigh (Muscles) | <ul style="list-style-type: none"> 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 conditions Understand the preventive and curative health care measures Practice the principles of Bioethics Apply strategic use of AI in health care Read relevant research article | <p>C2</p> <p>C2</p> <p>C2</p> <p>C1</p> <p>C3</p> <p>C3</p> <p>C3</p> <p>C3</p> <p>C3</p> | Skill Lab | <p>MCQ</p> <p>SEQ</p> <p>VIVA</p> <p>OSPE</p> |
| Anterolateral compartment of thigh (Neurovascular organization) | <ul style="list-style-type: none"> 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 Map the outline of femoral artery in a simulated patient / model Correlate the clinical conditions Understand the preventive and curative health care measures Practice the principles of Bioethics Apply strategic use of AI in health care Read relevant research article | <p>C2</p> <p>C2</p> <p>C1</p> <p>P</p> <p>C3</p> <p>C3</p> <p>C3</p> <p>C3</p> | Skill Lab | <p>MCQ</p> <p>SEQ</p> <p>VIVA</p> <p>OSPE</p> |
| Medial Compartment of thigh | <ul style="list-style-type: none"> 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 conditions Understand the preventive and curative health | <p>C2</p> <p>C2</p> <p>C2</p> <p>C3</p> | Skill Lab | <p>MCQ</p> <p>SEQ</p> <p>VIVA</p> <p>OSPE</p> |

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| | <ul style="list-style-type: none"> care measures Practice the principles of Bioethics Apply strategic use of AI in health care Read relevant research article | <p>C3</p> <p>C3</p> <p>C3</p> <p>C3</p> | | |
| Gluteal Region (Muscles) | <ul style="list-style-type: none"> 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. <p>Understand the preventive and curative health care measures</p> <ul style="list-style-type: none"> Practice the principles of Bioethics Apply strategic use of AI in health care Read relevant research article | <p>C2</p> <p>C1</p> <p>C3</p> <p>C3</p> <p>C3</p> <p>C3</p> | Skill Lab | <p>MCQ</p> <p>SEQ</p> <p>VIVA</p> <p>OSPE</p> |
| Gluteal Region (Neurovascular organization) | <ul style="list-style-type: none"> Describe trochanteric 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.. <p>Correlate the clinical conditions</p> <p>Understand the preventive and curative health care measures</p> <ul style="list-style-type: none"> Practice the principles of Bioethics Apply strategic use of AI in health care Read relevant research article | <p>C2</p> <p>C1</p> <p>C2</p> <p>C3</p> <p>C3</p> <p>C3</p> <p>C3</p> | Skill Lab | <p>MCQ</p> <p>SEQ</p> <p>VIVA</p> <p>OSPE</p> |
| Posterior Compartment of Thigh (Muscles) | <ul style="list-style-type: none"> Enlist the Hamstring muscles Discuss origin insertion, nerve supply and actions Identify the muscles Correlate the clinical conditions Understand the preventive and curative health care measures Practice the principles of Bioethics | <p>C1</p> <p>C2</p> <p>C1</p> <p>C3</p> <p>C3</p> <p>C3</p> | Skill Lab | <p>MCQ</p> <p>SEQ</p> <p>VIVA</p> <p>OSPE</p> |

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| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care • Read relevant research article | C3 C3 | | |
| Posterior Compartment of thigh (Neurovascular Organization) | <ul style="list-style-type: none"> • 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 conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | C2 C2 C1 C3 C3 C3 C3 C3 | Skill Lab | MCQ SEQ VIVA OSPE |
| Hip Joint | <ul style="list-style-type: none"> • 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 conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | C2 C2 C2 C2 C1 C2 C2 C3 C3 C3 C3 C3 | Skill Lab | MCQ SEQ VIVA OSPE |
| Tibia | <ul style="list-style-type: none"> • Identify bone • Demonstrate its side. • Demonstrate its normal anatomical position. • Describe bony features. • Discuss attachment of muscle and ligament | C1 P P C2 C2 | | MCQ SEQ |

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|-----------------|--|--|-----------|----------------------------|
| | <ul style="list-style-type: none"> • Describe articular surfaces • Identify nutrient foramen • Describe its ossification • Correlate the clinical conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | C2 C1 C2 C3 C3 C3 C3 C3 C3 | Skill Lab | VIVA OSPE |
| Fibula | <ul style="list-style-type: none"> • 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 conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | C1 P P C2 C2 C2 C1 C2 C3 C3 C3 C3 C3 C3 | Skill Lab | MCQ SEQ VIVA OSPE |
| Popliteal Fossa | <ul style="list-style-type: none"> • Identify surface landmarks • Enlist contents • Discuss boundaries, roof and floor • Map the outline of popliteal artery in a simulated patient / model • Correlate the clinical conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | C1 C1 C2 P C3 C3 C3 C3 C3 | Skill Lab | MCQ SEQ VIVA OSPE |

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| Knee Joint | <ul style="list-style-type: none"> • 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 conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | <p>C1 C2 P C1 P C2 C2 C3 C3 C3 C3 C3</p> | Skill Lab | <p>MCQ SEQ VIVA OSPE</p> |
| Anterior Compartment of Leg (Muscles and Neurovascular Organization) | <ul style="list-style-type: none"> • Demonstrate surface landmarks • Discuss superficial fascia & deep fascia, their contents including retinacula • Describe Origin, insertion, nerve supply and action of all muscles of anterior compartment of leg • Identify different structures in compartment • Correlate the clinical conditions • Understand the preventive and curative health care measures • Practice the principles of Bioethics • Apply strategic use of AI in health care • Read relevant research article | <p>P C2 C2 C1 C3 C3 C3 C3 C3 C3</p> | Skill Lab | <p>MCQ SEQ VIVA OSPE</p> |
| Radiology / Cross Sectional Anatomy | <ul style="list-style-type: none"> • Demonstrate major landmarks of thigh and anterior compartment of leg on radiographs • Identify the structures present at different levels of cross sections Upper 3rd of thigh | <p>P C2</p> | Skill Lab | <p>MCQ SEQ VIVA OSPE</p> |

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| | Mid shaft of femur Lower 3 rd of thigh Upper part of patella Distal part of patella Through tibial condyles <ul style="list-style-type: none"> Correlate the clinical conditions | C3 | | |
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Physiology Small Group Discussion (SGDs)

| Topic | Learning Objectives Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tools |
|--|--|-----------------|-------------------|--------------------|
| Sliding filaments of skeletal muscle, sarcotubular system | • Discuss the sliding filament model of muscle contraction. | C2 | SGD | MCQ SAQ VIVA |
| | • Describe the structure sarcotubular system and its importance in muscle contraction | C1 | | |
| Physiology of smooth muscle, mechanism of smooth muscle contraction | • Enlist type of smooth muscles and explain their characteristics | C1 | SGD | MCQ SAQ VIVA |
| | • Discuss the properties of smooth muscle | C2 | | |
| Properties of myocardium, myocardial action potential, Excitatory and conduction system of heart | • Describe the physiologic anatomy of myocardium Discuss properties of myocardium. | C1 | LGIS | MCQ SAQ VIVA |
| | • Discuss in detail various properties of myocardium Describe the mechanism of production of action potential and its propagation. | C2 | | |
| | • Describe excitation contraction coupling in detail | C1 | | |
| | • Discuss propagation of electrical activity in cardiac muscle | C2 | | |
| Comparison of three types of muscle | • Discuss three types of muscles | C2 | LGIS | MCQ SAQ VIVA |
| | • Discuss differences among three types of muscle in detail | 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 | <ul style="list-style-type: none"> Explain primary, secondary, tertiary and quaternary structures of proteins | C2 | SGD | MCQs & SAQs |

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|----------|---|----------------|-----|----------------|
| Collagen | <ul style="list-style-type: none"> • Discuss structure of collagen • Describe synthesis of collagen • Interpret related clinical disorders | C2 C2 C3 | SGD | MCQs & SAQs |
|----------|---|----------------|-----|----------------|

Anatomy Self Directed Learning (SDL)

| Topics Of SDL | Learning Objective | References |
|------------------------------------|---|---|
| Hip Bone | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Describe the origin and insertion of muscles in anterolateral compartment of thigh. • Describe the nerves and vessels of anterolateral | Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 510, 545-548,557-558). https://www.youtube.com/watch?v=AeuLBN5ouwo |

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| | compartment of thigh <ul style="list-style-type: none"> • Discuss the femoral triangle and adductor canal with contents • Identify these muscles. • Correlate the clinical aspects • Read relevant research article • Use digital library | https://link.springer.com/article/10.1186/s10195-023-00691-w |
| Medial Compartment Of Thigh | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 trochanteric 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 |

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| <p>Posterior Compartment Of Thigh</p> | <ul style="list-style-type: none"> • 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 | <p>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</p> |
| <p>Hip Joint</p> | <ul style="list-style-type: none"> • 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 | <p>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</p> |
| <p>Tibia</p> | <ul style="list-style-type: none"> • 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 | <p>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</p> |
| | <ul style="list-style-type: none"> • Identify bone • Demonstrate its side. • Demonstrate its normal anatomical position. | <p>Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 20,510,513,521,528,687,790). https://www.youtube.com/watch?v=AeuLBN5ouwo</p> |

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| Fibula | <ul style="list-style-type: none"> • 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 | <p>https://link.springer.com/chapter/10.1007/978-3-030-93685-3_14</p> <p>https://link.springer.com/chapter/10.1007/978-3-319-78387-1_69</p> |
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Physiology Self Directed Learning (SDL)

| Topics Of SDL | Learning Objective | References | Learning Resources |
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| 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 | <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • https://www.sciencedirect.com/science/article/abs/pii/0197018687901070 • https://youtu.be/8iklTDIra5Q • https://link.springer.com/article/10.1007/s12551-013-0135-x |

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| <p>Molecular Mechanism of skeletal muscle contraction, Rigor</p> | <p>Define motor unit Discuss recruitment and its effect on force of contraction</p> | <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • https://youtu.be/RTnKBt2sDf0 • https://youtu.be/NvV2xTrShvg |
| <p>Molecular Mechanism of skeletal muscle contraction, Rigor mortis, Muscular dystrophies</p> | <p>Define motor unit Discuss recruitment and its effect on force of contraction Discuss Molecular Mechanism of skeletal muscle contraction</p> | <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • https://youtu.be/RTnKBt2sDf0 • https://youtu.be/NvV2xTrShvg |
| <p>Length tension curve, Load and velocity of contraction, diseases</p> | <p>Draw and describe Length duration curve Load and velocity of contraction</p> | <ul style="list-style-type: none"> • Physiology by Linda S. Costanzo 6th Edition. Cellular Physiology (Chapter 1. Page 39) • Human Physiology by Dee Unglaub Silver | <ul style="list-style-type: none"> • https://www.urmc.rochester.edu/encycl/lopedia/content.aspx?ContentTypeID=85&ContentID=P00792 • https://www.sciencedirect.com/topics/engineering/length-tension-curve |

| | | | |
|--|--|---|--|
| of muscle | | <p>thorn. 8TH Edition.Muscle (Chapter 12,Page 431,435)</p> <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • https://youtu.be/v5Nm_LaAQVo • https://www.sciencedirect.com/science/article/abs/pii/S2387020622003485 |

| | | | |
|---|--|---|--|
| Introduction to CVS | Introduction to Cardiovascular system. Classify blood vessels | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition.Section 05,Cardiovascular physiology (Chapter 29, Page 519) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Cardiovascular 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) | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • https://youtu.be/L2Gf9cj7jBw • https://www.sciencedirect.com/topics/medicine-and-dentistry/cardiac-action-potential |

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|--|---|--|--|
| Mechanism of smooth muscle contraction & its control | Explain the chemical and physical basis of smooth muscle contraction | <ul style="list-style-type: none"> • Ganong's Review of Medical 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) | <ul style="list-style-type: none"> • https://www.kenhub.com/en/library/anatomy/smooth-musculature • https://youtu.be/qEVRoKuo4U |
| Regulation of myocardial activity | Describe the regulation of pumping activity of heart | <ul style="list-style-type: none"> • Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Excitation and Contraction of Smooth muscle. Section 02. (Chapter 09, Page 123) | <ul style="list-style-type: none"> • https://pubmed.ncbi.nlm.nih.gov/1661829/ • https://www.sciencedirect.com/topics/medicine-and-dentistry/cardiac-action-potential |
| Comparison of 3 types of muscle | <ul style="list-style-type: none"> • Discuss differences among three types of muscle in detail | <ul style="list-style-type: none"> • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Muscle (Chapter 12, Page 444) | <ul style="list-style-type: none"> • https://training.seer.cancer.gov/anatomy/muscular/types.html • https://youtu.be/eShBZ3-RxHA |
| Excitatory & Conducting system of heart | <ul style="list-style-type: none"> • 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 propagation | <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Describe amphoteric properties of amino acids • Discuss Post transitional amino acids and location of amino acids in proteins • Explain Important peptides | <ul style="list-style-type: none"> • Textbook of Mushtaq 8th Eidtion Chapter No. 4 pg 97 |
| Proteins | <ul style="list-style-type: none"> • Discuss Importance of proteins • Classify proteins • Describe Functions of proteins | <ul style="list-style-type: none"> • Textbook of Mushtaq 8th Eidtion Chapter No. 4 pg 97, 98 |
| Primary structure of proteins | <ul style="list-style-type: none"> • Describe Primary structure of protein • Discuss Peptide bond | <ul style="list-style-type: none"> • Textbook of Lippincott 8th Eidtion Chapter No. 2 pg 14 |
| Secondary structure of proteins | <ul style="list-style-type: none"> • Enlist Types of secondary structure. • Describe Secondary structure of proteins. • Elaborate Significance of secondary structure | <ul style="list-style-type: none"> • Textbook of Lippincott 8th Eidtion Chapter No. 2 pg 16 |
| Tertiary and quaternary structure | <ul style="list-style-type: none"> • Describe Tertiary and quaternary structure of proteins • Understand the forces stabilizing protein structure | <ul style="list-style-type: none"> • Textbook of Lippincott 8th Eidtion Chapter No. 2 pg 19 |
| Protein folding And denaturation | <ul style="list-style-type: none"> • Discuss Folding of proteins • Describe protein misfolding • Interpret the clinical cases related to protein misfolding • Discuss denaturation of proteins | <ul style="list-style-type: none"> • Textbook of Lippincott 8th Eidtion Chapter No. 2 pg 20, 21 |
| Collagen and Elastin | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Textbook of Lippincott 8th Eidtion Chapter No. 4 pg 45,97 |
| Techniques for separation of proteins | <ul style="list-style-type: none"> • Describe Techniques for separation of proteins | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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: | Learning Domain | Teaching Strategy | Assessment Tools | References |
|----------------------------|---|-----------------|-------------------|------------------|--|
| Determination of RBC count | • Apparatus identification | P | Skill Lab | OSPE | Practical Notebook of Physiology Second year MBBS by Dr Saqib Sohail |
| | • Principle | C1 | | | |
| | • Procedure | C1 | | | |
| | • Recall composition of Diluents | C1 | | | |
| | • Comprehend | | | | |
| | • Calculation on hemocytometer | C3 | | | |
| Determination of | • Apparatus identification | P | Skill Lab | OSPE | Practical Notebook of Physiology Second year MBBS by Dr Saqib |
| | • Principle | C1 | | | |
| | • Procedure | C1 | | | |
| | | | | | |

| | | | | | |
|------------------------------------|--|----|-----------|------|--|
| TLC | • Recall composition of Diluents | C1 | | | Sohail |
| | • Comprehend Calculation on hemocytometer | C2 | | | |
| | • Recall Normal values | C1 | | | |
| Determination of Platelet Count | • Apparatus identification | P | Skill Lab | OSPE | Practical Notebook of Physiology Second year MBBS by Dr Saqib Sohail |
| | • Principle | C1 | | | |
| | • Procedure | C1 | | | |
| | • Recall composition of Diluents | C1 | | | |
| | • Comprehend, Calculation on hemocytometer | C2 | | | |
| • Recall Normal values | C1 | | | | |
| Determination of ABO, Blood groups | • Principle | C1 | Skill Lab | OSPE | Practical Notebook of Physiology Second year MBBS by Dr Saqib Sohail |
| | • Procedure | C1 | | | |
| | • Methods | C1 | | | |
| | • Types of blood groups | C2 | | | |
| | • Clinical Correlations of blood transfusion | C3 | | | |

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 |

Basic and Clinical Sciences (Vertical Integration)

Content

- **Case Based Learning (CBLs)**
- **Problem Based Learning (PBL)**
- **Vertical Integration Large Group Interactive Session (LGIS)**

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 |
|--------------------|--|------------------------|--------------------------|------------------------|
| X rays of Hip Bone | • Interpret normal x-rays of Hip bone & Lower Limb | C2 | LGIS | MCQs |
| | • Discuss features of different Fractures of Hip Bone & Lower Limb | C2 | | |

Orthopedics

| Topic | At The End Of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|-------------------------|---|------------------------|--------------------------|------------------------|
| Fractures of Lower Limb | • Understand the anatomical and biomechanical principles underlying fractures of the lower limb. | C2 | LGIS | MCQs |
| | • Identify and classify fractures of the lower limb through clinical assessment and radiographic interpretation | | | |

List of MSK-II Module Vertical Courses Lectures

| Sr. # | Date/Day | Week | Department | Time | Topic Of Lectures | Teachers Name & Contact # |
|--------------|------------------------|-----------------|-------------------|----------------------------|--------------------------|--------------------------------------|
| 1. | Thursday 30-05-2024 | 1 st | Radiology | 10:20 AM – 11:20 AM | X rays of Hip Bone | |
| 2. | Tuesday 25-06-2024 | 5 th | Orthopedics | 10:30 AM – 11:20 AM | Fractures of Lower Limb | |

Spirally Integrated Courses / General Education Cluster (GEC) Courses

Content

- **Longitudinal Themes**
 - **The Holy Quran Translation**
 - **Seerat Mubarak**
 - **Biomedical Ethics & Professionalism**
 - **Family Medicine**
 - **Artificial Intelligence (Innovation)**
 - **Early Clinical Exposure (ECE)**

The Holy Quran Translation Lecture

| Topic | Learning Objectives At the end of the lecture the student should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
|---------|--|-----------------|-------------------|-----------------|
| Imaniat | <ul style="list-style-type: none"> • Describe the Concept of Tauheed • Explain the attributes of pious. • Discuss the attributes of Allah Almighty • Explain Hazarat Uzair's and Hazarat Ibrahim's experience about resurrection | C2 | LGIS | SAQ |
| Ibadat | <ul style="list-style-type: none"> • Understand the concept of worship, mastering ritual acts, fostering a spiritual connection. | C2 | LGIS | SAQ |

Seerat Mubarak

| | | | | |
|---------------------------------|--|----|------|-----|
| Importance of Hadees and Sunnah | <ul style="list-style-type: none"> • Discuss the meaning of Hadith and Sunnah • Describe the importance of Hadees and Sunnah | C2 | LGIS | SAQ |
|---------------------------------|--|----|------|-----|

Family Medicine

| Topic | At The End Of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|----------------------|--|-----------------|-------------------|-----------------|
| Communication Skills | <ul style="list-style-type: none"> • To be able to communicate with the patients keeping mind the principle of communication skills | C2 | LGIS | MCQS |

Artificial Intelligence (Innovation)

| Topic | Learning Objectives At the end of the lecture the student should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
|---|---|-----------------|-------------------|-----------------|
| Introduction to Artificial Intelligence | <ul style="list-style-type: none"> • Understand the fundamental concepts and applications of Artificial Intelligence (AI) in healthcare, including medical image analysis, disease prediction, and personalized treatment recommendations. • Demonstrate the ability to critically evaluate AI algorithms and their ethical implications in medical decision-making, patient care, and privacy. | C2 | LGIS | MCQS |

Biomedical Ethics & Professionalism

Practical Session 1

| | | | | | |
|---|---|---|---|---|--|
| Introduction to Professional Ethics and PM&DC Code of Conduct | <p>Discussion will cover;</p> <ul style="list-style-type: none"> • Introduction to Professional Ethics and PM&DC Code of Conduct • Purpose of medical code of conduct by Regulatory body PM&DC; covering following subtopics <ul style="list-style-type: none"> • 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? <p>What Are the Code of Conduct Requirements?</p> | <p>At the end of the session students should be able to</p> <ul style="list-style-type: none"> • 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 | <p>LGIS 1hr contact session in 2-4 parallel classes conducted by Senior faculty</p> | <p>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.</p> | <p>PMDC Code of Ethics: http://www.pmdc.org.pk/LinkClick.aspx?fileticket=v5WmQYMvhz4%3D&tabid=102&mid=554</p> |
| History of Medical Ethics | <p>Discussion on Health Research ethics focusing;</p> <ul style="list-style-type: none"> •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. <ul style="list-style-type: none"> - Interpretation research ethics for; - Informed consent and confidentiality in research HR | <p>At the end of the session students should be able to;</p> <ul style="list-style-type: none"> • 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 • Discuss the development of indigenous ethical codes in the South-East Asian Region. C2. | <p>LGIS 1hr contact session in 2-4 parallel classes, Conducted by Senior faculty.</p> | <p>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.</p> | <p>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 Nuremburg Code: http://www.hhs.gov/ohrp/archives/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 . Nuffield Council on Bioethics Guidelines: http://www.sirc.org/news/nuffie</p> |

| | | | | | |
|-------------------|---|---|---|--|---|
| | | <ul style="list-style-type: none"> • Demonstrate sensitivity to cultural diversity in medical care. C3 | | | ld.shtml |
| Laboratory Ethics | <p>Discussion will cover basic elements of Laboratory Ethics focusing;</p> <ul style="list-style-type: none"> • 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 | <p>At the end of the session students should be able to ;</p> <ul style="list-style-type: none"> • 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 | <p>Case based discussion in 2 hr contact session in 4-6 parallel classes conducted by faculty of respective departments</p> <p>Role plays</p> <p>Reflective writing</p> | <p>Assignment based assessment under aggregate Marks (Internal Assessment)</p> <p>Assignment to be uploaded on LMS</p> | <ul style="list-style-type: none"> - Real life scenarios in form of Case base learning /problem based learning (PBL) To be share with students one week before the session <p>Introduction to criteria for assessment of behavior, code of conduct and professionalism at RMU</p> |

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 | MCQS |
| | ➤ To apply this knowledge in clinical settings | C2 | CBL | |

List of MSK-II Module Spiral Courses Lectures

| Sr. # | Date/Day | Week | Department | Time | Topic Of Lectures | Teachers Name & Contact # |
|-------|----------------------|-----------------|-------------------|---------------------|---|--|
| 1. | Friday 31-05-2024 | 1 st | Seerat Mubarak | 09:00 AM – 10:00 AM | Importance of Hadees and Sunnah | Molana Abdul Waahid (0341-5444667) |
| 2. | Friday 31-05-2024 | 1 st | Family Medicine | 11:00 AM – 12:00 PM | Communication and consultation skills in Family Medicine Practice | Dr. Sadia Azam Khan |
| 3. | Friday 07-06-2024 | 2 nd | Quran Translation | 11:00 AM – 12:00 PM | Imaniat-I, Ibadat-II | Molana Abdul Waahid (0341-5444667) Mufti Naeem Sherazi (0300-5580299) |
| 4. | Friday | 3 rd | Quran Translation | 10:00 AM – 11:00 AM | Imaniat -I, Ibadat-II | Mufti Naeem Sherazi (0300-5580299) |

| | | | | | | |
|-----|------------------------|-----------------|-------------------------|----------------------------|--|--|
| | 14-06-2024 | | | | | Molana Abdul Waahid (0341-5444667) |
| 5. | Thursday 20-06-2024 | 4 th | Behavioral Sciences | 11:20 AM – 12:10 PM | Communication Skills | Dr. Arsalan Manzoor |
| 6. | Friday 21-06-2024 | 4 th | Quran Translation | 09:00 AM – 10:00 AM | Ibadat-III Immaniat-II | Molana Abdul Waahid (0341-5444667) Mufti Naeem Sherazi (0300-5580299) |
| 7. | Friday 21-06-2024 | 4 th | Quran Translation | 10:00 AM – 11:00 AM | Ibadat-IV, Immaniat-III | Mufti Naeem Sherazi (0300-5580299) Molana Abdul Waahid (0341-5444667) |
| 8. | Saturday 22-06-2024 | 4 th | Biomedical Ethics | 11:20 AM – 12:10 PM | Introduction to Professional Ethics and PM&DC Code of Conduct | Dr. Aneela (Even) Dr. Kashif (Odd) |
| 9. | Monday 24-06-2024 | 5 th | Artificial Intelligence | 10:30 AM – 11:20 AM | Introduction to Artificial Intelligence | Prof. Dr. Riaz Ahmed |
| 10. | Tuesday 25-06-2024 | 5 th | Behavioral Sciences | 09:00 AM – 10:10 AM | Rights and responsibilities of patients and doctors | |
| 11. | Tuesday 26-06-2024 | 5 th | Biomedical Ethics | 11:20 AM – 12:10 PM | History of Medical Ethics | Dr. Arsalan Even Dr. Maria Odd |



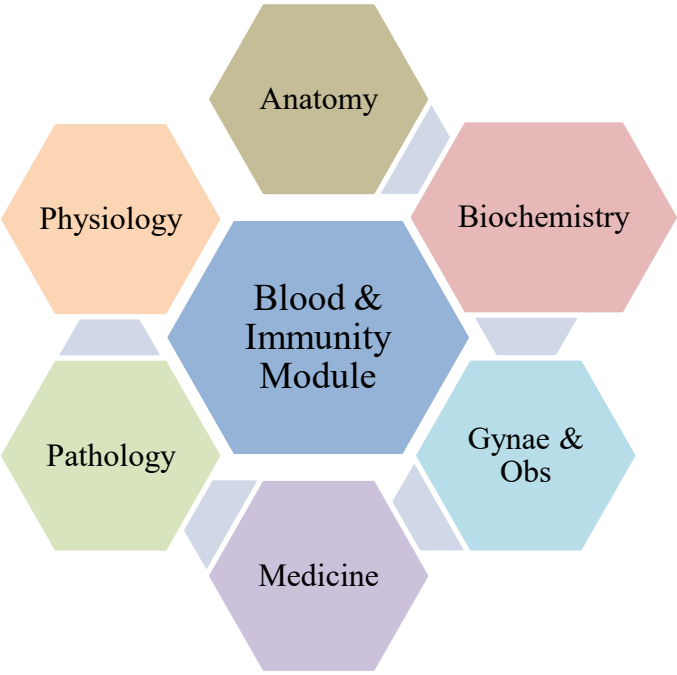
RMU 12

Integrated Modular Curriculum 2026

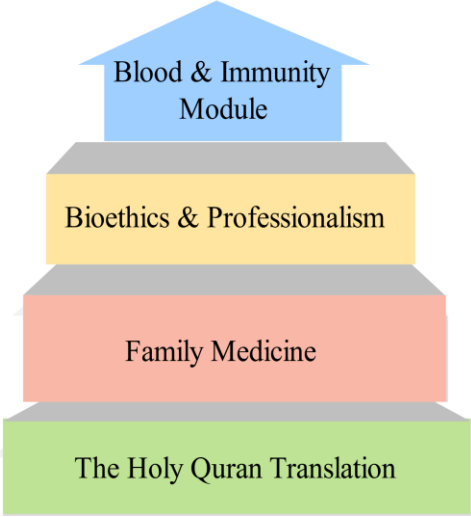
Isolation to *Beyond Boundaries*

Hematology & Immunology Module-I

Integration of Disciplines in Hematology & Immunology Module



Spiral / General Education Cluster Courses



Discipline Wise Details of Modular Contents

| Block | Subjects | Embryology | Histology | Gross Anatomy | CBL | SDL |
|-------|--|---|--|---|---|--|
| II | <ul style="list-style-type: none"> • Anatomy | <ul style="list-style-type: none"> • Development of pharyngeal arches • Development of spleen • Development of thymus | <ul style="list-style-type: none"> • Spleen • Thymus • Lymph nodes • Tonsils | Lower Limb <ul style="list-style-type: none"> • Posterior compartment of leg to foot | <ul style="list-style-type: none"> • Ankle sprain • Flat foot | <ul style="list-style-type: none"> • Posterior compartment of leg and flexor retinaculum • Neurovascular organization of posterior compartment of leg • Foot joints • Ankle joints • Sole of foot • Spleen • Gait cycle |
| | <ul style="list-style-type: none"> • Physiology | <ul style="list-style-type: none"> • Plasma Proteins • Stages of erythropoiesis & factors affecting erythropoiesis • Hemoglobin & Hemoglobinopathies, Iron Metabolism • Red cell fragility, ESR & Red cell indices, Anemia & polycythemia • Fate of RBCs & Jaundice • Types of immunity, Physiology of innate immunity tolerance & auto immunity • Physiology of acquired immunity B-Cells • Physiology of acquired immunity T-Cells. Allergy and Hypersensitivity reactions, Auto-immune diseases and AIDS • Composition of blood & Hemopoiesis • WBCs classification & formation. Neutrophils, Eosinophils & Basophils and their properties • Platelet formation & function. hemostasis, blood coagulation tests (BT, CT, PT, APTT and INR) • Blood coagulation • Concept of intravascular anticoagulants and bleeding disorders (Vit K deficiency, hemophilia and thrombocytopenia) • Thromboembolic condition (DVT, Pulmonary Embolism, DIC) Anticoagulant therapy (Heparin, warfarin, Prevention of blood clotting outside the body) • Physiological mechanism of temperature regulation • Role of Hypothalamus in temperature regulation • Disorders of temperature regulation (Fever, Heat stroke, Exposure of body to extreme cold) • ABO & Rh Blood grouping system • Rh Blood grouping system and Erythroblastosis fetalis • Blood transfusion hazards • Tissue and organ transplantations | | | | |
| | <ul style="list-style-type: none"> • Biochemistry | <ul style="list-style-type: none"> • Heme synthesis • Porphyria | | | | |

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|---|---|
| | <ul style="list-style-type: none"> • Breakdown of hemoglobin • Jaundice • Blood • Structure of hemoglobin and myoglobin • Types of Hemoglobin • Oxygen dissociation curve. • Abnormalities in Hemoglobin. • Hemoglobinopathies • Plasma proteins • Acute phase proteins & Albumin • Haptoglobin and transferrin. • Ferritin and hemosiderin • Ceruloplasmin. • Antiproteases and amyloidosis • Immunoglobulins • AIDs • Folic acid. • Vitamin B12 • Iron |
| Spiral Courses | |
| <ul style="list-style-type: none"> • Bioethics & Professionalism | <ul style="list-style-type: none"> • Activity I • Activity II • Activity III |
| <ul style="list-style-type: none"> • Family Medicine | <ul style="list-style-type: none"> • Approach to a Patient Anemia |
| <ul style="list-style-type: none"> • The Holy Quran Translation | <ul style="list-style-type: none"> • Muaamlaat • Muaasharat |
| Vertical components | |
| <ul style="list-style-type: none"> • Pathology | <ul style="list-style-type: none"> • Mediators of Inflammation (Medicine) |
| <ul style="list-style-type: none"> • Medicine | <ul style="list-style-type: none"> • Anemia • Jaundice |
| <ul style="list-style-type: none"> • Gynae & Obs | <ul style="list-style-type: none"> • Rh Incompatibility And Its Significance -Immune |
| Early Clinical Exposure (ECE) | |
| <ul style="list-style-type: none"> • Medicine | <ul style="list-style-type: none"> • Immunodeficiency cases • Hepatosplenomegaly • Lymphadenopathy |
| <ul style="list-style-type: none"> • Pediatrics | <ul style="list-style-type: none"> • Neonatal Jaundice • ABO/ Rh Incompatibility |

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| | | <ul style="list-style-type: none">• Lymphadenopathy/ Hepatosplenomegaly |
| | <ul style="list-style-type: none">• Pathology Laboratory | Identification of Slides of Spherocytosis <ul style="list-style-type: none">• Microcytosis• Leukocytosis• Lymph node• Bone Marrow |

Hematology & Immunology Module Team

| | | |
|--------------------|---|---------------------------|
| Module Name | : | Blood and Immunity Module |
| Duration of module | : | 05 Weeks |
| Coordinator | : | Dr. Rahat |
| Co-coordinator | : | Dr. Kamil Tahir |
| Reviewed by | : | Module Committee |

| Module Committee | | | Module Task Force Team | | |
|-------------------------|---|--------------------------------|--------------------------------|---|---|
| 1. | Vice Chancellor RMU | Prof. Dr. Muhammad Umar | 1. | Coordinator | Dr. Rahat (APWMO of Biochemistry) |
| 2. | Chairperson Anatomy & Dean Basic Sciences | Prof. Dr. Ayesha Yousaf | 2. | DME Focal Person | Dr. Farzana Fatima |
| 3. | Director DME | Prof. Dr. Ifra Saeed | 3. | Co-coordinator | Dr. Ali Raza (Senior Demonstrator of Anatomy) |
| 4. | Chairperson Physiology | Prof. Dr. Samia Sarwar | 4. | Co-Coordinator | Dr. Uzma Zafar (APWMO of Biochemistry) |
| 5. | Chairperson Biochemistry | Dr. Aneela Jamil | 5. | Co-coordinator | Dr. Kamil Tahir (Senior Demonstrator Physiology) |
| 6. | Focal Person Anatomy First Year MBBS | Asso. Prof. Dr. Mohtashim Hina | DME Implementation Team | | |
| 7. | Focal Person Physiology | Dr. Sidra Hamid | | | |
| 8. | Focal Person Biochemistry | Dr. Aneela Jamil | 1. | Director DME | Prof. Dr. Ifra Saeed |
| 9. | Focal Person Pharmacology | Dr. Zunera Hakim | 2. | Assistant Director DME | Dr. Farzana Fatima |
| 10. | Focal Person Pathology | Dr. Asiya Niazi | 3. | Implementation Incharge 1st & 2 nd Year MBBS | Prof. Dr. Ifra Saeed Dr. Farzana Fatima Dr. Saira Aijaz |
| 11. | Focal Person Behavioral Sciences | Dr. Saadia Yasir | 4. | Editor | Muhammad Arslan Aslam |
| 12. | Focal Person Community Medicine | Dr. Afifa Kulsoom | | | |
| 13. | Focal Person Quran Translation Lectures | Dr. Fahad Anwar | | | |
| 14. | Focal Person Family Medicine | Dr. Sadia Khan | | | |

Module IV- Blood and Immunity Module

Rationale

Blood is a specialized connective tissue that delivers necessary substances such as nutrients and oxygen to the cells and transports metabolic waste products away from those same cells.. Blood accounts for 8% of the human body weight. The average adult has a blood volume of roughly 5 liters, composed of plasma and several kinds of cells (occasionally called corpuscles); these formed elements of the blood are erythrocytes (red blood cells, RBCs), leukocytes (white blood cells), and thrombocytes (platelets). By volume, the red blood cells constitute about 45% of whole blood, the plasma about 54.3%, and white cells about 0.7%.

White blood cells are part of the body's immune system; they destroy and remove old or aberrant cells and cellular debris, as well as attack infectious agents (pathogens) and foreign substances.

The rationale behind is to introduce the students the basic constituents, functions and transport of various substances through blood.

Module Outcomes

By the end of the module, students will be able to:

Knowledge

- This module is expected to build students basic knowledge about normal structure, organization, functions and development of blood and immunity system.
- Used technology based Medical Education including.

Artificial Intelligence

- Appreciate concept and importance of

Biomedical Ethics,

Research

Family Medicine

Skills

- Demonstrate effective skill for performing and interpreting various laboratory tests like Haemin crystal test.
- Demonstrate awareness of ethical, legal and social implication of issues related to bioethics.

Attitude

- Demonstrate **professional attitude, team-building spirit and good communication specially in small group discussions.**

This module will run in 5 weeks duration. Instructional strategies are given in the timetable and learning objectives are given in the study guides. Study guides will be uploaded on the university website. Good luck!

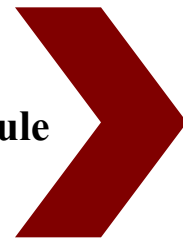
Learning Objectives, Teaching Strategies & Assessments

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



Syllabus of Blood & Immunity Module



Horizontally Integrated Basic Sciences (Anatomy, Physiology & Biochemistry)

Anatomy Large Group Interactive Session (LGIS)

| Topic | At the End of The Session Students Should Be Able To: | Learning Domain | Teaching Strategy | Assessment Tools |
|--------------------------------|---|-----------------|-------------------|--------------------|
| (Histology) Lymph node | • Classify lymphoid tissue | C2 | LGIS | MCQ SAQ VIVA |
| | • Define diffuse lymphoid tissue, nodular lymphoid tissue and lymphoid organs | C1 | | |
| | • Discuss the histological features of lymph node | C2 | | |
| | • Enlist functions of lymph node | C1 | | |
| | • Understand the supporting elements of lymph node | C2 | | |
| | • Describe filtration through lymph node | C2 | | |
| | • Discuss importance of high endothelial venules in lymph node | C2 | | |
| | • Discuss the clinical correlation of lymph node | C3 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read a research article | C3 | | |
| (Histology) Thymus & Tonsil | • Describe the location and functions of thymus | C1 | LGIS | MCQ SAQ VIVA |
| | • Enumerate different types of reticuloepithelial cells | C1 | | |
| | • Describe microscopic structure of thymus | C2 | | |
| | • Compare the histological structure of thymus and other lymphoid organs | C2 | | |
| | • Discuss blood thymus barrier | C2 | | |
| | • Describe general histological structure of tonsils | C2 | | |
| | • Differentiate palatine, lingual, and pharyngeal tonsils histologically | C2 | | |
| | • Discuss the clinical correlation of thymus | C3 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Read a research article | C3 | | |
| | • Describe the location and functions of spleen | C2 | | |
| | • Describe microscopic structure of spleen | C2 | | |

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| (Histology) Spleen | • Differentiate between red and white pulp of spleen | C2 | LGIS | MCQ SAQ VIVA |
| | • Discuss blood circulation through spleen | C2 | | |
| | • Discuss the clinical correlation of spleen | C3 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Read a research article | C3 | | |
| (Embryology) Development of Pharyngeal arches & pouches | • Define pharyngeal arches and pouches | C1 | LGIS | MCQ SAQ VIVA |
| | • Discuss the components of pharyngeal arches and pouches | C2 | | |
| | • Describe the development and fate of each pharyngeal arch and pouches | C2 | | |
| | • Discuss the clinical correlation of pharyngeal arches and pouches | C3 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Read a research article | C3 | | |

Physiology Large Group Interactive Session (LGIS)

| Topics | At the end of lecture students should be able to: | Learning Domains | Teaching Strategy | Assessment Tools | |
|------------------------------------|---|----------------------------------|-------------------|--|---|
| Composition of blood & Hemopoiesis | 1. Describe composition and general functions of blood 2. Explain the role of bone marrow in hemopoiesis and erythropoiesis 3. Draw steps of hemopoiesis 4. Define committed and uncommitted cells | 1. C2 2. C2 3. C3 4. C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology. 25TH Edition. Section 05, Cardiovascular Physiology (Chapter 31, Page 553) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 16, Page 547, 548) Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. Section <p>https://accessmedicine.mhmedical.com/content.aspx?bookid=3047&sectionid=255121548 2. https://youtu.be/cm8IK24RRvA</p> |

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|---|---|-------------------------|------|---|---|---|
| | | | | | 03, Blood (Chapter 19, Page347) (Chapter 20, Page 356) <ul style="list-style-type: none"> Textbook of Medical Physiology by Guyton & Hall.14thEdition. Red blood cells, Anemia and Polycythemia. Section 06. (Chapter 33, Page 439) | |
| Plasma Proteins | 1.Enumerate plasma proteins, their properties, sites of production and their functions. 2.Explain effects of deficiency of plasma proteins 3.Discuss conditions associated with decreased production and increased excretion of plasma proteins | C1 C2 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25THEdition. Section05, Cardiovascular Physiology (Chapter 31, Page 563) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 16, Page 547) Physiological Basis of Medical Practice by Best & Taylor's.13thEdition. Section 03, Blood (Chapter 19, Page | https://www.ncbi.nlm.nih.gov/books/NBK531504/ 2. https://accessmedicine.mhmedical.com/content.aspx?bookid=1366&sectionid=73247095348,353 |
| WBCs classification & formation. Neutrophils, Eosinophils &Basophils and their properties | 1. Enumerate and explain various types of leukocytes and steps of leucopoiesis. 2. Explain the characteristics and functions. 3. Conditions in which these cells are increased and decreased. 4. Leukemias and their effects on the body | C1/C2 C2 C2 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE | <ul style="list-style-type: none"> Textbook of Medical Physiology by Guyton & Hall.14thEdition. Resistance of the body to Infection. Section 06. (Chapter 34, Page 449,456,457) | https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9777002/ 2. https://youtu.be/TelOcCkZX7c |

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|--|---|---|-------------|--|---|---|
| <p>Stages of erythropoiesis & factors affecting erythropoiesis</p> | <ol style="list-style-type: none"> 1. Elaborate Morphological features of RBCs. 2. Describe the stages of production of RBCs. 3. Recall Life span of RBCs 4. Enumerate and explain factors which affect erythropoiesis. 5. Enlist sites of production of erythropoietin 6. Describe recombinant erythropoietin. 7. Explain mechanism of release and action of erythropoietin | <p>C2 C1 C1 C2 C1 C2 C2</p> | <p>LGIS</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE</p> | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology. 25TH Edition. Section 05, Cardiovascular Physiology (Chapter 31, Page 553) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 16, Page 547, 548) • Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. Section 03, Blood (Chapter 19, Page 347) (Chapter 20, Page 356) • Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Red blood cells, Anemia and Polycythemia. Section 06. (Chapter 33, Page 439) | <p>https://accessmedicine.mhmedical.com/content.aspx?bookid=3047&sectionid=255121548 2. https://youtu.be/cm8IK24RRvA</p> |
| <p>Monocytes - macrophage system & lymphocytes</p> | <ol style="list-style-type: none"> 1. Explain the characteristics and functions of monocytes. 2. Explain monocyte-macrophage system; importance | <p>C2 C2</p> | <p>LGIS</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE</p> | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology. 25TH Edition. Section 01, Immunity, Infection and Inflammation (Chapter 03, Page 67) • Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. Section 03, Blood (Chapter 21, Page 371) (Chapter 22, Page 387) • Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Section 06. (Chapter 34, Page 450- | <p>https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/mononuclear-phagocyte-system 2. https://bmcbiol.biomedcentral.com/articles/10.1186/s12915-017-0392-4</p> |

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| | | | | | 452) | |
| Hemoglobin & Hemoglobinopathies, Iron Metabolism | <ol style="list-style-type: none"> 1. Discuss details about iron metabolism in body including iron absorption and storage. 2. Understand the structure, synthesis and functions of hemoglobin and its types. 3. Enlist different types of hemoglobinopathies | C2 C2 C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology. 25TH Edition. Section 05, (Chapter 31, Page 555) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 16, Page 553) • Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. (Chapter 23, Page 407,409) • Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Section 06. (Chapter 34, Page 446,447) | https://www.sciencedirect.com/topics/medicine-and-dentistry/red-blood-cell-indices 2. https://youtu.be/QUHqYVK-Nhg 3. https://youtu.be/mOrRJBqm744 |
| Process of inflammation and Lines of defense during inflammation | <ol style="list-style-type: none"> 1. Describe the role of neutrophils and monocytes in inflammation. 2. Elaborate Lines of defense | 1.C1, C2 2. C1, C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology. 25TH Edition. Section 01, Immunity, Infection and Inflammation (Chapter 03, Page 81) • Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. Section 03, Blood) (Chapter 22, Page 384) • Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Section 06. (Chapter 34, Page 454) | https://youtu.be/WFm9j1rNkQs https://en.wikipedia.org/wiki/Inflammation https://www.verywellhealth.com/signs-of-inflammation-4580526 |

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|---|--|----------------------|------|---|--|---|
| Red cell fragility, ESR & Red cell indices, Anemia & polycythemia | <ol style="list-style-type: none"> 1. Define RBC fragility; importance; conditions in which fragility is changed. 2. Discuss various blood indices, give their formulae, co-related with different types of anemias. 3. Enumerate various types of anemias and polycythemias. 4. Discuss details about various types of anemias and polycythemia and their effect on circulatory system. | C1 C2 C1 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology. 25TH Edition. Section 05, (Chapter 31, Page 555) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 16, Page 553) • Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. (Chapter 23, Page 407, 409) • Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Section 06. (Chapter 34, Page 446, 447) | https://www.sciencedirect.com/topics/medicine-and-dentistry/red-blood-cell-indices 2. https://youtu.be/QUHqYVK-Nhg 3. https://youtu.be/mOrRJBqm744 |
| Platelet formation & function. hemostasis, blood coagulation tests (BT, CT, PT, APTT and INR) | <ol style="list-style-type: none"> 1. Explain thrombocytopoiesis. 2. Describe functions of platelets 3. Define hemostasis. 4. Explain steps of hemostasis | C2 C2 C1 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology. 25TH Edition. Section 05, (Chapter 31, Page 564) (Chapter 03, Page 79) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 16, Page 558) • Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. (Chapter 24, Page 413) • Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Section 06. (Chapter 37, Page 477, 487) | https://my.clevelandclinic.org/health/symptoms/21999-hemostasis https://www.sciencedirect.com/topics/neuroscience/hemostasis |
| Fate of RBCs & Jaundice | <ol style="list-style-type: none"> 1. Give life span of RBCs and explain their destruction. 2. Describe various types, compare and differentiate | C1, C2 C1, C2 | LGIS | MCQ SEQ VIVA VOCE | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology. 25TH Edition. Section 05, (Chapter 31, Page 555) | https://www.sciencedirect.com/topics/medicine-and-dentistry/red-blood-cell-indices |

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|--|--|----------------|------|--|--|--|
| | between various types of jaundice | | | MCQ (LMS based Assessment, MST based Assessment) OSPE | <ul style="list-style-type: none"> Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 16, Page 553) Physiological Basis of Medical Practice by Best & Taylor's.13thEdition. (Chapter 23, Page 407,409) Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 34, Page 446,447) | <p>2. https://youtu.be/QUHqYVK-Nhg</p> <p>3. https://youtu.be/mOrRJBqm744</p> |
| Blood coagulation | 1. Explain hemostasis, mechanism of blood coagulation, fibrinolysis and anticoagulants | C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE | <ul style="list-style-type: none"> Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 16, Page 559) Physiological Basis of Medical Practice by Best & Taylor's.13thEdition. (Chapter 24, Page 417) Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 37, Page 479) | <p>https://youtu.be/gExUCrpAKyQ</p> <p>https://medlineplus.gov/lab-tests/coagulation-factor-tests/</p> |
| Types of immunity, Physiology of innate immunity tolerance & auto immunity | <ol style="list-style-type: none"> Define immunity and its types. Compare and contrast innate and acquired immunity. Difference between passive and active immunity | C1 C2 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25THEdition. Section01, Immunity, Infection and Inflammation (Chapter 03, Page 67) Physiological Basis of Medical Practice by Best & Taylor's.13thEdition. Section 03, Blood (Chapter 21, Page371) (Chapter 22, Page 387) Textbook of Medical | <p>https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/mononuclear-phagocyte-system</p> <p>2. https://bmcbiol.biomedcentral.com/articles/10.1186/s12915-017-0392-4</p> |

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| | | | | | Physiology by Guyton & Hall.14 th Edition. Section 06. (Chapter 34, Page 450-452) | |
| Concept of intravascular anticoagulants and bleeding disorders (Vit K deficiency, hemophilia and thrombocytopenia) | <ol style="list-style-type: none"> 1. Explain Intravascular coagulation. 2. Discuss Bleeding disorders. 3. Enlist Types of hemophilia | <ol style="list-style-type: none"> 1.C2 2.C2 3. C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE | <ul style="list-style-type: none"> • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 16, Page 559) • Physiological Basis of Medical Practice by Best & Taylor's.13thEdition. (Chapter 24, Page 417) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 37, Page 479) | https://youtu.be/gExUCrpAKyQ https://medlineplus.gov/lab-tests/coagulation-factor-tests/ |
| Physiology of acquired immunity B-Cells | <ol style="list-style-type: none"> 1. Enumerate various types of lymphocytes 2. Discuss their important characteristics and 3. Explain the mechanism of preprocessing | <ol style="list-style-type: none"> C1 C2 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25THEdition. Section01, Immunity, Infection and Inflammation (Chapter 03, Page 67) • Physiological Basis of Medical Practice by Best & Taylor's.13thEdition. Section 03, Blood (Chapter 21, Page371) (Chapter 22, Page 387) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 34, Page 450-452) | https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/mononuclear-phagocyte-system 2. https://bmcbiol.biomedcentral.com/articles/10.1186/s12915-017-0392-4 |

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|---|---|--|-------------|--|---|--|
| <p>Thromboembolic condition (DVT, Pulmonary Embolism, DIC) Anticoagulant therapy (Heparin, warfarin, Prevention of blood clotting outside the body)</p> | <ul style="list-style-type: none"> • Discuss different Thromboembolic Conditions • Explain Pulmonary Embolism and clinical correlation <ul style="list-style-type: none"> • Enlist different Anticoagulant therapy | <p>C2 C2 C1</p> | <p>LGIS</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE</p> | <ul style="list-style-type: none"> • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 16, Page 559) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. (Chapter 24, Page 417) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 37, Page 479) | <p>https://youtu.be/gExUCrpAKyQ https://medlineplus.gov/lab-tests/coagulation-factor-tests/</p> |
| <p>Physiology of acquired immunity T-Cells. Allergy and Hypersensitivity reactions, Auto-immune diseases and AIDS</p> | <ol style="list-style-type: none"> 1. Define clone and explain the roles of T and B lymphocyte clones in immunity 2. Discuss the mechanisms involved in Immune Tolerance 3. Compare Type I and Type IV hypersensitivity reactions 4. Describe the process of immunization 5. Understand role of T-lymphocytes in transplants 6. Identify different types of tissue grafts | <p>C1, C2 C2 C2 C1 C2 C1</p> | <p>LGIS</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE</p> | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition. Section01, Immunity, Infection and Inflammation (Chapter 03, Page 67) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. Section 03, Blood (Chapter 21, Page371) (Chapter 22, Page 387) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 34, Page 450-452) | <p>https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/mononuclear-phagocyte-system 2.https://bmcbiol.biomedcentral.com/articles/10.1186/s12915-017-0392-4</p> |
| <p>Physiological mechanism of temperature regulation</p> | <ol style="list-style-type: none"> 1. Explain Concept of temperature 2. Discuss Physiological mechanism of temperature regulation | <p>C2 C2</p> | <p>LGIS</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment)</p> | <ul style="list-style-type: none"> • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 73, Page 889-936) | <p>https://shop.elsevier.com/books/guyton-and-hall-textbook-of-medical-physiology/hall/978-0-323-59712-8</p> |

| | | | | OSPE | | |
|---|---|----------------|------|---|---|--|
| ABO & Rh Blood grouping system | <ol style="list-style-type: none"> 1. Enlist Blood group and its types 2. Explain Rh Blood Grouping System | C1 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition. Section05, (Chapter 31, Page 558) (Chapter 36, Page 473) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. (Chapter 25, Page 432) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 36, Page 471) | https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/abo-blood-group-system https://youtu.be/wfqnuYIY78 |
| Role of Hypothalamus in temperature regulation | <ol style="list-style-type: none"> 1. Discuss Role of Hypothalamus in temperature regulation 2. Explain Temperature Regulating centers | C2 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE | <ul style="list-style-type: none"> • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 73, Page 889-936) | https://shop.elsevier.com/books/guyton-and-hall-textbook-of-medical-physiology/hall/978-0-323-59712-8 |
| Rh Blood grouping system and Erythroblastosis fetalis | <ol style="list-style-type: none"> 1. Discuss Rh Blood Grouping System 2. Explain Erythroblastosis fetalis 3. Discuss Clinical correlation | C2 C2 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition. Section05, (Chapter 31, Page 558) (Chapter 36, Page 473) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. (Chapter 25, Page 432) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 36, Page 471) | https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/abo-blood-group-system https://youtu.be/wfqnuYIY78 |

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|---|---|-------------------------------|-------------|--|--|--|
| <p>Disorders of temperature regulation (Fever, Heat stroke, Exposure of body to extreme cold)</p> | <ol style="list-style-type: none"> 1. Discuss Disorders of temperature regulation 2. Explain Concept of Fever 3. Clinical correlation Of Heat Stroke | <p>1.C2 2.C2 3.C3</p> | <p>LGIS</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE</p> | <ul style="list-style-type: none"> • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 73, Page 889-936) | <p>https://shop.elsevier.com/books/guyton-and-hall-textbook-of-medical-physiology/hall/978-0-323-59712-8</p> |
| <p>Blood transfusion hazards. Tissue and organ transplantations</p> | <ol style="list-style-type: none"> 1. Discuss Blood transfusion hazards. 2. Explain Effect of blood transfusion on various organs 3. Explain Tissue and organ transplantations | <p>C2 C2 C2</p> | <p>LGIS</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE</p> | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition. Section05, (Chapter 31, Page 558) (Chapter 36, Page 473) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. (Chapter 25, Page 432) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 36, Page 471) | <p>https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/abo-blood-group-system https://youtu.be/wfqnNuYIY78</p> |

Biochemistry Large Group Interactive Session (LGIS)

| Topics | At the end of lecture students should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
|---------------------------------------|--|-----------------|-------------------|-----------------|
| Blood | • Enlist various functions performed by blood. | C1 | LGIS | MCQs SAQs |
| | • Describe Composition of blood. | C2 | | |
| Structure of hemoglobin and myoglobin | • Describe Structure of hemoglobin | C2 | LGIS | MCQs SAQs |
| | • Describe structure of myoglobin. | C2 | | |
| | • Discuss Biochemical roles of hemoglobin and myoglobin. | C2 | | |
| Types of Hemoglobin | • Enlist various types of Hemoglobin. | C1 | LGIS | MCQs SAQs |
| | • Describe Importance of heme and globin components | C2 | | |
| | • Interpret importance of HbA1c in diagnosis of Diabetes | C3 | | |
| Oxygen dissociation curve. | • Discuss Importance of oxygen dissociation curve. | C2 | LGIS | MCQs SAQs |
| | • Enlist various factors affecting the curve. | C1 | | |
| Abnormalities in Hemoglobin. | • Elaborate congenital abnormalities in structure of Hemoglobin. | C2 | LGIS | MCQs SAQs |
| | • Enlist Structural defects of hemoglobin | C1 | | |
| | • Discuss Preventive measures. | C2 | | |
| Hemoglobinopathies | • Discuss hemoglobinopathies. | C2 | LGIS | MCQs SAQs |
| | • Enlist Types of thalassemia. | C1 | | |
| | • Discuss Familial counseling. | C2 | | |
| | • Elaborate Preventive measures. | C2 | | |
| Heme synthesis | • Describe enzymatic regulation of heme synthesis | C2 | LGIS | MCQs SAQs |
| Porphyria | • Discuss various types of porphyria | C2 | | |
| Breakdown of hemoglobin | • Elaborate steps in the breakdown of hemoglobin. | C2 | LGIS | MCQs SAQs |
| | • Describe Steps in synthesis of Bilirubin | C2 | | |
| Jaundice. | • Recall Normal level of S. Bilirubin. | C1 | LGIS | MCQs SAQs |
| | • Define jaundice. | C1 | | |
| | • Recall normal level of Bilirubin | C1 | | |
| | • Enlist types of Jaundice. | C1 | | |
| | • Describe Biochemical tests to distinguish various types of jaundice. | C2 | LGIS | |

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| | • . Describe Physiological Jaundice | C2 | | |
|--|-------------------------------------|----|--|--|

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|--------------------------------|--|----|------|--------------|
| Plasma proteins | • Describe plasma proteins. | C2 | LGIS | MCQs SAQs |
| | • Discuss Biochemical role of various plasma proteins. | C2 | | |
| | • Recall normal levels of plasma proteins | C1 | | |
| | • Illustrate Role of A/G ratio. | C3 | | |
| Acute phase proteins & Albumin | • Enlist various proteins raise in inflammation. | C1 | LGIS | MCQs SAQs |
| | • Describe Role of albumin. | C2 | | |
| | • Discuss Role of C- reactive protein. | C2 | | |
| Haptoglobin and transferrin | • Describe Structure of Haptoglobin and transferrin. | C2 | LGIS | MCQs SAQs |
| | • Discuss biochemical Role of Haptoglobin and transferrin. | C2 | | |
| Ferritin and hemosiderin | • Describe biochemical role of ferritin and hemosiderin. | C2 | LGIS | MCQs SAQs |
| | • Describe Hemosiderosis. | C2 | | |
| Ceruloplasmin. | • Describe biochemical role of ceruloplasmin. | C2 | LGIS | MCQs SAQs |
| | • Discuss Wilson's disease. | C2 | | |
| Iron | • Recall Sources of iron. | C1 | LGIS | MCQs SAQs |
| | • Describe Transport and absorption of iron. | C2 | | |
| | • Discuss hyper and hypo functions of iron. | C2 | | |
| Immunoglobulins | • Describe Structure of Immunoglobulin. | C2 | LGIS | MCQs SAQs |
| | • Discuss biochemical role of various Immunoglobulin. | C2 | | |
| | • Elaborate Class switching. | C2 | | |
| AIDs | • Define AIDs | C1 | LGIS | MCQs SAQs |
| | • Describe Immunological defects in AIDs. | C2 | | |
| | • Discuss various preventive measures. | C2 | | |
| Folic acid. | • Recall Sources of folic acid. | C1 | LGIS | MCQs SAQs |
| | • Discuss deficiency effects of folic acid | C2 | | |
| | • Describe biochemical role of folic acid. | C2 | | |
| | • Recall Recommended Dietary allowance. | C1 | | |
| Vitamin B12 | • Recall Sources of Vitamin B12 | C1 | LGIS | MCQs SAQs |
| | • Describe biochemical role of vitamin B12 | C2 | | |
| | • Discuss Deficiency effects of B12 | C2 | | |

Anatomy Small Group Discussion (SGDs)

| Topic | At the End Of The Session Students Should Be Able To: | Learning Domains | Teaching Strategy | Assessment Tools |
|---|--|------------------|-------------------|----------------------------|
| Posterior Compartment of Leg (muscles) and flexor retinaculum | • Illustrate cutaneous innervation | C2 | SGD, Skill Lab | MCQ SAQ VIVA OSPE |
| | • Describe superficial fascia & deep fascia. | C2 | | |
| | • Discuss superficial and deep muscle groups in posterior compartment | C2 | | |
| | • Tabulate origin, insertion, nerve supply and action of all muscles of posterior compartment of leg | C2 | | |
| | • Discuss ruptured calcaneal tendon, calcaneal bursitis and accessory soleus muscle | C3 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read a research article | C3 | | |
| Posterior Compartment of Leg (Neurovascular organization) | • Describe origin, course relations, branches and tributaries of neurovascular bundle | C2 | SGD, Skill Lab | MCQ SAQ VIVA OSPE |
| | • Discuss superficial veins i.e long and short saphenous veins | C2 | | |
| | • Palpate the posterior tibial pulse | C3 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read a research article | C3 | | |
| Bones of Foot | • Enumerate the bones of foot | C1 | SGD, Skill Lab | MCQ SAQ VIVA OSPE |
| | • Identify different bones of foot | C1 | | |
| | • Discuss bony features and muscle attachment | C2 | | |
| | • Discuss fracture of metatarsals and os trigonum, avascular necrosis of head of talus | C3 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |

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|---|--|----|-------------------|----------------------------|
| | <ul style="list-style-type: none"> • Read a research article | C3 | | |
| Dorsum of foot | <ul style="list-style-type: none"> • Tabulate muscle on the dorsal aspect of foot | C2 | SGD, Skill Lab | MCQ SAQ VIVA OSPE |
| | <ul style="list-style-type: none"> • Describe blood supply and nerve supply | C2 | | |
| | <ul style="list-style-type: none"> • Discuss cutaneous innervation of dorsum of foot | C2 | | |
| | <ul style="list-style-type: none"> • Palpate the dorsalis pedis artery on dorsum of foot | C3 | | |
| | <ul style="list-style-type: none"> • Discuss other clinicals related to the dorsum of the foot | C3 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> • Read a research article | C3 | | |
| Ankle Joint | <ul style="list-style-type: none"> • Describe the articular surfaces of ankle joint | C2 | Skill Lab | MCQ SAQ VIVA OSPE |
| | <ul style="list-style-type: none"> • Describe the attachment of capsule | C2 | | |
| | <ul style="list-style-type: none"> • Enumerate the ligaments | C1 | | |
| | <ul style="list-style-type: none"> • Discuss the movements possible at ankle joint and muscles producing them | C2 | | |
| | <ul style="list-style-type: none"> • Discuss ankle sprain | C3 | | |
| | <ul style="list-style-type: none"> • Discuss different types of ankle injuries | C3 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| <ul style="list-style-type: none"> • Read a research article | C3 | | | |
| Joints of Foot | <ul style="list-style-type: none"> • Classify the joints of foot | C2 | SGD, Skill Lab | MCQ SAQ VIVA OSPE |
| | <ul style="list-style-type: none"> • Discuss the articular surfaces, joint capsules, ligaments, movements and muscles producing movements | C2 | | |
| | <ul style="list-style-type: none"> • Discuss major ligaments in detail | C2 | | |
| | <ul style="list-style-type: none"> • Discuss tibial nerve entrapment | C3 | | |
| | <ul style="list-style-type: none"> • Discuss club foot, claw foot and other clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> • Read a research article | C3 | | |
| | <ul style="list-style-type: none"> • Identify Surface landmarks | C1 | | |

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|--|--|--------|-------------------|----------------------------|
| Sole of foot (Muscles) | • Describe cutaneous innervation of sole of foot | C2 | SGD, Skill Lab | MCQ SAQ VIVA OSPE |
| | • Describe Plantar aponeurosis its attachments | C2 | | |
| | • Discuss flexor retinaculum | C2 | | |
| | • Discuss muscles in different layers of foot with origin, insertion, nerve supply and actions | C2 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read a research article | C3 | | |
| Sole of foot (Neurovascular Organization) | • Enlist nerves and arteries present in sole of foot | C1 | SGD, Skill Lab | MCQ SAQ VIVA OSPE |
| | • Discuss route and relations of neurovascular bundle in sole of foot | C2 | | |
| | • Describe the formation of vascular arches of foot along with clinicals | C2, C3 | | |
| | • Discuss plantar fasciitis | C3 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read a research article | C3 | | |
| Arches of Foot and Gait Cycle | • Classify the arches of foot | C2 | SGD, Skill Lab | MCQ SAQ VIVA OSPE |
| | • Describe different components of arches of foot | C2 | | |
| | • Discuss stability factors of arches of foot | C2 | | |
| | • Discuss pes planus (flat foot), club foot and other clinicals | C3 | | |
| | • Discuss gait cycle and its stages | C2 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| • Read a research article | C3 | | | |
| Thymus, Tonsils | • Describe location of thymus and tonsils | C2 | SGD, Skill Lab | MCQ SAQ VIVA OSPE |
| | • Discuss anatomical features of thymus and tonsils | C2 | | |
| | • Describe blood supply, venous drainage and lymphatic drainage of thymus and tonsils | C2 | | |
| | • Enumerate functions of thymus and tonsils | C1 | | |

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|--|--|----|-------------------|----------------------------|
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read a research article | C3 | | |
| Spleen | • Discuss the location of spleen | C2 | SGD, Skill Lab | MCQ SAQ VIVA OSPE |
| | • Enumerate anatomical relations of spleen | C1 | | |
| | • Discuss blood supply, venous drainage and lymphatic drainage of spleen | C2 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read a research article | C3 | | |
| Radiology, Surface Anatomy & Cross Sectional Anatomy | • Identify different structures on radiographs | C3 | SGD, Skill Lab | MCQ SAQ VIVA OSPE |
| | • Demonstrate the surface anatomy of various structures present in posterior compartment of leg and foot | P | | |
| | • Demonstrate the surface anatomy of spleen, thymus and tonsils | P | | |
| | • Discuss the Cross-Sectional anatomy at the level of leg & foot | C2 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read a research article | C3 | | |

Physiology Small Group Discussion (SGDs)

| Topics | At the end of discussion students should be able to: | Learning Domains | Teaching Strategy | Assessment Tools |
|---|---|---|--------------------------|---|
| Functions & composition of blood, Hemopoiesis and Bone marrow | <ol style="list-style-type: none"> 1. Describe composition and general functions of blood 2. Explain the role of bone marrow in hemopoiesis and erythropoiesis 3. Draw steps of hemopoiesis 4. Define committed and uncommitted cells 5. Correlate basic knowledge with clinical application | <ol style="list-style-type: none"> 1. C2 2. C2 3. C3 4. C1 5. C3 | SGD | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Hemoglobin & Hemoglobinopathies, Iron Metabolism | <ol style="list-style-type: none"> 1. Discuss details about iron metabolism in body including iron absorption and storage 2. Understand the structure, synthesis and functions of hemoglobin and its types 3. Enlist different types of hemoglobinopathies 4. Correlate basic knowledge with clinical application | <ol style="list-style-type: none"> C2 C2 C1 C3 | SGD | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Platelet formation & function. hemostasis, blood coagulation tests (BT, CT, PT, APTT and INR) | <ol style="list-style-type: none"> 1. Explain thrombocytopenia 2. Describe functions of platelets 3. Define hemostasis 4. Explain steps of hemostasis 5. Correlate basic knowledge with clinical application | <ol style="list-style-type: none"> C2 C2 C1 C2 C3 | SGD | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Physiological mechanism of temperature regulation | <ol style="list-style-type: none"> 1. Explain Concept of temperature 2. Discuss Physiological mechanism of temperature regulation 3. Correlate basic knowledge with clinical application | <ol style="list-style-type: none"> C2 C2 C3 | SGD | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Stages of Erythropoiesis Factors Affecting | <ol style="list-style-type: none"> 1. Elaborate Morphological features of RBCs 2. Describe the stages of production of RBCs 3. Recall Life span of RBCs 4. Enumerate and explain factors which affect erythropoiesis | <ol style="list-style-type: none"> C2 C1 C1 C2 C1 | SGD | MCQ SEQ VIVA VOCE |

| | | | | |
|---|--|-----------------------------------|-----|--|
| Erythropoiesis (First week) | <ol style="list-style-type: none"> 5. Enlist sites of production of erythropoietin 6. Describe recombinant erythropoietin 7. Explain mechanism of release and action of erythropoietin | <p>C2 C2</p> | | <p>MCQ (LMS based Assessment, MST based Assessment) OSPE</p> |
| Physiology of WBC (third week) | <ol style="list-style-type: none"> 1. Enumerate and explain various types of leukocytes and steps of leucopoiesis 2. Explain the characteristics and functions 3. Conditions in which these cells are increased and decreased 4. Leukemias and their effects on the body | <p>C1/C2 C2 C2 C2</p> | SGD | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE</p> |
| Physiology of platelets (Fourth week) | <ol style="list-style-type: none"> 1. Explain thrombocytopenia 2. Describe functions of platelets 3. Define hemostasis 4. Explain steps of hemostasis | <p>C2 C2 C1 C2</p> | SGD | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE</p> |
| Blood transfusion hazards. Tissue and organ transplantations (Fifth week) | <ol style="list-style-type: none"> 1. Discuss Blood transfusion hazards. 2. Explain Effect of blood transfusion on various organs 3. Explain Tissue and organ transplantations | <p>C2 C2 C2</p> | SGD | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE</p> |
| Disorders of temperature regulation (Fever, Heat stroke, Exposure of body to extreme cold) (Fifth week) | <ol style="list-style-type: none"> 1. Discuss Disorders of temperature regulation 2. Explain Concept of Fever 3. Clinical correlation Of Heat Stroke | <p>1.C2 2.C2 3.C3</p> | SGD | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE</p> |

Biochemistry Small Group Discussion (SGDs)

| Topic | At the End of Tutorial Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|--------------|---|------------------------|--------------------------|------------------------|
| Blood | • Explain structure and biomedical role of hemoglobin & Myoglobin | C2 | SGD | MCQs, SAQs Viva |
| | • Describe oxygen dissociation curve and its significance. | C2 | | |
| | • Types of Hb | C1 | | |
| Iron | • Describe sources, structure, Biochemical role and related diseases of iron. | C2 | SGD | MCQs, SAQs Viva |

Anatomy Self-Directed Learning (SDL)

| Topics | Learning objectives | Learning Resources |
|--|---|--|
| Posterior compartment of leg and flexor retinaculum | <ul style="list-style-type: none"> • Illustrate cutaneous innervation • Describe superficial fascia & deep fascia. • Discuss superficial and deep muscle groups in posterior compartment • Tabulate origin, insertion, nerve supply and action of all muscles of posterior compartment of leg • Discuss ruptured calcaneal tendon, calcaneal bursitis and accessory soleus muscle • Correlate the clinical aspects • Read relevant research article • Use digital library | <ul style="list-style-type: none"> • Clinically Oriented Anatomy 9th Edition, pg no.755 • https://www.youtube.com/watch?v=Bj4c7wGdIwc&pp=ygUTY29tcGFydG1lbnRzIG9mIGxlZw%3D%3D • https://www.sciencedirect.com/science/article/abs/pii/S1440244004800343 • |
| Neurovascular organization of posterior compartment of leg | <ul style="list-style-type: none"> • Describe origin, course relations, branches and tributaries of neurovascular bundle • Discuss superficial veins i.e long and short saphenous veins • Palpate the posterior tibial pulse • Discuss clinical correlation related to venous return in leg • Correlate the clinical aspects • Read relevant research article • Use digital library | <ul style="list-style-type: none"> • Clinically Oriented Anatomy 9th Edition, pg no. 755 • https://www.youtube.com/watch?v=Bj4c7wGdIwc&pp=ygUTY29tcGFydG1lbnRzIG9mIGxlZw%3D%3D • https://www.mdpi.com/2077-0383/11/21/6448 |
| Foot Joints | <ul style="list-style-type: none"> • Classify the joints of foot • Discuss the articular surfaces, joint capsules, ligaments, movements and muscles producing movements • Discuss major ligaments in detail • Discuss tibial nerve entrapment • Discuss club foot, claw foot and other clinical conditions • Correlate the clinical aspects • Read relevant research article • Use digital library | <ul style="list-style-type: none"> • Clinically Oriented Anatomy 9th Edition, pg no. 808 • https://www.youtube.com/watch?v=Ex9KzkAYN-8&pp=ygUKZm9vdCBqb2ludA%3D%3D • https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3180294/ |
| Ankle joint | <ul style="list-style-type: none"> • Describe the attachment of capsule • Enumerate the ligaments • Discuss the movements possible at ankle joint and muscles producing them • Discuss ankle sprain • Discuss different types of ankle injuries • Correlate the clinical aspects | <ul style="list-style-type: none"> • Clinically Oriented Anatomy 9th Edition, pg no. 806 • https://www.youtube.com/watch?v=Ex9KzkAYN-8&pp=ygUKZm9vdCBqb2ludA%3D%3D |

| | | |
|--------------|---|--|
| | <ul style="list-style-type: none"> • Read relevant research article • Use digital library | <ul style="list-style-type: none"> • https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3414868/ |
| Sole of foot | <ul style="list-style-type: none"> • Identify Surface landmarks • Describe cutaneous innervation of sole of foot • Describe Plantar aponeurosis its attachments • Discuss flexor retinaculum • Discuss muscles in different layers of foot with origin, insertion, nerve supply and actions • Correlate the clinical aspects • Read relevant research article • Use digital library | <ul style="list-style-type: none"> • Clinically Oriented Anatomy 9th Edition, pg no. 768-781 • https://www.youtube.com/watch?v=JorGDBbPzI&pp=ygUcc29sZSBvZiBmb290IGFuYXRvbXkgbGVjdHVyZQ%3D%3D • https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3311689/ |
| Spleen | <ul style="list-style-type: none"> • Discuss the location of spleen • Enumerate anatomical relations of spleen • Discuss blood supply, venous drainage and lymphatic drainage of spleen • Discuss clinical correlations of spleen with special reference to splenectomy • Correlate the clinical aspects • Read relevant research article • Use digital library | <ul style="list-style-type: none"> • Clinically Oriented Anatomy 9th Edition, pg no. 487 • https://www.youtube.com/watch?v=3K5I6MMDA8M&pp=ygUOc3BsZWVuIGFuYXRvbXk%3D • https://www.sciencedirect.com/science/article/pii/S0046817782802232 |
| Gait cycle | <ul style="list-style-type: none"> • Define the gait cycle • Discuss the stages of gait cycle • Correlate the clinical aspects • Read relevant research article • Use digital library | <ul style="list-style-type: none"> • Clinically Oriented Anatomy 9th Edition, pg no. 701, 768-781 • https://www.youtube.com/watch?v=1u6d1CX7o9c&pp=ygUXZ2FpdCBjeWNsZSBiaW9tZWNoYW5pY3M%3D • https://www.sciencedirect.com/topics/engineering/gait-cycle |

Physiology Self-Directed Learning (SDL)

| Topics Of SDL | Learning Objectives | Learning Resources |
|--|---|---|
| <p style="text-align: center;">ON CAMPUS</p> <p>Platelet formation & function. hemostasis, blood coagulation tests (BT, CT, PT, APTT and INR)</p> | <ol style="list-style-type: none"> 1. Explain thrombocytopenia 2. Describe functions of platelets 3. Define hemostasis <ul style="list-style-type: none"> • Explain steps of hemostasis | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition. Section 05, (Chapter 31, Page 564) (Chapter 03, Page 79) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 16, Page 558) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. (Chapter 24, Page 413) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 37, Page 477,487) • https://my.clevelandclinic.org/health/symptoms/21999-hemostasis • https://www.sciencedirect.com/topics/neuroscience/hemostasis |
| <p>Concept of intravascular anticoagulants and bleeding disorders (Vit K deficiency, hemophilia and thrombocytopenia)</p> | <ol style="list-style-type: none"> 1. Explain Intravascular coagulation 2. Discuss Bleeding disorders <ul style="list-style-type: none"> • Enlist Types of hemophilia | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition. Section 05, (Chapter 31, Page 566) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. (Chapter 24, page 427) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 37, Page 484) • https://youtu.be/unp3vGsxlIA • https://www.hematology.org/education/patients/bleeding-disorders |
| <p style="text-align: center;">(OFF CAMPUS):</p> <p>Composition of blood</p> | <ol style="list-style-type: none"> 1. Describe composition and general functions of blood 2. Explain the role of bone marrow in hemopoiesis and erythropoiesis 3. Draw steps of hemopoiesis • 4. Define committed and uncommitted cells | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition. Section 05, Cardiovascular Physiology (Chapter 31, Page 553) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 16, Page 547,548) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. Section 03, Blood (Chapter 19, Page 347) (Chapter 20, Page 356) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Red blood cells, Anemia and Polycythemia. Section 06. (Chapter 33, Page 439) 1. https://accessmedicine.mhmedical.com/content.aspx?bookid=3047&sectionid=255121548 • 2. https://youtu.be/cm8IK24RRvA |
| <p>Function of</p> | <ol style="list-style-type: none"> 1. Enumerate plasma proteins, their properties, sites of productions and their functions 2. Explain effects of deficiency of plasma proteins | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition. Section 05, Cardiovascular Physiology (Chapter 31, Page 563) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 16, Page 547) |

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| Plasma Proteins | <ul style="list-style-type: none"> 3. Discuss conditions associated with decreased production and increased excretion of plasma proteins | <ul style="list-style-type: none"> Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. Section 03, Blood (Chapter 19, Page 348, 353) 1. https://www.ncbi.nlm.nih.gov/books/NBK531504/ 2. https://accessmedicine.mhmedical.com/content.aspx?bookid=1366&sectionid=73247095 |
| <p>WBCs classification & formation.</p> <p>Neutrophils, Eosinophils & Basophils and their properties</p> | <p>Enumerate and explain various types of leukocytes and steps of leucopoiesis</p> <p>Explain the characteristics and functions</p> <p>Conditions in which these cells are increased and decreased</p> <ul style="list-style-type: none"> Leukemias and their effects on the body | <ul style="list-style-type: none"> Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Resistance of the body to Infection. Section 06. (Chapter 34, Page 449, 456, 457) 1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9777002/ 2. https://youtu.be/TelOcCkZX7c |
| <p>Monocytes - macrophage system & lymphocytes</p> | <p>Explain the characteristics and functions of monocytes.</p> <ul style="list-style-type: none"> Explain monocyte-macrophage system; importance | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology. 25TH Edition. Section 01, Immunity, Infection and Inflammation (Chapter 03, Page 67) Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. Section 03, Blood (Chapter 21, Page 371) (Chapter 22, Page 387) Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Section 06. (Chapter 34, Page 450-452) 1. https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/mononuclear-phagocyte-system 2. https://bmcbiol.biomedcentral.com/articles/10.1186/s12915-017-0392-4 |
| <p>Process of inflammation and Lines of defense during inflammation</p> | <ol style="list-style-type: none"> Describe the role of neutrophils and monocytes in inflammation <ul style="list-style-type: none"> Elaborate Lines of defense | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology. 25TH Edition. Section 01, Immunity, Infection and Inflammation (Chapter 03, Page 81) Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. Section 03, Blood (Chapter 22, Page 384) Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Section 06. (Chapter 34, Page 454) 1. https://youtu.be/WFm9j1rNkQs 2. https://en.wikipedia.org/wiki/Inflammation 3. https://www.verywellhealth.com/signs-of-inflammation-4580526 |

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| <p>Red cell fragility, ESR & Red cell indices, Anemia & polycythemia</p> | <ol style="list-style-type: none"> 1. Define RBC fragility; importance; conditions in which fragility is changed. 2. Discuss various blood indices, give their formulae, co-relate with different types of anemias. 3. Enumerate various types of anemias and polycythemias. <ul style="list-style-type: none"> • Discuss details about various types of anemias and polycythemia and their effect on circulatory system. | <ol style="list-style-type: none"> 1. Ganong's Review of Medical Physiology.25TH Edition. Section 05, (Chapter 31, Page 555) 2. Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 16, Page 553) 3. Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. (Chapter 23, Page 407,409) 4. Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 34, Page 446,447) <ol style="list-style-type: none"> 1. https://www.sciencedirect.com/topics/medicine-and-dentistry/red-blood-cell-indices 2. https://youtu.be/QUHqYVK-Nhg 3. https://youtu.be/mOrRJBqm744 |
| <p>Blood coagulation</p> | <ul style="list-style-type: none"> • Explain hemostasis, mechanism of blood coagulation, fibrinolysis and anticoagulants | <ol style="list-style-type: none"> 1. Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 16, Page 559) 2. Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. (Chapter 24, Page 417) 3. Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 37, Page 479) <ol style="list-style-type: none"> 1. https://youtu.be/gExUCrpAKyQ 2. https://medlineplus.gov/lab-tests/coagulation-factor-tests/ |
| <p>ABO & Rh Blood grouping system</p> | <ul style="list-style-type: none"> • Blood group and its types Rh Blood Grouping System | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition. Section 05, (Chapter 31, Page 558) (Chapter 36, Page 473) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. (Chapter 25, Page 432) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 06. (Chapter 36, Page 471) • https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/abo-blood-group-system • https://youtu.be/wfqnuYIY78 |

Biochemistry Self-Directed Learning (SDL)

| Topics Of SDL | Learning Objectives | Learning resources |
|---------------------------------------|--|--|
| Structure of hemoglobin and myoglobin | <ul style="list-style-type: none"> Describe Structure of hemoglobin Describe structure of myoglobin. Discuss Biochemical roles of hemoglobin and myoglobin. | <ul style="list-style-type: none"> Lippincott Illustrated reviews of biochemistry 8th edition (Chapter 03, page 25-28) https://doi.org/10.1016/j.bcmed.2017.10.006 https://www.youtube.com/watch?v=Qv-KExGKAYw Use digital library https://chemed.chem.purdue.edu/genchem/topicreview/bp/1biochem/blood3.html |
| Types of Hemoglobin | <ul style="list-style-type: none"> Enlist various types of Hemoglobin. Describe Importance of heme and globin components Interpret importance of HbA1c in diagnosis of Diabetes | <ul style="list-style-type: none"> Lippincott Illustrated reviews of biochemistry 8th edition (Chapter 03, page 33-34) https://pubmed.ncbi.nlm.nih.gov/34200315/ https://www.youtube.com/@DrAishwaryaKelkar Use digital library https://www.ucsfhealth.org/medical-tests/hemoglobin-electrophoresis#:~:text=Many%20different%20types%20of%20hemoglobin,have%20small%20amounts%20of%20HbF |
| Oxygen dissociation curve. | <ul style="list-style-type: none"> Discuss Importance of oxygen dissociation curve. Enlist various factors affecting the curve. | <ul style="list-style-type: none"> Lippincott Illustrated reviews of biochemistry 8th edition (Chapter 03, page 28-32) https://pubmed.ncbi.nlm.nih.gov/2650756/ https://youtu.be/BYGpKRFvzOc Use digital library https://www.osmosis.org/learn/Oxygen-hemoglobin_dissociation_curve |
| Hemoglobinopathies | <ul style="list-style-type: none"> Discuss hemoglobinopathies. Enlist Types of thalassemia. Discuss Familial counseling. Elaborate Preventive measures. | <ul style="list-style-type: none"> Lippincott Illustrated reviews of biochemistry 8th edition (Chapter 03, page 35-39) https://pubmed.ncbi.nlm.nih.gov/30193516/ https://youtu.be/34u1sOLrgV0 Use digital library https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3163784/ |
| Heme synthesis | <ul style="list-style-type: none"> Describe enzymatic regulation of heme synthesis | <ul style="list-style-type: none"> Lippincott Illustrated reviews of biochemistry 8th edition (Chapter 21, page 277-279) https://www.sciencedirect.com/science/article/pii/S089158499900 |

| | | |
|-------------------------|---|---|
| | | <p>2233</p> <ul style="list-style-type: none"> • Use digital library • https://www.youtube.com/watch?v=f-0n_eOK4JE • https://pubmed.ncbi.nlm.nih.gov/29126700/ |
| Porphyria | <ul style="list-style-type: none"> • Discuss various types of porphyria | <ul style="list-style-type: none"> • Lippincott Illustrated reviews of biochemistry 8th edition (Chapter 21, page 279-281) • https://pubmed.ncbi.nlm.nih.gov/20226990/ • https://www.mayoclinic.org/diseases-conditions/porphyria/symptoms-causes/syc-20356066#:~:text=Porphyria%20(por%2DFEAR%2De,the%20body's%20organs%20and%20tissues. • https://www.aacc.org/science-and-research/clinical-chemistry-trainee-council/trainee-council-in-english/pearls-of-laboratory-medicine/2012/porphyrias |
| Breakdown of hemoglobin | <ul style="list-style-type: none"> • Elaborate steps in the breakdown of hemoglobin. • Describe Steps in synthesis of Bilirubin • Recall Normal level of S. Bilirubin. | <ul style="list-style-type: none"> • Lippincott Illustrated reviews of biochemistry 8th edition (Chapter 21, page 282-283) • https://www.sciencedirect.com/science/article/pii/S0891584999002233 • Use digital library • https://www.youtube.com/watch?v=f-0n_eOK4JE • https://pubmed.ncbi.nlm.nih.gov/29126700/ |
| Jaundice | <ul style="list-style-type: none"> • Define jaundice. • Recall normal level of Bilirubin. • Enlist types of Jaundice. • Describe Biochemical tests to distinguish various types of jaundice. • Describe Physiological Jaundice | <ul style="list-style-type: none"> • Lippincott Illustrated reviews of biochemistry 8th edition (Chapter 21, page 284-285) • https://pubmed.ncbi.nlm.nih.gov/14765767/ • https://www.youtube.com/watch?v=gIACp5js4MU • https://my.clevelandclinic.org/health/diseases/15367-adult-jaundice |
| Plasma proteins | <ul style="list-style-type: none"> • Describe plasma proteins. • Discuss Biochemical role of various plasma proteins. • Recall normal levels of plasma proteins • Illustrate Role of A/G ratio. | <ul style="list-style-type: none"> • Harpers Illustrated biochemistry 30th edition (Chapter 49, page 588-589) • http://ib.bioninja.com.au/options/option-d-human-physiology/d3-functions-of-the-liver/plasma-proteins.html • https://www.nottingham.ac.uk/nmp/sonet/rlos/bioproc/plasma_proteins/page_three.html • https://pubmed.ncbi.nlm.nih.gov/21544836/ • Use digital library |

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| Acute phase proteins & Albumin | <ul style="list-style-type: none"> Describe Role of albumin. Discuss Role of C- reactive protein. | <ul style="list-style-type: none"> Harpers Illustrated biochemistry 30th edition (Chapter 49, page 590-592) https://www.youtube.com/watch?v=xMSE1ad0z8 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3053509/ https://pubmed.ncbi.nlm.nih.gov/9971870/ Use digital library |
| Haptoglobin and transferrin | <ul style="list-style-type: none"> Describe Structure of Haptoglobin and transferrin. Discuss biochemical Role of Haptoglobin and transferrin. | <ul style="list-style-type: none"> Harpers Illustrated biochemistry 30th edition (Chapter 49, page 592) https://pubmed.ncbi.nlm.nih.gov/23016887/ https://www.youtube.com/watch?v=QR_hcSow4OI https://pubmed.ncbi.nlm.nih.gov/7027909/ Use digital library |
| Ferritin and hemosiderin | <ul style="list-style-type: none"> Describe biochemical role of ferritin and hemosiderin. Describe Hemosiderosis. | <ul style="list-style-type: none"> Harpers Illustrated biochemistry 30th edition (Chapter 49, page 592-594) http://www.vivo.colostate.edu/hbooks/pathphys/topics/ferritin.html https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4831249/ https://www.forthwithlife.co.uk/blog/whats-the-difference-between-ferritin-and-iron/ Use digital library |
| Ceruloplasmin. | <ul style="list-style-type: none"> Describe biochemical role of ceruloplasmin. Discuss Wilson's disease. | <ul style="list-style-type: none"> Harpers Illustrated biochemistry 30th edition (Chapter 49, page 595-597) https://pubmed.ncbi.nlm.nih.gov/12055353/ https://www.youtube.com/watch?v=KCh-7Ghj0jY https://www.mountsinai.org/health-library/tests/ceruloplasmin-blood-test Use digital library |
| Antiproteases and amyloidosis | <ul style="list-style-type: none"> Describe biochemical role of antiproteases and amyloidosis. | <ul style="list-style-type: none"> Harpers Illustrated biochemistry 30th edition (Chapter 49, page 597-598) https://pubmed.ncbi.nlm.nih.gov/31986086/ https://pubmed.ncbi.nlm.nih.gov/1719439/ https://www.youtube.com/watch?v=CQ5q3phGdtQ Use digital library |

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| Immunoglobulins | <ul style="list-style-type: none"> Describe Structure of Immunoglobulin. Discuss biochemical role of various Immunoglobulin. Elaborate Class switching. | <ul style="list-style-type: none"> Harpers Illustrated biochemistry 30th edition (Chapter 49, page 599-603) https://pubmed.ncbi.nlm.nih.gov/4188929/ https://www.youtube.com/watch?v=29mlSMaD-cY https://medlineplus.gov/lab-tests/immunoglobulins-blood-test/#:~:text=Immunoglobulins%20are%20also%20called%20antibodies,to%20destroy%20only%20those%20germs. Use digital library |
| AIDs | <ul style="list-style-type: none"> Define AIDs Describe Immunological defects in AIDs. Discuss various preventive measures. | <ul style="list-style-type: none"> Mushtaq volume II, 7th edition (chapter 11 page – 333-338) https://pubmed.ncbi.nlm.nih.gov/3277764/ https://www.who.int/news-room/fact-sheets/detail/hiv-aids#:~:text=Acquired%20immunodeficiency%20syndrome%20(AIDS)%20is,tuberculosis%2C%20infections%20and%20some%20cancers. https://www.cdc.gov/hiv/basics/whatisshiv.html Use digital library |
| Folic acid. | <ul style="list-style-type: none"> Recall Sources of folic acid. Discuss deficiency effects of folic acid Describe biochemical role of folic acid. Recall Recommended Dietary allowance. | <ul style="list-style-type: none"> Lippincott Illustrated reviews of biochemistry 8th edition (Chapter 28, page 378-379) https://pubmed.ncbi.nlm.nih.gov/29777755/ https://www.cdc.gov/ncbddd/folicacid/about.html https://www.cdc.gov/ncbddd/folicacid/about.html#:~:text=When%20the%20baby%20is%20developing,the%20early%20brain%20and%20spine. Use digital library |
| Vitamin B12 | <ul style="list-style-type: none"> Recall Sources of Vitamin B12 Describe biochemical role of vitamin B12 Discuss Deficiency effects of B12 | <ul style="list-style-type: none"> Lippincott Illustrated reviews of biochemistry 8th edition (Chapter 28, page 379-381) https://pubmed.ncbi.nlm.nih.gov/25824066/ https://ods.od.nih.gov/factsheets/VitaminB12-HealthProfessional/ https://www.youtube.com/watch?v=j-2xHmcKkcy Use digital library |

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| Iron | <ul style="list-style-type: none"> Recall Sources of iron. Describe Transport and absorption of iron. Discuss hyper and hypo functions of iron. | <ul style="list-style-type: none"> Lippincott Illustrated reviews of biochemistry 8th edition (Chapter 29, page 403-404) https://pubmed.ncbi.nlm.nih.gov/34373750/ https://www.youtube.com/watch?v=vSkb0kDacjs https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/ Use digital library |
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Histology Practicals Skill Laboratory (SKL)

| Topic | At the End of The Session Students Should Be Able To: | Learning Domains | Teaching Strategy | Assessment Tools |
|------------|--|------------------|-------------------|------------------|
| Lymph node | • Identify lymph node under microscope | P | Skill Lab | OSPE |
| | • Focus the slide | P | | |
| | • Draw the histological structure of lymph node | C2 | | |
| | • Enlist two identification points of lymph node | C1 | | |
| Thymus | • Identify the slide of thymus under light microscope | P | Skill Lab | OSPE |
| | • Focus the slide | P | | |
| | • Draw the histological structure of thymus | C2 | | |
| | • Enlist two identifications points of thymus | C1 | | |
| Spleen | • Identify the slide of spleen under light microscope | P | Skill Lab | OSPE |
| | • Focus the slide | P | | |
| | • Draw histological structure of spleen, | C2 | | |
| | • Enlist two identification points of spleen | C1 | | |
| Tonsils | • Identify the slide of tonsils under light microscope | P | Skill Lab | OSPE |
| | • Focus the slide | P | | |
| | • Draw histological structure of tonsils | C2 | | |
| | • Write two identification points of tonsils | C1 | | |

Physiology Practicals Skill Laboratory (SKL)

| Topic | Learning Objectives | Learning Domains | Learning Strategy | Assessment Tools |
|--|--|-------------------|-------------------------|--|
| Determination of Rh blood group | <ul style="list-style-type: none"> • Principle • Procedure • Methods • Types of blood groups • Clinical Correlations of blood transfusion | C1/C3 A3 P3 | Practical/ skill lab | Viva Voce OSPE Video Assisted Assessment |
| Determination of Clotting time (CT) | <ul style="list-style-type: none"> • Procedure • Clinical importance • Recall Normal values | C1/C3 A3 P3 | Practical/ skill lab | Viva Voce OSPE Video Assisted Assessment |
| Determination of Bleeding time (BT) | <ul style="list-style-type: none"> • Procedure • Clinical importance • Recall Normal values | C1/C3 A3 P3 | Practical/ skill lab | Viva Voce OSPE Video Assisted Assessment |
| Recording of Body Temperature | <ul style="list-style-type: none"> • Principle • Procedure • Methods • Clinical Correlations | C1/C3 A3 P3 | Practical/ skill lab | Viva Voce OSPE Video Assisted Assessment |
| Reference: Saqib Practical Copy First Year | | | | |

Biochemistry Practical Skill Laboratory (SKL)

| Topic | At the End of Practical Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|---|---|------------------------|--------------------------|------------------------|
| Draw of Blood Technique | <ul style="list-style-type: none"> • How to draw blood | P | Skill Lab | OSPE |
| Quantitative Estimation of Serum Total Proteins | <ul style="list-style-type: none"> • Perform estimation of serum Protein • Describe Principal, method, normal blood level and clinical significance of S. Proteins | P | Skill Lab | OSPE |
| Hemin crystals Technique to draw blood | <ul style="list-style-type: none"> • Describe Preparation, shape and clinical significance of hemin crystals Illustrate Method and precautions to draw blood. | P | Skill Lab | OSPE |
| Estimation of S. Bilirubin | <ul style="list-style-type: none"> • Perform estimation of serum bilirubin • Describe Principal, method, normal blood level and clinical significance of S. Bilirubin | P | Skill Lab | OSPE |

Basic and Clinical Sciences (Vertical Integration)

Content

- **Case Based Learning (CBLs)**
- **Problem Based Learning (PBL)**
- **Vertical Integration Large Group Interactive Session (LGIS)**

Case Based Learning Objectives (CBL)

| Subjects | Topics | At the end of the session the student should be able to | Learning Domains |
|--------------|----------------|--|------------------|
| Anatomy | • Ankle sprain | Apply basic knowledge of subject to study clinical case. | C3 |
| | • Flat foot | Apply basic knowledge of subject to study clinical case. | C3 |
| Physiology | • Anemia | Apply basic knowledge of subject to study clinical case | C3 |
| Biochemistry | • Thalassemia | Apply basic knowledge of subject to study clinical case. | C3 |
| | • Jaundice | Apply basic knowledge of subject to study clinical case. | C3 |

Vertical Integration LGIS

Pathology

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|---------------------------|---|-----------------|-------------------|-----------------|
| Mediators of Inflammation | • Define inflammation | C1 | LGIS | MCQ |
| | • Classify inflammation | C2 | | |
| | • Classify mediators of inflammation • Cell derived Plasma derived | C2 | | |
| | • Describe general features of mediators of inflammation | C1 | | |

Medicine

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|----------|--|-----------------|-------------------|-----------------|
| Jaundice | • Discuss Jaundice. | C2 | LGIS | MCQs |
| | • Discuss various Types and Subtypes of Jaundice. | C2 | | |
| | • Discuss the signs and symptoms of a patient with Jaundice due to various Causes. | C2 | | |
| | • Discuss the workup for diagnosis of different type of Jaundice | C2 | | |
| | • Discuss Treatment of Various Causes of Jaundice. | C2 | | |
| | • Discuss the diagnostic workup and treatment. | C2 | | |
| | • Define Heat Stroke. | C1 | | |
| | • Discuss the clinical Presentation of Heat Stroke. | C2 | | |
| | • Discuss the diagnostic workup and management. | C2 | | |

Obstetrics & Gynecology

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|---|--|-----------------|-------------------|-----------------|
| Rh incompatibility and its significance | • Know the basic pathophysiology of Rh sensitization | C2 | LGIS | MCQs |
| | • Describe the fetal effects of Rh isoimmunization | C2 | | |
| | • Understand signs of fetal anemia | C2 | | |
| | • Describe role of Anti-D antibodies in prevention of Rh isoimmunization | C2 | | |

Spirally Integrated Courses / General Education Cluster (GEC) Courses

Content

- **Longitudinal Themes**
 - **The Holy Quran Translation**
 - **Family Medicine**
 - **Biomedical Ethics & Professionalism**
 - **Early Clinical Exposure (ECE)**

Family Medicine

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|--------|--|-----------------|-------------------|-----------------|
| Anemia | • Define Anemia. | C1 | LGIS | MCQs |
| | • Discuss various Types and Subtypes of Anemia. | C2 | | |
| | • Discuss the signs and symptoms of a patient with Anemia. | C2 | | |
| | • Discuss the workup for diagnosis of type of anemia. | C2 | | |
| | • Discuss Treatment of Various types of anemia. | C2 | | |

Biomedical Ethics

| Topics | At the end of session students should be able to: | Learning Domains | Teaching Strategy | Assessment Tools |
|-------------------|--|-------------------------------|---|--|
| Laboratory Ethics | <p>At the end of the session students should be able to;</p> <ul style="list-style-type: none"> • 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 | <p>A1</p> <p>A1</p> <p>A2</p> | <p>Short video demonstration on violation of Ethical principle of autonomy from suit CBEC Video resources</p> | <ul style="list-style-type: none"> • Assignment based assessment involving real life case scenarios under aggregate Marks (Internal Assessment) • Assignment to be uploaded on LMS |



➤ SECTION – VII

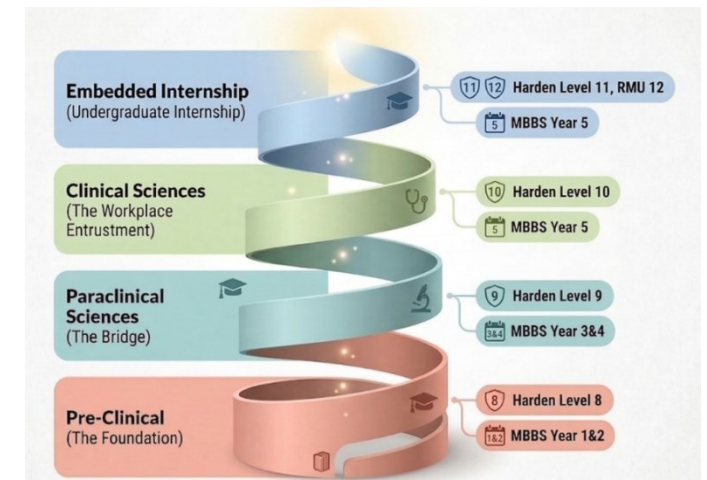
RMU 12

Integrated Modular Curriculum 2026

Isolation to **Beyond Boundaries**

➤ Block-III

- Cardiovascular System Module-I
- Respiration Module-I





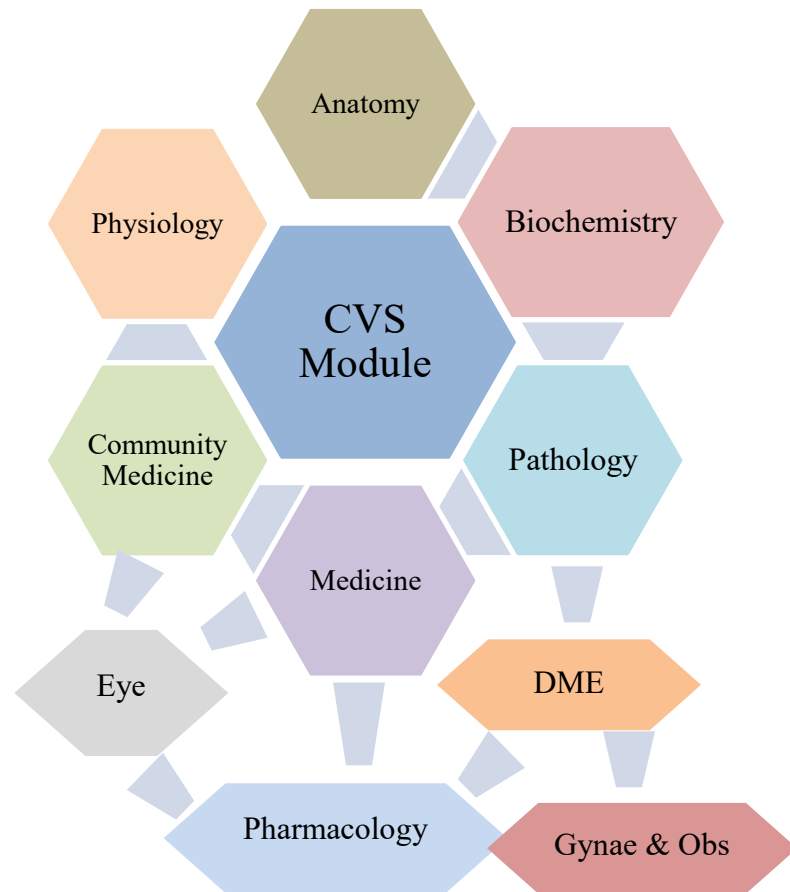
RMU 12

Integrated Modular Curriculum 2026

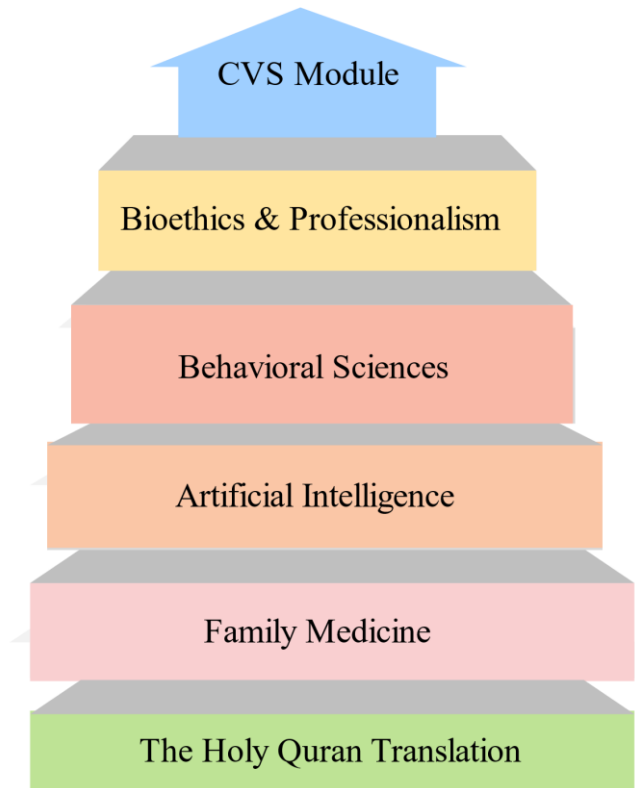
Isolation to **Beyond Boundaries**

Cardiovascular System Module-I

Integration of Disciplines in Cardiovascular System Module



Spiral /General Education Cluster Courses



Discipline Wise Details of Modular Content

| Block | Department | General Anatomy | Embryology | Histology | Gross Anatomy | |
|---|--|--|---|---|---|--|
| III | <ul style="list-style-type: none"> Anatomy | <ul style="list-style-type: none"> Heart & Vessels | <ul style="list-style-type: none"> Cardiovascular System | <ul style="list-style-type: none"> Heart & Vessels | <ul style="list-style-type: none"> Mediastinum, Heart, Great Vessels | |
| | <ul style="list-style-type: none"> Biochemistry | <ul style="list-style-type: none"> Carbohydrate chemistry, Lipid chemistry | | | | |
| | <ul style="list-style-type: none"> Physiology | <ul style="list-style-type: none"> The Heart as a Pump and Function of the Heart Valves & regulation of heart pumping, cardiac cycle Rhythmical Excitation of the Hear & Specialized excitatory & conductive system of the heart & its control (revisit) Electrocardiogram, its interpretation & its abnormalities Medical Physics of Pressure, Flow, and Resistance, Vascular Distensibility and Functions of the Arterial and Venous Systems Microcirculation and the Lymphatic System, Local and Humoral Control of Blood Flow by the Tissues Nervous Regulation of the Circulation, and Rapid & Long-Term Control of Arterial Pressure, hypertension Cardiac Output, Venous Return, and Their Regulation Muscle Blood Flow and Cardiac Output During Exercise; the Coronary & regional circulation Cardiac Failure, Circulatory Shock Heart Valves and Heart Sounds; Dynamics of Valvular and Congenital Heart Defects | | | | |
| | Spiral Courses | | | | | |
| | <ul style="list-style-type: none"> The Holy Quran Translation | <ul style="list-style-type: none"> Mumamalat-I Muashrat-II Ekhlaqiaat-I Mumamalat -II | | | | |
| | <ul style="list-style-type: none"> Behavioural Sciences, Bioethics & Professionlism | <ul style="list-style-type: none"> Breaking the bad news Stigma to mental illness | | | | |
| | <ul style="list-style-type: none"> Radiology, Artificial Inteligence & Innovation | <ul style="list-style-type: none"> Chest radiograph with perspective of cardiovascular system Radiology with perspective of Artificial Intelligence & Innovation. | | | | |
| | <ul style="list-style-type: none"> Family Medicine | <ul style="list-style-type: none"> Approach to a patient with chest pain | | | | |
| | Vertical Integration | | | | | |
| | <ul style="list-style-type: none"> Community Medicine | <ul style="list-style-type: none"> Risk factors of coronary vascular disease | | | | |
| | <ul style="list-style-type: none"> DME | <ul style="list-style-type: none"> DME orientation/paper discussion | | | | |
| | <ul style="list-style-type: none"> Pathology | <ul style="list-style-type: none"> Thrombosis & Infarction | | | | |
| | <ul style="list-style-type: none"> Eye | <ul style="list-style-type: none"> Hypertensive retinopathy | | | | |
| | <ul style="list-style-type: none"> Medicine | <ul style="list-style-type: none"> ECG Changes (MI, Electrical Imbalance, Myocardial hypertrophy) Overview of acute coronary syndrome & management of heart failure & management of shock Hypertension | | | | |
| | <ul style="list-style-type: none"> Pharmacology | <ul style="list-style-type: none"> Clinical pharmacology of antihypertensive drugs | | | | |
| <ul style="list-style-type: none"> Gynae & Obs | <ul style="list-style-type: none"> Cardiovascular changes in pregnancy | | | | | |
| Early Clinical Exposure (ECE) | | | | | | |

| | | |
|--|--|--|
| | <ul style="list-style-type: none"> • Cardiology | <ul style="list-style-type: none"> • See cases of Heart Failure and Dyspnea Raised JVP/Oedema • Clinical Examination of Precordium • Normal Heart Sounds • Additional heart sounds See Cases of Coronary Heart Disease |
| | <ul style="list-style-type: none"> • Radiology | <ul style="list-style-type: none"> • X-Ray chest • Cardiomegaly • Radiological signs of heart failure |
| | <ul style="list-style-type: none"> • Pediatrics | <ul style="list-style-type: none"> • See cases of congenital heart diseases • Pediatric case of Heart Failure |

CVS Module Team

| | | |
|--------------------|---|--------------------|
| Module Name | : | CVS Module |
| Duration of module | : | 05 Weeks |
| Coordinator | : | Dr. Aneela Yasmeen |
| Co-Coordinator | : | Dr. Sheena Tariq |
| Reviewed by | : | Module Committee |

| Module Committee | | | Module Task Force Team | | |
|------------------|---|--------------------------------|--------------------------------|---|---|
| 1. | Vice Chancellor RMU | Prof. Dr. Muhammad Umar | 1. | Coordinator | Dr. Aneela (Senior Demonstrator of Physiology) |
| 2. | Chairperson Anatomy & Dean Basic Sciences | Prof. Dr. Ayesha Yousaf | 2. | DME Focal Person | Dr. Farzana Fatima |
| 3. | Director DME | Prof. Dr. Ifra Saeed | 3. | Co-coordinator | Dr. Kashif (Senior Demonstrator of Anatomy) |
| 4. | Chairperson Physiology | Prof. Dr. Samia Sarwar | 4. | Co-Coordinator | Dr. Romessa Naeem (Demonstrator Biochemistry) |
| 5. | Chairperson Biochemistry | Dr. Aneela Jamil | 5. | Co-coordinator | Dr. Sheena Tariq (Senior Demonstrator Physiology) |
| 6. | Focal Person Anatomy First Year MBBS | Asso. Prof. Dr. Mohtashim Hina | DME Implementation Team | | |
| 7. | Focal Person Physiology | Dr. Sidra Hamid | | | |
| 8. | Focal Person Biochemistry | Dr. Aneela Jamil | 1. | Director DME | Prof. Dr. Ifra Saeed |
| 9. | Focal Person Pharmacology | Dr. Zunera Hakim | 2. | Assistant Director DME | Dr. Farzana Fatima |
| 10. | Focal Person Pathology | Dr. Asiya Niazi | 3. | Implementation Incharge 1st & 2 nd Year MBBS | Prof. Dr. Ifra Saeed Dr. Farzana Fatima |
| 11. | Focal Person Behavioral Sciences | Dr. Saadia Yasir | 4. | Editor | Muhammad Arslan Aslam |
| 12. | Focal Person Community Medicine | Dr. Afifa Kulsoom | | | |
| 13. | Focal Person Quran Translation Lectures | Dr. Fahad Anwar | | | |
| 14. | Focal Person Family Medicine | Dr. Sadia Khan | | | |

Module V – CVS Module

Rationale: The main role of the cardiovascular system in the body is to transport oxygen to all tissues in the body and for removing, from these same tissues, metabolic waste products. The system itself consists of the blood, the medium for exchanging oxygen, nutrients and waste products throughout the body, the blood vessels, the pipes through which the blood flows and the heart, the pump which forces blood to flow through the blood vessels.

Cardiovascular health is important in maintaining overall health and wellness. This module will teach how heart and cardiovascular system work when healthy, and what happens when diseased. We will explore through lectures, SGDs and skill lab normal anatomy, physiology, biochemistry of CVS. This module will briefly discuss the common CVS diseases & their prevention, therapeutic drug treatment, behavioral aspects, radiological findings.

Module Outcomes

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

Knowledge:

1. Explain the structural & developmental organization of CVS.
2. Explain different waves, segment and intervals of ECG and apply it to the interpretation of ECG.
3. Use technology based medical education including.
Artificial Intelligence.
4. Appreciate concepts & importance of
Family Medicine
Biomedical Ethics
Research

Skill:

1. Understand the physiology of conductive system of heart, cardiac cycle.
2. Must understand the pathophysiology of edema, infarction, shock and thrombosis.

Attitude:

- Demonstrate **Professional Attitude, Team-Building Spirit and Good Communication Specially in Small Group Discussions.**

Learning Objectives, Teaching Strategies & Assessments

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



Syllabus of Cardiovascular System Module

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 Tool |
|---|--|-----------------|-------------------|--------------------|
| General Anatomy | | | | |
| General Anatomy of CVS (General Organization) | • Describe general organization of cardiovascular system | C2 | LGIS | MCQ SAQ VIVA |
| | • Describe different types of circulations | C2 | | |
| | • Discuss general structural patterns of arteries and veins | C2 | | |
| | • Classify capillaries | C1 | | |
| | • Explain bio - functional importance and location of continuous, fenestrated and sinusoidal capillaries | C2 | | |
| | • Discuss related clinicals | C3 | | |
| | • To understand the Biophysiological aspects | C3 | | |
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| • How to read relevant research article | C3 | | | |
| General Anatomy of CVS (Classification of vessels) | • Classify arteries on the basis of function and size | C1 | LGIS | MCQ SAQ VIVA |
| | • Classify veins on the basis of function and size | C1 | | |
| | • Describe differences between arteries and veins | C2 | | |
| | • Define anastomosis and discuss different types of arterial and venous anastomosis | C2 | | |
| | • Differentiate between anatomic end arteries and functional end arteries giving example | C2 | | |
| | • Discuss related clinicals | C3 | | |
| | • To understand the Biophysiological aspects | C3 | | |
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| • How to read relevant research article | C3 | | | |
| Histology | | | | |
| Histology of CVS (Arteries and Veins) | • Describe general histological structure of arteries and veins | C2 | LGIS | MCQ SAQ VIVA |
| | • Tabulate histological differences between arterioles, medium sized arteries, and large arteries | C2 | | |
| | • Discuss related clinicals | C3 | | |
| | • To understand the Biophysiological aspects | C3 | | |

| | | | | |
|---|--|----|------|--------------------|
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • How to read relevant research article | C3 | | |
| Histology of CVS (Capillaries) | • Differentiate between continuous, fenestrated and sinusoidal capillaries | C2 | LGIS | MCQ SAQ VIVA |
| | • Enlist bio functions of endothelium | C2 | | |
| | • Discuss related clinicals | C2 | | |
| | • To understand the Biophysiological aspects | C3 | | |
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • How to Read How to read relevant research article | C3 | | |
| Histology of CVS (Tunics of Heart & Lymphatic System) | • Describe histological details of endocardium, myocardium and epicardium | C3 | LGIS | MCQ SAQ VIVA |
| | • Tabulate differences between blood capillaries and lymphatic capillaries | C2 | | |
| | • Discuss biophysiological aspects of Heart & Lymphatic System | C2 | | |
| | • To understand the Biophysiological aspects | C3 | | |
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • How to Read How to read relevant research article | C3 | | |
| Embryological Development | | | | |
| Development of CVS (Development of Veins) | • Recall the process of vasculogenesis | C2 | LGIS | MCQ SAQ VIVA |
| | • Describe venous drainage of embryo | C2 | | |
| | • Enlist derivatives of vitelline veins | C1 | | |
| | • Discuss role cardinal veins | C2 | | |
| | • Describe Development of inferior vena cava | C2 | | |
| | • Discuss related Congenital abnormalities | C3 | | |
| | • To understand the Biophysiological aspects | C3 | | |
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • How to read relevant research article | C3 | | |
| | • Describe development and transformation of aortic arches | C2 | | MCQ |
| | • Enlist derivatives of 1-6th aortic arches | C1 | | |
| | • Discuss formation of intersegmental arteries | C2 | | |

| | | | | |
|--|---|----|------|--------------------|
| Development of CVS (Aortic Arches and derivatives) | • Describe sources and formation of coronary arteries | C2 | LGIS | SAQ VIVA |
| | • Discuss development of aorta Related Congenital abnormalities | C3 | | |
| | • To understand the Biophysiological aspects | C3 | | |
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • How to read relevant research article | C3 | | |
| Development of CVS (Formation, Position and Partitioning of heart tube) | • Discuss establishment of cardiogenin field | C2 | LGIS | MCQ SAQ VIVA |
| | • Describe formation and position of heart tube in developing embryo | C2 | | |
| | • Discuss formation of cardiac loop | C2 | | |
| | • Describe development of sinus venosus | C2 | | |
| | • Explain importance of septum spurium | C2 | | |
| | • Describe development of cardiac septa | C2 | | |
| | • Discuss different methods of septum formation | C2 | | |
| | • Explain septum formation in right atrium | C2 | | |
| | • Describe development and differentiation of atria | C2 | | |
| | • Discuss related congenital abnormalities | C3 | | |
| | • To understand the Biophysiological aspects | C3 | | |
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| • How to read relevant research article | C3 | | | |
| Development of CVS (Formation and partitioning of Ventricles) | • Discuss formation of septum in atrioventricular canal | C2 | LGIS | MCQ SAQ VIVA |
| | • Describe formation of atrioventricular valves | C2 | | |
| | • Explain septum formation in truncus arteriosus & conus cordis | C2 | | |
| | • Describe septum formation in ventricles Discuss formation of semilunar valves | C2 | | |
| | • Discuss development of conducting system of heart | C2 | | |
| | • Discuss related Congenital abnormalities | C3 | | |
| | • To understand the Biophysiological aspects | C3 | | |
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| • How to read relevant research article | C3 | | | |
| | • Describe fetal circulation in detail | C2 | | |

| | | | | |
|---|---|----|------|--------------------|
| Development of CVS (Fetal circulation) | • Discuss role of foramen ovale, ductus arteriosus and ductus venosus in fetal circulation and their fate | C2 | LGIS | MCQ SAQ VIVA |
| | • Differentiate between fetal and postnatal circulation | C2 | | |
| | • Discuss related Congenital abnormalities | C3 | | |
| | • To understand the Biophysiological aspects | C3 | | |
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |

Physiology Large Group Interactive Session (LGIS)

| Topics | Learning Objectives | References | Learning Resources | Learning Domains | Learning Strategy | Assessment Tools |
|--|---|--|--|------------------|-------------------|---|
| Introduction to CVS | 1. Describe scheme of circulation through the heart and body | <ul style="list-style-type: none"> Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Cardiovascular Physiology (Chapter 14, Page 469) Physiology by Linda S. Costanzo 6th Edition. Cardiovascular Physiology (Chapter 4, Page 117) Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. Section 02, (Chapter 05, Page 101) | <ol style="list-style-type: none"> https://youtu.be/28CYhgjrBLA https://training.seer.cancer.gov/anatomy/cardiovascular/#:~:text=The%20cardiovascular%20system%20is%20sometimes,arteries%2C%20veins%2C%20and%20capillaries. | 1.C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Classification of blood vessels & Biophysical considerations | 1. Enumerate Classification of blood vessels. 2. Explain structure and functions of types of blood vessels | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology. 25TH Edition. Section 05, Cardiovascular Physiology (Chapter 31, Page 567, 571) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 15, Page 513) Physiology by Linda S. Costanzo 6th Edition. Cardiovascular Physiology (Chapter 4, Page 119) | <ol style="list-style-type: none"> https://youtu.be/ar2_UPiGzmU https://training.seer.cancer.gov/anatomy/cardiovascular/blood/classification.html | C1 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |

| | | | | | | |
|--|---|--|--|----------------|------|---|
| | | <ul style="list-style-type: none"> Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 04 (Chapter 15, Page 183) | | | | |
| Heart Sounds | Describe four heart sound and differences between 1st and 2nd heart sounds | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 05, Cardiovascular Physiology (Chapter 30, Page 542) Textbook of Medical Physiology by Guyton & Hall.14th Edition.Section 04. (Chapter 23, Page 283) | <ol style="list-style-type: none"> https://youtu.be/dBwr2GZCmQM https://www.utmb.edu/pedi_ed/CoreV2/Cardiology/cardiologV2/cardiologV23.html | C1/C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Aseessment, MST based Assessment) OSPE |
| Regulation of blood flow | Define and describe Resistance to Blood flow Describe regulation of Blood pressure and Poiseuilles law Describe factors related with Blood viscosity and its role in regulation | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 05, Cardiovascular Physiology (Chapter 31, Page 575) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 02(Chapter 5, Page 107) (Chapter 6,page 110) Textbook of Medical Physiology by Guyton & Hall.14th Edition.Section 04. (Chapter 14, Page 173) (Chapter 17, Page 205) | <ol style="list-style-type: none"> https://youtu.be/cocB-M3h9k0 https://journals.physiology.org/doi/full/10.1152/advan.00074.2010 | C1 C1 C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Aseessment, MST based Assessment) OSPE |
| Capillary circulation, Concept of vasomotion and starling forces | Explain the details of types of starling forces . Expalin role of starling forces in different pathological conditions | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 05,(Chapter 31, Page 577) Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 4,Page 170) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 02(Chapter 6,Page 119) | <ol style="list-style-type: none"> https://youtu.be/YNROPnYy1tc https://www.osmosis.org/learn/Microcirculation_and_Starling_forces | C2 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Aseessment, MST based Assessment) |

| | | | | | | |
|---|---|---|--|--|------|---|
| | | <ul style="list-style-type: none"> Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 04. (Chapter 16, Page 193) | | | | OSPE |
| Functions of veins, Venous return and factors affecting venous return | Describe how veins are different from arteries Explain Various factors that affect venous return | <ul style="list-style-type: none"> Physiology by Linda S. Costanzo 6th Edition. Cardiovascular Physiology (Chapter 4, Page 158) Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 4. (Chapter 15, Page 188) | <ol style="list-style-type: none"> https://youtu.be/FKJr5uqPv5s https://www.sciencedirect.com/topics/medicine-and-dentistry/venous-return | C1 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Aseessment, MST based Assessment) OSPE |
| Introduction to ECG & its clinical importance | Enumerate and describe normal components of ECG Draw normal ECG Describe the method of recording ECG Describe the following. Bipolar limb leads. Describe Einthovians law and Enthovian triangle. Describe Chest leads and Augmented unipolar limb leads Describe how to read normal ECG Describe the principles of vectorial analysis of ECG. Describe the vectorial analysis of normal ECG | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition. Section 01, Immunity, Infection and Inflammation (Chapter 29, Page 522) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 14, Page 491) Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. Chapter 09, Page 170) Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 03. (Chapter 11, Page 135) | <ol style="list-style-type: none"> https://youtu.be/SEFhbK8ZCgk https://my.clevelandclinic.org/health/diagnostics/16953-electrocardiogram-ekg | C1 C1 C1 C1 C1 C1 C1 C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Aseessment, MST based Assessment) OSPE |
| Cardiac output & its control, measurement of cardiac | Explain cardiac output Understand various method to measure cardiac output Explain various factor which help in regulation of heart rate and stroke volume | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition. Section 05, (Chapter 30, Page 543) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 14, Page 500-507) | <ol style="list-style-type: none"> https://youtu.be/WuGMqezV3e https://teachmephysiology.com/cardiovascular-system/cardiac-output/ | C2 C2 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based |

| | | | | | | |
|---|--|--|---|----------------------|------|---|
| output, pathologically high and low cardiac output | | <ul style="list-style-type: none"> Physiology by Linda S. Costanzo 6th Edition. Cardiovascular Physiology (Chapter 4, Page 149, 154-158) Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Section 04. (Chapter 20, Page 245) (Chapter 22, Page 280) | | | | Assessment, MST based Assessment) OSPE |
| Vectorial analysis & arrhythmias I | Describe the principles of vectorial analysis of ECG. Describe the vectorial analysis of normal ECG Define arrhythmia Describe abnormal sinus rhythms | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology. 25TH Edition. Section 05 (Chapter 29, Page 526) Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. (Chapter 09, Page 179, 180-189) Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Section 03. (Chapter 12, Page 143) (Chapter 13, Page 157) | <ol style="list-style-type: none"> https://www.brainkart.com/article/Principles-of-Vectorial-Analysis-of-Electrocardiograms_19241/ https://youtu.be/6LrptveKYus https://www.medicalnewstoday.com/articles/8887#definition | C1 C1 C1 C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Cardiac cycle - I, Events of cardiac cycle and its graphical representation | Describe the cardiac cycle in detail Enumerate and explain its events Explain the events of cardiac cycle | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology. 25TH Edition. Section 05, (Chapter 30, Page 537) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 14, Page 495-500) Physiology by Linda S. Costanzo 6th Edition. Cardiovascular Physiology (Chapter 4, Page 154) Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Section 03. (Chapter 9, Page 117) | <ol style="list-style-type: none"> https://youtu.be/XbivIaFPoQI https://www.sciencedirect.com/science/article/pii/S0010027721003309 https://youtu.be/sLLLOaZ85Lk https://teachmephysiology.com/cardiovascular-system/cardiac-cycle-2/cardiac-cycle/ https://youtu.be/HNkwXZSSsU | C1 C1, C2 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| | Describe abnormal rhythms resulting from the block of heart signals within the intra cardiac conduction pathways Define ectopic beats | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology. 25TH Edition. Section 05 (Chapter 29, Page 527) | <ol style="list-style-type: none"> https://youtu.be/6LrptveKYus https://www.medicalnewstoday.com/articles/8887#definition | C1 C1 C2 C2 | | MCQ SEQ VIVA VOCE |

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|--|---|---|--|--------------------------------|-------------|--|
| Arrhythmias II | <p>Explain the following with the help of relevant ECGs.</p> <p>Premature contractions. Paroxysmal tachycardia. Ventricular fibrillation. Atrial fibrillation. Atrial flutter. Cardiac arrest.</p> <p>Describe different degrees of heart block and ECG changes Explain atrial and ventricular flutter and fibrillation</p> | <ul style="list-style-type: none"> Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.(Chapter 09,Page 180-189) Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 03. (Chapter 13, Page 157) | | <p>C2 C2 C1 C2</p> | <p>LGIS</p> | <p>MCQ (LMS based Aseessment, MST based Assessment) OSPE</p> |
| Cardiac cycle – II, Functions of ventricles as pumps, aortic pressure curve, regulation of heart pumping | <p>Draw various events during cardiac cycle Explain regulation of heart pumping</p> | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 05,(Chapter 30, Page 537) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 14,Page 495-500) Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 4,Page 154) Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 03. (Chapter 9, Page 117-126) | <ol style="list-style-type: none"> https://youtu.be/dmPtaJxgRQU https://youtu.be/VI9zo_CzQ9g https://youtu.be/pli2zs8Kekw https://youtu.be/kMJ-US6Qfqc https://youtu.be/qhtAhbyBSfs https://teachmephysiology.com/cardiovascular-system/cardiac-cycle-2/cardiac-cycle/ | <p>C1 C2</p> | <p>LGIS</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Aseessment, MST based Assessment) OSPE</p> |
| ECG changes in myocardial hypertrophies, ischemic heart disease | <p>Discuss ECG changes in different diseases</p> | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 05(Chapter 29, Page 532) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.(Chapter 12,Page 151) | <ul style="list-style-type: none"> https://youtu.be/SEFhbK8ZCgk https://youtu.be/D0V_aQXtRSw https://www.msmanuals.com/home/heart-and-blood-vessel-disorders/diagnosis-of-heart-and-blood-vessel-disorders/electrocardiography | <p>1.C2</p> | <p>LGIS</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Aseessment, MST based Assessment) OSPE</p> |

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|--|--|--|--|--|-------------|--|
| <p>Short term regulation of blood pressure</p> | <p>Explain short term regulation of blood pressure Explain central nervous system ischemic response & cushing reaction</p> | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition.Section 05(Chapter 32, Page 585,590) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 15,Page 517,528) • Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 4,Page 163) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.(Chapter 18,Page 217) | <ol style="list-style-type: none"> 1. https://youtu.be/HUf1LtkPj1k 2. https://www.sciencedirect.com/topics/nursing-and-health-professions/blood-pressure-regulation 3. https://www.cliffsnotes.com/study-guides/anatomy-and-physiology/the-cardiovascular-system/control-of-blood-pressure | <p>C2 C2</p> | <p>LGIS</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Aseessment, MST based Assessment) OSPE</p> |
| <p>Congestive cardiac failure</p> | <p>Define cardiac failure. Classify cardiac failure Enumerate the causes of cardiac failure and discuss in detail. Discuss and differentiate between compensated heart failure and decompensated heart failure Discuss and differentiate between Low and high output cardiac failure Define Cardiac reserve.</p> | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition.Section 05(Chapter 30, Page 538) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.(Chapter 22,Page 271) | <ol style="list-style-type: none"> 1. https://www.webmd.com/heart-disease/guide-heart-failure 2. https://youtu.be/EDCaFKgtXks 3. https://www.healthline.com/health/congestive-heart-failure | <p>C1/C2 C1 C2 C2 C1</p> | <p>LGIS</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Aseessment, MST based Assessment) OSPE</p> |
| <p>Long term regulation of blood pressure</p> | <p>Explain the role of kidneys in long term regulation of blood pressure</p> | <ul style="list-style-type: none"> • Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 4,Page 163) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. (Chapter 16,page 282) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 19, Page 229) | <ol style="list-style-type: none"> 1. https://youtu.be/5S9xEpAdAgA 2. https://jps.biomedcentral.com/articles/10.1007/s12576-012-0192-0 3. https://onlinelibrary.wiley.com/doi/10.1111/j.1440-1681.2005.04205.x | <p>C2</p> | <p>LGIS</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Aseessment, MST based Assessment) OSPE</p> |

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| Splanchnic circulation, cutaneous circulation | Describe the Physiologic anatomy of cerebral blood flow Describe the blood flow in normal state and local control of blood flow | <ul style="list-style-type: none"> Physiology by Linda S. Costanzo 6th Edition. Cardiovascular Physiology (Chapter 4, Page 173) Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. (Chapter 7, page 146) | <ol style="list-style-type: none"> https://youtu.be/hr6oGuW7mV https://www.sciencedirect.com/topics/medicine-and-dentistry/splanchnic-blood-flow https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2999290/ | C2 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Skeletal muscle blood flow, Cardiovascular changes during exercise | Discuss the blood flow regulation in skeletal muscle at rest and during exercise. | <p>Ganong's Review of Medical Physiology. 25TH Edition. Section 05 (Chapter 30, Page 549)</p> <p>Physiology by Linda S. Costanzo 6th Edition. Cardiovascular Physiology (Chapter 4, Page 178)</p> <p>Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. (Chapter 07, Page 148)</p> <p>Textbook of Medical Physiology by Guyton & Hall. 14th Edition. (Chapter 18, Page 226) (Chapter 21, Page 259)</p> | <ol style="list-style-type: none"> https://www.sciencedirect.com/topics/medicine-and-dentistry/muscle-blood-flow https://youtu.be/H6Fd8sfE2eQ | C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Fetal circulation & cardiac abnormalities in fetal circulation | Describe the fetal circulation Discuss the pathophysiology of cardiac abnormalities related to it | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology. 25TH Edition. Section 05 (Chapter 33, Page 614) Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. Section 4 (Chapter 23, Page 288) | <ol style="list-style-type: none"> https://youtu.be/rYVGjbmAtg https://www.sciencedirect.com/science/article/abs/pii/0033062072900151 https://myhealth.ucsd.edu/Conditions/Heart/Congenital/90,P01790 | C1 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Circulatory Shock | Define shock. Describe the physiologic causes of shock. | <ul style="list-style-type: none"> Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. Section 4 (Chapter 24, Page 293) | <ol style="list-style-type: none"> https://youtu.be/VZtBOaAMG9w | 1.C1 2.C1 3.C1 4.C1 | LGIS | MCQ SEQ VIVA VOCE |

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|--|--|---|---|---|-------------|--|
| | <p>Enumerate various types of shock.</p> <p>Describe the stages of shock</p> <p>Describe the following types of shock in detail.</p> <p>Describe Circulatory shock and Hypovolemic shock.</p> <p>Describe Neurogenic shock.</p> <p>Describe Septic shock.</p> <p>Describe Anaphylactic shock</p> | | <p>2. https://my.clevelandclinic.org/health/diseases/17837-cardiogenic-shock</p> | <p>5.C1</p> <p>6.C1</p> <p>7.C1</p> <p>8.C1</p> <p>9.C1</p> | | <p>MCQ (LMS based</p> <p>Aseessment, MST based</p> <p>Assessment)</p> <p>OSPE</p> |
| <p>Coronary circulation, Atherosclerosis & acute coronary occlusion</p> | <p>Understand the physiologic anatomy of coronary blood supply and normal coronary blood flow</p> <p>Discuss the control of coronary blood flow</p> | <p>Ganong's Review of Medical Physiology.25TH Edition.Section 05(Chapter 33, Page 610)</p> <p>Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.(Chapter 15,Page 265)</p> <p>Textbook of Medical Physiology by Guyton & Hall.14th Edition.. (Chapter 21, Page 262)</p> | <p>1. https://www.msmanuals.com/professional/cardiovascular-disorders/coronary-artery-disease/overview-of-coronary-artery-disease</p> <p>2. https://youtu.be/WKrVxKJVh00</p> <p>3. https://www.uptodate.com/contents/mechanisms-of-acute-coronary-syndromes-related-to-atherosclerosis</p> | <p>1.C2</p> <p>2.C2</p> | <p>LGIS</p> | <p>MCQ</p> <p>SEQ</p> <p>VIVA VOCE</p> <p>MCQ (LMS based</p> <p>Aseessment, MST based</p> <p>Assessment)</p> <p>OSPE</p> |
| <p>Cardiac cycle, Events of cardiac cycle and its graphical representation, Functions of ventricles as pumps, aortic pressure curve, regulation of heart pumping (SDL)</p> | <p>Describe the cardiac cycle in detail</p> <p>Enumerate and explain its events</p> <p>Explain the events of cardiac cycle</p> | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition.Section 05,(Chapter 30, Page 537) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 14,Page 495-500) • Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 4,Page 154) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 03. (Chapter 9, Page 117) | <p>1. https://youtu.be/XbivIaFPoQI</p> <p>2. https://www.sciencedirect.com/science/article/pii/S0010027721003309</p> <p>3. https://youtu.be/sLLLOaZ85Lk</p> <p>4. https://teachmephysiology.com/cardiovascular-system/cardiac-cycle-2/cardiac-cycle/</p> <p>5. https://youtu.be/HNkwXZSSsU</p> | <p>C1</p> <p>C1/C2</p> <p>C2</p> | <p>LGIS</p> | <p>MCQ</p> <p>SEQ</p> <p>VIVA VOCE</p> <p>MCQ (LMS based</p> <p>Aseessment, MST based</p> <p>Assessment)</p> <p>OSPE</p> |

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 |
|--|--|------------------------|--------------------------|------------------------|
| Definition and Biological importance of lipids. | • Define lipids | C1 | LGIS | MCQs |
| | • Classify lipids | C2 | | SAQs |
| | • Describe Biomedical significance of lipids | C2 | | Viva |
| Fatty acids | • Classify fatty acids | C1 | LGIS | MCQs |
| | • Describe physical and chemical properties of fatty acids | C2 | | SAQs Viva |
| Simple lipids | • Elaborate Structure and physical properties of Triglycerides | C2 | LGIS | MCQs |
| | • Discuss Chemical properties of Triglycerides and their clinical significance | C2 | | SAQs Viva |
| Compound lipids (Phospholipids, glycolipids, lipoproteins) | • Classify compound lipids | C2 | LGIS | MCQs |
| | • Discuss structure and functions of compound lipids | C2 | | SAQs |
| | • Interpret the clinical role of compound lipids | C3 | | Viva |
| Derived lipids | • Describe derived lipids | C2 | LGIS | MCQs SAQs Viva |
| Cholesterol | • Describe Structure and physical properties of Cholesterol | C2 | LGIS | MCQs |
| | • Discuss Chemical properties and functions | C2 | | SAQs |
| | • Interpret clinical findings of hypercholesterolemia | C3 | | Viva |
| Prostaglandins | • Classify Prostaglandins | C2 | LGIS | MCQs |
| | • Describe functions and clinical significance of Prostaglandins. | C2 | | SAQs |
| | • Interpret the role of drugs in prostaglandin synthesis | C3 | | Viva |
| Carbohydrate Chemistry | | | | |
| Introduction and classification of carbohydrates | • Classify carbohydrates | C2 | LGIS | MCQs |
| | • Explain different types of carbohydrates and their clinical significance | C2 | | SAQs Viva |
| Isomerism, optical activity and mutarotation | • Discuss Different properties of carbohydrates (Isomerism, optical activity and mutarotation) | C2 | LGIS | MCQs SAQs Viva |
| Monosaccharide | • Classify monosaccharide | C2 | LGIS | MCQs |
| | • Describe chemical properties of monosaccharide | C2 | | SAQs |

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| | <ul style="list-style-type: none"> • Interpret the clinical role of sorbitol, mannitol and cardiac glycosides | C3 | | Viva |
| Disaccharides | <ul style="list-style-type: none"> • Describe Structure and functions of Individual sugars | C2 | LGIS | MCQs SAQs Viva |
| Homopolyssacharides | <ul style="list-style-type: none"> • Explain Structure, physical and chemical properties of homopolyssacharide and their biological importance. | C2 | LGIS | MCQs SAQs Viva |
| Heteropolysaccharides | <ul style="list-style-type: none"> • Explain Structure, physical and chemical properties of heteropolysaccharides and their biological importance. • Apply the role of heteropolysaccharides in clinical cases | C2 C3 | LGIS | MCQs SAQs Viva |

Anatomy Small Group Discussion (SGDs)

| Topic | Learning Objectives At the end of lecture students should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
|-----------------------------------|--|-----------------|-------------------|----------------------------|
| Thoracic Wall / Thoracic Vertebra | • Define thorax | C1 | SGD, Skills Lab | MCQ SAQ VIVA OSPE |
| | • Discuss components and shape of thoracic cavity. | C2 | | |
| | • Discuss the applied and the related clinical anatomy | C2 | | |
| | • Classify Ribs | C1 | | |
| | • Describe ribs (side determination, features, attachments, relations, types and ossification. | C2 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • To understand the Biophysiological aspects of Thoracic wall | C3 | | |
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| • Read relevant research article | C3 | | | |
| Mediastinum | • Discuss the boundaries and division of mediastinum | C2 | SGD Skills lab | MCQ SAQ VIVA OSPE |
| | • Enumerate the contents of anterior mediastinum. | C1 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • To understand the Biophysiological aspects of Mediastinum | C3 | | |
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Map Arch of Aorta, Brachiocephalic artery on SP/Model | P | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read relevant research article | C3 | | |
| Pericardium | • Describe the gross features of fibrous pericardium with its blood and nerve supply | C2 | SGD Skills lab | MCQ SAQ VIVA OSPE |
| | • Describe the gross features of serous pericardium with its blood and nerve supply | C2 | | |
| | • Describe transverse and oblique pericardial sinus | C2 | | |
| | • Describe the Clinical Significance of the Transverse Pericardial Sinus | C3 | | |
| | • Define Pericarditis and Pericardial Effusion | C1 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • To understand the Biophysiological aspects of Pericardium | C3 | | |
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |

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| | <ul style="list-style-type: none"> • Map Pericardium on SP/Model | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> • Read relevant research article | C3 | | |
| Heart (External features) | <ul style="list-style-type: none"> • Demonstrate Position and orientation of heart. | P | SGD, Skills lab | MCQ SAQ VIVA OSPE |
| | <ul style="list-style-type: none"> • Describe borders and surfaces of the heart. | C2 | | |
| | <ul style="list-style-type: none"> • Demonstrate the external features of the heart | C2 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • To understand the Biophysiological aspects of Heart(External Feature) | C3 | | |
| | <ul style="list-style-type: none"> • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> • Read relevant research article | C3 | | |
| | <ul style="list-style-type: none"> • Use HEC digital library | C3 | | |
| Heart (Internal features) | <ul style="list-style-type: none"> • Differentiate between muscular and smooth part. | C2 | SGD, Skills lab | MCQ SAQ VIVA OSPE |
| | <ul style="list-style-type: none"> • Identify the various openings, important features in inter-atrial septum. | C2 | | |
| | <ul style="list-style-type: none"> • Identify S.A node | C1 | | |
| | <ul style="list-style-type: none"> • Discuss internal features of left atrium, inter atrial septum, mitral valve and pulmonary veins. | C2 | | |
| | <ul style="list-style-type: none"> • Discuss importance of modulator band. | C2 | | |
| | <ul style="list-style-type: none"> • Identify mitral valve, interventricular septum, aortic vestibule, aortic valve. | C3 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • To understand the Biophysiological aspects of Heart (Internal features) | C3 | | |
| | <ul style="list-style-type: none"> • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Map Cardiac valves on SP/Model | P | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> • Read relevant research article | C3 | | |
| | <ul style="list-style-type: none"> • Use HEC digital library | C3 | | |
| Heart (Clinical Correlations) | <ul style="list-style-type: none"> • Coronary Atherosclerosis | C1 | SGD, Skills lab | MCQ SAQ VIVA OSPE |
| | <ul style="list-style-type: none"> • Myocardial Infarction | C1 | | |
| | <ul style="list-style-type: none"> • Angina Pectoris | C1 | | |
| | <ul style="list-style-type: none"> • Coronary Angioplasty | C1 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C2 | | |
| | <ul style="list-style-type: none"> • To understand the Biophysiological aspects of Heart (Clinical Correlations) | C3 | | |

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|--|--|----|--------------------|----------------------------|
| | Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read relevant research article | C3 | | |
| Vasculature of heart | • Describe the origin of coronary arteries | C2 | SGD, Skills lab | MCQ SAQ VIVA OSPE |
| | • Identify course branches and distribution of right coronary arteries and left coronary artery, | C1 | | |
| | • Discuss the concept of right and left dominance. | C2 | | |
| | • Describe the venous drainage of heart. | C2 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • To understand the Biophysiological aspects of Vasculature of heart | C3 | | |
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read relevant research article | C3 | | |
| Innervation of Heart | • Describe the formation of superficial and deep cardiac plexus. | C2 | SGD, Skills lab | MCQ SAQ VIVA OSPE |
| | • | C3 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • To understand the Biophysiological aspects of Innervation of Heart | C3 | | |
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read relevant research article | C3 | | |
| Superior mediastinum (Trachea, Esophagus, Ascending Aorta) | • Enumerate the structure of superior mediastinum | C1 | SGD Skills lab | MCQ SAQ VIVA OSPE |
| | • Describe great vessels in superior mediastinum | C2 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • To understand the Biophysiological aspects of Superior Mediastinum | C3 | | |
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Map Ascending Aorta on SP/Model | P | | |

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| | <ul style="list-style-type: none"> Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> Read relevant research article | C3 | | |
| Posterior mediastinum (Boundaries and Structures) | <ul style="list-style-type: none"> Identify structures in posterior mediastinum | C1 | SGD, Skills lab | MCQ SAQ VIVA OSPE |
| | <ul style="list-style-type: none"> Describe anatomy of structure in Posterior mediastinum | C2 | | |
| | <ul style="list-style-type: none"> Identify course, relations and branches of descending aorta. | C2 | | |
| | <ul style="list-style-type: none"> Correlate the clinical conditions | C2 | | |
| | <ul style="list-style-type: none"> To understand the Biophysiological aspects of Posterior mediastinum | C3 | | |
| | <ul style="list-style-type: none"> Able to focus on provision of curative and preventive health care measures | C3 | | |
| | <ul style="list-style-type: none"> Map Descending Thoracic Aorta on SP/Model | P | | |
| | <ul style="list-style-type: none"> Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> Read relevant research article | C3 | | |
| Posterior mediastinum (Azygos system) | <ul style="list-style-type: none"> Describe formation, course and clinical importance of azygos system of veins | C3 | SGD, Skills lab | MCQ SAQ VIVA OSPE |
| | <ul style="list-style-type: none"> Describe formation and importance of hemiazygos vein | C1 | | |
| | <ul style="list-style-type: none"> Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> To understand the Biophysiological aspects of Posterior mediastinum | C3 | | |
| | <ul style="list-style-type: none"> Able to focus on provision of curative and preventive health care measures | C3 | | |
| | <ul style="list-style-type: none"> Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> Apply strategic use of AI in health care | C3 | | |
| <ul style="list-style-type: none"> Read relevant research article | C3 | | | |
| Cross sectional Anatomy/ Radiology | <ul style="list-style-type: none"> Identify the surfaces present at different levels of cross sections | P | SGD, Skills lab | MCQ SAQ VIVA OSPE |
| | <ul style="list-style-type: none"> | | | |
| | <ul style="list-style-type: none"> Manubriosternal Joint/Angle of Louis | P | | |
| | <ul style="list-style-type: none"> Upper body of Sternum | P | | |
| | <ul style="list-style-type: none"> Section between T 7 , T 8 Thoracic vertebrae | P | | |
| | <ul style="list-style-type: none"> Section between T 8 , T 9 Thoracic vertebrae | P | | |
| | <ul style="list-style-type: none"> Section between T 9 , T 10 Thoracic vertebrae | P | | |
| | <ul style="list-style-type: none"> How to access HEC digital library | C3 | | |
| <ul style="list-style-type: none"> Correlate the clinical conditions | C2 | | | |

| | | | | |
|--|--|----|--|--|
| | • Able to focus on provision of curative and preventive health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read relevant research article | C3 | | |

Physiology Small Group Discussion (SGDs)

| Topics | Learning Objectives | References | Learning Resources | Learning Domains | Learning Strategy | Assessment Tools |
|--|---|--|---|------------------|-------------------|--|
| Capillary circulation, Concept of vasomotion and starling forces | Explain the details of types of starling forces . Expalin role of starling forces in different pathological conditions | <ul style="list-style-type: none"> Ganong’s Review of Medical Physiology.25TH Edition.Section 05,(Chapter 31, Page 577) Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 4,Page 170) Physiological Basis of Medical Practice by Best & Taylor’s.13th Edition.Section 02(Chapter 6,Page 119) Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 04. (Chapter 16, Page 193) | <ol style="list-style-type: none"> https://youtu.be/YNROPnYylt_c https://www.osmosis.org/learn/Microcirculation_and_Starling_forces | C2 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Aeessment, MST based Assessment) OSPE |
| Short term regulation of blood pressure | Explain short term regulation of blood pressure Explain central nervous system ischemic response & cushing reaction | <ul style="list-style-type: none"> Ganong’s Review of Medical Physiology.25TH Edition.Section 05(Chapter 32, Page 585,590) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 15,Page 517,528) Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 4,Page 163) | <ol style="list-style-type: none"> https://youtu.be/HUf1LtkPj1k https://www.sciencedirect.com/topics/nursing-and-health-professions/blood-pressure-regulation https://www.cliffsnotes.com/study-guides/anatomy-and-physiology/the-cardiovascular-system/control-of-blood-pressure | C2 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Aeessment, MST based Assessment) OSPE |

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|--|---|---|---|----|------|---|
| | | <ul style="list-style-type: none"> Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.(Chapter 18,Page 217) | | | | |
| Long term regulation of blood pressure | Explain the role of kidneys in long term regulation of blood pressure | <ul style="list-style-type: none"> Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 4,Page 163) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. (Chapter 16,page 282) Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 19, Page 229) | <ol style="list-style-type: none"> https://youtu.be/5S9xEpAdAgA https://jps.biomedcentral.com/articles/10.1007/s12576-012-0192-0 https://onlinelibrary.wiley.com/doi/10.1111/j.1440-1681.2005.04205.x | C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |

Biochemistry Small Group Discussion (SGDs)

| Topic | Learning Objectives At the end of lecture students should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
|--|---|-----------------|-------------------|-----------------|
| Introduction of lipids and carbohydrates | <ul style="list-style-type: none"> Classify lipids and carbohydrates | C1 | SGD | MCQs, SAQs Viva |
| | <ul style="list-style-type: none"> Discuss importance of lipids and carbohydrates | C2 | | |
| Fatty acids | <ul style="list-style-type: none"> Classify fatty acids | C1 | SGD | MCQs SAQs Viva |
| | <ul style="list-style-type: none"> Describe physical and chemical properties of fatty acids | C2 | | |
| Cholesterol | <ul style="list-style-type: none"> Describe Structure and physical properties of Cholesterol | C2 | SGD | MCQs SAQs Viva |
| | <ul style="list-style-type: none"> Discuss Chemical properties and functions | C2 | | |
| | <ul style="list-style-type: none"> Interpret clinical findings of hypercholesterolemia | C3 | | |
| Heteropolysaccharides | <ul style="list-style-type: none"> Explain Structure, physical and chemical properties of heteropolysaccharides and their biological importance. | C2 | SGD | MCQs SAQs Viva |
| | <ul style="list-style-type: none"> Apply the role of heteropolysaccharides in clinical cases | C3 | | |

Anatomy Self Directed Learning (SDL)

| Topic | Learning Objectives At the end of lecture students should be able to | Learning Resources |
|---|--|--|
| Thoracic Wall / Thoracic Vertebra | • Define thorax | <ul style="list-style-type: none"> • ClinicallyOriented Anatomy 6th Edition, Pg no.73,77, 78-79, 84,89,93,95,98,446,454 https://youtu.be/PoA-Uq9w-7s https://youtu.be/Ok8-nwVLysM https://www.sciencedirect.com/science/article/pii/S0161475415000639 |
| | • Discuss components and shape of thoracic cavity. | |
| | • Discuss the applied and the related clinical anatomy | |
| | • Classify Ribs | |
| | • Describe ribs (side determination, features, attachments, relations, types and ossification. | |
| | • Discuss the applied and the related clinical anatomy | |
| | • How to access HEC digital library • How to read relevant research article | |
| Mediastinum | • Discuss the boundaries and division of mediastinum | <ul style="list-style-type: none"> • ClinicallyOriented Anatomy 6th Edition, P no.107,110,118,127,128,132-133,160-168,171 https://youtu.be/oBR9p_UDTuo https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5111324/ |
| | • Enumerate the contents of anterior mediastinum. | |
| | • How to access HEC digital library | |
| | • How to read relevant research article | |
| Pericardium | • Describe the gross features of fibrous pericardium with its blood and nerve supply | <ul style="list-style-type: none"> • ClinicallyOriented Anatomy 6th Edition, P no.111,128-129,133-134 https://youtu.be/5RMeCgJn730 https://www.sciencedirect.com/science/article/abs/pii/S1054880721000302 |
| | • Describe the gross features of serous pericardium with its blood and nerve supply | |
| | • Describe transverse and oblique pericardial sinus | |
| | • Describe the Clinical Significance of the Transverse Pericardial Sinus | |
| | • Define Pericarditis and Pericardial Effusion | |
| | • How to access HEC digital library | |
| | • How to read relevant research article | |
| Heart I External features | • Demonstrate Position and orientation of heart. | <ul style="list-style-type: none"> • ClinicallyOriented Anatomy 6th Edition, P no.129,135-137,144-149,153-159,171-172 https://youtu.be/uhSBFOTwzDQ |
| | • Describe borders and surfaces of the heart. | |
| | • Demonstrate the external features of the heart | |
| | • How to access HEC digital library | |
| | • How to read relevant research article | |

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| | | https://www.ahajournals.org/doi/full/10.1161/JAHA.122.028014 |
| Heart II Internal features | • Differentiate between muscular and smooth part. | <ul style="list-style-type: none"> • ClinicallyOriented Anatomy 6th Edition, P no.129,135-137,144-149,153-159,171-172 https://youtu.be/uhSBFOTwzDQ https://www.ahajournals.org/doi/full/10.1161/JAHA.122.028014 |
| | • Identify the various openings, important features in inter-atrial septum. | |
| | • Identify S.A node | |
| | • How to access HEC digital library | |
| | • How to read relevant research article | |
| Heart III Clinical Co-Relation | • Discuss internal features of left atrium, inter atrial septum, mitral valve and pulmonary veins. | <ul style="list-style-type: none"> • ClinicallyOriented Anatomy 6th Edition, P no.129,135-137,144-149,153-159,171-172 https://youtu.be/uhSBFOTwzDQ https://www.ahajournals.org/doi/full/10.1161/JAHA.122.028014 |
| | • Discuss importance of modulator band. | |
| | • Identify mitral valve, interventricular septum, aortic vestibule, aortic valve. | |
| | • How to access HEC digital library | |
| | • How to read relevant research article | |
| Vasculature of heart | • Describe the origin of coronary arteries | <ul style="list-style-type: none"> • ClinicallyOriented Anatomy 6th Edition, P no.129,135-137,144-149,153-159,171-172 https://youtu.be/uhSBFOTwzDQ https://www.ahajournals.org/doi/full/10.1161/JAHA.122.028475 |
| | • Identify course branches and distribution of right coronary arteries and left coronary artery, | |
| | • Discuss the concept of right and left dominance. | |
| | • Describe the venous drainage of heart. | |
| | • Discuss the related applied and clinical anatomy | |
| | • How to access HEC digital library | |
| | • How to read relevant research article | |
| Innervation of Heart | • Describe the formation of superficial and deep cardiac plexus. | <ul style="list-style-type: none"> • ClinicallyOriented Anatomy 6th Edition, P no.129,135-137,144-149,153-159,171-172 https://youtu.be/uhSBFOTwzDQ https://www.ahajournals.org/doi/full/10.1161/JAHA.122.028932 |
| | • How to access HEC digital library | |
| | • How to read relevant research article | |
| Superior mediastinum (Trachea, | • Enumerate the structure of superior mediastinum | <ul style="list-style-type: none"> • ClinicallyOriented Anatomy 6th Edition, P no.127-128,132,160-166,179 https://youtu.be/2POIIBe2xR4 |
| | • Describe great vessels in superior mediastinum | |
| | • How to access HEC digital library | |
| | • How to read relevant research article | |

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| Esophagus, Ascending Aorta) | | https://www.sciencedirect.com/science/article/abs/pii/S1472029906000336 |
| Posterior mediastinum I | • Identify structures in posterior mediastinum | <ul style="list-style-type: none"> Clinically Oriented Anatomy 6th Edition, P no. 128, 168-172, 179 https://youtu.be/2POIIBe2xR4 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9792830/ |
| | • Describe anatomy of structure in Posterior mediastinum | |
| | • Identify course, relations and branches of descending aorta. | |
| | • How to access HEC digital library | |
| | • How to read relevant research article | |
| Posterior mediastinum II | • Describe formation, course and clinical importance of azygos system of veins | <ul style="list-style-type: none"> Clinically Oriented Anatomy 6th Edition, P no. 128, 168-172, 179 https://youtu.be/2POIIBe2xR4 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9792830/ |
| | • Describe formation and importance of hemiazygos vein | |
| | • How to access HEC digital library | |
| | • How to read relevant research article | |
| Surface anatomy / Radiology | • Demonstrate surface projection and radiological aspects of heart, great vessels, trachea, oesophagus, position of heart valves | <ul style="list-style-type: none"> Clinically Oriented Anatomy 6th Edition, P no. 129, 135-137, 144-149, 153-159, 171-172 https://youtu.be/wqiK-8nZEK https://pubs.rsna.org/doi/10.1148/ryct.220047 |
| | • How to access HEC digital library | |
| | • How to read relevant research article | |

Physiology Self Directed Learning (SDL)

| Topics Of SDL | Learning Objective | References | Learning Resources | Learning Domains | Learning Strategy | Assessment Tools |
|-----------------------------------|---|--|--|------------------|-------------------|---|
| ON CAMPUS: Heart Sounds | 1. Describe four heart sound and differences between 1st and 2nd heart sounds | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology. 25TH Edition. Section 05, Cardiovascular Physiology (Chapter 30, Page 542) ❖ Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Section 04. (Chapter 23, Page 283) | <ol style="list-style-type: none"> https://youtu.be/dBwr2GZCmQM https://www.utmb.edu/ped_ed/CoreV2/Cardiology/cardiologyV2/cardiologyV23.html | C1/C2 | SDL | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation |

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|---|--|--|--|---|------------|---|
| <p>Capillary circulation, Concept of vasomotion and starling forces</p> | <ol style="list-style-type: none"> 1. Explain the details of types of starling forces. 2. Explain role of starling forces in different pathological conditions | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition.Section 05,(Chapter 31, Page 577) • Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 4,Page 170) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 02(Chapter 6,Page 119) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 04. (Chapter 16, Page 193) | <ol style="list-style-type: none"> 1. https://youtu.be/YNROPnYy1tc 2. https://www.osmosis.org/learn/Microcirculation_and_Starling_forces | <p>1.C2 2.C2</p> | <p>SDL</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation</p> |
| <p>Introduction to ECG & its clinical importance</p> | <ul style="list-style-type: none"> • Enumerate and describe normal components of ECG • Draw normal ECG • Describe the method of recording ECG • Describe the following. Bipolar limb leads. • Describe Einthovians law and Enthovian triangle. • Describe Chest leads and Augmented unipolar limb leads • Describe how to read normal ECG • Describe the principles of vectorial analysis of ECG. • Describe the vectorial analysis of normal ECG | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition.Section 01,Immunity,Infection and Inflammation(Chapter 29, Page 522) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 14,Page 491) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. Chapter 09,Page 170) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 03. (Chapter 11, Page 135) | <ol style="list-style-type: none"> 1. https://youtu.be/SEFhbK8ZCgk 2. https://my.clevelandclinic.org/health/diagnostics/16953-electrocardiogram-ekg | <p>C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1</p> | <p>SDL</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation</p> |
| | <ul style="list-style-type: none"> • Describe the cardiac cycle in detail • Enumerate and explain its events | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition.Section 05,(Chapter 30, Page 537) | <ol style="list-style-type: none"> 1.https://youtu.be/XbivIaFpoQI | <ol style="list-style-type: none"> 1. C1 2. C1/C2 3. C2 | | <p>MCQ SEQ</p> |

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|--|--|--|--|--|------------|---|
| <p>Cardiac cycle - I, Events of cardiac cycle and its graphical representation</p> | <p>Explain the events of cardiac cycle</p> | <ul style="list-style-type: none"> Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 14,Page 495-500) Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 4,Page 154) <p>Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 03. (Chapter 9, Page 117)</p> | <ol style="list-style-type: none"> https://www.sciencedirect.com/science/article/pii/S0010027721003309 https://youtu.be/sLLLOaZ85Lk https://teachmephysiology.com/cardiovascular-system/cardiac-cycle-2/cardiac-cycle/ https://youtu.be/HNkwXZSSsU | | <p>SDL</p> | <p>VIVA VOCE MCQ (LMS based Aseessment, MST based Assessment) OSPE SDL Evaluation</p> |
| <p>Arrhythmias</p> | <ul style="list-style-type: none"> Describe the principles of vectorial analysis of ECG. Describe the vectorial analysis of normal ECG Define arrhythmia Describe abnormal sinus rhythms | <ul style="list-style-type: none"> Ganong’s Review of Medical Physiology.25TH Edition.Section 05(Chapter 29, Page 526) Physiological Basis of Medical Practice by Best & Taylor’s.13th Edition.(Chapter 09,Page 179,180-189) <p>Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 03. (Chapter 12, Page 143)((Chapter 13, Page 157)</p> | <ol style="list-style-type: none"> https://www.brainkart.com/article/Principles-of-Vectorial-Analysis-of-Electrocardiograms_19241/ https://youtu.be/6LrptveKYus https://www.medicalnewstoday.com/articles/8887#definition | <ol style="list-style-type: none"> C1 C1 C1 C1 | <p>SDL</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Aseessment, MST based Assessment) OSPE SDL Evaluation</p> |
| <p>Congestive cardiac failure</p> | <p>Explain the characteristics and functions of monocytes.</p> <ul style="list-style-type: none"> Explain monocyte-macrophge system; importance | <ul style="list-style-type: none"> Ganong’s Review of Medical Physiology.25TH Edition.Section 01,Immunity,Infection and Inflamma tion(Chapter 03, Page 67) Physiological Basis of Medical Practice by Best & Taylor’s.13th Edition.Section 03, Blood(Chapter 21,Page 371)(Chapter 22,Page 387) | <ol style="list-style-type: none"> https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/mononuclear-phagocyte-system https://bmcbiol.biomedcentral.com/articles/10.1186/s12915-017-0392-4 | <ol style="list-style-type: none"> C2 C2 | <p>SDL</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Aseessment, MST based Assessment) OSPE SDL Evaluation</p> |

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|---|--|---|---|------|-----|---|
| | | Textbook of Medical Physiology by Guyton & Hall.14 th Edition. Section 06. (Chapter 34, Page 450-452) | | | | |
| Long term regulation of blood pressure | 1. Explain the role of kidneys in long term regulation of blood pressure | <ul style="list-style-type: none"> Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 4,Page 163) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. (Chapter 16,page 282) <p>Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 19, Page 229)</p> | <ol style="list-style-type: none"> https://youtu.be/5S9xEpAdAgA https://jps.biomedcentral.com/articles/10.1007/s12576-012-0192-0 https://onlinelibrary.wiley.com/doi/10.1111/j.1440-1681.2005.04205.x | C2 | SDL | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation</p> |
| Skeletal muscle blood flow, Cardiovascular changes during exercise | 1. Discuss the blood flow regulation in skeletal muscle at rest and during exercise. | <p>Ganong's Review of Medical Physiology.25TH Edition.Section 05(Chapter 30, Page 549)</p> <p>Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 4,Page 178)</p> <p>Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.(Chapter 07,Page 148)</p> <p>Textbook of Medical Physiology by Guyton & Hall.14th Edition.. (Chapter 18, Page 226)(Chapter 21,Page 259)</p> | <ol style="list-style-type: none"> https://www.sciencedirect.com/topics/medicine-and-dentistry/muscle-blood-flow https://youtu.be/H6Fd8sfE2eQ | C2 | SDL | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation</p> |
| (OFF CAMPUS): Introduction to CVS | <ul style="list-style-type: none"> 1. Describe scheme of circulation through the heart and body | <ul style="list-style-type: none"> Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Cardiovascular Physiology(Chapter 14,Page 469) Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 4,Page 117) | <ol style="list-style-type: none"> https://youtu.be/28CYhgjrBLA https://training.seer.cancer.gov/anatomy/cardiovascular/#:~:text=The%20cardiovascular%20system%20is%20sometimes,arteries%2C% | 1.C1 | SDL | <p>MCQ SEQ VIVA VOCE</p> |

| | | | | | | |
|--|---|--|--|----------------------|-----|---|
| | | <ul style="list-style-type: none"> Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 02,(Chapter 05,Page 101) | 20veins%2C%20and%20capillaries. | | | MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation |
| Classification of blood vessels & Biophysical considerations | 1.Enumerate Classification of blood vessels. 2.Explain structure and functions of types of blood vessels <ul style="list-style-type: none"> | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 05,Cardiovascular Physiology (Chapter 31, Page 567,571) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 15,Page 513) Physiology by Linda S. Costanzo 6th Edition.Cardiovascular Physiology (Chapter 4,Page 119) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 04 (Chapter 15,Page 183) | <ol style="list-style-type: none"> https://youtu.be/ar2_UPiGzmU https://training.seer.cancer.gov/anatomy/cardiovascular/blood/classification.html | 1.C1 2. C2 | SDL | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation |
| Regulation of blood flow | 1.Define and describe Resistance to Blood flow Describe regulation of Blood pressure and Poiseuilles law <ul style="list-style-type: none"> Describe factors related with Blood viscosity and its role in regulation | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 05,Cardiovascular Physiology (Chapter 31, Page 575) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 02(Chapter 5,Page 107)(Chapter 6,page 110) Textbook of Medical Physiology by Guyton & Hall.14th Edition..Section 04. (Chapter 14, Page 173) (Chapter 17, Page 205) | <ol style="list-style-type: none"> https://youtu.be/cocB-M3h9k0 https://journals.physiology.org/doi/full/10.1152/advan.00074.2010 | 1.C1 2.C1 3.C1 | SDL | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation |
| | <ul style="list-style-type: none"> Enumerate and describe normal components of ECG | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section | <ol style="list-style-type: none"> https://youtu.be/SEFhbK8ZCgk | C1 C1 C1 | | MCQ SEQ VIVA VOCE |

| | | | | | | |
|--|---|--|---|---|------------|---|
| <p>Introduction to ECG & its clinical importance</p> | <ul style="list-style-type: none"> • Draw normal ECG • Describe the method of recording ECG • Describe the following. Bipolar limb leads. • Describe Einthovians law and Enthovian triangle. • Describe Chest leads and Augmented unipolar limb leads • Describe how to read normal ECG • Describe the principles of vectorial analysis of ECG. • Describe the vectorial analysis of normal ECG | <p>01,Immunity,Infection and Inflammation(Chapter 29, Page 522)</p> <ul style="list-style-type: none"> • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 14,Page 491) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. Chapter 09,Page 170) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 03. (Chapter 11, Page 135) | <p>2. https://my.clevelandclinic.org/health/diagnostics/16953-electrocardiogram-ekg</p> | <p>C1 C1</p> <p>C1 C1 C1 C1</p> | <p>SDL</p> | <p>MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation</p> |
| <p>Vectorial analysis & arrhythmias</p> | <ul style="list-style-type: none"> • Describe the principles of vectorial analysis of ECG. • Describe the vectorial analysis of normal ECG • Define arrhythmia • Describe abnormal sinus rhythms | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition.Section 05(Chapter 29, Page 526) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.(Chapter 09,Page 179,180-189) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. Section 03. (Chapter 12, Page 143)((Chapter 13, Page 157) | <p>1. https://www.brainkart.com/article/Principles-of-Vectorial-Analysis-of-Electrocardiograms_19241/Electrocardiograms_19241/</p> <p>3. https://youtu.be/6LrptveKYus</p> <p>2. https://www.medicalnewstoday.com/articles/8887#definition</p> | <p>C1 C1 C1 C1</p> | <p>SDL</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation</p> |
| <p>Ca c cycle</p> | <ul style="list-style-type: none"> • Describe the cardiac cycle in detail • Enumerate and explain its events • Explain the events of cardiac cycle | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition.Section 05,(Chapter 30, Page 537) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 14,Page 495-500) | <p>1. https://youtu.be/XbivIaFPoQI</p> <p>2. https://www.sciencedirect.com/science/article/pii/S0010027721003309</p> <p>3. https://youtu.be/sLLL0aZ85Lk</p> | <p>C1 C1/C2 C2</p> | <p>SDL</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE</p> |

| | | | | | | |
|---|--|---|--|---------------|-----|---|
| | | <ul style="list-style-type: none"> • Physiology by Linda S. Costanzo 6th Edition. Cardiovascular Physiology (Chapter 4, Page 154) • Textbook of Medical Physiology by Guyton & Hall. 14th Edition. Section 03. (Chapter 9, Page 117) | <ol style="list-style-type: none"> 4. https://teachmephysiology.com/cardiovascular-system/cardiac-cycle-2/cardiac-cycle/ 5. https://youtu.be/HNkwXZSSsU | | | SDL Evaluation |
| Splanchnic circulation, cutaneous circulation | <ul style="list-style-type: none"> • Describe the Physiologic anatomy of cerebral blood flow • Describe the blood flow in normal state and local control of blood flow | <ul style="list-style-type: none"> • Physiology by Linda S. Costanzo 6th Edition. Cardiovascular Physiology (Chapter 4, Page 173) • Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. (Chapter 7, page 146) | <ol style="list-style-type: none"> 1. https://youtu.be/hr6oGuW7mVA 2. https://www.sciencedirect.com/topics/medicine-and-dentistry/splanchnic-blood-flow 3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2999290/ | 1.C2 2. C2 | SDL | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation |
| Regulation of blood pressure | <ol style="list-style-type: none"> 1. Explain short term regulation of blood pressure <ul style="list-style-type: none"> • Explain central nervous system ischemic response & cushing reaction | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology. 25TH Edition. Section 05 (Chapter 32, Page 585, 590) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. (Chapter 15, Page 517, 528) • Physiology by Linda S. Costanzo 6th Edition. Cardiovascular Physiology (Chapter 4, Page 163) • Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. (Chapter 18, Page 217) | <ol style="list-style-type: none"> 1. https://youtu.be/HUflLtkPj1k 2. https://www.sciencedirect.com/topics/nursing-and-health-professions/blood-pressure-regulation 3. https://www.cliffsnotes.com/study-guides/anatomy-and-physiology/the-cardiovascular-system/control-of-blood-pressure | 1.C2 2. C2 | SDL | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation |

Biochemistry Self Directed Learning (SDL)

| Topic | Learning Objectives At the end of lecture students should be able to | References |
|---|--|---|
| Protein chemistry | | |
| Classifications and functions of carbohydrates | <ul style="list-style-type: none"> • Classify carbohydrates • Explain different types of carbohydrates and their clinical significance | <ul style="list-style-type: none"> • Textbook of Lippincott 8th Edition Chapter No.7 pg 92,93 • Text Book of Harper 32 S T Edition chap No. 15 pg 141, 142 ,144 ,147 |
| Classifications and functions of lipids | <ul style="list-style-type: none"> • Define lipids • Classify lipids • Describe Biomedical significance of lipids | <ul style="list-style-type: none"> • Textbook of Harper 32 S T EDITION Chapter No.21 pg 196 |
| Fatty acids and simple lipids | <ul style="list-style-type: none"> • Classify fatty acids • Describe physical and chemical properties of fatty acids • Elaborate Structure and physical properties of Triglycerides • Discuss Chemical properties of Triglycerides and their clinical significance | <ul style="list-style-type: none"> • Textbook of Lippincott 8th Edition Chapter No.15 pg 196 -199 |
| Classification and Chemical reactions of monosaccharide | <ul style="list-style-type: none"> • Classify monosaccharide • Describe chemical properties of monosaccharide • Interpret the clinical role of sorbitol, mannitol and cardiac glycosides | <ul style="list-style-type: none"> • Text Book of Harper 32 S T Edition chap No.15 pg 142, 145 |
| Disaccharides | <ul style="list-style-type: none"> • Describe Structure and functions of Individual sugars | <ul style="list-style-type: none"> • Text book of Harper 32 S T Edition Chap No.15 pg 145, 156 |
| Compound lipids | <ul style="list-style-type: none"> • Classify compound lipids • Discuss structure and functions of compound lipids • Interpret the clinical role of compound lipids | <ul style="list-style-type: none"> • Textbook of Lippincott 8th Edition Chapter No. 21 pg 199-202 |
| Prostaglandins | <ul style="list-style-type: none"> • Classify Prostaglandins • Describe functions and clinical significance of Prostaglandins. • Interpret the role of drugs in prostaglandin synthesis | <ul style="list-style-type: none"> • Textbook of Lippincott 8th Edition Chapter No. 17 pg 236 • Text Book of Lehninger 7th Edition chap No. 10.3 pg 375,376 |
| Heteropolysaccharides | <ul style="list-style-type: none"> • Explain Structure, physical and chemical properties of heteropolysaccharides and their biological importance. • Apply the role of heteropolysaccharides in clinical cases | <ul style="list-style-type: none"> • Textbook of Lippincott 8th Edition Chapter No. 14 pg 173-175 • Text Book of Harper 32 S T Edition Chap No.15 pg 147 ,148 |

Histology Practicals Skill Laboratory (SKL)

| Topic | Learning Objectives At The End Of Practical Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|-------------------------------------|--|-----------------|-------------------|-----------------|
| Elastic Arteries | • identify characteristic histological features of tunica intima, tunica media and tunica adventitia of elastic arteries under microscope | P1 | Skill lab | OSPE |
| | • Illustrate histological structure of elastic artery | C1 | | |
| | • Write two points of identification | C1 | | |
| | • To read relevant research article | C3 | | |
| Muscular Arteries Small Arteries | • identify characteristic histological features of tunica intima, tunica media and tunica adventitia of muscular and small sized arteries under microscope | P1 | Skill lab | OSPE |
| | • Illustrate histological structure of Muscular and small sized artery | C1 | | |
| | • Write two points of identification | C1 | | |
| | • Differentiate between three types of arteries on histology slides | C1 | | |
| Large Vein | • Identify characteristic histological features of tunica intima, tunica media and tunica adventitia of large vein under microscope | P1 | Skill lab | OSPE |
| | • Illustrate histological structure of large vein | C1 | | |
| | • Write two points of identification | C1 | | |
| | • To read relevant research article | C3 | | |
| Medium and small sized vein | • Identify characteristic histological features of tunica intima, tunica media and tunica adventitia of medium and small sized vein under microscope | P1 | Skill lab | OSPE |
| | • Illustrate histological structure of medium and small sized vein | C1 | | |
| | • Write two points of identification Differentiate between three types of veins on histology slides | C1 | | |
| | • To read relevant research article | C3 | | |
| Capillaries | • Classify capillaries on the basis of histological structure and function | C1 | Skill lab | OSPE |
| | • Enlist sites of continuous, fenestrated and sinusoidal capillaries | C1 | | |
| | • Elaborate characteristic histological features of tunica intima, tunica media and tunica adventitia of capillaries | C1 | | |
| | • Draw and label histological structure of each type of capillaries | C1 | | |

| | | | | |
|--|--------------------------------------|----|--|--|
| | • Write two points of identification | C1 | | |
| | • To read relevant research article | C3 | | |

Physiology Practicals Skill Laboratory (SKL)

| Topic | Learning Objectives At The End Of Practical Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|--|---|-----------------|-------------------|-----------------|
| Blood Pressure at rest and during exercise | • Define B. P | C1 | Skill Lab | OSPE Viva |
| | • Detail study of apparatus | P | | |
| | • How to use apparatus | P | | |
| | • Identify changes in blood pressure during exercise | P | | |
| Examination of arterial pulse and JVP | • Importance of radial pulse & JVP | C1 | Skill Lab | OSPE Viva |
| | • Procedure | P | | |
| | • Various characteristic of pulse | P, C2 | | |
| ECG | • Detail study of ECG leads | C2 | Skill Lab | OSPE Viva |
| | • How to apply leads | P | | |
| | • Recording | P | | |
| | • Discussion about normal ECG | P, C2 | | |
| | • Clinical importance | C2 | | |
| Clinical examination of chest (Heart sounds) | • Inspection | P | Skill Lab | OSPE Viva |
| | • Palpation | P | | |
| | • Auscultation of all areas of heart | P | | |
| | • Locate apex beat | P | | |
| CPR | • Steps of CPR | P | Skill Lab | OSPE Viva |
| | • Importance of CPR in daily life | C2, P | | |
| Triple Response | • Steps of Examination | P | Skill Lab | OSPE Viva |
| | • Clinical Importance | C2 | | |

Biochemistry Practicals Skill Laboratory (SKL)

| Topic | Learning Objectives At The End Of Practical Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|---------------|--|------------------------|--------------------------|------------------------|
| Lipids | <ul style="list-style-type: none">Describe Physical and chemical properties of lipids (solubility, saponification, Emulsification and Acrolein test) | P | Skill lab | OSPE |
| Carbohydrates | <ul style="list-style-type: none">Perform Tests for the detection of carbohydrates and reducing sugars (Molisch's and Benedict's tests) | P | Skill lab | OSPE |
| Carbohydrates | Perform Tests for differentiation between Mono and disaccharides; Aldo and keto sugars (Barford's and Salvinoff's test) | P | Skill lab | OSPE |
| Carbohydrates | <ul style="list-style-type: none">Perform Iodine test | P | Skill lab | OSPE |

Basic and Clinical Sciences (Vertical Integration)

Content

- **Case Based Learning (CBLs)**
- **Problem Based Learning (PBL)**
- **Vertical Integration Large Group Interactive Session (LGIS)**

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 | • Cardiac Temponade | Apply basic knowledge of subject to study clinical case. | C3 |
| | • Coarctation of Aorta | Apply basic knowledge of subject to study clinical case. | C3 |
| Physiology | • Pitting edema | Apply basic knowledge of subject to study clinical case. | C3 |
| | • Palpitations / Tachycardia | Apply basic knowledge of subject to study clinical case. | C3 |
| Biochemistry | • Atherosclerosis | Apply basic knowledge of subject to study clinical case. | C3 |
| | • Heparin/dextran | Apply basic knowledge of subject to study clinical case. | C3 |

Large Group Interactive Sessions (LGIS)

Pathology

| Topic | Learning Objectives At the end of lecture students should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
|------------|--|-----------------|-------------------|-----------------|
| Edema | • Define edema | C1 | LGIS | MCQ |
| | • Classify edema | C2 | | |
| | • Discuss pathophysiology of edema with clinical correlation | C2 | | |
| Thrombosis | • Define embolus | C1 | LGIS | MCQ |
| | • Describe different types of emboli with clinical context <ul style="list-style-type: none"> ○ Thrombotic ○ Fat and marrow ○ Cholesterol ○ Air ○ Fat | C1 | | |
| | • Differentiate between pulmonary and systemic thrombo-embolism with clinical relevance | C2 | | |
| Infarction | • Describe the Patho-genetic mechanism of infarction | C1 | LGIS | MCQ |
| | • Describe commonly occurring infarcts in different clinical settings | C1 | | |
| Shock | • Define shock | C1 | LGIS | MCQ |
| | • Enumerate Types with clinical examples | C1 | | |

| | | | | |
|--|---|----|--|--|
| | • Describe pathogenesis of shock | C1 | | |
| | • Describe stages of shock with clinical examples | C1 | | |

Medicine

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|-------------------------------------|---|-----------------|-------------------|-----------------|
| Ecg changes | • Discuss normal ECG and its various components. | C2 | LGIS | MCQs |
| | • Explain important ECGs seen in emergency department. | C2 | | |
| Hypertension | • Define Hypertension | C1 | LGIS | MCQs |
| | • Discuss various causes and grades. | C2 | | |
| | • Explain the clinical presentation. | C2 | | |
| | • Compare between primary and secondary hypertension. | C2 | | |
| | • Enlist the lab investigations to be done for hypertension. | C2 | | |
| | • Discuss the treatment plan of hypertension. | C2 | | |
| Overview of acute coronary syndrome | • Discuss ACS and its various causes. | C2 | LGIS | MCQs |
| | • Illustrate the clinical presentation of ACS. | C2 | | |
| | • Explain the workshop to be done in E.R for ACS | C2 | | |
| | • Discuss the treatment of ACS | C2 | | |
| Management of heart failure | • Discuss the stepwise management of heart failure. | C2 | LGIS | MCQs |
| Management of shock | • Discuss the management according to various types of shock. | C2 | LGIS | MCQs |

Surgery

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|---------------------------------|--|-----------------|-------------------|-----------------|
| Congenital cardiac anomalies | <ul style="list-style-type: none"> • Describe: • Various cardiac deformities • & congenital malformations | C1 | LGIS, CBL | MCQs |
| | <ul style="list-style-type: none"> • Significance of deformities • General and operative management outline | C1 | | |
| Introduction to Cardiac Surgery | <ul style="list-style-type: none"> • To outline basics of Cardiac surgery | C1 | LGIS | MCQs |
| | <ul style="list-style-type: none"> • Differentiate from other subspecialties | C2 | | |
| | <ul style="list-style-type: none"> • Basic cardiac patient management | C2 | | |
| Ectopia Cordis & Dextrocardia | <ul style="list-style-type: none"> • Describe: • Various cardiac abnormalities with significance | C2 | LGIS | MCQs |
| | <ul style="list-style-type: none"> • General and operative management outline | C2 | | |
| Congenital cardiac anomalies | <ul style="list-style-type: none"> • Describe: • Various cardiac deformities • & congenital malformations | C2 | LGIS | MCQs |
| | <ul style="list-style-type: none"> • Significance of deformities • General and operative management outline | C2 | | |
| Introduction to Cardiac Surgery | <ul style="list-style-type: none"> • To outline basics of Cardiac surgery | C1 | LGIS | MCQs |
| | <ul style="list-style-type: none"> • Differentiate from other subspecialties | C2 | | |
| | <ul style="list-style-type: none"> • Basic cardiac patient management | C2 | | |

Obstetrics & Gynaecology

| Topic | At The End Of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|---|---|-----------------|-------------------|-----------------|
| Cardiovascular changes in pregnancy, common cardiac diseases | <ul style="list-style-type: none"> • Understand physiological changes in cardiovascular system during pregnancy (incl. plasma volume, stroke volume, cardiac output, blood pressure) | C2 | LGIS | MCQs |
| | <ul style="list-style-type: none"> • Know physiological versus pathological symptoms related to CVS | C2 | | |
| | <ul style="list-style-type: none"> • Briefly describe clinical presentations of common cardiac diseases during pregnancy (rheumatic heart disease, cardiomyopathy, cardiac failure) | C2 | | |
| | <ul style="list-style-type: none"> • The effect of cardiac disease on fetus and the mother | C2 | | |
| Hypertensive disorders in pregnancy (gestational hypertension, pre-eclampsia) | <ul style="list-style-type: none"> • Define gestational hypertension | C1 | LGIS | MCQs |
| | <ul style="list-style-type: none"> • Describe the spectrum of hypertensive disorders during pregnancy with proper definitions | C2 | | |
| | <ul style="list-style-type: none"> • Comprehend pathophysiology of these disorders | C2 | | |
| | <ul style="list-style-type: none"> • Know clinical presentation of hypertensive disorders | C2 | | |
| | <ul style="list-style-type: none"> • Justify relevant laboratory investigations | C2 | | |
| | <ul style="list-style-type: none"> • Understand principles of management | C2 | | |
| Obstetric shock | <ul style="list-style-type: none"> • Define circulatory shock | C1 | LGIS | MCQs |
| | <ul style="list-style-type: none"> • Differentiate between different types of shock in pregnancy according to their pathophysiology | C2 | | |
| | <ul style="list-style-type: none"> • Appreciate clinical features of shock | C2 | | |
| | <ul style="list-style-type: none"> • Enumerate common causes of hypovolemic shock in pregnancy | C2 | | |
| | <ul style="list-style-type: none"> • Outline management of hypovolemic shock | C2 | | |

Padiatrics

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|---------|--|-----------------|-------------------|-----------------|
| Murmurs | <ul style="list-style-type: none"> • Differentiate between cyanotic and acyanotic congenital heart diseases on the basis of clinical features | C2 | LGIS | MCQs |

Eye

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|---------------------------------|---|-----------------|-------------------|-----------------|
| Retinal changes in hypertension | <ul style="list-style-type: none"> • Define hypertensive retinopathy | C1 | LGIS CBL | MCQs |
| | <ul style="list-style-type: none"> • Describe stages of hypertensive retinopathy | C2 | | |
| | <ul style="list-style-type: none"> • Explain pathophysiology of hypertensive retinopathy | C2 | | |

Radiology

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|------------------------------------|--|-----------------|-------------------|-----------------|
| Radiology of hip bone & Lower Limb | <ul style="list-style-type: none"> • Interpret normal x-rays of Hip bone & Lower Limb | C2 | LGIS | MCQs |
| | <ul style="list-style-type: none"> • Discuss features of different Fractures of Hip Bone & Lower Limb | C2 | | |

Spirally Integrated Courses / General Education Cluster (GEC) Courses

Content

- **Longitudinal Themes**
 - **The Holy Quran Translation**
 - **Behavioral Sciences & Biomedical Ethics**
 - **Family Medicine**
 - **Early Clinical Exposure (ECE)**

Behavioral Sciences & Biomedical Ethics

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|---------------------------|--|-----------------|-------------------|-----------------|
| Breaking bad news | <ul style="list-style-type: none"> • To be able to break bad news to the patient or their families in clinical settings and dealing with emotions arising | C2 | LGIS CBL | MCQS |
| Stress and its management | <ul style="list-style-type: none"> • To be able to define types of stress, its causes and management of stress | C2 | LGIS CBL | MCQS |

Family Medicine

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|---------------------------------------|--|-----------------|-------------------|-----------------|
| Approach to a patient with chest pain | <ul style="list-style-type: none"> • Describe chest pain | C1 | LGIS | MCQs |
| | <ul style="list-style-type: none"> • Discuss various causes | C2 | | |
| | <ul style="list-style-type: none"> • Explain the clinical presentation. | C2 | | |
| | <ul style="list-style-type: none"> • Enlist the lab investigations | C2 | | |
| | <ul style="list-style-type: none"> • Decision for referral of patient | C2 | | |



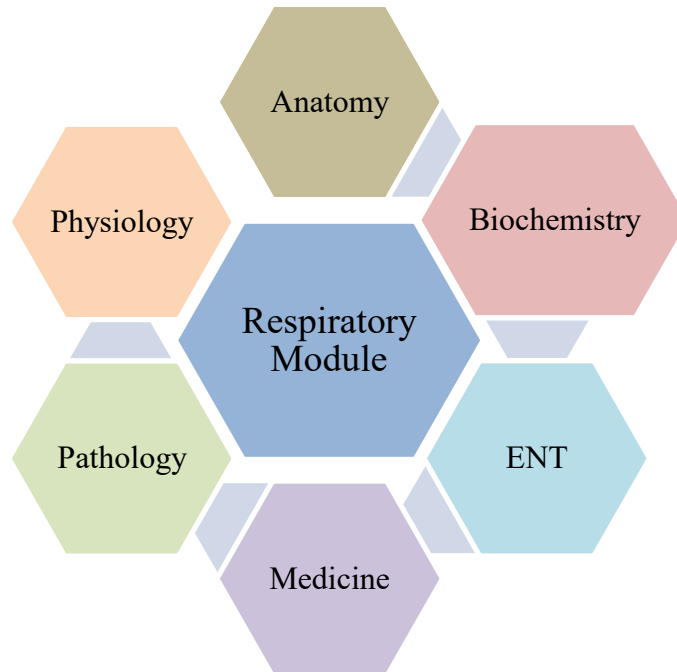
RMU 12

Integrated Modular Curriculum 2026

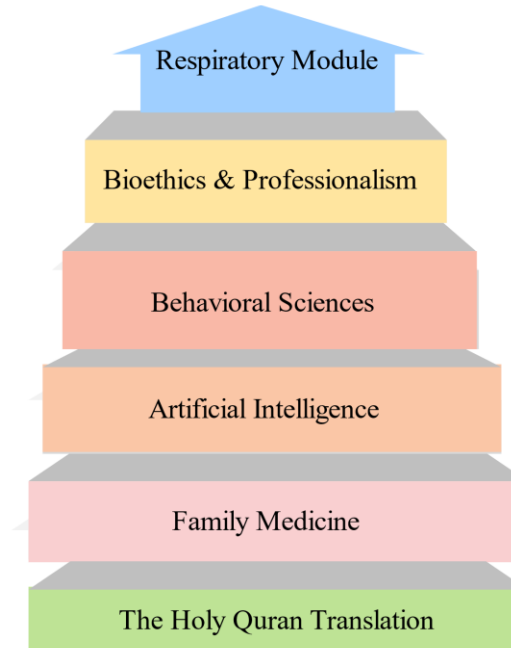
Isolation to **Beyond Boundaries**

Respiration Module-I

Integration of Disciplines in Respiration Module



Spiral / General Education Cluster Courses



Discipline Wise Details of Modular Content

| Block | Module | General Anatomy | Embryology | Histology | Gross Anatomy | |
|---|---|--|--|--|---|--|
| III | <ul style="list-style-type: none"> Anatomy | <ul style="list-style-type: none"> | <ul style="list-style-type: none"> Embryology of Respiratory System | Histology of Upper & Lower <ul style="list-style-type: none"> Respiratory System | <ul style="list-style-type: none"> Gross Anatomy of Upper & Lower Respiratory System | |
| | <ul style="list-style-type: none"> Biochemistry | <ul style="list-style-type: none"> pH, Electron transport chain, Oxidative phosphorylation, Water soluble vitamins riboflavin, biotin, pyridoxine, pantothenic acid, Normal acid base regulation | | | | |
| | <ul style="list-style-type: none"> Physiology | <ul style="list-style-type: none"> Pulmonary Ventilation, Pulmonary Volumes and Capacities, Alveolar Ventilation, Functions of the Respiratory Passageways Pulmonary Circulation, Pulmonary Edema, Physical Principles of Gas Exchange; Diffusion of Oxygen and Carbon Dioxide Through the Respiratory Membrane Transport of Oxygen and Carbon Dioxide in Blood and Tissue Fluids Regulation of Respiration Useful Methods for Studying Respiratory Abnormalities, Respiratory Insufficiency, Hypoxia & Oxygen Therapy, Hypercapnia & Artificial Respiration Respiratory changes during Exercise, Aviation, Space & Deep-Sea Diving Physiology | | | | |
| | Spiral Courses | | | | | |
| | <ul style="list-style-type: none"> The Holy Quran Translation | <ul style="list-style-type: none"> Immaniat- V & VI Ibaadat-V | | | | |
| | <ul style="list-style-type: none"> Artificial Intelligence | <ul style="list-style-type: none"> Artificial Intelligence basic concepts | | | | |
| | <ul style="list-style-type: none"> Family Medicine | <ul style="list-style-type: none"> Approach to a patient with cough hemoptysis & shortness of breath | | | | |
| | <ul style="list-style-type: none"> Climate Change & Health | <ul style="list-style-type: none"> Effects of Climate Changes on Body Systems (IHD, Skin Diseases & Heat Stroke) Effects of Climate Changes on Respiratory System (Asthma, COPD, Allergies & Cancers) Greenhouse effect Global warming and climate change | | | | |
| | <ul style="list-style-type: none"> Bioethics Professionalism & Behavioral Sciences | <ul style="list-style-type: none"> Crises intervention and disaster Conflict resolution and empathy | | | | |
| | Vertical Integration | | | | | |
| | <ul style="list-style-type: none"> Medicine | <ul style="list-style-type: none"> Tuberculosis | | | | |
| | <ul style="list-style-type: none"> Pathology | <ul style="list-style-type: none"> Clinical disorders of Respiration | | | | |
| | <ul style="list-style-type: none"> ENT | <ul style="list-style-type: none"> Foreign body nose & ear & Tonsillitis | | | | |
| | Early Clinical Exposure (ECE) | | | | | |
| | <ul style="list-style-type: none"> Medicine | <ul style="list-style-type: none"> Dyspnea Observe/see patients Cyanosis & see Asthma case COPD cases Tuberculosis cases with fibrosis of lungs | | | | |
| <ul style="list-style-type: none"> Surgery | <ul style="list-style-type: none"> See cases of Flail chest & Pneumothorax | | | | | |

| | | |
|--|---|---|
| | | <ul style="list-style-type: none">• Chest intubation |
| | <ul style="list-style-type: none">• Radiology | <ul style="list-style-type: none">• Radiology of chest• Chest X-ray at different level with reference to Anatomy and Pathologies |

Respiration Module Team

Module Name : Respiration Module
 Duration of module : 04 Weeks
 Coordinator : Dr. Rahat
 Co- Coordinator : Dr. Qurat ul Ain
 Review by : Module Committee

| Module Committee | | | Module Task Force Team | | |
|-------------------------|---|--------------------------------|--------------------------------|---|--|
| 1. | Vice Chancellor RMU | Prof. Dr. Muhammad Umar | 1. | Coordinator | Dr. Rahat (Senior Demonstrator of Biochemistry) |
| 2. | Chairperson Anatomy & Dean Basic Sciences | Prof. Dr. Ayesha Yousaf | 2. | DME Focal Person | Dr. Farzana Fatima |
| 3. | Director DME | Prof. Dr. Ifra Saeed | 3. | Co-coordinator | Dr. Qurat ul Ain (Senior Demonstrator of Anatomy) |
| 4. | Chairperson Physiology | Prof. Dr. Samia Sarwar | 4. | Co-Coordinator | Dr. Almas Ejaz (Demonstrator Biochemistry) |
| 5. | Chairperson Biochemistry | Dr. Aneela Jamil | 5. | Co-coordinator | Dr. Fareed Ullah Khan (Senior Demonstrator Physiology) |
| 6. | Focal Person Anatomy First Year MBBS | Asso. Prof. Dr. Mohtashim Hina | DME Implementation Team | | |
| 7. | Focal Person Physiology | Dr. Sidra Hamid | | | |
| 8. | Focal Person Biochemistry | Dr. Aneela Jamil | 1. | Director DME | Prof. Dr. Ifra Saeed |
| 9. | Focal Person Pharmacology | Dr. Zunera Hakim | 2. | Assistant Director DME | Dr. Farzana Fatima |
| 10. | Focal Person Pathology | Dr. Asiya Niazi | 3. | Implementation Incharge 1st & 2 nd Year MBBS | Prof. Dr. Ifra Saeed Dr. Farzana Fatima |
| 11. | Focal Person Behavioral Sciences | Dr. Saadia Yasir | 4. | Editor | Muhammad Arslan Aslam |
| 12. | Focal Person Community Medicine | Dr. Afifa Kulsoom | | | |
| 13. | Focal Person Quran Translation Lectures | Dr. Fahad Anwar | | | |
| 14. | Focal Person Family Medicine | Dr. Sadia Khan | | | |

Module IV – Respiratory Module

Rationale: A respiratory system's function is to allow gas exchange. The space between the alveoli and the capillaries, the anatomy or structure of the exchange system, and the precise physiological uses of the exchanged gases vary depending on the organism. In humans' respiratory system include airways, lungs, and the respiratory muscles. Molecules of oxygen and carbon dioxide that are passively exchanged, by diffusion, between the gaseous external environment and the blood. This exchange process occurs in the alveolar region of the lungs.

In this present module has been designed to unfold structural organization function congenital anomalies and diseases of respiration. It explains the anatomy, control, gases exchange, reflexes of respiratory system. It also helps to include the radiological examination of the respiratory system.

Module Outcomes

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

Knowledge:

1. Integrate the basic science knowledge with clinical sciences in order to describe the pathogenesis, clinical presentations of common respiratory disorders, e.g. COPD
2. Use technology based medical education including **Artificial Intelligence.**
3. Appreciate concepts & importance of **Family Medicine**
Biomedical Ethics
Research.

Skill:

1. Describe the gross anatomy of mediastinum along with clear understanding of structures present in it.
2. Correlate between histological structure of respiratory membrane and its role in diffusion of gases.

Attitude:

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

Learning Objectives, Teaching Strategies & Assessments

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



Syllabus of Respiratory Module

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 Tool |
|---------------------------------------|--|-----------------|-------------------|--------------------|
| Respiratory system I (Histology) | • Explain division of the respiratory system | C2 | LGIS | MCQ SAQ VIVA |
| | • Describe different functions of respiratory system. | C2 | | |
| | • Describe details of respiratory epithelium | C2 | | |
| | • Discuss microscopic structure of vestibule | C2 | | |
| | • Describe structural specialization in mucosa of nasal cavity proper | C2 | | |
| | • Appreciate differences between respiratory mucosa and olfactory mucosa | C1 | | |
| | • Describe the features of olfactory mucosa | C2 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| • Read a research article | C3 | | | |
| Respiratory system II (Histology) | • Describe microscopic structure of paranasal sinuses | C2 | LGIS | MCQ SAQ VIVA |
| | • Describe general histological organization of respiratory system | C2 | | |
| | • Appreciate different histological layers of nasopharynx | C1 | | |
| | • Describe histological structure of laryngeal cartilages | C2 | | |
| | • Discuss components of tracheal wall | C2 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read a research article | C3 | | |
| Respiratory System III (Histology) | • Describe division of bronchial tree | C2 | LGIS | MCQ SAQ VIVA |
| | • Discuss microscopic structure of extra and intra pulmonary bronchi | C2 | | |
| | • Describe histological structure of bronchioles | C2 | | |
| | • Appreciate differences between bronchi and bronchioles Discuss microscopic structure of terminal bronchioles | C1 | | |
| | • Appreciate the significance of Clara cells with their functions | C2 | | |
| | • Discuss other cells present in terminal bronchioles | C2 | | |

| | | | | |
|--|---|----|------|--------------------|
| | <ul style="list-style-type: none"> • Describe the microscopic structure of respiratory bronchioles | C2 | | |
| | <ul style="list-style-type: none"> • Describe differences between respiratory and terminal bronchioles Describe characteristics of alveolar ducts | C2 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> • Read a research article | C3 | | |
| Respiratory System IV (Histology) | <ul style="list-style-type: none"> • Describe histological structure of alveolar ducts and their functions | C2 | LGIS | MCQ SAQ VIVA |
| | <ul style="list-style-type: none"> • Identify type I and type II alveolar cells | C1 | | |
| | <ul style="list-style-type: none"> • Describe histological structure of interalveolar septum | C2 | | |
| | <ul style="list-style-type: none"> • Discuss role of alveolar macrophages | C2 | | |
| | <ul style="list-style-type: none"> • Describe Blood – Air barrier in detail | C2 | | |
| | <ul style="list-style-type: none"> • Discuss histology of pleura in detail | C2 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> • Read a research article | C3 | | |
| Development of Nose and Paranasal sinuses | <ul style="list-style-type: none"> • Describe role of pharyngeal arches in development of nose | C2 | LGIS | MCQ SAQ VIVA |
| | <ul style="list-style-type: none"> • Describe development of nose and paranasal sinuses | C2 | | |
| | <ul style="list-style-type: none"> Describe the Congenital anomalies of nose and paranasal sinuses | C2 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| Development of Larynx & Trachea | <ul style="list-style-type: none"> • Describe formation of respiratory primordium | C2 | LGIS | MCQ SAQ VIVA |
| | <ul style="list-style-type: none"> • Describe the role of pharyngeal arches in development of larynx | C2 | | |
| | <ul style="list-style-type: none"> • Discuss formation of laryngotracheal diverticulum | C2 | | |
| | <ul style="list-style-type: none"> • Describe formation of trachea esophageal septum and its importance | C2 | | |
| | <ul style="list-style-type: none"> • Describe Congenital defects associated with development of Trachea | C3 | | |
| | <ul style="list-style-type: none"> • Describe formation and division of respiratory buds | C2 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |

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|--|---|---|------|--------------------|
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read a research article | C3 | | |
| Development of Lungs | • Discuss development of bronchi and bronchopulmonary segments | C2 | LGIS | MCQ SAQ VIVA |
| | • Describe development of pleural cavities | C2 | | |
| | • Discuss process of maturation of lungs | C2 | | |
| | • Enlist different stages of lung maturation | C1 | | |
| | • Explain the production and significance of Surfactant | C2 | | |
| | • Describe role of fetal breathing movements in maturation of lungs | C2 | | |
| | • Discuss postnatal development of lungs | C2 | | |
| | • Describe congenital anomalies associated with lungs | C3 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read a research article | C3 | | |
| | Development of Diaphragm | • Describe the development of diaphragm | | |
| • Elaborate formation of septum transversum and its role in development of diaphragm | | C2 | | |
| • Discuss congenital defects associated with diaphragm | | C3 | | |
| • Correlate the clinical conditions | | C3 | | |
| • Understand the preventive and curative health care measures | | C3 | | |
| • Practice the principles of Bioethics | | C3 | | |
| • Apply strategic use of AI in health care | | C3 | | |
| • Read a research article | | C3 | | |

Physiology Large Group Interactive Session (LGIS)

| Topics | Learning Objectives | References | Learning Resources | Learning Domains | Learning Strategy | Assessment Tools |
|--|--|--|--|--|-------------------|---|
| Mechanics of pulmonary ventilation, Lung compliance | <ul style="list-style-type: none"> Enumerate muscles of inspiration and expiration and Describe mechanics of pulmonary ventilation Describe surfactant, surface tension and collapse of alveoli Define compliance. Draw compliance diagram of lungs. Explain relationship of surface tension, radius of alveoli, elastic forces of lungs with compliance | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology. 25TH Edition. Section 06, Respiratory Physiology (Chapter 34, Page 621,629) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Mechanics of Breathing (Chapter 17,Page 569) Physiology by Linda S. Costanzo 6th Edition. Respiratory Physiology (Chapter 5,Page 189,197) Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. Section 05,(Chapter 36,Page 581) ,(Chapter 40,Page 629) Textbook of Medical Physiology by Guyton & Hall. 14th Edition. (Chapter 38, Page 491,493) | <ol style="list-style-type: none"> https://www.ncbi.nlm.nih.gov/books/NBK538324/ https://youtu.be/BTwgmMfqOW4 | C1 C1 C1 C1 C1 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Pulmonary circulation & Pulmonary capillary dynamics. Physical principles of gas exchange & diffusion through respiratory membrane | <ul style="list-style-type: none"> Discuss the role of alveoli and pleural space in respiration and pressure changes during respiration Enlist non-respiratory and respiratory functions of respiration Define and explain the concept of respiratory membrane. Define and draw respiratory unit Draw a diagram showing the exchange of gases through the respiratory membrane Enlist four factors affecting the rate of gas diffusion through the | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology. 25TH Edition. Section 06,Respiratory Physiology (Chapter 34, Page 626,633,635) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Mechanics of Breathing (Chapter 17,Page 574) Physiology by Linda S. Costanzo 6th Edition. Respiratory Physiology (Chapter 5,Page 209) Physiological Basis of Medical Practice by Best & Taylor's. 13th Edition. Section 05,(Chapter 37,Page 592) | <ol style="list-style-type: none"> https://youtu.be/aJPwUnZtycQ https://youtu.be/zv1fDFn8BaM https://pressbooks-dev.oer.hawaii.edu/biology/chapter/gas-exchange-across-respiratory-surfaces/ https://www.sciencedirect.com/ | C2 C1 C1 C1 C1 C1 C1 C1 C1 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |

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|--|--|---|--|----------------------------|------|---|
| | <ul style="list-style-type: none"> respiratory membrane Define diffusing capacity of respiratory membrane. Describe the diffusing capacity for oxygen. Describe the diffusing capacity for carbon dioxide. Describe the changes in diffusing capacity of oxygen and carbon dioxide during exercise Compare the diffusing capacities of oxygen and carbon dioxide | <ul style="list-style-type: none"> Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 39, Page 503) (Chapter 40, Page 511,515) | t.com/science/article/pii/S2666496822000194 . | | | |
| Pulmonary volumes, capacities & functions of respiratory tract | <ul style="list-style-type: none"> Define lung volumes and capacities. Define the four pulmonary volumes and capacities. Enlist normal values of all the lung volumes and capacities Draw a graph representing all the lung volumes and capacities. Describe how lung volumes and capacities can be measured with spirometer. Enlist the lung volumes and capacities which can't be measured by spirometer | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition. Section 06,Respiratory Physiology (Chapter 34, Page 628) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Mechanics of Breathing (Chapter 17,Page 578) Physiology by Linda S. Costanzo 6th Edition. Respiratory Physiology (Chapter 5,Page 191) Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 38, Page 495) | <ol style="list-style-type: none"> https://youtu.be/9VdHhD1vcDU https://teachmephysiology.com/respiratory-system/ventilation/lung-volumes/ | C1 C1 C1 C1 C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Transport of oxygen | Describe in detail the transport of oxygen from lungs to tissues | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition. Section 06, Respiratory Physiology (Chapter 35, Page 639) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Gas Exchange and Transport (Chapter 18, Page 599) | <ol style="list-style-type: none"> https://teachmephysiology.com/respiratory-system/gas-exchange/oxygen-transport/ https://youtu.be/HU6_LQldvog | C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, |

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|--------------------------------------|--|---|--|----------------------|------|---|
| | | <ul style="list-style-type: none"> • Physiology by Linda S. Costanzo 6th Edition. Respiratory Physiology (Chapter 5,Page 210,213,216) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. Section 05,(Chapter 38,Page 603) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 41, Page 521) | | | | MST based Assessment) OSPE |
| Ventilation perfusion ratio | <ul style="list-style-type: none"> • Define And Explain importance. • Draw ventilation perfusion diagram Explain the concept of physiologic shunt and dead space | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition. Section 06, Respiratory Physiology (Chapter 34, Page 636) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Mechanics of Breathing (Chapter 17, Page 587) • Physiology by Linda S. Costanzo 6th Edition. Respiratory Physiology (Chapter 5,Page 194,225,229) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. Section 05,(Chapter 39,Page 612) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 38, Page 497) | <ol style="list-style-type: none"> 1. https://youtu.be/UKsOLb5XWa0 2. https://teachmephysiology.com/respiratory-system/gas-exchange/ventilation-perfusion/ | C1/C2 C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Oxygen hemoglobin dissociation curve | Describe the role of hemoglobin in oxygen transport. Draw oxy-hemoglobin dissociation curve. Enlist and explain factors which shift the curve towards right and left. Briefly explain the transport of oxygen in plasma | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition. Section 06, Respiratory Physiology (Chapter 35, Page 639-641) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Gas Exchange and Transport (Chapter 18, Page 608) | <ol style="list-style-type: none"> 1. https://www.science-direct.com/topics/nursing-and-health-professions/oxygen-dissociation-curve 2. https://youtu.be/MUKkv1rbOIM | C1 C1 C1 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) |

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|------------------------------|---|--|--|----------------------|------|---|
| | | <ul style="list-style-type: none"> • Physiology by Linda S. Costanzo 6th Edition. Respiratory Physiology (Chapter 5,Page 218) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 41, Page 524) | | | | OSPE |
| Lung function test | <ul style="list-style-type: none"> • Describe all the non-invasive & invasive tests to assess the pulmonary functions | <ul style="list-style-type: none"> • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Mechanics of Breathing (Chapter 17, Page 592) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 44, Page 553) | <ol style="list-style-type: none"> 1. https://www.webmd.com/lung/types-of-lung-function-tests 2. https://youtu.be/6dHVhEjzj64 | C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Transport of CO ₂ | <p>Enumerate and explain the various transport forms of carbon dioxide in blood.Also state percentages of all these forms</p> <p>Explain the carbondioxide dissociation curve</p> <p>Define respiratory exchange ratio.</p> <p>Describe haldanes effect ,bohr effect and chloride shift</p> | <ul style="list-style-type: none"> • Ganong’s Review of Medical Physiology.25TH Edition. Section 06, Respiratory Physiology (Chapter 35, Page 641) • Physiology by Linda S. Costanzo 6th Edition. Respiratory Physiology (Chapter 5,Page 223) • Physiological Basis of Medical Practice by Best & Taylor’s.13th Edition. Section 05,(Chapter 38,Page 606) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 41, Page 528) | <ol style="list-style-type: none"> 1. https://courses.lumenlearning.com/wm-biology2/chapter/transport-of-carbon-dioxide-in-the-blood/ 2. https://youtu.be/VgpNSdWvrno | C1 C2 C1 C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Respiratory abnormalities | <ul style="list-style-type: none"> • Explain the physiologic peculiarities of chronic pulmonary emphysema, pneumonia, atelectasis, asthma and | <ul style="list-style-type: none"> • Ganong’s Review of Medical Physiology.25TH Edition.Section 06, Respiratory Physiology (Chapter 36, Page 664) | <ol style="list-style-type: none"> 1. https://www.physio-pedia.com/Respiratory_Disorders | C2 | LGIS | MCQ SEQ VIVA VOCE |

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|--|---|---|--|----------------|------|--|
| (COPD, Tuberculosis, Pneumonia, Atelectasis) | tuberculosis | <ul style="list-style-type: none"> Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 43, Page 541) | <ol style="list-style-type: none"> https://youtu.be/SrKfsCdeqWc https://youtu.be/h0p7bs5xdgQ | | | MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Nervous regulation of respiration | <ul style="list-style-type: none"> Describe term respiratory center. Enumerate the various respiratory centers. Give the anatomical location of respiratory centers | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 06, Respiratory Physiology (Chapter 36, Page 655) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Gas Exchange and Transport (Chapter 18, Page 614) Physiology by Linda S. Costanzo 6th Edition. Respiratory Physiology (Chapter 5,Page 231) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 05(Chapter 41,Page 646) Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 42, Page 531) | <ol style="list-style-type: none"> https://youtu.be/KNAKKNbq20 https://teachmephysiology.com/respiratory-system/regulation/neural-control-ventilation/ | C1 C1 C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Hypoxia, hypercapnia, cyanosis | <ul style="list-style-type: none"> Define hypoxia and hypercapnia. Enumerate and explain its various types. Enumerate the roles of oxygen therapy in different types of hypoxia | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 06, Respiratory Physiology (Chapter 35, Page 646,650) Physiology by Linda S. Costanzo 6th Edition.Respiratory Physiology (Chapter 5,Page 239) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 05,,(Chapter 41,Page 653) (Chapter 42,Page 662) | <ol style="list-style-type: none"> https://youtu.be/wtn--qgs3Fg https://www.verywellhealth.com/hypoxia-types-symptoms-and-causes-2248929 | C1 C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |

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|---|---|---|--|----------------------|------|---|
| | | <ul style="list-style-type: none"> Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 43, Page 546) | | | | |
| Chemical regulation of respiration & exercise changes | <ul style="list-style-type: none"> Describe in detail the role of respiratory centers in the regulation of respiration. Explain chemical control of respiration in detail Describe changes in respiration during exercise. Enumerate and briefly explain factors which affect respiration. Describe briefly the mechanism of periodic breathing and sleep apnea | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 06, Respiratory Physiology (Chapter 36, Page 657,664) Physiology by Linda S. Costanzo 6th Edition.Respiratory Physiology (Chapter 5,Page 233,235) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 05,(Chapter 41,Page 649) Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 42, Page 533,536) | <ol style="list-style-type: none"> https://youtu.be/gR_RLgo9Vn0 https://journals.physiology.org/doi/abs/10.1152/physrev.1925.5.4.551?journalCode=physrev | C1 C2 C1 C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Space physiology | <ul style="list-style-type: none"> Define and explain the process of acclimatization to low oxygen tension Describe acute and chronic mountain sickness Describe the effects of acceleratory forces on body in aviation and space physiology | <ul style="list-style-type: none"> Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.(Chapter 42,Page 659,663) Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 44, Page 553) | <ol style="list-style-type: none"> https://youtu.be/NFfHh_rQZJE https://www.physoc.org/careers/research/space-physiology/ | C1 C1 C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Miscellaneous factors affecting respiration (concept of voluntary control of respiration, lung J receptor, brain edema, anesthesia, chyne stokes) | <ul style="list-style-type: none"> Describe in detail the role of respiratory centers in the regulation of respiration. Explain chemical control of respiration in detail Describe changes in respiration during exercise. Enumerate and briefly explain factors which affect respiration. | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 06, Respiratory Physiology (Chapter 36, Page 662) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 05,(Chapter 41,Page 656) | <ol style="list-style-type: none"> https://www.physoc.org/careers/research/space-physiology/ https://www.brainkart.com/article/Factors-Affecting-Respiration_16533/ | | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, |

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|--------------------------|---|---|--|----------------------|------|---|
| breathing, sleep apnea) | <ul style="list-style-type: none"> Describe briefly the mechanism of periodic breathing and sleep apnea | <ul style="list-style-type: none"> Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 42, Page 538) | | | | MST based Assessment) OSPE |
| High altitude physiology | <ul style="list-style-type: none"> Describe the effects of low oxygen pressure on body Enumerate the acute effects of hypoxia on body Define and explain the process of acclimatization to low oxygen tension Describe acute and chronic mountain sickness Describe the effects of acceleratory forces on body in aviation and space physiology | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 06, Respiratory Physiology (Chapter 35, Page 648) Physiology by Linda S. Costanzo 6th Edition.Respiratory Physiology (Chapter 5,Page 237) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 05,(Chapter 42,Page 659) Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 44, Page 553,556,559) | <ol style="list-style-type: none"> https://youtu.be/6KHQGS4jJyI https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2151873/ | C1 C1 C1 C1 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Deep sea physiology | <ul style="list-style-type: none"> Discuss Effect of high partial pressure of individual gasses on the body Discuss Oxygen toxicity at high pressure Carbon dioxide toxicity at high pressure Explain in detail the process of decompression in deep sea divers | <ul style="list-style-type: none"> Physiological Basis of Medical Practice by Best & Taylor's.13th Edition. (Chapter 42, page 665) Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 44, Page 553) | <ol style="list-style-type: none"> https://medicoapps.org/m-physiology-of-deep-sea-diving/ https://youtu.be/eNMcPam9aU | C2 C2 | LGIS | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |

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 |
|------------|---|-----------------|-------------------|-----------------|
| PH And PKA | <ul style="list-style-type: none"> Define of pH and pKa | C1 | LGIS | MCQs |
| | <ul style="list-style-type: none"> Elaborate Henderson Hasselbalch equation. | C2 | | SAQs |
| | <ul style="list-style-type: none"> Describe Measurement of pH by equation. | C2 | | Viva |
| | <ul style="list-style-type: none"> Define buffers. | C1 | | MCQs |

| | | | | |
|--|---|----|------|----------------------|
| Body buffers | <ul style="list-style-type: none"> • Discuss Mechanism of various buffers in maintenance of blood pH. | C2 | LGIS | SAQs Viva |
| Electron transport chain | <ul style="list-style-type: none"> • Describe Components/ complexes of electron transport chain. | C2 | LGIS | MCQs SAQs Viva |
| | <ul style="list-style-type: none"> • Enlist Enzymes and Co-enzymes of each component. | C1 | | |
| | <ul style="list-style-type: none"> • Enlist Inhibitors of these complexes. | C1 | | |
| Mechanisms of energy generation in the body. | <ul style="list-style-type: none"> • Discuss various mechanisms of energy generation in the body. | C2 | LGIS | MCQs SAQs Viva |
| | <ul style="list-style-type: none"> • Discuss Oxidative phosphorylation. | C2 | | |
| | <ul style="list-style-type: none"> • Describe uncouplers. | C2 | | |
| Energy change. | <ul style="list-style-type: none"> • Define the terms: <ul style="list-style-type: none"> ○ Free energy change. ○ Standard free energy. | C1 | LGIS | MCQs SAQs Viva |
| | <ul style="list-style-type: none"> • Describe various sources of electrons. | C2 | | |
| Vitamins | <ul style="list-style-type: none"> • Define Vitamins | C1 | LGIS | MCQs SAQs Viva |
| | <ul style="list-style-type: none"> • Discuss the distribution, daily requirement and deficiency of vitamins | C2 | | |
| | <ul style="list-style-type: none"> • Clinical indication of vitamins | C2 | | |
| Xenobiotics | <ul style="list-style-type: none"> • Define xenobiotics | C1 | LGIS | MCQs SAQs Viva |
| | <ul style="list-style-type: none"> • Discuss its metabolism and its role in environment | C2 | | |

Anatomy Small Group Discussion (SGDs)

| Topic | Learning Objectives At the end of lecture students should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
|--------------------------|--|-----------------|-------------------|----------------------------|
| Nose & Paranasal Sinuses | <ul style="list-style-type: none"> • Describe anatomy of nasal cavity | C2 | Skill Lab | MCQ SAQ Viva OSPE |
| | <ul style="list-style-type: none"> • Describe the blood supply and the site of anastomosis in the nose. | C2 | | |
| | <ul style="list-style-type: none"> • Discuss the nerve supply of nose | C2 | | |
| | <ul style="list-style-type: none"> • Discuss the applied and the related clinical. | C3 | | |
| | <ul style="list-style-type: none"> • Define and enumerate para nasal sinuses. | C1 | | |
| | <ul style="list-style-type: none"> • Discuss the shape, location and their point of openings. | C2 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |

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|----------------------------------|---|----|-----------|----------------------------|
| | <ul style="list-style-type: none"> • Read a research article | C3 | | |
| Larynx & Trachea | <ul style="list-style-type: none"> • Enumerate the components of larynx | C1 | Skill Lab | MCQ SAQ Viva OSPE |
| | <ul style="list-style-type: none"> • Describe paired and unpaired cartilages of larynx Describe Intrinsic and extrinsic muscles of larynx (origin, insertion nerve supply and action). | C2 | | |
| | <ul style="list-style-type: none"> • Describe Intrinsic and extrinsic membrane (attachments and structure piercing the membranes). | C2 | | |
| | <ul style="list-style-type: none"> • Discuss the movements of vocal cords and their effects on the voice and respiration. | C2 | | |
| | <ul style="list-style-type: none"> • Discuss the blood supply and nerve supply of larynx. | C2 | | |
| | <ul style="list-style-type: none"> • Discuss the applied and the related clinical. | C3 | | |
| | <ul style="list-style-type: none"> • Describe the level of commencement of trachea, its termination and the tracheal cartilages. | C2 | | |
| | <ul style="list-style-type: none"> • State the level of division of trachea | C1 | | |
| | <ul style="list-style-type: none"> • Describe in detail the nerve supply and blood supply of trachea. | C2 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> • Read a research article | C3 | | |
| Overview of Thoracic wall | <ul style="list-style-type: none"> • Enumerate the bones of the thorax. | C1 | Skill Lab | MCQ SAQ Viva OSPE |
| | <ul style="list-style-type: none"> • Describe and classify the typical ribs (side determination, features, attachments, relations, types and ossification). | C2 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> • Read a research article | C3 | | |
| Skeleton of thoracic wall (Ribs) | <ul style="list-style-type: none"> • Describe and classify the atypical ribs (side determination, features, attachments, relations, types and ossification). | C2 | Skill Lab | MCQ SAQ Viva OSPE |
| | <ul style="list-style-type: none"> • Differentiate between typical and atypical ribs. | C2 | | |
| | <ul style="list-style-type: none"> • Discuss costal cartilages and their attachments. | C2 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> • Read a research article | C3 | | |

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| Skeleton of thoracic wall (Sternum) | • Identify different parts of sternum. | C1 | Skill Lab | MCQ SAQ Viva OSPE |
| | • Describe the bony features, attachments ossification of sternum | C2 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read a research article | C3 | | |
| Joints of thoracic wall | • Classify the joints of the thorax. | C2 | Skill Lab | MCQ SAQ Viva OSPE |
| | • Discuss the type, ligaments and relations of the joints of the thorax (Manubriosternal, xiphisternal, costovertebral, costotransverse, costochondral, chondrosternal, interchondral and intervertebral joints). | C2 | | |
| | • Discuss the components functions of the intervertebral disc. | C2 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read a research article | C3 | | |
| Thoracic apertures | • Discuss the boundaries, shape and structure passing through superior thoracic aperture (viscera, blood vessels, nerve and muscles) | C2 | Skill Lab | MCQ SAQ Viva OSPE |
| | • Describe the thoracic inlet syndrome. | C3 | | |
| | • Discuss the boundaries, shape and structures passing through the inferior thoracic aperture. | C2 | | |
| | • Correlate the clinical conditions | C3 | | |
| | • Understand the preventive and curative health care measures | C3 | | |
| | • Practice the principles of Bioethics | C3 | | |
| | • Apply strategic use of AI in health care | C3 | | |
| | • Read a research article | C3 | | |
| Intercostal spaces / Movements of thoracic wall | • Discuss the thoracic wall. | C2 | Skill Lab | MCQ SAQ Viva OSPE |
| | • Describe the intercostals muscles (origin, insertion, direction of fibers, nerve supply and actions. | C2 | | |
| | • Discuss in detail the formation, branches, distribution and the related clinical of the intercostals nerves. | C3 | | |
| | • Explain the formation, course, relations, distribution and branches of the thoracic sympathetic trunk. | C2 | | |
| | • Differentiate between the typical and atypical intercostals space. | C1 | | |
| | • Compare the typical and atypical intercostals space. | C2 | | |

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|---|--|----|-----------|----------------------------|
| | <ul style="list-style-type: none"> Describe the types and axis of movements of vertebral column (flexion, extension, lateral flexion and rotation). | C2 | | |
| | <ul style="list-style-type: none"> Define the respiratory movements on the basis of principles, factors and the different types (pump handle, bucket handle and piston). | C1 | | |
| | <ul style="list-style-type: none"> Discuss the related physiological and pathological changes occurring (related to age movement etc). | C2 | | |
| | <ul style="list-style-type: none"> Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> Read a research article | C3 | | |
| Diaphragm | <ul style="list-style-type: none"> Describe the small and large openings in the diaphragm (vertebral level, location, formation, structures passing through and effects on the openings and structures by the diaphragmatic contraction). | C2 | Skill Lab | MCQ SAQ Viva OSPE |
| | <ul style="list-style-type: none"> Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> Read a research article | C3 | | |
| Vessels and lymphatics of thoracic wall | <ul style="list-style-type: none"> Explain the arterial supply of intercostals space (anterior / posterior, parent vessels, branches, course, relations and termination). | C2 | Skill Lab | MCQ SAQ Viva OSPE |
| | <ul style="list-style-type: none"> Differentiate between the arterial supply of typical and atypical intercostal space with the related clinicals. | C3 | | |
| | <ul style="list-style-type: none"> Explain the venous drainage of the intercostal spaces (anterior / posterior, parent vessels, tributaries, course, relations and termination). | C2 | | |
| | <ul style="list-style-type: none"> Differentiate between the venous drainage of typical and atypical intercostal space with the related clinicals | C3 | | |
| | <ul style="list-style-type: none"> Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> Read a research article | C3 | | |
| Innervation of Thoracic Wall | <ul style="list-style-type: none"> Discuss the origin of intercostal nerves. | C2 | Skill Lab | MCQ SAQ Viva |
| | <ul style="list-style-type: none"> Discuss course of nerves. | C2 | | |
| | <ul style="list-style-type: none"> Discuss branches and related area supplied by these | C2 | | |
| | <ul style="list-style-type: none"> Correlate the clinical conditions | C3 | | |

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|---|---|----|-----------|----------------------------|
| | <ul style="list-style-type: none"> • Understand the preventive and curative health care measures | C3 | | OSPE |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> • Read a research article | C3 | | |
| Pleura | <ul style="list-style-type: none"> • Discuss visceral and parietal pleura | C2 | Skill Lab | MCQ SAQ Viva OSPE |
| | <ul style="list-style-type: none"> • Discuss the pleural recesses and pleural cavity. | C2 | | |
| | <ul style="list-style-type: none"> • Describe the nerve and blood supply of pleura. | C2 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| Lungs | <ul style="list-style-type: none"> • Identify the features of right and left lung. | C1 | Skill Lab | MCQ SAQ Viva OSPE |
| | <ul style="list-style-type: none"> • Discuss the bronchopulmonary segments and their clinical significance | C3 | | |
| | <ul style="list-style-type: none"> • Discuss and differentiate between the root of lung and the hilum of lung. | C2 | | |
| | <ul style="list-style-type: none"> • Describe the nerve plexuses related to the lungs. | C2 | | |
| | <ul style="list-style-type: none"> • Explain the blood supply of lungs | C2 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| | <ul style="list-style-type: none"> • Read a research article | C3 | | |
| Surface Marking | <ul style="list-style-type: none"> • Identify heart borders | P1 | Skill Lab | MCQ SAQ Viva OSPE |
| | <ul style="list-style-type: none"> • aortic knuckle, | P1 | | |
| | <ul style="list-style-type: none"> • costophrenic angles, | P1 | | |
| | <ul style="list-style-type: none"> • cardio phrenic angles, | P1 | | |
| | <ul style="list-style-type: none"> • domes of diaphragm, | P1 | | |
| | <ul style="list-style-type: none"> • counting of ribs | P1 | | |
| | <ul style="list-style-type: none"> • Correlate the clinical conditions | C3 | | |
| | <ul style="list-style-type: none"> • Understand the preventive and curative health care measures | C3 | | |
| | <ul style="list-style-type: none"> • Practice the principles of Bioethics | C3 | | |
| | <ul style="list-style-type: none"> • Apply strategic use of AI in health care | C3 | | |
| <ul style="list-style-type: none"> • Read a research article | C3 | | | |

Physiology Small Group Discussion (SGDs)

| Topics | Learning Objectives | References | Learning Resources | Learning Domains | Learning Strategy | Assessment Tools |
|---|---|---|--|----------------------------------|-------------------|---|
| Physiology of unusual environment | <ul style="list-style-type: none"> • Define and explain the process of acclimatization to low oxygen tension • Describe acute and chronic mountain sickness • Describe the effects of acceleratory forces on body in aviation and space physiology | <ul style="list-style-type: none"> • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.(Chapter 42,Page 659,663) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 44, Page 553) | <ol style="list-style-type: none"> 1. https://youtu.be/NFfHh_rQZJE 2. https://www.physoc.org/careers/research/space-physiology/ | C1 C1 C1 | SGD | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |
| Mechanics of pulmonary ventilation & compliance (Second week) | <ul style="list-style-type: none"> • Enumerate muscles of inspiration and expiration and • Describe mechanics of pulmonary ventilation • Describe surfactant, surface tension and collapse of alveoli • Define compliance. • Draw compliance diagram of lungs. Explain relationship of surface tension, radius of alveoli, elastic forces of lungs with compliance | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition.Section 06,Respiratory Physiology (Chapter 34, Page 621,629) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Mechanics of Breathing (Chapter 17,Page 569) • Physiology by Linda S. Costanzo 6th Edition. Respiratory Physiology (Chapter 5,Page 189,197) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 05,(Chapter 36,Page 581) ,(Chapter 40,Page 629) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 38, Page 491,493) | <ul style="list-style-type: none"> • https://www.ncbi.nlm.nih.gov/books/NBK538324/ • https://youtu.be/BTwmMfqOW4 | C1 C1 C1 C1 C1 C2 | SGD | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |

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|--|--|---|--|---------------------------|------------|--|
| <p>Ventilation perfusion ratio & regulation of respiration (Second week)</p> | <ul style="list-style-type: none"> • Define And Explain importance. • Draw ventilation perfusion diagram Explain the concept of physiologic shunt and dead space | <ul style="list-style-type: none"> • Ganong’s Review of Medical Physiology.25TH Edition.Section 06, Respiratory Physiology (Chapter 34, Page 636) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition. Mechanics of Breathing (Chapter 17, Page 587) • Physiology by Linda S. Costanzo 6th Edition. Respiratory Physiology (Chapter 5,Page 194,225,229) • Physiological Basis of Medical Practice by Best & Taylor’s.13th Edition.Section 05,(Chapter 39,Page 612) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 38, Page 497) | <ul style="list-style-type: none"> • https://youtu.be/UKsOLb5XWa0 • https://teachmephysiology.com/respiratory-system/gas-exchange/ventilation-perfusion/ | <p>1. C1/C2 2. C1</p> | <p>SGD</p> | <p>MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE</p> |
|--|--|---|--|---------------------------|------------|--|

Biochemistry Small Group Discussion (SGDs)

| Topic | Learning Objectives At the end of lecture students should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
|--|--|------------------------|--------------------------|------------------------|
| Body buffers | <ul style="list-style-type: none"> • Define buffers. | C1 | SGD | MCQs SAQs Viva |
| | <ul style="list-style-type: none"> • Discuss Mechanism of various buffers in maintenance of blood PH. | C2 | | |
| Electron transport chain | <ul style="list-style-type: none"> • Enlist Components/ complexes of electron transport chain. | C1 | SGD | MCQs SAQs Viva |
| | <ul style="list-style-type: none"> • Describe Enzymes and Co-enzymes of each component. | C2 | | |
| | <ul style="list-style-type: none"> • Discuss Inhibitors of these complexes. | C2 | | |
| Mechanisms of energy generation in the body. | <ul style="list-style-type: none"> • Describe various mechanisms of energy generation in the body. | C2 | SGD | MCQs SAQs Viva |
| | <ul style="list-style-type: none"> • Discuss Oxidative Phosphorylation. | C2 | | |
| | <ul style="list-style-type: none"> • Describe uncouplers of ETC. | C2 | | |
| Vitamin | <ul style="list-style-type: none"> • Define Vitamins • Discuss the distribution, daily requirement and deficiency of vitamins • Clinical indication of vitamins | C1 C2 C2 | SGD | MCQs SAQs Viva |

Anatomy Self-Directed Learning (SDL)

| Topics Of SDL | Learning Objective | References |
|--|---|---|
| Nose, paranasal sinuses, larynx, and trachea | <ul style="list-style-type: none"> • Describe anatomy of nasal cavity | Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 395, 396, 973, 974, 978, 979) https://youtu.be/UPrY8JqXYCc https://youtu.be/IDBYF2i9vqU https://www.ncbi.nlm.nih.gov/books/NBK513272/ |
| | <ul style="list-style-type: none"> • Describe the blood supply and the site of anastomosis in the nose. | |
| | <ul style="list-style-type: none"> • Discuss the nerve supply of nose | |
| | <ul style="list-style-type: none"> • Discuss the applied and the related clinical. | |
| | <ul style="list-style-type: none"> • Define and enumerate para nasal sinuses. | |
| | <ul style="list-style-type: none"> • Discuss the shape, location and their point of openings. | |
| | <ul style="list-style-type: none"> • Clinical significance with surgical interventions. | |
| | <ul style="list-style-type: none"> • Enumerate the components of larynx | |
| | <ul style="list-style-type: none"> • Describe paired and unpaired cartilages of larynx Describe Intrinsic and extrinsic muscles of larynx (origin, insertion nerve supply and action). | |
| | <ul style="list-style-type: none"> • Describe Intrinsic and extrinsic membrane (attachments and structure piercing the membranes). | |
| | <ul style="list-style-type: none"> • Discuss the movements of vocal cords and their effects on the voice and respiration. | |
| | <ul style="list-style-type: none"> • Discuss the blood supply and nerve supply of larynx. | |
| | <ul style="list-style-type: none"> • Discuss the applied and the related clinical. | |
| | <ul style="list-style-type: none"> • Describe the level of commencement of trachea, its termination and the tracheal cartilages. | |
| | <ul style="list-style-type: none"> • State the level of division of trachea | |
| <ul style="list-style-type: none"> • Describe in detail the nerve supply and blood supply of trachea. | | |
| <ul style="list-style-type: none"> • Correlate the clinical aspects | | |
| <ul style="list-style-type: none"> • Read relevant research article | | |
| <ul style="list-style-type: none"> • Use digital library | | |
| Skeleton of thoracic wall | <ul style="list-style-type: none"> • Describe and classify the atypical ribs (side determination, features, attachments, relations, types and ossification. | Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 299). https://youtu.be/PoA-Uq9w-7s https://www.ncbi.nlm.nih.gov/books/NBK557710/ |
| | <ul style="list-style-type: none"> • Differentiate between typical and atypical ribs. | |
| | <ul style="list-style-type: none"> • Discuss costal cartilages and their attachments. | |

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| | <ul style="list-style-type: none"> • Discuss the applied and the related clinicals. • Identify different parts of sternum. • Describe the bony features, attachments ossification of sternum • Correlate the clinical aspects • Read relevant research article • Use digital library | |
| Movements of thoracic wall and Intercostal spaces | <ul style="list-style-type: none"> • Discuss the thoracic wall. • Describe the intercostals muscles (origin, insertion, direction of fibers, nerve supply and actions. • Discuss in detail the formation, branches, distribution and the related clinical of the intercostals nerves. • Explain the formation, course, relations, distribution and branches of the thoracic sympathetic trunk. • Differentiate between the typical and atypical intercostals space. • Compare the typical and atypical intercostals space. • Describe the types and axis of movements of vertebral column (flexion, extension, lateral flexion and rotation). • Define the respiratory movements on the basis of principles, factors and the different types (pump handle, bucket handle and piston). • Discuss the related physiological and pathological changes occurring (related to age movement etc). • Correlate the clinical aspects • Read relevant research article • Use digital library | <p>Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 306, 307, 308). https://youtu.be/NwDxbNqEVaA https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4534848/</p> |
| Anatomy of diaphragm | <ul style="list-style-type: none"> • Describe the small and large openings in the diaphragm (vertebral level, location, formation, structures passing through and effects on the openings and structures by the diaphragmatic contraction). | <p>Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 297, 313, 314, 391, 396, 397, 412, 455, 457, 521, 523). https://youtu.be/6IK-YHK1ToM https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5184786/</p> |

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|--------|--|--|
| | <ul style="list-style-type: none"> • Correlate the clinical aspects • Read relevant research article • Use digital library | |
| Pleura | <ul style="list-style-type: none"> • Discuss visceral and parietal pleura • Discuss the pleural recesses and pleural cavity. • Describe the nerve and blood supply of pleura. • Correlate the clinical aspects • Read relevant research article • Use digital library | <p>Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 333, 334, 335, 336). https://youtu.be/66PR3IYWb0A https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4332049/</p> |
| Lungs | <ul style="list-style-type: none"> • Identify the features of right and left lung. • Discuss the bronchopulmonary segments and their clinical significance • Discuss and differentiate between the root of lung and the hilum of lung. • Describe the nerve plexuses related to the lungs. • Explain the blood supply of lungs • Correlate the clinical aspects • Read relevant research article • Use digital library | <p>Clinical Oriented Anatomy by Keith L. Moore.5TH Edition. (Page 337-347). https://youtu.be/66PR3IYWb0A https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4332049/</p> |

Physiology Self-Directed Learning (SDL)

| Topics Of SDL | Learning Objective | References | Learning Resources | Learning Domains | Learning Strategy | Assessment Tools |
|---|---|--|--|--|-------------------|---|
| Mechanics of pulmonary ventilation, Lung compliance | <ul style="list-style-type: none"> • Enumerate muscles of inspiration and expiration and • Describe mechanics of pulmonary ventilation • Describe surfactant, surface tension and collapse of alveoli • Define compliance. • Draw compliance diagram of lungs. <ol style="list-style-type: none"> 1. Explain relationship of surface tension, radius of alveoli, elastic forces of lungs with compliance | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition.Section 06,Respiratory Physiology (Chapter 34, Page 621,629) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Mechanics of Breathing (Chapter 17,Page 569) • Physiology by Linda S. Costanzo 6th Edition. Respiratory Physiology (Chapter 5,Page 189,197) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 05,(Chapter 36,Page 581) ,(Chapter 40,Page 629) • Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 38, Page 491,493) <p style="text-align: center;">❖</p> | <ol style="list-style-type: none"> 1. https://www.ncbi.nlm.nih.gov/books/NBK538324/ 2. https://youtu.be/BTwgmMfqOW4 | C1 C1 C1 C1 C1 C2 | SDL | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation |
| Pulmonary circulation & Pulmonary capillary dynamics. Physical principles of gas exchange & diffusion through | <ul style="list-style-type: none"> • Discuss the role of alveoli and pleural space in respiration and pressure changes during respiration • Enlist non-respiratory and respiratory functions of respiration • Define and explain the concept of respiratory membrane. • Define and draw respiratory unit • Draw a diagram showing the exchange of gases through the respiratory membrane • Enlist four factors affecting the rate of gas diffusion through the respiratory membrane | <ul style="list-style-type: none"> • Ganong's Review of Medical Physiology.25TH Edition.Section 06,Respiratory Physiology (Chapter 34, Page 626,633,635) • Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Mechanics of Breathing (Chapter 17,Page 574) • Physiology by Linda S. Costanzo 6th Edition. Respiratory Physiology (Chapter 5,Page 209) • Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 05,(Chapter 37,Page 592) | <ol style="list-style-type: none"> 1. https://youtu.be/aJPwUnZtycQ 2. https://youtu.be/zv1fDFn8BaM 3. https://pressbooks-dev.oer.hawaii.edu/biology/chapter/gas-exchange-surfaces/ 4. https://www.sciencedirect | C2 C1 C1 C1 C1 C1 C1 C1 C1 C2 | SDL | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE |

| | | | | | | |
|--|--|---|--|----------------------------------|-----|---|
| respiratory membrane | <ul style="list-style-type: none"> Define diffusing capacity of respiratory membrane. Describe the diffusing capacity for oxygen. Describe the diffusing capacity for carbon dioxide. Describe the changes in diffusing capacity of oxygen and carbon dioxide during exercise <ol style="list-style-type: none"> Compare the diffusing capacities of oxygen and carbon dioxide | <ul style="list-style-type: none"> Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 39, Page 503) (Chapter 40, Page 511,515) | .com/science/article/pii/S2666496822000194. | | | SDL Evaluation |
| Pulmonary volumes, capacities & functions of respiratory tract | <ul style="list-style-type: none"> Define lung volumes and capacities. Define the four pulmonary volumes and capacities. Enlist normal values of all the lung volumes and capacities Draw a graph representing all the lung volumes and capacities. Describe how lung volumes and capacities can be measured with spirometer. Enlist the lung volumes and capacities which can't be measured by spirometer | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 06,Respiratory Physiology (Chapter 34, Page 628) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Mechanics of Breathing (Chapter 17,Page 578) Physiology by Linda S. Costanzo 6th Edition. Respiratory Physiology (Chapter 5,Page 191) Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 38, Page 495) | <ol style="list-style-type: none"> https://youtu.be/9VdHhD1vcDU https://teachmephsiology.com/respiratory-system/ventilation/lung-volumes/ | C1 C1 C1 C1 C1 C1 | SDL | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation |
| Transport of oxygen | <ul style="list-style-type: none"> Describe in detail the transport of oxygen from lungs to tissues | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 06, Respiratory Physiology (Chapter 35, Page 639) Human Physiology by Dee Unglaub Silver thorn. 8TH Edition.Gas Exchange and Transport (Chapter 18, Page 599) Physiology by Linda S. Costanzo 6th Edition. Respiratory Physiology (Chapter 5,Page 210,213,216) | <ol style="list-style-type: none"> https://teachmephsiology.com/respiratory-system/gas-exchange/oxygen-transport/ https://youtu.be/HU6_LQldvog | C1 | SDL | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) |

| | | | | | | |
|---|---|--|--|----------------------|-----|---|
| | | <ul style="list-style-type: none"> Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 05,(Chapter 38,Page 603) <p>Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 41, Page 521)</p> | | | | OSPE SDL Evaluation |
| Chemical regulation of respiration & exercise changes | <ul style="list-style-type: none"> Describe in detail the role of respiratory centers in the regulation of respiration. Explain chemical control of respiration in detail Describe changes in respiration during exercise. Enumerate and briefly explain factors which affect respiration. Describe briefly the mechanism of periodic breathing and sleep apnea | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 06, Respiratory Physiology (Chapter 36, Page 657,664) Physiology by Linda S. Costanzo 6th Edition.Respiratory Physiology (Chapter 5,Page 233,235) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 05,(Chapter 41,Page 649) <p>Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 42, Page 533,536)</p> | <ol style="list-style-type: none"> https://youtu.be/gR_RLgo9Vn0 https://journals.physiology.org/doi/abs/10.1152/physrev.1925.5.4.551?journalCode=physrev | C1 C2 C1 C1 | SDL | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation |
| Hypoxia, hypercapnia, cyanosis | <ul style="list-style-type: none"> Define hypoxia and hypercapnia. Enumerate and explain its various types. Enumerate the roles of oxygen therapy in different types of hypoxia | <ul style="list-style-type: none"> Ganong's Review of Medical Physiology.25TH Edition.Section 06, Respiratory Physiology (Chapter 35, Page 646,650) Physiology by Linda S. Costanzo 6th Edition.Respiratory Physiology (Chapter 5,Page 239) Physiological Basis of Medical Practice by Best & Taylor's.13th Edition.Section 05,,(Chapter 41,Page 653) (Chapter 42,Page 662) <p>Textbook of Medical Physiology by Guyton & Hall.14th Edition. (Chapter 43, Page 546)</p> | <ol style="list-style-type: none"> https://youtu.be/wt n--qgs3Fg https://www.verywellhealth.com/hypoxia-types-symptoms-and-causes-2248929 | C1 C1 | SDL | MCQ SEQ VIVA VOCE MCQ (LMS based Assessment, MST based Assessment) OSPE SDL Evaluation |

Biochemistry Self-Directed Learning (SDL)

| Topic | Learning Objectives At the end of lecture students should be able to | Learning Domain | Teaching Strategy | Assessment Tool |
|---|--|-----------------|-------------------|----------------------|
| HH equation | • Define of pH and pKa | C1 | SDL | MCQs SAQs Viva |
| | • Elaborate Henderson Hasselbalch equation. | C2 | | |
| | • Describe Measurement of pH by equation. | C2 | | |
| Role of Chemical Buffers in pH regulation | • Define buffers. | C1 | SDL | MCQs SAQs Viva |
| | • Discuss Mechanism of various buffers in maintenance of blood pH. | C2 | | |
| | • Elaborate the carbonic acid-bicarbonate buffer system | | | |
| pH meter and physiological buffers in pH regulation | • Measure the pH of solution in Pharmaceutical, Chemical, and Biotechnology Industry | C2 | SDL | MCQs SAQs Viva |
| | • Elaborate the Bicarbonate and Phosphate system of Buffers and intracellular and extracellular proteins | C1 | | |
| | | C1 | | |
| Vitamin Pyridoxine | • Discuss Vitamin B ₆ , used as a dietary supplement | C2 | SDL | MCQs SAQs Viva |
| | • Describe its deficiency and related clinical disorders | C2 | | |
| | | C2 | | |
| Xenobiotics | • Define xenobiotics | C1 | SDL | MCQs SAQs Viva |
| | • Discuss its metabolism and its role in environment | C2 | | |

Histology Practicals Skill Laboratory (SKL)

| Topic | Learning Objectives At The End Of Practical Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|-------------------------|--|-----------------|-------------------|-----------------|
| Olfactory /Nasal mucosa | • Identify microscopic structure of respiratory and nasal mucosa under microscope. | P1 | Skills Lab | OSPE |
| | • Illustrate histological structures of olfactory / nasal mucosa | C1 | | |
| | • Write two points of identification | C1 | | |
| Epiglottis | • Identify types of cells and epithelium of epiglottis under microscope | P1 | Skills Lab | OSPE |
| | • Illustrate histological structure of epiglottis. | C1 | | |
| | • Write two points of identification | C1 | | |
| Trachea | • Identify microscopic structure of trachea. | P1 | Skills Lab | OSPE |
| | • Illustrate microscopic structure of trachea. | C1 | | |
| | • Write two points of identification | C1 | | |
| Lungs | • Identify microscopic structure of, bronchi, terminal bronchiole, respiratory bronchiole, alveoli, alveolar duct of the respiratory tract on the basis of <ul style="list-style-type: none"> ○ Types of epithelial cells present ○ Relative amount of gland, cartilage, smooth muscles and connective tissue fibers present in wall of the tubes. | P1 | Skills Lab | OSPE |
| | • Illustrate microscopic structure of different layers of respiratory passages. | C1 | | |
| | • Write points of identification of each part | C1 | | |

Physiology Practicals Skill Laboratory (SKL)

| Topic | Learning Objectives | Reference | Learning Domains | Learning Strategy | Assessment Tools |
|---|---|---|-------------------|--------------------------|--|
| Measurement of different lung volume & capacities with the help of spirometer | <ul style="list-style-type: none"> • Description of its various parts • Importance of spirometer for measurements of various volumes • Define various lung volumes & capacity • How to measure them | Practical Notebook of Physiology First year MBBS by Dr Saqib Sohail | C1/C3 A3 P3 | Practicals /skill lab | Viva Voce Ospe Video Assisted Assessment |
| Recording of normal and modified movement of respiration (Stethography) | <ul style="list-style-type: none"> • Introduction to stethography • How to use it and its clinical importance | Practical Notebook of Physiology First year MBBS by Dr Saqib Sohail | C1/C3 A3 P3 | Practicals /skill lab | Viva Voce Ospe Video Assisted Assessment |
| Clinical examination of chest for respiration | <ul style="list-style-type: none"> • Detail introduction and explanation about inspection • Palpation • Percussion • Auscultation | Practical Notebook of Physiology First year MBBS by Dr Saqib Sohail | C1/C3 A3 P3 | Practicals /skill lab | Viva Voce Ospe Video Assisted Assessment |

Biochemistry Practicals Skill Laboratory (SKL)

| Topic | Learning Objectives At The End Of Practical Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|---------------------------------|---|-----------------|-------------------|-----------------|
| Henderson Hassel batch equation | Illustrate Henderson Hassel batch equation. Measure pH by equation. | P | Skill lab | OSPE |
| Buffers | Illustrate buffer actions and buffer zone. | P | Skill lab | OSPE |
| pH meter | Measure the acidity or basicity of water-based solutions | P | Skill lab | OSPE |

Basic and Clinical Sciences (Vertical Integration)

Content

- **Case Based Learning (CBLs)**
- **Problem Based Learning (PBL)**
- **Vertical Integration Large Group Interactive Session (LGIS)**

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 | • Lung's cancer | Apply basic knowledge of subject to study clinical case. | C3 |
| | • Chest trauma | Apply basic knowledge of subject to study clinical case. | C3 |
| Physiology | • Wheeze/Stridor | Apply basic knowledge of subject to study clinical case. | C3 |
| | • Crib Death | Apply basic knowledge of subject to study clinical case. | C3 |
| Biochemistry | • CBL-ABGs | Apply basic knowledge of subject to study clinical case. | C3 |
| | • CBL – uncouplers | Apply basic knowledge of subject to study clinical case. | C3 |

Large Group Interactive Sessions (LGIS)
Pathology

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|------------------------------------|---|------------------------|--------------------------|------------------------|
| Clinical disorders of Respiration: | • Discuss Pneumonia in detail. | C1 | LGIS | MCQs |
| | • Discuss Tuberculosis in detail. | C1 | | |
| | • Discuss Cystic fibrosis in detail. | C1 | | |
| | • Discuss Respiratory Failure Incidence in detail. | C1 | | |
| | • Discuss Sign and symptoms in detail. | C1 | | |
| | • Discuss Pathophysiology in detail. | C1 | | |

Surgery

| Topic | At The End Of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|--------------------------------|--|-----------------|-------------------|-----------------|
| Chest Deformities (Congenital) | <ul style="list-style-type: none"> • Describe: • Various chest deformities & congenital malformations | C2 | LGIS | MCQs |
| | <ul style="list-style-type: none"> • Significance of deformities | C2 | | |
| | <ul style="list-style-type: none"> • General and operative management outline | C2 | | |
| Pneumothorax | <ul style="list-style-type: none"> • Describe: • Various types of Pnuemothorax | C2 | LGIS | MCQs |
| | <ul style="list-style-type: none"> • Causes | C2 | | |
| | <ul style="list-style-type: none"> • Signs and symptoms Significance of tension pneumothorax | C2 | | |
| | <ul style="list-style-type: none"> • Emergency and definitive management | C2 | | |
| Hemothorax | <ul style="list-style-type: none"> • Describe: • Various types of Hemothorax | C2 | LGIS | MCQ |
| | <ul style="list-style-type: none"> • Causes of Hemothorax | C2 | | |
| | <ul style="list-style-type: none"> • Signs and symptoms of Hemothorax | C2 | | |
| | <ul style="list-style-type: none"> • Emergency and definitive management | | | |
| Pleural effusion | <ul style="list-style-type: none"> • Describe: • Definition | C1 | LGIS | MCQ |
| | <ul style="list-style-type: none"> • Causes | C2 | | |
| | <ul style="list-style-type: none"> • Signs &symptoms • General and operative management outlines | C2 | | |

ENT

| Topic | At The End Of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|-------------------------|--|-----------------|-------------------|-----------------|
| Tonsillitis | • Define tonsillitis | C1 | LGIS CBL | MCQs |
| | • Enlist the causes of tonsillitis | C1 | | |
| | • List the clinical features of tonsillitis | C2 | | |
| | • Enumerate the management of tonsillitis | C1 | | |
| Foreign body nose & ear | • Classify foreign bodies | C1 | LGIS CBL | MCQs |
| | • Enumerate emergency situations for removal. | C2 | | |

Medicine

| Topic | At the End Of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|--------------------------|--|-----------------|-------------------|-----------------|
| Tuberculosis | • Discuss TB. | C2 | LGIS | MCQs |
| | • Discuss its diagnostic Criteria. | C2 | | |
| | • Describe How to treat a patient with TB. | C2 | | |
| Drowning & Strangulation | • Discuss How to manage a patient with drowning and strangulation. | C2 | LGIS | MCQs |

Spirally Integrated Courses / General Education Cluster (GEC) Courses

Content

- **Longitudinal Themes**
 - **The Holy Quran Translation**
 - **Behavioral Sciences & Biomedical Ethics**
 - **Climate Change & Health & Community Medicine**
 - **Artificial Intelligence (AI)**
 - **Family Medicine**
 - **Early Clinical Exposure (ECE)**

Bioethics Professionalism & Behavioral Sciences

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|----------------------------------|---|-----------------|-------------------|-----------------|
| Crises intervention and disaster | <ul style="list-style-type: none"> To be able identify crises situations and learn the means to cope with them during disasters either natural or man made | C1 C2 | LGIS CBL | MCQS |
| Conflict resolution and empathy | <ul style="list-style-type: none"> To be able to identify crises situations and using empathy how to deal with these situations arising in clinical practice | C2 | LGIS CBL | MCQS |

Climate Change & Health & Community Medicine

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|---|---|-----------------|-------------------|-----------------|
| Air and Ventilation Air composition & indices of thermal comfort | <ul style="list-style-type: none"> At the end of the session the students will be able to: Enlist indices of thermal comfort | C1 | LGIS | MCQ |
| | <ul style="list-style-type: none"> Describe the factors responsible for vitiation of air | C2 | | |
| Air pollution and its factors | <ul style="list-style-type: none"> Define air pollution Identify sources of air pollution and air pollutants | C1 C1 | LGIS | MCQ |
| Preventive measures to control air pollution | <ul style="list-style-type: none"> Demonstrate selection of air sample for analysis Enumerate the methods to prevent & control of air pollution | C2 C1 | LGIS | MCQ |
| Air purification methods | <ul style="list-style-type: none"> Enlist natural and artificial methods of air purification. | C1 | LGIS | MCQ |
| Greenhouse effect | <ul style="list-style-type: none"> Describe the greenhouse effect Enlist greenhouse gases. | C2 C1 | LGIS | MCQ |

| | | | | |
|-----------------------------------|---|----------|------|-----|
| | <ul style="list-style-type: none"> Identify sources of greenhouse gases | C1 | | |
| Global warming and climate change | <ul style="list-style-type: none"> Demonstrate global warming. | C2 | LGIS | MCQ |
| | <ul style="list-style-type: none"> Define ozone hole. Describe link between global warming and climate change | C1 C2 | | |

Artificial Intelligence (AI)

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|--|--|-----------------|-------------------|-----------------|
| Artificial Intelligence basic concepts | <ul style="list-style-type: none"> To learn the concept of deep and superficial neural networks in AI | C2 | LGIS | MCQs |

Family Medicine

| Topic | At the End of Lecture Students Should Be Able To | Learning Domain | Teaching Strategy | Assessment Tool |
|---|--|-----------------|-------------------|-----------------|
| Approach to a Patient with cough & hemoptysis | <ul style="list-style-type: none"> Define cough & hemoptysis. | C1 | LGIS | MCQs |
| | <ul style="list-style-type: none"> Discuss differential diagnoses cough & hemoptysis. | C2 | | |
| | <ul style="list-style-type: none"> When to refer a patient of cough & hemoptysis to pulmonologist | C2 | | |



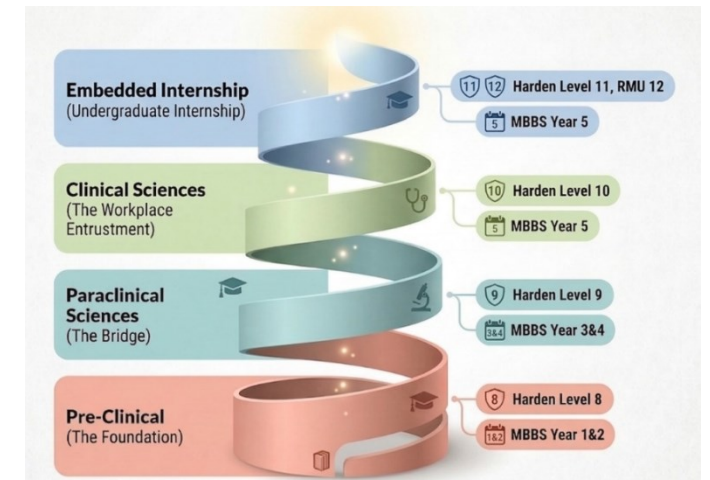
➔ SECTION – VIII

RMU 12

Integrated Modular Curriculum 2026

Isolation to *Beyond Boundaries*

General Education Cluster Module (GEC)



General Education Cluster Module

Preamble

In alignment with the Higher Education Commission's Undergraduate Policy 2023 and the Pakistan Medical and Dental Council's Guidelines 2024, This comprehensive module is designed to enrich the MBBS curriculum with a broad spectrum of interdisciplinary competencies.

The General Education Cluster encompasses essential domains—Leadership, Information Technology, Entrepreneurship, Expository Writing, Art and Humanities, Research, Bioethics, and Quran Translation—integrating these elements into a cohesive learning experience that extends across the five-year MBBS program.

This module is meticulously structured to enhance both professional and personal development, ensuring that medical graduates are not only adept in clinical skills but also well-rounded individuals equipped with a diverse skill set.

Leadership: In an era where the healthcare landscape is rapidly evolving, effective leadership is crucial. This component aims to develop strategic thinking, management skills, and the ability to inspire and lead multidisciplinary teams with confidence and ethical integrity.

Information Technology and Artificial Intelligence: With the growing influence of technology in medicine, proficiency in IT and AI is essential. This section will cover the latest advancements in health informatics, digital health tools, and AI applications, preparing students to harness these technologies for enhanced patient care and research.

Entrepreneurship: Cultivating an entrepreneurial mindset will empower students to innovate and drive change within the healthcare sector. This segment will focus on business acumen, strategic planning, and the creation of impactful healthcare solutions.

Expository Writing: Effective communication is key to successful medical practice. This part of the module will refine students' writing skills, enabling them to articulate complex ideas clearly and persuasively, which is vital for academic publications and patient documentation.

Art and Humanities: The integration of art and humanities fosters empathy, cultural awareness, and ethical sensitivity, all of which are integral to holistic patient care. This section aims to broaden perspectives and deepen understanding of the human experience.

Research and Bioethics: Building on the foundation of research and bioethics covered earlier in the program, this module will advance students' ability to conduct ethical research and address complex bioethical issues in clinical practice and beyond.

Quran Translation and Islamiyat: As part of our commitment to cultural and religious literacy, the module will continue the study of Quran Translation and Islamiyat, emphasizing the integration of these teachings with medical ethics and practice.

By integrating these diverse yet complementary fields into the General Education Cluster, we aim to cultivate a generation of medical professionals who are not only skilled clinicians but also visionary leaders, adept communicators, and ethical practitioners. This holistic approach will prepare our graduates to meet the challenges of a dynamic healthcare environment with competence, compassion, and innovation.

Rationale for the General Education Cluster Module

The General Education Cluster Module is conceived to address the multifaceted demands of modern medical education and practice. In accordance with the Higher Education Commission's Undergraduate Policy 2023 and the Pakistan Medical and Dental Council's Guidelines 2024, this module is designed to create a comprehensive educational framework that extends beyond traditional medical training.

The rationale behind this integrative approach includes:

1. **Holistic Development:** Medicine is a field that requires not only technical proficiency but also leadership, ethical judgment, and effective communication. By incorporating Leadership, Information Technology, Entrepreneurship, Expository Writing, Art and Humanities, Research and Bioethics, and Quran Translation into the curriculum, the module aims to develop well-rounded professionals who excel in both clinical and non-clinical aspects of healthcare.
2. **Adaptation to Technological Advancements:** The rapid advancement of technology and artificial intelligence is transforming healthcare. Proficiency in Information Technology and AI is crucial for modern medical practitioners to effectively use digital tools, engage in data-driven decision-making, and contribute to innovations in patient care and research.
3. **Leadership and Management Skills:** Effective leadership and management are essential for navigating the complexities of the healthcare environment. By focusing on leadership skills, the module prepares students to lead teams, manage healthcare systems, and address challenges with strategic vision and ethical integrity.
4. **Entrepreneurial Mindset:** Entrepreneurship fosters innovation and problem-solving. By integrating entrepreneurial principles into the curriculum, students are encouraged to think creatively, develop new healthcare solutions, and drive positive change in the industry.
5. **Enhanced Communication Skills:** Expository writing is a fundamental skill for clear and effective communication in medical practice. Mastery of this skill is vital for documenting patient care, conducting research, and engaging in academic discourse.
6. **Cultural and Ethical Awareness:** The inclusion of Art and Humanities helps students understand the broader human context of medicine, fostering empathy and cultural sensitivity. Concurrently, the continued study of Quran Translation and Islamiyat reinforces the integration of cultural and ethical perspectives with medical practice.
7. **Strengthening Research and Bioethics:** Advanced knowledge in research methodologies and bioethics ensures that students are well-prepared to conduct and evaluate research ethically, contributing to the advancement of medical science while adhering to high standards of ethical practice.
8. **Preparation for a Dynamic Healthcare Environment:** The General Education Cluster Module equips students with a diverse skill set necessary to thrive in a rapidly evolving healthcare landscape. It prepares them to be versatile, innovative, and ethical practitioners capable of addressing the multifaceted challenges they will encounter.

In essence, this module represents a strategic response to the evolving needs of the healthcare profession, ensuring that medical graduates are not only technically proficient but also capable of leading, innovating, and communicating effectively in a complex and dynamic field.

Outcomes

The General Education Cluster Module is designed to cultivate a comprehensive set of competencies across the domains of Knowledge, Skills, and Attitudes. The following general learning objectives outline the intended outcomes for students within this framework:

Domain of Knowledge

1. **Leadership and Management**
 - **Understand** the principles of effective leadership and management in healthcare settings, including team dynamics, strategic planning, and decision-making processes.
 - **Apply** leadership theories to real-world healthcare scenarios, demonstrating an understanding of how to lead and manage multidisciplinary teams effectively.
2. **Information Technology and Artificial Intelligence**
 - **Comprehend** the fundamental concepts of information technology and artificial intelligence as they pertain to healthcare.
 - **Analyze** the impact of digital health tools, electronic health records, and AI technologies on patient care and healthcare delivery.
3. **Entrepreneurship**
 - **Grasp** the basics of entrepreneurship, including business planning, innovation, and the healthcare market landscape.
 - **Evaluate** opportunities for entrepreneurial ventures within the healthcare sector, considering factors such as feasibility, impact, and sustainability.
4. **Expository Writing**

- **Master** the conventions of expository writing, including structure, clarity, and argumentation.
 - **Understand** the importance of effective written communication in academic, clinical, and professional contexts.
5. **Art and Humanities**
 - **Recognize** the role of art and humanities in understanding human experiences and perspectives, and their influence on medical practice and patient care.
 - **Integrate** insights from art and humanities into a holistic approach to medicine that values cultural and emotional dimensions.
 6. **Research and Bioethics**
 - **Acquire** knowledge of research methodologies, including qualitative and quantitative approaches, and their application in medical research.
 - **Understand** the ethical principles and guidelines governing medical research and clinical practice, and apply these principles to real-world scenarios.
 7. **Quran Translation and Islamiyat**
 - **Understand** the key concepts and teachings of the Quran as they relate to ethical and moral decision-making in medicine.
 - **Apply** principles from Islamiyat to enhance ethical practice and cultural competence in a diverse healthcare environment.
 8. **Pakistan Studies**
 - Incorporating Pakistan Studies into the MBBS curriculum fosters a deeper understanding of the country's healthcare needs and cultural context. It enhances medical professionals' ability to address local health issues effectively and engage with diverse patient populations.

Domain of Skills

1. **Leadership and Management**
 - **Demonstrate** effective leadership and management skills by leading projects, resolving conflicts, and making informed decisions in healthcare settings.
 - **Develop** strategic plans and initiatives to address healthcare challenges and improve organizational outcomes.
2. **Information Technology and Artificial Intelligence**
 - **Utilize** information technology tools and AI applications effectively to enhance patient care, research, and operational efficiency.
 - **Assess** and implement technological solutions to address specific healthcare needs and challenges.
3. **Entrepreneurship**
 - **Create** and present business plans for innovative healthcare solutions, demonstrating entrepreneurial thinking and problem-solving skills.
 - **Evaluate** the feasibility and impact of entrepreneurial ventures through market research and strategic analysis.
4. **Expository Writing**
 - **Compose** clear, coherent, and well-organized expository texts, including research papers, case reports, and clinical documentation.
 - **Critique** and revise written work to improve clarity, accuracy, and effectiveness.
5. **Art and Humanities**
 - **Analyze** and interpret artistic and humanistic works to gain insights into diverse perspectives and experiences relevant to medical practice.
 - **Incorporate** humanistic approaches into patient interactions and healthcare delivery.
6. **Research and Bioethics**
 - **Conduct** rigorous and ethical research, including designing studies, collecting and analyzing data, and interpreting results.
 - **Navigate** ethical dilemmas in research and clinical practice with a well-founded understanding of bioethical principles.
7. **Quran Translation and Islamiyat**

- **Translate** and interpret Quranic texts accurately and thoughtfully, applying relevant teachings to medical practice.
- **Integrate** Islamic ethical perspectives into clinical decision-making and patient care practices.

Domain of Attitudes

1. Leadership and Management

- **Cultivate** a proactive and collaborative attitude towards leadership and team management.
- **Demonstrate** commitment to ethical leadership and continuous improvement in healthcare settings.

2. Information Technology and Artificial Intelligence

- **Embrace** a positive attitude towards the adoption and integration of new technologies in healthcare.
- **Show** openness to continuous learning and adaptation in response to technological advancements.

3. Entrepreneurship

- **Foster** an entrepreneurial mindset characterized by creativity, resilience, and a willingness to take initiative.
- **Commit** to ethical practices and social responsibility in entrepreneurial ventures.

4. Expository Writing

- **Adopt** a meticulous and reflective attitude towards written communication, valuing clarity, accuracy, and engagement.
- **Strive** for excellence in written expression and its impact on professional and academic success.

5. Art and Humanities

- **Appreciate** the significance of art and humanities in enriching medical practice and enhancing patient care.
- **Respect** diverse cultural and emotional perspectives and integrate them into medical interactions.

6. Research and Bioethics

- **Adopt** a principled attitude towards ethical research and practice, emphasizing integrity, transparency, and respect for human subjects.
- **Demonstrate** a commitment to ongoing ethical reflection and professional development.

7. Quran Translation and Islamiyat

- **Show** respect for Islamic teachings and their relevance to ethical practice in medicine.
- **Commit** to cultural and religious sensitivity in patient care and professional interactions.

8. Pakistan Studies

- Promotes a sense of national identity and responsibility among future doctors.

These learning objectives are designed to ensure that graduates of the MBBS program are not only proficient in medical knowledge and clinical skills but also equipped with the critical thinking, ethical reasoning, and leadership abilities necessary to excel in a complex and evolving healthcare environment.

Alignment of RMU curriculum as per HEC Undergraduate Policy 2023 and guidelines of PMDC 2024

| Title | Hours recommended by HEC/PMDC (to be covered from 1 st to 4 th year) | Teaching hours in RMU Curriculum |
|--|--|----------------------------------|
| Quran Kareem | 50 hours (PMDC) | 55 Hours |
| Bioethics / Professionalism | 25 Hours (PMDC) | 50 Hours |
| Leadership | 25 Hours (PMDC) | 30 Hours |
| Islamic Studies | 2 credit hours (HEC) | 17 Hours |
| Ideology & Constitution of Pakistan/Pakistan Studies | 2 credit hours (HEC) 25 hours (PMDC) | 17 Hours |
| Quantitative Reasoning/Research | 2 credit hours (HEC) 100 Hours (PMDC) | 120 Hours |
| Entrepreneurship | 2 credit hours (HEC) | 50 Hours |
| Arts and Humanities (Videography) | 2 credit hours (HEC) | 20 Hours |
| Expository writing | 2 credit hours (HEC) | 16 Hours |
| Applications of information and communication technologies (ICT) | 2 credit hours (HEC) 25 Hours (PMDC) | 25 Hours |
| Family medicine | ----- | 30 Hours |
| Artificial intelligence | ----- | 25 Hours |
| Behavioral Sciences | 100 Hours (PMDC) | 150 Hours |

- 1 credit hour = 16 teaching hours
 - The minimum requirement for the general education component is 30 credits in all the undergraduate/equivalent degree programs including associate degree.
- References: undergraduate-policy-2023-1pdf/261474627



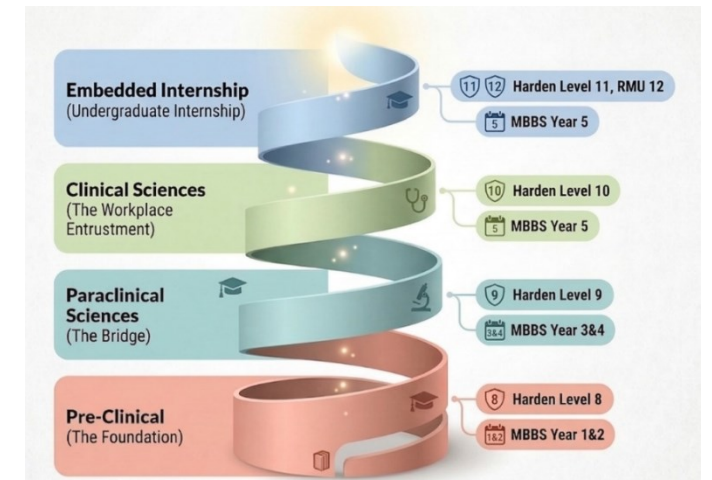
➔ SECTION – IX

RMU 12

Integrated Modular Curriculum 2026

Isolation to **Beyond Boundaries**

Learning Resources



Learning Resources

| Subjects | Resources |
|--|---|
| Core Subjects & Horizontal Integration Subjects | |
| Anatomy | <p>1. Gross Anatomy</p> <ol style="list-style-type: none"> 2. Gray's Anatomy by Prof. Susan Standring 42th edition, Elsevier. 3. Clinical Anatomy for Medical Students by Richard S. Snell 10th edition. 4. Clinically Oriented Anatomy by Keith Moore 9th edition. 5. Cunningham's Manual of Practical Anatomy by G.J. Romanes, 16th edition, Vol-I, II and III 6. http://www.anatomyzone.com 3D anatomy https://teachmeanatomy.info/ <p>B. Histology</p> <ol style="list-style-type: none"> 1. B. Young J. W. Health Wheather's Functional Histology 6th edition. 2. Medical Histology by Prof. Laiq Hussain 7th edition. 3. https://www.udemy.com/course/histology/ <p>C. Embryology</p> <ol style="list-style-type: none"> 1. Keith L. Moore. The Developing Human 11th edition. 2. Langman's Medical Embryology 14th edition. |
| Physiology | <p>A. Textbooks</p> <ol style="list-style-type: none"> 1. Textbook Of Medical Physiology by Guyton And Hall 14th edition. 2. Ganong ' S Review of Medical Physiology 26th edition. <p>B. Reference Books</p> <ol style="list-style-type: none"> 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 | <p>Textbooks</p> <ol style="list-style-type: none"> 1. Lippincott Illustrated Reviews: Biochemistry – Wolters Kluwer 2. Harper's Illustrated Biochemistry 32th edition. 3. Lehninger Principle of Biochemistry 8th edition. 4. Biochemistry by Devlin 7th edition. |
| Community Medicine | <p>Textbooks</p> <ol style="list-style-type: none"> 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 | <p>Textbooks</p> <ol style="list-style-type: none"> 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 |

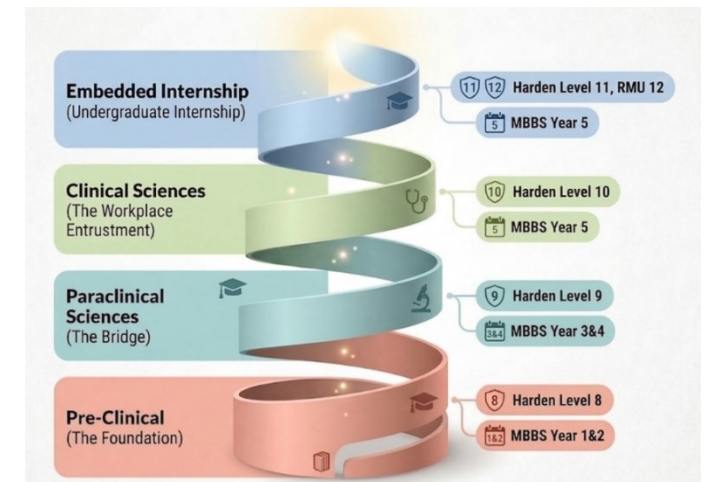
| | |
|--|---|
| Pharmacology | Textbooks 1. Lippincot Illustrated Pharmacology 9 th edition. |
| Spiral Integration Subjects & General Education Cluster Courses | |
| Bioethics | Textbooks 1. Textbook of Medical Ethics by Erich H. Loewy (Author) |
| Videography | The Five Cs of Cinematography by Joseph V. Mascelli Digital Video Production: A Comprehensive Guide by Anirban Das |
| Leadership | Leadership and the New Science by Margaret J. Wheatley A Treatise on Good Works by Martin Luther |
| Family Medicine | Textbooks 1. Textbook of Family Medicine" by Robert E. Rakel and David P. Rakel 2. Essentials of Family Medicine" by Philip D. Sloane, Lisa M. Slatt, and others 3. Textbook of Family Medicine" by Ian R. McWhinney 4. Family Medicine: Principles and Practice" by Robert B. Taylor |
| Islamiyat & Pak Studies | Islamiyat Lazmi by Muhammad Khalil |
| Vertical Integration Subjects | |
| Medicine | Textbooks 1. Harrison's Principles of Internal Medicine by J. Larry Jameson, Anthony S. Fauci, and others 2. Davidson's Principles and Practice of Medicine by Stuart H. Ralston, Ian D. Penman, and others 3. Kumar and Clark's Clinical Medicine by Parveen Kumar and Michael Clark 4. Oxford Handbook of Clinical Medicine by Ian B. Wilkinson, Tim Raine, and others |
| Surgery | Textbooks 1. Bailey & Love's Short Practice of Surgery by Norman S. Williams, P. Ronan O'Connell, and Andrew W. McCaskie |
| Obsteterics & Gynecology | Textbooks 1. Obstetrics by Ten Teachers 2. Gynaecology by Ten Teachers |
| Pediatrics | Textbooks 1. Nelson Textbook of Pediatrics" by Robert M. Kliegman, Joseph St. Geme, and others 2. "Textbook of Pediatrics" by A. Parthasarathy |
| Digital Resources | |
| Up To Date | https://www.uptodate.com/contents/search |
| RMU Digital library | http://www.digitallibrary.edu.pk/rmc.html |
| International Resources | |
| USMLE | https://www.usmle.org/ |

| | |
|---------|---|
| Plab | https://www.gmc-uk.org/registration-and-licensing/join-the-register/plab |
| U World | https://www.uworld.com/ |
| Kaplan | https://mykaplan.co.uk/ |



➔ SECTION – X

RMU 12 **Integrated Modular Curriculum 2026** **Isolation to **Beyond Boundaries**** **Assessment**



RMU – 12 Assessment Framework of Integrated Modular MBBS Curriculum 2026
Isolation to **Beyond Boundaries**

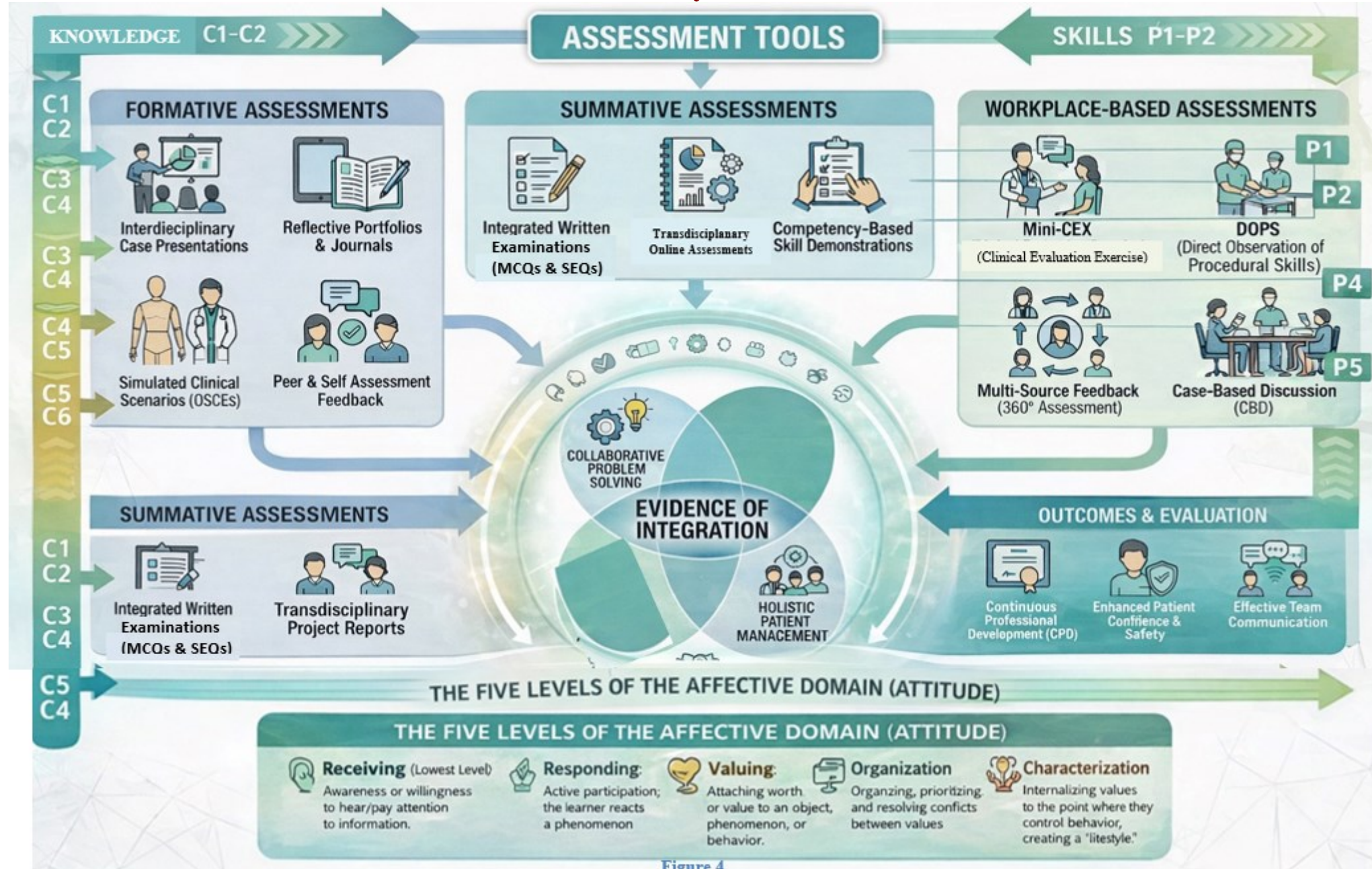


Figure 4

Assessment

Assessment is the systematic basis for making inferences about the learning and development of students. It is the process of defining, selecting, designing, collecting, analyzing, interpreting, and using information to increase students' learning and development.

Assessment Policy

Scope

This policy is applicable to all the students of the MBBS program of RMU for all modes of teaching (on campus/online/any other) from the date of approval by the RMU Academic Council.

1. Guiding principles

- RMU has the responsibility to ensure to all the stakeholders that students have achieved the identified outcomes of the medical degree course.
- Assessment requires a variety of methods; no single method can completely ensure that the requisite competence level has been achieved. Hence each assessment instrument must be selected based on its utility index.
- Feedback, ensuring that the feedback loop is closed, should be provided to students following all assessments to ensure that students identify gaps in their learning and faculty can review future curricular and assessment content.
- The quality of the entire assessment including confidentiality of the assessment process must be ensured.
- The assessment process should be clear and transparent so that students know in advance the expectations (from students) and consequences of the assessment.
- Details of the conduct of examinations are available in the Examination policy document.

2. Purposes of Assessment.

- To ensure appropriate competence has been achieved.
- Feedback to students regarding their readiness and deficiencies
- Feedback to faculty to evaluate the effectiveness of the teaching program.

3. Forms of assessments

3.1 Formative Assessment

A formative assessment refers to a low-stakes assessment that does not normally contribute towards a student's final grade. Assessment for learning is carried out throughout modules and clerkships using various strategies (at the discretion of module coordinators and clerkship directors' feedback. Formative assessment is conducted at both mid-module and end-module stages for clinical lectures and joint multidisciplinary sessions. These assessments are carried out through an on-campus online assessment platform to monitor students' ongoing learning and progress.

3.2 Summative Assessment

A summative assessment is performed at the end of a unit that allows a teacher to measure a student's understanding, typically against a standardized criterion. These Assessment includes End of Module Assessment (EMA), End of Block Assessment (EBA), Pre- Annual Assessment (PAA) and Annual Professional Assessment (APA). Each Assessment comprises of theory component and a practical component.

3.2.1 Components of Assessment

- Cognitive competence is tested in the theory component using the following tool of assessment
 - USMLE/ PLAB Type / Multiple Choice Questions (MCQs)
 - USMLE/ PLAB Type / Extended Match Questions (EMQ)
 - Short Answer Questions (SAQs)
 - Short Essay Questions (SEQs)
- Competence in psychomotor and affect domains is tested in practical component using the following tools of assessment
 - Audio Visual OSPE (AVOSPE): This comprises of stations using PowerPoint slides with images animations and videos
 - Laboratory OSPE (Lab OSPE): This comprises of stations focused on practical (hands on performance) components from core subject areas
 - Integrated OSPE (I OSPE): This comprises of stations, from each core subject, emphasizing horizontal and vertical integration
 - Objective Structured Clinical Examinations (OSCE): This comprises of stations, dedicated to Early Clinical Exposure (ECE), Simulated Patients (SP), models, ALPHA and clinical component of core subjects
 - Objective Structured Viva Examinations (OSVE): This comprises of table viva for each core subject. Students will be evaluated by internal and external examiner using a structured marking rubric, with each viva

3.2.2 End of Module Assessment (EMA)

- End of module assessments will be conducted at the end of each module.
- The module teams will be responsible for the assessment plan including assessment strategies, timings, and other essentials

3.2.3 End of Block Assessment (EBA)

- End of block assessments will be conducted at the end of each block.
- The block teams will be responsible for the assessment plan including assessment strategies, timings, and other essentials
- 85% attendance in each subject will be mandatory
- Student must pass in all LMS, mid module assessments to appear in EBA
- There will be no remedial classes for attendance compensation
- There will be no remedial of assessment in case of poor academic performance

3.2.4 Weekly LMS Based Online Assessment

- Weekly assessment of Large Group Interactive Session (LGIS) and Self-Directed Learning (SDL) Sessions will be conducted on LMS (learning management system). The LMS result will be shared by module coordinator and DME through vice chancellor on weekly basis

Table of Specification (TOS) For Module & Block Examination for First Year MBBS

| Domains: C-Core Subject (70%) Levels C1-C2, HV- Horizontal & Vertical Integration (20%) Levels C2-C3, S- Spiral Integration (10%) Levels C2-C3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--------------|-------------------------------|----|---|-------|-------|------|-------|-------|------|----|---|-------|-------|---|----|---|-------|--------------------|---|---------|---|----|---|-------|------|-------------|---------------------------------|------------------------|-------|------|------|-----------------------|-------|
| End of Module Assessment | Subject | Theory (Cognitive) Assessment | | | | | | | | | | | | | | | | | | Practical (Skill & Attitude) Assessment | | | | | | | Grand Total | Total Time of Module Assessment | | | | | | |
| | | MCQs | | | | | EMQs | | | SAQs | | | | SEQs | | | | Marks | Total Marks Theory | Total Time | AV OSPE | | | | | Time | | | AED Reflective Writing | OSVE | | | Total Practical Marks | |
| | | C | HV | S | Total | Marks | C | Total | Marks | C | HV | S | Total | Marks | C | HV | S | | | | Total | C | HV | S | Total | | | | | Marks | Viva | Copy | | Total |
| First Module | Anatomy | 19 | 4 | 2 | 25 | 25 | 1 | 1 | 5 | 3 | 1 | 1 | 5 | 25 | 3 | 1 | 1 | 5 | 45 | 100 | 2 HRS | 7 | 2 | 1 | 10 | 50 | 50 min | 15 min | 45 | 5 | 50 | 100 | 200 | 6 HRS |
| | Physiology | 19 | 4 | 2 | 25 | 25 | 1 | 1 | 5 | 3 | 1 | 1 | 5 | 25 | 3 | 1 | 1 | 5 | 45 | 100 | 2 HRS | 7 | 2 | 1 | 10 | 50 | 50 min | 15 min | 45 | 5 | 50 | 100 | 200 | 6 HRS |
| | Biochemistry | 19 | 4 | 2 | 25 | 25 | 1 | 1 | 5 | 3 | 1 | 1 | 5 | 25 | 3 | 1 | 1 | 5 | 45 | 100 | 2 HRS | 7 | 2 | 1 | 10 | 50 | 50 min | 15 min | 45 | 5 | 50 | 100 | 200 | 6 HRS |
| Formative- Weekly LMS Based Assessment of 30 MCQs (10 MCQs per Subject) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| End of Module Assessment | Subject | Theory (Cognitive) Assessment | | | | | | | | | | | | | | | | | | Practical (Skill & Attitude) Assessment | | | | | | | Grand Total | Total Time of Module Assessment | | | | | | |
| | | MCQs | | | | | EMQs | | | SAQs | | | | SEQs | | | | Marks | Total Marks Theory | Total Time | AV OSPE | | | | | Time | | | AED Reflective Writing | OSVE | | | Total Practical Marks | |
| | | C | HV | S | Total | Marks | C | Total | Marks | C | HV | S | Total | Marks | C | HV | S | | | | Total | C | HV | S | Total | | | | | Marks | Viva | Copy | | Total |
| Second Module | Anatomy | 19 | 4 | 2 | 25 | 25 | 1 | 1 | 5 | 3 | 1 | 1 | 5 | 25 | 3 | 1 | 1 | 5 | 45 | 100 | 2 HRS | 7 | 2 | 1 | 10 | 50 | 50 min | 15 min | 45 | 5 | 50 | 100 | 200 | 6 HRS |
| | Physiology | 19 | 4 | 2 | 25 | 25 | 1 | 1 | 5 | 3 | 1 | 1 | 5 | 25 | 3 | 1 | 1 | 5 | 45 | 100 | 2 HRS | 7 | 2 | 1 | 10 | 50 | 50 min | 15 min | 45 | 5 | 50 | 100 | 200 | 6 HRS |
| | Biochemistry | 19 | 4 | 2 | 25 | 25 | 1 | 1 | 5 | 3 | 1 | 1 | 5 | 25 | 3 | 1 | 1 | 5 | 45 | 100 | 2 HRS | 7 | 2 | 1 | 10 | 50 | 50 min | 15 min | 45 | 5 | 50 | 100 | 200 | 6 HRS |
| Formative- Weekly LMS Based Assessment of 30 MCQs (10 MCQs per Subject) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Block | Subjects | LMS Based Assessment | | | | | OSPE | | | | | | Grand Total | Total Block Time |
|-------|--------------|----------------------|----|---|-------|--------|---------|----|-------|----|-------|-------|-------------|------------------|
| | | MCQs | | | | | LabOSPE | | IOSPE | | COSPE | | | |
| | | C | HV | S | Total | Time | C | HV | C | HV | C | HV | | |
| BLOCK | Anatomy | 21 | 6 | 3 | 30 | 30 min | 14 | 4 | 2 | 20 | 60 | 6 HRS | 90 | 10 HRS |
| | Physiology | 21 | 6 | 3 | 30 | 30 min | 14 | 4 | 2 | 20 | 60 | 6 HRS | 90 | 10 HRS |
| | Biochemistry | 21 | 6 | 3 | 30 | 30 min | 14 | 4 | 2 | 20 | 60 | 6 HRS | 90 | 10 HRS |

| Weekly LMS Assessment | | | |
|------------------------------|---------|------------|--------------|
| Subjects | Anatomy | Physiology | Biochemistry |
| No of MCQs* | 30 | 30 | 30 |
| Marks/MCQ | 30 | 30 | 30 |
| *MCQ=1 Mark each, 1 min each | | | |

50% Questions/OSPE Stations/Viva Stations will be from Foundation Module and 50% Questions will be from MSK-1 Module

For Each assessment student will have to individually pass Theory and Practical components

| | | | | | | |
|--|-------|--------|--------|--------|-----------|---------|
| Marks per Item | MCQ=1 | EMQ= 5 | SAQ= 5 | SEQ= 9 | AVOSPE= 5 | OSPE= 3 |
| OSPE Time=1 Round of 40 Students =80 min | | | | | | |
| 3 Round of 40 Students =240 min | | | | | | |
| OSVE=Time per student=5mins | | | | | | |

3.2.4 Continuous Internal Assessment (CIA)

Continuous Internal Assessment means the assessment based on tests and assignments given to the students during an academic period.

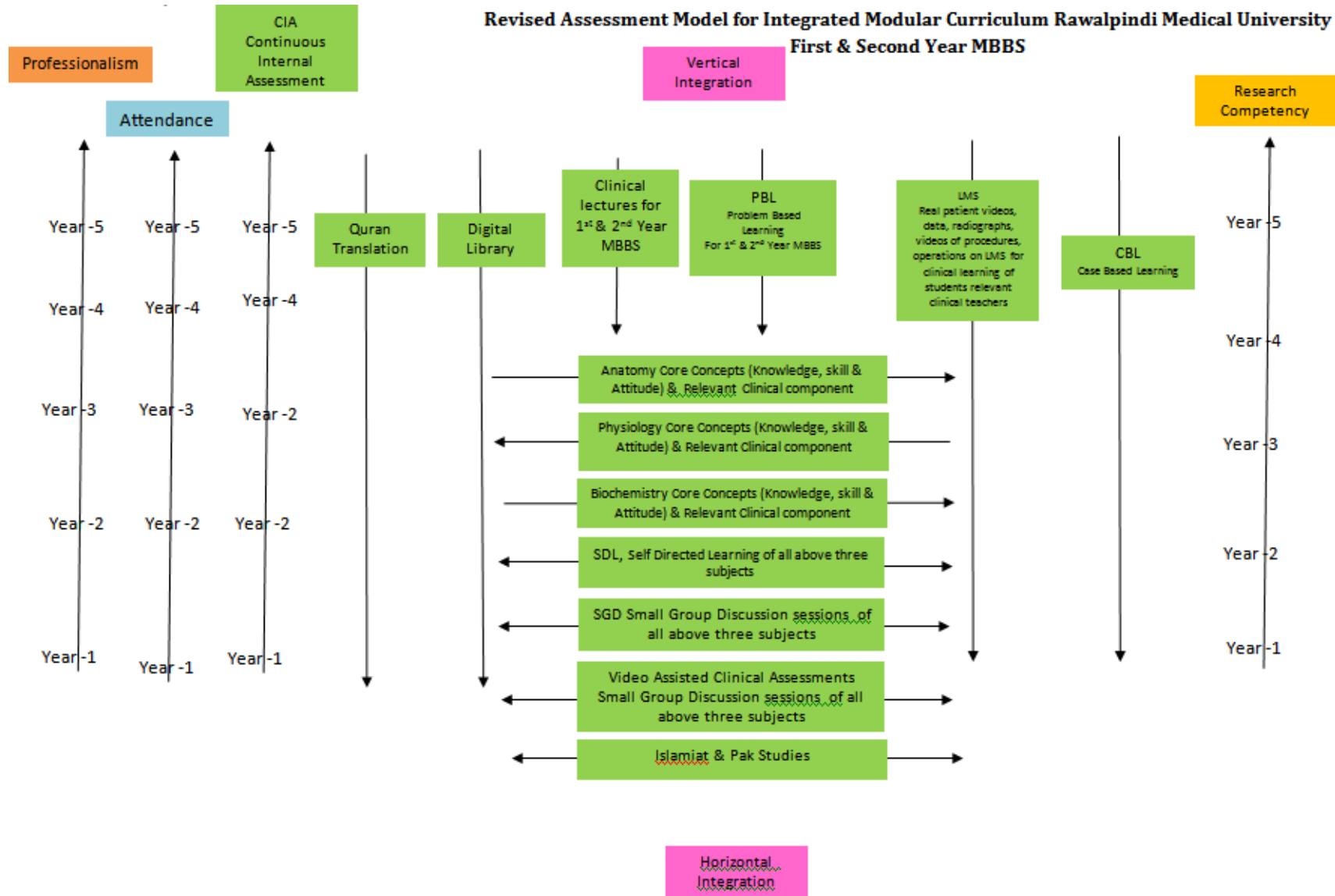
Break up of internal assessment is as follows:

Table 4: Block wise and subject wise distribution of CIA marks = 360Marks (40%)

| Subjects | Block-I | | | Block-II | | | Block-III | | | Total CIA (40%) |
|---------------------------|-----------------------------|--|-------------|-----------------------------|--|-------------|-----------------------------|--|-------------|-------------------------|
| | On campus assessments (30%) | Online LMS based Summative assessments (10%) | Total (40%) | On campus assessments (30%) | Online LMS based Summative assessments (10%) | Total (40%) | On campus assessments (30%) | Online LMS based Summative assessments (10%) | Total (40%) | |
| Anatomy | 30 | 10 | 40 | 30 | 10 | 40 | 30 | 10 | 40 | 40+40+40=120 |
| Physiology | 30 | 10 | 40 | 30 | 10 | 40 | 30 | 10 | 40 | 40+40+40=120 |
| Biochemistry | 30 | 10 | 40 | 30 | 10 | 40 | 30 | 10 | 40 | 40+40+40=120 |
| Total Marks of CIA | 90 | 30 | 120 | 90 | 30 | 120 | 90 | 30 | 120 | 120+120+120= 360 |

Once internal assessment is compiled it CANNOT be altered under ANY circumstance unless a clerical/ human error is detected. He will repeat classes and skills There will be no change in calculated internal assessment scores for supplementary University examination.

I. Diagrammatic Presentation of Various Components of Clinically Oriented Integrated Modular Curriculum of Rawalpindi Medical University



No. of Assessments of Anatomy for First Year MBBS (Block- I):

| Block | Sr. # | Module – 1 Foundation Module - I Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
|--------------|---|---|---------------------|---------------------------------|---------------------------------|---------------------------|----------------------|----------------------|--|
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| Block – I | 1 | End Module Examinations (SEQs, SAQs, EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 30 Minutes | 1 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | Weekly LMS based Assessment (MCQs based) | Summative | 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 05 Minutes | | | 3 Assessments | |
| | Sr. # | Module – 2 MSK-I Module Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| | 1 | End Module Examinations (SEQs, SAQs, EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 60 Minutes | 2 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | 2 Weekly LMS based Assessment (MCQs based) | Summative | 2 x 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 35 Minutes | | | 4 Assessments | |
| | Sr. # | Block – I Assessment | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| | 1 | Objectively Structured Practical Examination (OSPE) | Summative | 5 Hours | 5 Hours & 30 minutes | | | 2 Summative | |
| 2 | LMS Based Block Assessment (MCQs based) | Summative | 30 Minutes | | | | | | |
| Total | | | | 5 Hours & 30 Minutes | | | 2 Assessments | | |

No. of Assessments of Anatomy for First Year MBBS (Block- II):

| Block | Sr. # | Module – 3 MSK-II Module Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
|--------------|---|---|------------------------|---------------------------------|---------------------------------|---------------------------|----------------------|----------------------|--|
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| Block – II | 1 | End Module Examinations (SEQs, SAQs, EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 30 Minutes | 1 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | Weekly LMS based Assessment (MCQs based) | Summative | 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 05 Minutes | | | 3 Assessments | |
| | Sr. # | Module – 4 Hematology & Immunology Module-I Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| | 1 | End Module Examinations (SEQs,SAQs,EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 60 Minutes | 2 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | 2 Weekly LMS based Assessment (MCQs based) | Summative | 2 x 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 35 Minutes | | | 4 Assessments | |
| Sr. # | Block – II Assessment | Type of Assessments | Total Assessments Time | | | No. of Assessments | | | |
| | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | | |
| 1 | Objectively Structured Practical Examination (OSPE) | Summative | 5 Hours | 5 Hours & 30 minutes | | | 2 Summative | | |
| 2 | LMS Based Block Assessment (MCQs based) | Summative | 30 Minutes | | | | | | |
| Total | | | | 5 Hours & 30 Minutes | | | 2 Assessments | | |

No. of Assessments of Anatomy for First Year MBBS (Block- III):

| Block | Sr. # | Module – 5 CVS Module-I Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
|--------------|---|---|------------------------|---------------------------------|---------------------------------|---------------------------|----------------------|----------------------|--|
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| Block – II | 1 | End Module Examinations (SEQs,SAQs,EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 30 Minutes | 1 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | Weekly LMS based Assessment (MCQs based) | Summative | 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 05 Minutes | | | 3 Assessments | |
| | Sr. # | Module – 6 Respiration Module-I Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| | 1 | End Module Examinations (SEQs,SAQs,EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 60 Minutes | 2 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | 2 Weekly LMS based Assessment (MCQs based) | Summative | 2 x 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 35 Minutes | | | 4 Assessments | |
| Sr. # | Block – III Assessment | Type of Assessments | Total Assessments Time | | | No. of Assessments | | | |
| | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | | |
| 1 | Objectively Structured Practical Examination (OSPE) | Summative | 5 Hours | 5 Hours & 30 minutes | | | 2 Summative | | |
| 2 | LMS Based Block Assessment (MCQs based) | Summative | 30 Minutes | | | | | | |
| Total | | | | 5 Hours & 30 Minutes | | | 2 Assessments | | |

Total Time of Anatomy Assessments for First Year MBBS:

| Module | Summative Assessment Time | Formative Assessment Time | Total Assessments Time |
|----------------------------------|----------------------------------|-------------------------------|---------------------------------|
| Foundation Module - I | 2 Hours & 35 minutes | 30 Minutes | 3 Hours & 05 Minutes |
| MSK-I Module | 2 Hours & 35 minutes | 60 Minutes | 3 Hours & 35 Minutes |
| Block -I | 5 Hours & 30 Minutes | | 5 Hours & 30 Minutes |
| MSK-II Module | 2 Hours & 35 minutes | 30 Minutes | 3 Hours & 05 Minutes |
| Hematology & Immunology Module-I | 2 Hours & 35 minutes | 60 Minutes | 3 Hours & 35 Minutes |
| Block -II | 5 Hours & 30 Minutes | | 5 Hours & 30 Minutes |
| CVS Module-I | 2 Hours & 35 minutes | 30 Minutes | 3 Hours & 05 Minutes |
| Respiration Module-I | 2 Hours & 35 minutes | 60 Minutes | 3 Hours & 35 Minutes |
| Block -III | 5 Hours & 30 Minutes | | 5 Hours & 30 Minutes |
| Pre-Annual Examination | | | 7 Hours & 45 Minutes |
| First Professional | | | 3 Hours & 45 Minutes |
| Grand Total | 31 Hours & 30 Minutes | 4 hours and 30 minutes | 48 Hours |

Total Teaching Hours vs Total Assessment Hours

| | | |
|---|--|---|
| Ratio of Teaching Hours to Assessments Hours | Grand Total Teaching Hours 250 Hours: | Grand Total Assessment Hours 48 Hours |
| | 5:1 | |

No. of Assessments of Physiology for First Year MBBS (Block- I):

| Block | Sr. # | Module – 1 Foundation Module - I Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
|--------------|---|---|------------------------|---------------------------------|---------------------------------|---------------------------|----------------------|----------------------|--|
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| Block – I | 1 | End Module Examinations (SEQs, SAQs, EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 30 Minutes | 1 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | Weekly LMS based Assessment (MCQs based) | Summative | 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 05 Minutes | | | 3 Assessments | |
| | Sr. # | Module – 2 MSK-I Module Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| | 1 | End Module Examinations (SEQs, SAQs, EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 60 Minutes | 2 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | 2 Weekly LMS based Assessment (MCQs based) | Summative | 2 x 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 35 Minutes | | | 4 Assessments | |
| Sr. # | Block – I Assessment | Type of Assessments | Total Assessments Time | | | No. of Assessments | | | |
| | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | | |
| 1 | Objectively Structured Practical Examination (OSPE) | Summative | 5 Hours | 5 Hours & 30 minutes | | | 2 Summative | | |
| 2 | LMS Based Block Assessment (MCQs based) | Summative | 30 Minutes | | | | | | |
| Total | | | | 5 Hours & 30 Minutes | | | 2 Assessments | | |

No. of Assessments of Physiology for First Year MBBS (Block- II)

| Block | Sr. # | Module – 3 MSK-II Module Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
|--------------|---|--|------------------------|---------------------------------|---------------------------------|---------------------------|----------------------|----------------------|--|
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| Block – II | 1 | End Module Examinations (SEQs, SAQs, EMQs, MCQs Av OSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 30 Minutes | 1 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | Weekly LMS based Assessment (MCQs based) | Summative | 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 05 Minutes | | | 3 Assessments | |
| | Sr. # | Module – 4 Hematology & Immunology Module-I Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| | 1 | End Module Examinations (SEQs, SAQs, EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 60 Minutes | 2 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | 2 Weekly LMS based Assessment (MCQs based) | Summative | 2 x 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 35 Minutes | | | 4 Assessments | |
| Sr. # | Block – II Assessment | Type of Assessments | Total Assessments Time | | | No. of Assessments | | | |
| | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | | |
| 1 | Objectively Structured Practical Examination (OSPE) | Summative | 5 Hours | 5 Hours & 30 minutes | | | 2 Summative | | |
| 2 | LMS Based Block Assessment (MCQs based) | Summative | 30 Minutes | | | | | | |
| Total | | | | 5 Hours & 30 Minutes | | | 2 Assessments | | |

No. of Assessments of Physiology for First Year MBBS (Block- III):

| Block | Sr. # | Module – 5 CVS Module-I Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
|--------------|---|---|------------------------|---------------------------------|---------------------------------|---------------------------|----------------------|----------------------|--|
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| Block – II | 1 | End Module Examinations (SEQs, SAQs, EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 30 Minutes | 1 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | Weekly LMS based Assessment (MCQs based) | Summative | 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 05 Minutes | | | 3 Assessments | |
| | Sr. # | Module – 6 Respiration Module-I Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| | 1 | End Module Examinations (SEQs, SAQs, EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 60 Minutes | 2 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | 2 Weekly LMS based Assessment (MCQs based) | Summative | 2 x 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 35 Minutes | | | 4 Assessments | |
| Sr. # | Block – III Assessment | Type of Assessments | Total Assessments Time | | | No. of Assessments | | | |
| | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | | |
| 1 | Objectively Structured Practical Examination (OSPE) | Summative | 5 Hours | 5 Hours & 30 minutes | | | 2 Summative | | |
| 2 | LMS Based Block Assessment (MCQs based) | Summative | 30 Minutes | | | | | | |
| Total | | | | 5 Hours & 30 Minutes | | | 2 Assessments | | |

Total Time of Physiology Assessments for First Year MBBS:

| Module | Summative Assessment Time | Formative Assessment Time | Total Assessments Time |
|----------------------------------|----------------------------------|-------------------------------|---------------------------------|
| Foundation Module - I | 2 Hours & 35 minutes | 30 Minutes | 3 Hours & 05 Minutes |
| MSK-I Module | 2 Hours & 35 minutes | 60 Minutes | 3 Hours & 35 Minutes |
| Block -I | 5 Hours & 30 Minutes | | 5 Hours & 30 Minutes |
| MSK-II Module | 2 Hours & 35 minutes | 30 Minutes | 3 Hours & 05 Minutes |
| Hematology & Immunology Module-I | 2 Hours & 35 minutes | 60 Minutes | 3 Hours & 35 Minutes |
| Block -II | 5 Hours & 30 Minutes | | 5 Hours & 30 Minutes |
| CVS Module-I | 2 Hours & 35 minutes | 30 Minutes | 3 Hours & 05 Minutes |
| Respiration Module-I | 2 Hours & 35 minutes | 60 Minutes | 3 Hours & 35 Minutes |
| Block -III | 5 Hours & 30 Minutes | | 5 Hours & 30 Minutes |
| Pre-Annual Examination | | | 7 Hours & 45 Minutes |
| First Professional | | | 3 Hours & 45 Minutes |
| Grand Total | 31 Hours & 30 Minutes | 4 hours and 30 minutes | 48 Hours |

Total Teaching Hours vs Total Assessment Hours

| | | |
|---|--|--|
| Ratio of Teaching Hours to Assessments Hours | Grand Total Teaching Hours 225 hours: | Grand Total Assessment Hours 48 Hours |
| | 9:2 | |

No. of Assessments of Biochemistry for First Year MBBS (Block-I):

| Block | Sr. # | Module – 1 Foundation Module - I Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
|--------------|---|---|------------------------|---------------------------------|---------------------------------|---------------------------|----------------------|----------------------|--|
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| Block – I | 1 | End Module Examinations (SEQs,SAQs,EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 30 Minutes | 1 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | Weekly LMS based Assessment (MCQs based) | Summative | 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 05 Minutes | | | 3 Assessments | |
| | Sr. # | Module – 2 MSK-I Module Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| | 1 | End Module Examinations (SEQs,SAQs,EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 60 Minutes | 2 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | 2 Weekly LMS based Assessment (MCQs based) | Summative | 2 x 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 35 Minutes | | | 4 Assessments | |
| Sr. # | Block – I Assessment | Type of Assessments | Total Assessments Time | | | No. of Assessments | | | |
| | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | | |
| 1 | Objectively Structured Practical Examination (OSPE) | Summative | 5 Hours | 5 Hours & 30 minutes | | | 2 Summative | | |
| 2 | LMS Based Block Assessment (MCQs based) | Summative | 30 Minutes | | | | | | |
| Total | | | | 5 Hours & 30 Minutes | | | 2 Assessments | | |

No. of Assessments of Biochemistry for First Year MBBS (Block- II):

| Block | Sr. # | Module – 3 MSK-II Module Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
|--------------|---|---|------------------------|---------------------------------|---------------------------------|---------------------------|----------------------|----------------------|--|
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| Block – II | 1 | End Module Examinations (SEQs,SAQs,EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 30 Minutes | 1 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | Weekly LMS based Assessment (MCQs based) | Summative | 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 05 Minutes | | | 3 Assessments | |
| | Sr. # | Module – 4 Hematology & Immunology Module-I Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| | 1 | End Module Examinations (SEQs,SAQs,EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 60 Minutes | 2 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | 2 Weekly LMS based Assessment (MCQs based) | Summative | 2 x 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 35 Minutes | | | 4 Assessments | |
| Sr. # | Block – II Assessment | Type of Assessments | Total Assessments Time | | | No. of Assessments | | | |
| | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | | |
| 1 | Objectively Structured Practical Examination (OSPE) | Summative | 5 Hours | 5 Hours & 30 minutes | | | 2 Summative | | |
| 2 | LMS Based Block Assessment (MCQs based) | Summative | 30 Minutes | | | | | | |
| Total | | | | 5 Hours & 30 Minutes | | | 2 Assessments | | |

No. of Assessments of Biochemistry for First Year MBBS (Block- III):

| Block | Sr. # | Module – 5 CVS Module-I Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
|--------------|---|---|------------------------|---------------------------------|---------------------------------|---------------------------|----------------------|----------------------|--|
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| Block – II | 1 | End Module Examinations (SEQs, SAQs, EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 30 Minutes | 1 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | Weekly LMS based Assessment (MCQs based) | Summative | 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 05 Minutes | | | 3 Assessments | |
| | Sr. # | Module – 6 Respiration Module-I Components | Type of Assessments | Total Assessments Time | | | No. of Assessments | | |
| | | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | |
| | 1 | End Module Examinations (SEQs,SAQs,EMQs, MCQs AvOSPE Based) | Summative | 2 Hours 25 minutes | 2 Hours & 35 minutes | 60 Minutes | 2 Formative | 2 Summative | |
| | 2 | Structured & Clinically oriented Viva voce | Summative | 10 Minutes | | | | | |
| | 3 | 2 Weekly LMS based Assessment (MCQs based) | Summative | 2 x 30 Minutes | | | | | |
| | Total | | | | 3 Hours & 35 Minutes | | | 4 Assessments | |
| Sr. # | Block – III Assessment | Type of Assessments | Total Assessments Time | | | No. of Assessments | | | |
| | | | Assessment Time | Summative Assessment Time | Formative Assessment Time | | | | |
| 1 | Objectively Structured Practical Examination (OSPE) | Summative | 5 Hours | 5 Hours & 30 minutes | | | 2 Summative | | |
| 2 | LMS Based Block Assessment (MCQs based) | Summative | 30 Minutes | | | | | | |
| Total | | | | 5 Hours & 30 Minutes | | | 2 Assessments | | |

Total Time of Biochemistry Assessments for First Year MBBS:

| Module | Summative Assessment Time | Formative Assessment Time | Total Assessments Time |
|----------------------------------|----------------------------------|-------------------------------|------------------------|
| Foundation Module - I | 2 Hours & 35 minutes | 30 Minutes | 3 Hours & 05 Minutes |
| MSK-I Module | 2 Hours & 35 minutes | 60 Minutes | 3 Hours & 35 Minutes |
| Block -I | 5 Hours & 30 Minutes | | 5 Hours & 30 Minutes |
| MSK-II Module | 2 Hours & 35 minutes | 30 Minutes | 3 Hours & 05 Minutes |
| Hematology & Immunology Module-I | 2 Hours & 35 minutes | 60 Minutes | 3 Hours & 35 Minutes |
| Block -II | 5 Hours & 30 Minutes | | 5 Hours & 30 Minutes |
| CVS Module-I | 2 Hours & 35 minutes | 30 Minutes | 3 Hours & 05 Minutes |
| Respiration Module-I | 2 Hours & 35 minutes | 60 Minutes | 3 Hours & 35 Minutes |
| Block -III | 5 Hours & 30 Minutes | | 5 Hours & 30 Minutes |
| Pre-Annual Examination | | | 7 Hours & 45 Minutes |
| First Professional | | | 3 Hours & 45 Minutes |
| Grand Total | 31 Hours & 30 Minutes | 4 hours and 30 minutes | 48 Hours |

Total Teaching Hours vs Total Assessment Hours

| | | |
|---|--|--|
| Ratio of Teaching Hours to Assessments Hours | Grand Total Teaching Hours 125 Hours: | Grand Total Assessment Hours 48 Hours |
| | 5:2 | |

No. of Assessments of Clinical Component (Vertical and Horizontal Integration) for First Year MBBS (Block- I):

| Block | Sr. # | Module – 1 Foundation Module - I Components | Type of Assessments | Total Assessments Time | | No. of Assessments |
|--------------|--------------|--|---------------------|------------------------|---------------------------|----------------------|
| | | | | Assessment Time | Formative Assessment Time | |
| Block – I | 1 | Mid Module Examination (MCQs Based) | Formative | 15 Minutes | 45 Minutes | 2 Formative |
| | 2 | End Module Examination (MCQs Based) | Formative | 30 Minutes | | |
| | Total | | | | 45 Minutes | 2 Assessments |
| | Sr. # | Module – 2 MSK-I Module Components | Type of Assessments | Total Assessments Time | | No. of Assessments |
| | | | | Assessment Time | Formative Assessment Time | |
| | 1 | Mid Module Examination (MCQs Based) | Formative | 15 Minutes | 45 Minutes | 2 Formative |
| | 2 | End Module Examination (MCQs Based) | Formative | 30 Minutes | | |
| Total | | | | 45 Minutes | 2 Assessments | |

No. of Assessments of Clinical Component (Vertical and Horizontal Integration) for First Year MBBS (Block- II):

| Block | Sr. # | Module – 3 MSK-II Module Components | Type of Assessments | Total Assessments Time | | No. of Assessments | |
|--------------|--------------|---|---------------------|------------------------|---------------------------|----------------------|----------------------|
| | | | | Assessment Time | Formative Assessment Time | | |
| Block – II | 1 | Mid Module Examination (MCQs Based) | Formative | 15 Minutes | 45 Minutes | 2 Formative | |
| | 2 | End Module Examination (MCQs Based) | Formative | 30 Minutes | | | |
| | Total | | | | 45 Minutes | | 2 Assessments |
| | Sr. # | Module – 4 Hematology & Immunology Module-I Components | Type of Assessments | Total Assessments Time | | No. of Assessments | |
| | | | | Assessment Time | Formative Assessment Time | | |
| | 1 | Mid Module Examination (MCQs Based) | Formative | 15 Minutes | 45 Minutes | 2 Formative | |
| | 2 | End Module Examination (MCQs Based) | Formative | 30 Minutes | | | |
| Total | | | | 45 Minutes | | 2 Assessments | |

No. of Assessments of Clinical Component (Vertical and Horizontal Integration) for First Year MBBS (Block- III):

| Block | Sr. # | Module – 5 CVS Module-I Components | Type of Assessments | Total Assessments Time | | No. of Assessments | |
|--------------|--------------|---|---------------------|------------------------|---------------------------|----------------------|----------------------|
| | | | | Assessment Time | Formative Assessment Time | | |
| Block – III | 1 | Mid Module Examination (MCQs Based) | Formative | 15 Minutes | 45 Minutes | 2 Formative | |
| | 2 | End Module Examination (MCQs Based) | Formative | 30 Minutes | | | |
| | Total | | | | 45 Minutes | | 2 Assessments |
| | Sr. # | Module – 6 Respiration Module-I Components | Type of Assessments | Total Assessments Time | | No. of Assessments | |
| | | | | Assessment Time | Formative Assessment Time | | |
| | 1 | Mid Module Examination (MCQs Based) | Formative | 15 Minutes | 45 Minutes | 2 Formative | |
| | 2 | End Module Examination (MCQs Based) | Formative | 30 Minutes | | | |
| Total | | | | 45 Minutes | | 2 Assessments | |

Total Time of Clinical Component (Vertical and Horizontal Integration) Assessments for First Year MBBS:

| Module | Formative Assessment Time | Total Assessments Time |
|----------------------------------|----------------------------------|-------------------------------|
| Foundation Module - I | 45 Minutes | 45 Minutes |
| MSK-I Module | 45 Minutes | 45 Minutes |
| Block -I | | |
| MSK-II Module | 45 Minutes | 45 Minutes |
| Hematology & Immunology Module-I | 45 Minutes | 45 Minutes |
| Block -II | | |
| CVS Module-I | 45 Minutes | 45 Minutes |
| Respiration Module-I | 45 Minutes | 45 Minutes |
| Block -III | | |
| Pre-Annual Examination | | 35 Minutes |
| First Professional | | 60 Minutes |
| Grand Total | 4 hours and 30 minutes | 6 hours and 5 minutes |

Total Teaching Hours vs Total Assessment Hours

| | | |
|---|---|---|
| Ratio of Teaching Hours to Assessments Hours | Grand Total Teaching Hours 97 Hours: | Grand Total Assessment Hours 6 Hours |
| | 19:1 | |

3.2.4 Pre- Annual Assessment (PAA)

- It is mandatory to appear in all EBA to appear in PAA
- Transcript / good character certificate from head of departments will be needed to appear in pre-annual assessment.

Table of Specifications for Pre-Annual Examination

- Total Marks: 845

| Total marks =800 Marks | | |
|--|-------------------------|-------------------------------------|
| Subjects | % Weightage of subjects | Marks distribution as per weightage |
| Anatomy | 28% | 240 Marks |
| Physiology | 28% | 240 Marks |
| Biochemistry | 28% | 240 Marks |
| Integrated Subjects Community Medicine & Public Health/Research Behavioral Sciences Pathology Pharmacology Radiology Family Medicine Surgery Medicine Gynae & Obs Orthopedics Pediatrics Surgery Ophthalmology Otorhinolaryngology | 14 % | 115 Marks |
| Early Clinical Exposure (ECE) | 1% | 5 Marks |
| ALPHA(Artificial Intelligence, Leadership, Professionalism, Humanities & Arts) GEC (General Education Cluster) | 1% | 5 Marks |
| Total Marks | | 845 Marks |

Notes:

- The total marks for final Annual Assessment (Professional examination) are 900 as per UHS
- The total marks for Pre-Annual Assessment are 800 as OSVE is not being used as assessment tool.
- As per analysis of Module/Block results throughout the academic year, the passing percentage of students is generally higher in OSVE than in other assessment tools. For comprehensive assessment this tool will not be used in Pre- Annual Assessment.as per decision of assessment committee OSVE is not included.

A - Blockwise Distribution of Marks

| Total Marks | BLOCK I Marks | BLOCK II Marks | BLOCK III Marks | Total Marks |
|--------------------|--------------------------|---------------------------|----------------------------|------------------------|
| 845 Marks | 285 Marks | 285 Marks | 275 Marks | 845 Marks |

B - Subject wise marks breakup in Blocks

| Subjects | Block I | Block II | Block III | Total Marks |
|------------------------|----------------|-----------------|------------------|------------------------|
| Anatomy | 80 Marks | 80 Marks | 80 Marks | 240 Marks (28%) |
| Physiology | 80 Marks | 80 Marks | 80 Marks | 240 Marks (28%) |
| Biochemistry | 80 Marks | 80 Marks | 80 Marks | 240 Marks (28%) |
| Integrated Subjects | 45 Marks | 45 Marks | 35 Marks | 125 Marks (16%) |

C - Subject wise Break up of Marks for First year MBBS - Block -I

| Block | Subjects | Theory (Knowledge) | Practical (Skill/attitude) | Total marks | Total marks (Core subjects + Integrated Subjects) |
|--|---------------------------------|-----------------------|-------------------------------|----------------|--|
| Block I | Anatomy | 50 | 30 | 80 marks | 240+ 45 = 285 marks |
| | Physiology | 50 | 30 | 80 marks | |
| | Biochemistry | 50 | 30 | 80 marks | |
| | Total | | | 240 marks | |
| (Core subjects + Integrated Subjects) | Integrated Subjects | | | | |
| | Community Medicine /Research | 6 Marks | | | |
| | Behavioral Sciences | 3 Marks | | | |
| | Pathology | 2 Marks | | | |
| | Pharmacology | 3 Marks | | | |
| | Radiology | 2 Marks | | | |
| | Gynae & Obs | 4 Marks | | | |
| | Medicine | 2 Marks | | | |
| | Family Medicine | 2 Marks | | | |
| | Pediatrics | 4 Marks | | | |
| | Surgery | 2 Marks | | | |
| | ECE | | 5 Marks | | |
| | ALPHA and GEC | | 5 Marks | | |
| | Total | | | | |
| 285 Marks | | | | | |
| Total | | 240+ 45 = 285 marks | | | |
| marks | | | | | |

D - Subject wise Break up of Marks for First year MBBS - Block -II

| Block | Subjects | Theory (Knowledge) | Practical (Skill/attitude) | Total marks | Total marks (Core subjects + Integrated Subjects) |
|--|------------------------------|---------------------|----------------------------|-------------|--|
| Block II (Core subjects + Integrated Subjects) 285 Marks | Anatomy | 50 | 30 | 80 marks | 240+ 45 = 285 marks |
| | Physiology | 50 | 30 | 80 marks | |
| | Biochemistry | 50 | 30 | 80 marks | |
| | Total | | | 240 marks | |
| | Integrated Subjects | | | | |
| | Community Medicine /Research | 4 Marks | | | |
| | Family Medicine | 3 Marks | | | |
| | Orthopedics | 3 Marks | | | |
| | Radiology | 3 Marks | | | |
| | Medicine | 3 Marks | | | |
| | Gynae & Obs | 3 Marks | | | |
| | Behavioral Sciences | 4 Marks | | | |
| | Pathology | 2 Marks | | | |
| | ECE | | 5 Marks | | |
| ALPHA and GEC | | 5 Marks | | | |
| Total | | 240+ 45 = 285 marks | | | |
| marks | | | | | |

E - Subject wise Break up of Marks for First year MBBS - Block -III

| Block | Subjects | Theory (Knowledge) | Practical (Skill/attitude) | Total marks | Total marks (Core subjects + Integrated Subjects) | |
|---|---------------------|-----------------------|-------------------------------|----------------|--|----------|
| Block III | Anatomy | 50 | 30 | 80 marks | 240+35 = 275 marks | |
| | Physiology | 50 | 30 | 80 marks | | |
| | Biochemistry | 50 | 30 | 80 marks | | |
| | Total | | | 240 marks | | |
| Total marks (Core subjects + Integrated Subjects) | Integrated Subjects | | | | | 35 Marks |
| | Community Medicine | 2 Marks | | | | |
| | Behavioral Sciences | 2Marks | | | | |
| | Medicine | 3 Marks | | | | |
| | Family medicine | 3 Marks | | | | |
| | Gynae & Obs | 2 Marks | | | | |
| | Radiology | 2 Marks | | | | |
| | Pediatrics | 2 Marks | | | | |
| | Otorhinolaryngology | 3 Marks | | | | |
| | Ophthalmology | 2 Marks | | | | |
| | Pathology | 2Marks | | | | |
| | Pharmacology | 2 Marks | | | | |
| | ECE | | 5 Marks | | | |
| | ALPHA and GEC | | 5 Marks | | | |
| Total | | 240+35 = 275 marks | | | | |
| marks | | | | | | |
| GRAND TOTAL MARKS | | 800 | | | | |

F - Modular distribution of Marks for Module 1(Foundation Module - I) & Module 2(MSK-I Module) - Block -I

Block -I Theory Component (Knowledge)

| Subjects | MCQs | | | EMQ | | | SAQ | | | SEQ | | | Total marks |
|---|------------|-----------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|
| | Module -1 | Module- 2 | Marks | Module -1 | Module- 2 | Marks | Module -1 | Module- 2 | Marks | Module -1 | Module- 2 | Marks | |
| Anatomy | 13 | 12 | 25 | - | 01 | 5 | 01 | 01 | 10 | 0.5 | 0.5 | 10 | 50 |
| Physiology | 12 | 13 | 25 | | 01 | 5 | 01 | 01 | 10 | | 01 | 10 | 50 |
| Biochemistry | 15 | 10 | 25 | - | 01 | 5 | 01 | 01 | 10 | 01 | - | 10 | 50 |
| Vertically & Spirally Integrated Subjects | | | 35 | - | | - | - | | - | - | | - | 35 |
| Total | 110 | | 110 | 3 | | 15 | 6 | | 30 | 3 | | 30 | 185 |

Block -I Practical Component (Skill & Attitude)

| Subjects | Lab OSPE | | | Iospe | | | OSCE | | | Total stations | Total marks |
|-----------------|---------------------------------|---------------------------------|-----------|---------------------------------|---------------------------------|-----------|---------------------------------|---------------------------------|-----------|----------------|-------------|
| | Number of Stations of Module -1 | Number of Stations of Module -2 | Marks | Number of Stations of Module -1 | Number of Stations of Module -2 | Marks | Number of Stations of Module -1 | Number of Stations of Module -2 | Marks | | |
| Anatomy | 01 | 02 | 15 | 01 | | 5 | 01 | 01 | 10 | 6 | 30 |
| Physiology | 01 | 02 | 15 | | 01 | 5 | 01 | 01 | 10 | 6 | 30 |
| Biochemistry | 01 | 02 | 15 | - | 01 | 5 | 01 | 01 | 10 | 6 | 30 |
| ECE | - | | - | - | | - | | 01 | 5 | 1 | 5 |
| ALPHA- Research | - | | - | - | | - | | 01 | 5 | 1 | 5 |
| Total | 9 | | 45 | 3 | | 15 | 8 | | 40 | 20 | 100 |

G- Modular distribution of Marks for Module 3 (MSK-II Module) & Module 4(Haematology & Immunology Module-I) - Block -II

Block -II Theory Component (Knowledge)

| Subjects | MCQs | | | EMQ | | | SAQ | | | SEQ | | | Total marks |
|---|------------|----------|------------|-----------|----------|-----------|-----------|----------|-----------|-----------|----------|-----------|-------------|
| | Module -1 | Module-2 | Marks | Module -1 | Module-2 | Marks | Module -1 | Module-2 | Marks | Module -1 | Module-2 | Marks | |
| Anatomy | 12 | 13 | 25 | | 01 | 5 | 01 | 01 | 10 | 0.5 | 0.5 | 10 | 50 |
| Physiology | 12 | 13 | 25 | | 01 | 5 | 01 | 01 | 10 | | 01 | 10 | 50 |
| Biochemistry | 10 | 15 | 25 | | 01 | 5 | 01 | 01 | 10 | | 01 | 10 | 50 |
| Vertically & Spirally Integrated Subjects | | | 35 | - | | - | - | | - | - | | - | 35 |
| Total | 110 | | 110 | 3 | | 15 | 6 | | 30 | 3 | | 30 | 185 |

Block -II Practical Component (Skill & Attitude)

| Subjects | Lab OSPE | | | I ospe | | | OSCE | | | Total stations | Total marks |
|----------------|---------------------------------|---------------------------------|-----------|---------------------------------|---------------------------------|-----------|---------------------------------|---------------------------------|-----------|----------------|-------------|
| | Number of Stations of Module -1 | Number of Stations of Module -2 | Marks | Number of Stations of Module -1 | Number of Stations of Module -2 | Marks | Number of Stations of Module -1 | Number of Stations of Module -2 | Marks | | |
| Anatomy | 02 | 01 | 15 | - | 01 | 5 | 01 | 01 | 10 | 6 | 30 |
| Physiology | 01 | 02 | 15 | | 01 | 5 | 01 | 01 | 10 | 6 | 30 |
| Biochemistry | 01 | 02 | 15 | 01 | - | 5 | 01 | 01 | 10 | 6 | 30 |
| ECE | - | | - | - | | - | | 01 | 5 | 1 | 5 |
| ALPHA-Research | - | | - | - | | - | | 01 | 5 | 1 | 5 |
| Total | | 9 | 45 | | 3 | 15 | | 8 | 40 | 20 | 100 |

H - Modular distribution of Marks for Module 5 (CVS Module-I) & Module 6 (Respiration Module-I) - Block -III

Block -III Theory Component (Knowledge)

| Subjects | MCQs | | | EMQ | | | SAQ | | | SEQ | | | Total marks |
|---|-----------|----------|-------|-----------|----------|-------|-----------|----------|-------|-----------|----------|-------|-------------|
| | Module -1 | Module-2 | Marks | Module -1 | Module-2 | Marks | Module -1 | Module-2 | Marks | Module -1 | Module-2 | Marks | |
| Anatomy | 13 | 12 | 25 | 01 | - | 5 | 01 | 01 | 10 | 0.5 | 0.5 | 10 | 50 |
| Physiology | 13 | 12 | 25 | 01 | | 5 | 01 | 01 | 10 | 01 | | 10 | 50 |
| Biochemistry | 13 | 12 | 25 | 01 | - | 5 | 01 | 01 | 10 | 01 | - | 10 | 50 |
| Vertically & Spirally Integrated Subjects | | | 25 | - | | - | - | | - | - | | - | 25 |
| Total | 100 | | 100 | 3 | | 15 | 6 | | 30 | 3 | | 30 | 175 |

Block -III Practical Component (Skill & Attitude)

| Subjects | Lab OSPE | | | I OSPE | | | OSCE | | | Total stations | Total marks |
|----------------|---------------------------------|---------------------------------|-------|---------------------------------|---------------------------------|-------|---------------------------------|---------------------------------|-------|----------------|-------------|
| | Number of Stations of Module -1 | Number of Stations of Module -2 | Marks | Number of Stations of Module -1 | Number of Stations of Module -2 | Marks | Number of Stations of Module -1 | Number of Stations of Module -2 | Marks | | |
| Anatomy | 02 | 01 | 15 | - | 01 | 5 | 01 | 01 | 10 | 6 | 30 |
| Physiology | 02 | 01 | 15 | 01 | - | 5 | 01 | 01 | 10 | 6 | 30 |
| Biochemistry | 02 | 01 | 15 | - | 01 | 5 | 01 | 01 | 10 | 6 | 30 |
| ECE | - | | - | - | | - | | 01 | 5 | 1 | 5 |
| ALPHA-Research | - | | - | - | | - | | 01 | 5 | 1 | 5 |
| Total | 9 | | 45 | 3 | | 15 | 8 | | 40 | 20 | 100 |

Calculation for Pre-Annual Assessment Implementation for First Year MBBS 2025

| | | | | | | | | |
|----------------------------------|---|------------|------------|-----------|--|-------------|-------------|---|
| Block -I | Theory component (Knowledge) | | | | Practical component (Skill & Attitude) | | | Total time required for Block – I pre annual assessment is 8 hrs and 25 minutes |
| | MCQs | SAQs | SEQs | EMQs | Lab OSPE | I OSPE | OSCE | |
| Total number of questions | 110 | 6 | 3 | 3 | 9 | 3 | 8 | |
| Time required for each component | 110 x 1 min | 6 x 10 min | 3 x 10 min | 3 x 5 min | 9 x 2.5 min | 3 x 2.5 min | 8 x 2.5 min | |
| | 110 mins | 60 mins | 30 mins | 25 mins | 22.5 mins | 7.5 mins | 20 mins | |
| Total time | 110+60+30+25 = 225 mins (4hrs and 25 mins) | | | | 22.5+7.5+20 = 50 mins/ round of 20 students | | | 4 hrs |
| | | | | | If the OSPE is conducted simultaneously at 4 venues: In 50 minutes, 20 students can complete the OSPE at each venue, totaling 80 students across all venues. With 5 rounds at 4 venues, the entire class can complete the OSPE within 4 hours. | | | |
| Block -II | Theory component (Knowledge) | | | | Practical component (Skill & Attitude) | | | Total time required for Block – II pre annual assessment is 8 hrs and 25 minutes |
| | MCQs | SAQs | SEQs | EMQs | Lab OSPE | I OSPE | OSCE | |
| Total number of questions | 110 | 6 | 3 | 3 | 9 | 3 | 8 | |
| Time required for each component | 110 x 1 min | 6 x 10 min | 3 x 10 min | 3 x 5 min | 9 x 2.5 min | 3 x 2.5 min | 8 x 2.5 min | |
| | 110 mins | 60 mins | 30 mins | 25 mins | 22.5 mins | 7.5 mins | 20 mins | |
| Total time | 110+60+30+25 = 225 mins (4hrs and 25 mins) | | | | 22.5+7.5+20 = 50 mins/ round of 20 students | | | 4 hrs |
| | | | | | If the OSPE is conducted simultaneously at 4 venues: In 50 minutes, 20 students can complete the OSPE at each venue, totaling 80 students across all venues. With 5 rounds at 4 venues, the entire class can complete the OSPE within 4 hours. | | | |
| Block -III | Theory component (Knowledge) | | | | Practical component (Skill & Attitude) | | | Total time required for Block – III pre annual assessment is 8 hrs and 15 minutes |
| | MCQs | SAQs | SEQs | EMQs | Lab OSPE | I OSPE | OSCE | |
| Total number of questions | 100 | 6 | 3 | 3 | 9 | 3 | 8 | |
| Time required for each component | 100 x 1 min | 6 x 10 min | 3 x 10 min | 3 x 5 min | 9 x 2.5 min | 3 x 2.5 min | 8 x 2.5 min | |
| | 100 mins | 60 mins | 30 mins | 25 mins | 22.5 mins | 7.5 mins | 20 mins | |
| Total time | 100+60+30+25 = 225 mins (4hrs and 15 mins) | | | | 22.5+7.5+20 = 50 mins/ round of 20 students | | | 4 hrs |
| | | | | | If the OSPE is conducted simultaneously at 4 venues: In 50 minutes, 20 students can complete the OSPE at each venue, totaling 80 students across all venues. With 5 rounds at 4 venues, the entire class can complete the OSPE within 4 hours. | | | |

Table of Specification: First and Second year Final Annual Assessment (Professional)

Statutes:

1. **Scheduling:** First Professional MBBS will be held at the end of First year whereas the Second Professional MBBS shall be held at the end of Second year.
2. **Subjects:** Every candidate is required to appear in the following subjects in Each Block
 - a. **Core subjects**
Integrated Anatomy, Integrated Physiology and Integrated Biochemistry
 - b. **Vertically integrated Subjects**
Community Medicine & Public Health, Behavioural Sciences, Pathology, Pharmacology and associated Clinical Subjects
 - c. **Spirally Integrated subjects**
General Education Cluster (GEC), ALPHA (Artificial Intelligence, Leadership, Professionalism, Humanities and Arts), Early Clinical Exposure (ECE) and Research.
3. **Assessments:** There will be three papers in First Annual Professional Examination and four papers in the Second Annual professional Examination.

Table: 1 Number of Papers/Blocks in First & Second Annual professional Examination

| Paper | First year MBBS | Second year MBBS |
|--------------|------------------------|--|
| Paper-1 | Block -I | Block -I |
| Paper-2 | Block- II | Block- II |
| Paper-3 | Block-III | Block-III |
| Paper-4 | Nil | GEC (Islamic Studies & Pakistan Studies) |

- a. **First Professional Examination Total Marks = 900***
 - i. Block I Assessment Total Marks = 300
 - ii. Block II Assessment Total Marks = 300
 - iii. Block III Assessment Total Marks = 300
- b. **Second Professional Examination Total Marks = 1000 ***

- i. Block I Assessment Total Marks = 300
- ii. Block II Assessment Total Marks = 300
- iii. Block III Assessment Total Marks = 300
- iv. GEC Assessment (Islamic Studies & Pakistan Studies) Total Marks = 100

4. Continuous Internal Assessment (CIA):

Continuous Internal Assessment shall carry total marks = 360 (40% of the total allocated marks= 900) for first and second year MBBS .CIA will have two components for each block

A: On Campus assessments (30%) = 270 Marks

B: Online LMS Based Summative Assessments (10%) = 90 Marks

Total marks for each block per subject will be 120 marks.

5. Block Assessment Components: The components of Block Assessment shall be as follows:

A. One Theory Paper (Knowledge(K) having two sections

- i. **Section:1** will have Multiple choice questions (1 mark for each MCQ) and time allocated will be 1 minute for each MCQ. The integration ratio in MCQs will be 70% core content, 10% horizontal integration, and 20% vertical integration. There will be no negative marking
- ii. **Section:2** will have Structured Essay Questions of 5 marks each and time allocated for 1 SEQ will be 10 minutes.

Table: 2 Block wise Number of MCQs and SEQs in First & Second Annual professional Examination

| First year MBBS | Number of MCQs | Number of SEQs |
|-------------------------|-----------------------|-----------------------|
| Block -I | 60 | 6 |
| Block -II | 60 | 6 |
| Block -III | 60 | 6 |
| Second Year MBBS | Number of MCQs | Number of SEQs |
| Block -I | 60 | 6 |
| Block -II | 60 | 6 |
| Block -III | 60 | 6 |

B. Skill Assessment Component (Practical(P) and Attitude(A)):

The assessment will include an Objective Structured Practical Examination (OSPE) with a total of 18 stations, time allocated for each station will be 3 minutes.

i. Laboratory OSPE (Lab OSPE):

This section will consist of stations focused on practical (hands on performance) components from core subject areas, each station carries 5 marks.

ii. Integrated OSPE (I OSPE):

This section will include stations, from each core subject, emphasizing horizontal and vertical integration, each station carries 5 marks.

iii. Objective Structured Clinical Examinations (OSCE):

This section comprises of stations, dedicated to Early Clinical Exposure (ECE), Simulated Patients (SP), models, ALPHA and clinical component of core subjects, each station carries 5 marks.

iv. Objective Structured Viva Examinations (OSVE):

This section will consist of table viva for each core subject. Students will be evaluated by internal and external examiner using a structured marking rubric, with total marks 10.

Table: 3 Block wise Number of OSPE and OSVE Stations in First & Second Annual professional Examination

| First year MBBS | Number of LabOSPE Stations | Number of iOSPE Stations | Number of OSCE Stations | Number of table VIVA /OSPE Station |
|-------------------------|-----------------------------------|---------------------------------|--------------------------------|---|
| Block -I | 5 | 3 | 4 | 6 |
| Block -II | 5 | 3 | 4 | 6 |
| Block -III | 4 | 3 | 5 | 6 |
| Second Year MBBS | Number of LabOSPE Stations | Number of iOSPE Stations | Number of OSCE Stations | Number of table VIVA /OSPE Station |
| Block -I | 4 | 3 | 5 | 6 |
| Block -II | 5 | 3 | 4 | 6 |
| Block -III | 5 | 3 | 4 | 6 |

Table: 4 Block wise Total Number of MCQs, SEQs OSPE and OSVE Stations in First & Second Annual Professional Examination

| First year MBBS | Number of MCQs | Number of SEQs | Number of OSPE Stations + OSVE |
|------------------------|-----------------------|-----------------------|---------------------------------------|
| Block -I | 60 | 6 | 18 |
| Block -II | 60 | 6 | 18 |

| | | | |
|-------------------------|-----------------------|-----------------------|---------------------------------------|
| Block -III | 60 | 6 | 18 |
| Total | 180 MCQs | 18 SEQs | 54 OSPE Stations |
| Second Year MBBS | Number of MCQs | Number of SEQs | Number of OSPE Stations + OSVE |
| Block -I | 60 | 6 | 18 |
| Block -II | 60 | 6 | 18 |
| Block -III | 60 | 6 | 18 |
| Total | 180 MCQs | 18 SEQs | 54 OSPE Stations |

- 5 **Annual Examination Eligibility Criteria:** Eligibility to appear in Annual Professional will be as per RMU Assessment Policy approved by the Academic Council and Syndicate.
- 6 **Passing Criteria:** The students of First & Second year MBBS must secure at least 50% marks separately in theory and practical exams of all core subjects (Anatomy, Physiology & Biochemistry), with an overall aggregate of 50% to pass in a Block Assessment. *
- 7 **Supplementary Examination Criteria:** If a student fails in any component (subject) within a Block, they shall appear in relevant block **only in that failed subject (s)** during the Supplementary Examination.

Table: 5 Table of Abbreviation

| | |
|----------|---|
| CIA | Continuous Internal Assessment |
| I-OSPE | Integrated OSPE |
| Lab OSPE | Laboratory Objective Structured Practical Examination |
| OSCE | Objective Structured Clinical Examinations |
| OSVE | Objective Structured Viva Examinations |
| ECE | Early Clinical Exposure |
| ALPHA | (Artificial Intelligence, Leadership, Professionalism, Humanities & Arts) |
| GEC | General Education Cluster |
| K | Knowledge |

*Reference: University of Health Sciences Lahore (87th meeting of syndicate) Annexure 1

Previous Model with 30% CIA

Annual Assessment Plan of First Year MBBS 2024 (Batch 51)

- Total First Professional Marks: 900
- Annual Marks: (70%) =630 Marks
- Continuous Internal Assessment (30%) =270 Marks

A: Original Distribution of CIA (Continuous Internal Assessment) Marks (270 Marks)

B: Extrapolated marks to be calculated throughout the Academic Year 2024

| Blocks | Subjects | Total marks | Module 1 | Module 2 | Total marks |
|---------------------------|--------------|-------------|------------|--------------|-------------|
| Block 1 (90 Marks) | Anatomy | 30 | 15 marks | 15 marks | 90 |
| | Physiology | 30 | 15 marks | 15 marks | |
| | Biochemistry | 30 | 15 marks | 15 marks | |
| Block 2 (90 Marks) | Anatomy | 30 | 15 marks | 15 marks | 90 |
| | Physiology | 30 | 15 marks | 15 marks | |
| | Biochemistry | 30 | 15 marks | 15 marks | |
| Block 3 (90 Marks) | Anatomy | 30 | 15 marks | 15 marks | 90 |
| | Physiology | 30 | 15 marks | 15 marks | |
| | Biochemistry | 30 | 15 marks | 15 marks | |
| Total marks | | | | | 270 Marks |
| Blocks | Modules | Anatomy | Physiology | Biochemistry | Total |
| Block 1 1470 Marks | Module 1 | 200 | 200 | 200 | 600 |
| | Module 2 | 200 | 200 | 200 | 600 |
| | Block Exam | 90 | 90 | 90 | 270 |
| | Total | 490 | 490 | 490 | 1470 |
| Block 2 1470 Marks | Module 1 | 200 | 200 | 200 | 600 |
| | Module 2 | 200 | 200 | 200 | 600 |
| | Block Exam | 90 | 90 | 90 | 270 |
| | Total | 490 | 490 | 490 | 1470 |
| Block 3 1470 Marks | Module 1 | 200 | 200 | 200 | 600 |
| | Module 2 | 200 | 200 | 200 | 600 |
| | Block Exam | 90 | 90 | 90 | 270 |
| | Total | 490 | 490 | 490 | 1470 |
| Total Marks | | 1470 | 1470 | 1470 | 4410 |

from Summative assessments

Note:

- Total Operational marks =4410 converted to 270 marks and per block 1470 marks will be converted to 90 marks for Annual Professional marks calculation .

Continuous Internal Assessment (CIA) Plan of First Year MBBS 2025
With CIA 40%

- Total First Professional Marks: 900
- Annual Marks: (60%) =540 Marks
- Continuous Internal Assessment (40%)

Components of CIA

- **A:** CIA calculated from on campus assessments including LMS (on campus) =30%=270 Marks
- **B:** CIA calculated from Online LMS Assessments =10%=90 Marks

Table1: CIA calculated from on campus assessments =30%= 270 Marks

| Total Block Marks | Subjects | Block wise subject Marks | Module 1 Marks | Module 2 Marks | Block Marks | Total Block Marks |
|--------------------------|-----------------|-----------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|--------------------------|
| Block – I 90 Marks | Anatomy | 30 (Theory-15 Practical-15) | 10 marks (Theory-6 Practical-4) | 10 marks (Theory-6 Practical-4) | 10 Marks (Theory-3 Practical-7) | Block – I 90 Marks |
| | Physiology | 30 (Theory-15 Practical-15) | 10 marks (Theory-6 Practical-4) | 10 marks (Theory-6 Practical-4) | 10 Marks (Theory-3 Practical-7) | |
| | Biochemistry | 30 (Theory-15 Practical-15) | 10 marks (Theory-6 Practical-4) | 10 marks (Theory-6 Practical-4) | 10 Marks (Theory-3 Practical-7) | |
| Block – II 90 Marks | Anatomy | 30 (Theory-15 Practical-15) | 10 marks (Theory-6 Practical-4) | 10 marks (Theory-6 Practical-4) | 10 Marks (Theory-3 Practical-7) | Block – II 90 Marks |
| | Physiology | 30 (Theory-15 Practical-15) | 10 marks (Theory-6 Practical-4) | 10 marks (Theory-6 Practical-4) | 10 Marks (Theory-3 Practical-7) | |
| | Biochemistry | 30 (Theory-15 Practical-15) | 10 marks (Theory-6 Practical-4) | 10 marks (Theory-6 Practical-4) | 10 Marks (Theory-3 Practical-7) | |
| Block – III 90 Marks | Anatomy | 30 (Theory-15 Practical-15) | 10 marks (Theory-6 Practical-4) | 10 marks (Theory-6 Practical-4) | 10 Marks (Theory-3 Practical-7) | Block – III 90 Marks |
| | Physiology | 30 (Theory-15 Practical-15) | 10 marks (Theory-6 Practical-4) | 10 marks (Theory-6 Practical-4) | 10 Marks (Theory-3 Practical-7) | |

| | | | | | | |
|--------------------|--------------|-----------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|-----------|
| | Biochemistry | 30 (Theory-15 Practical-15) | 10 marks (Theory-6 Practical-4) | 10 marks (Theory-6 Practical-4) | 10 Marks (Theory-3 Practical-7) | |
| Total Marks of CIA | | | | | | 270 Marks |

Table 2 : CIA calculated from Online LMS Summative Assessments = 10% = 90 Marks

| Total Block Marks | Subjects | Block wise subject Marks | Module 1 Marks | Module 2 Marks | Total Block Marks |
|--------------------------------|-----------------|---------------------------------|--|--|--------------------------|
| Block – I 30 Marks | Anatomy | 10 (Theory-5 Practical-5) | 5 marks (Theory-2.5 Practical-2.5) | 5 marks (Theory-2.5 Practical-2.5) | Block – I 30 Marks |
| | Physiology | 10 (Theory-5 Practical-5) | 5 marks (Theory-2.5 Practical-2.5) | 5 marks (Theory-2.5 Practical-2.5) | |
| | Biochemistry | 10 (Theory-5 Practical-5) | 5 marks (Theory-2.5 Practical-2.5) | 5 marks (Theory-2.5 Practical-2.5) | |
| Block – II 30 Marks | Anatomy | 10 (Theory-5 Practical-5) | 5 marks (Theory-2.5 Practical-2.5) | 5 marks (Theory-2.5 Practical-2.5) | Block – II 30 Marks |
| | Physiology | 10 (Theory-5 Practical-5) | 5 marks (Theory-2.5 Practical-2.5) | 5 marks (Theory-2.5 Practical-2.5) | |
| | Biochemistry | 10 (Theory-5 Practical-5) | 5 marks (Theory-2.5 Practical-2.5) | 5 marks (Theory-2.5 Practical-2.5) | |
| Block – III 30 Marks | Anatomy | 10 (Theory-5 Practical-5) | 5 marks (Theory-2.5 Practical-2.5) | 5 marks (Theory-2.5 Practical-2.5) | Block – III 30 Marks |
| | Physiology | 10 (Theory-5 Practical-5) | 5 marks (Theory-2.5 Practical-2.5) | 5 marks (Theory-2.5 Practical-2.5) | |
| | Biochemistry | 10 (Theory-5 Practical-5) | 5 marks (Theory-2.5 Practical-2.5) | 5 marks (Theory-2.5 Practical-2.5) | |

Table 3 : Extrapolated marks to be calculated from on campus Summative assessments throughout the Academic Year 2025

| Blocks | Modules | Anatomy | Physiology | Biochemistry | Total |
|-----------------------|----------------|----------------|-------------------|---------------------|--------------|
| Block 1 1470 Marks | Module 1 | 200 | 200 | 200 | 600 |
| | Module 2 | 200 | 200 | 200 | 600 |
| | Block Exam | 90 | 90 | 90 | 270 |
| | Total | 490 | 490 | 490 | 1470 |
| Block 2 1470 Marks | Module 1 | 200 | 200 | 200 | 600 |
| | Module 2 | 200 | 200 | 200 | 600 |
| | Block Exam | 90 | 90 | 90 | 270 |
| | Total | 490 | 490 | 490 | 1470 |
| Block 3 1470 Marks | Module 1 | 200 | 200 | 200 | 600 |
| | Module 2 | 200 | 200 | 200 | 600 |
| | Block Exam | 90 | 90 | 90 | 270 |
| | Total | 490 | 490 | 490 | 1470 |
| Total Marks | | 1470 | 1470 | 1470 | 4410 |

Note:

- Total Operational marks =4410 converted to 270 marks and per block 1470 marks will be converted to 90 marks for Annual Professional marks calculation.
- The CIA should be submitted to Examination cell in round off values.

Table 4: Block wise and subject wise distribution of CIA marks = 360Marks (40%)

| Subjects | Block-I | | | Block-II | | | Block-III | | | Total CIA (40%) |
|---------------------------|------------------------------------|---|--------------------|------------------------------------|---|--------------------|------------------------------------|---|--------------------|-------------------------|
| | On campus assessments (30%) | Online LMS based Summative assessments (10%) | Total (40%) | On campus assessments (30%) | Online LMS based Summative assessments (10%) | Total (40%) | On campus assessments (30%) | Online LMS based Summative assessments (10%) | Total (40%) | |
| Anatomy | 30 | 10 | 40 | 30 | 10 | 40 | 30 | 10 | 40 | 40+40+40=120 |
| Physiology | 30 | 10 | 40 | 30 | 10 | 40 | 30 | 10 | 40 | 40+40+40=120 |
| Biochemistry | 30 | 10 | 40 | 30 | 10 | 40 | 30 | 10 | 40 | 40+40+40=120 |
| Total Marks of CIA | 90 | 30 | 120 | 90 | 30 | 120 | 90 | 30 | 120 | 120+120+120= 360 |

Table: 5 Module wise No of MCQs per subject per LMS Based Summative Assessment (10% CIA)

| | No of MCQs per subject per LMS Based Summative Assessment | Module :1 (Number of MCQs x Number of LMS) | Module :2 (Number of MCQs x Number of LMS) | Module :3 (Number of MCQs x Number of LMS) | Module :4 (Number of MCQs x Number of LMS) | Module :5 (Number of MCQs x Number of LMS) | Module :6 (Number of MCQs x Number of LMS) | TOTAL Number of MCQs |
|-----------------------------|---|--|--|--|--|--|--|----------------------|
| Anatomy | 40 MCQs | 40 x2= 80 MCQs | 40 x2= 80 MCQs | 40 x2= 80 MCQs | 40 x2= 80 MCQs | 40 x2= 80 MCQs | 40 MCQs | 440 |
| Physiology | 40 MCQs | 40 x2= 80 MCQs | 40 x2= 80 MCQs | 40 x2= 80 MCQs | 40 x2= 80 MCQs | 40 x2= 80 MCQs | 40 MCQs | 440 |
| Biochemistry | 40 MCQs | 40 x2= 80 MCQs | 40 x2= 80 MCQs | 40 x2= 80 MCQs | 40 x2= 80 MCQs | 40 x2= 80 MCQs | 40 MCQs | 440 |
| Total Number of MCQs | | 240 | 240 | 240 | 240 | 240 | 120 | 1320 |

Table:6 Table of specification of Continuous Internal Assessment (CIA) for LMS Based Summative Assessment

| Subjects | Total No of MCQs Per LMS | Knowledge (K) +Practical (SKL) | | | | | | | | | Total time per LMS Assessment 30 min (0.75 seconds for 1 MCQ) |
|---------------------|--------------------------|--------------------------------|------------------|----|----|-----|----------------|------------------|----|----|---|
| | | LGIS ,SGDs& Skill lab (50%) | | | | | | SDL (50%) | | | |
| | | Number of MCQs | Cognitive Domain | | | SKL | Number of MCQs | Cognitive Domain | | | |
| | | | C1 | C2 | C3 | | | C1 | C2 | C3 | |
| Anatomy | 40 | 20 | 2 | 3 | 10 | 5 | 20 | 5 | 5 | 10 | |
| Physiology | 40 | 20 | 2 | 3 | 10 | 5 | 20 | 5 | 5 | 10 | |
| Biochemistry | 40 | 20 | 2 | 3 | 10 | 5 | 20 | 5 | 5 | 10 | |

Note: An LMS-based assessment conducted during the block is regarded as part of the on-campus assessment, with the resulting CIA contributing to the 30% weightage.

The time allocated for LMS Based Summative assessment (off Campus) will be 30 minutes for 40 Mcqs (0.75 seconds for 1 MCQ)

Table: 7 Table of specification of Continuous Internal Assessment (CIA) for First and Second year MBBS (On Campus assessments (30%))

| Domains: C-Core Subject (70%) Levels C1-C2, HV- Horizontal & Vertical Integration (20%) Levels C2-C3, S- Spiral Integration (10%) Levels C2-C3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--------------|-------------------------------|----|---|-------|-------|------|-------|-------|------|----|---|-------|-------|---|----|---|-------|--------------------|---|---------|-------|---|----|----|------|-------------|---------------------------------|------------------------|-------|-------|------|-----------------------|-------|
| End of Module Assessment | Subject | Theory (Cognitive) Assessment | | | | | | | | | | | | | | | | | | Practical (Skill & Attitude) Assessment | | | | | | | Grand Total | Total Time of Module Assessment | | | | | | |
| | | MCQs | | | | | EMQs | | | SAQs | | | | SEQs | | | | Marks | Total Marks Theory | Total Time | AV OSPE | | | | | Time | | | AED Reflective Writing | OSVE | | | Total Practical Marks | |
| | | C | HV | S | Total | Marks | C | Total | Marks | C | HV | S | Total | Marks | C | HV | S | | | | Total | Marks | C | HV | S | | | | | Total | Marks | Viva | | Copy |
| First Module | Anatomy | 19 | 4 | 2 | 25 | 25 | 1 | 1 | 5 | 3 | 1 | 1 | 5 | 25 | 3 | 1 | 1 | 5 | 45 | 100 | 2 HRS | 7 | 2 | 1 | 10 | 50 | 50 min | 15 min | 45 | 5 | 50 | 100 | 200 | 6 HRS |
| | Physiology | 19 | 4 | 2 | 25 | 25 | 1 | 1 | 5 | 3 | 1 | 1 | 5 | 25 | 3 | 1 | 1 | 5 | 45 | 100 | 2 HRS | 7 | 2 | 1 | 10 | 50 | 50 min | 15 min | 45 | 5 | 50 | 100 | 200 | 6 HRS |
| | Biochemistry | 19 | 4 | 2 | 25 | 25 | 1 | 1 | 5 | 3 | 1 | 1 | 5 | 25 | 3 | 1 | 1 | 5 | 45 | 100 | 2 HRS | 7 | 2 | 1 | 10 | 50 | 50 min | 15 min | 45 | 5 | 50 | 100 | 200 | 6 HRS |
| Formative- Weekly LMS Based Assessment of 30 MCQs (10 MCQs per Subject) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| End of Module Assessment | Subject | Theory (Cognitive) Assessment | | | | | | | | | | | | | | | | | | Practical (Skill & Attitude) Assessment | | | | | | | Grand Total | Total Time of Module Assessment | | | | | | |
| | | MCQs | | | | | EMQs | | | SAQs | | | | SEQs | | | | Marks | Total Marks Theory | Total Time | AV OSPE | | | | | Time | | | AED Reflective Writing | OSVE | | | Total Practical Marks | |
| | | C | HV | S | Total | Marks | C | Total | Marks | C | HV | S | Total | Marks | C | HV | S | | | | Total | Marks | C | HV | S | | | | | Total | Marks | Viva | | Copy |
| Second Module | Anatomy | 19 | 4 | 2 | 25 | 25 | 1 | 1 | 5 | 3 | 1 | 1 | 5 | 25 | 3 | 1 | 1 | 5 | 45 | 100 | 2 HRS | 7 | 2 | 1 | 10 | 50 | 50 min | 15 min | 45 | 5 | 50 | 100 | 200 | 6 HRS |
| | Physiology | 19 | 4 | 2 | 25 | 25 | 1 | 1 | 5 | 3 | 1 | 1 | 5 | 25 | 3 | 1 | 1 | 5 | 45 | 100 | 2 HRS | 7 | 2 | 1 | 10 | 50 | 50 min | 15 min | 45 | 5 | 50 | 100 | 200 | 6 HRS |
| | Biochemistry | 19 | 4 | 2 | 25 | 25 | 1 | 1 | 5 | 3 | 1 | 1 | 5 | 25 | 3 | 1 | 1 | 5 | 45 | 100 | 2 HRS | 7 | 2 | 1 | 10 | 50 | 50 min | 15 min | 45 | 5 | 50 | 100 | 200 | 6 HRS |
| Formative- Weekly LMS Based Assessment to 30 MCQs (10 MCQs per Subject) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Block | Subjects | LMS Based Assessment | | | | | OSPE | | | | | | Grand Total | Total Block Time | |
|-------|--------------|----------------------|----|---|-------|--------|---------|-------|-------|----|-------|-------|-------------|------------------|------|
| | | MCQs | | | | | LabOSPE | IOSPE | COSPE | | Total | Marks | | | Time |
| | | C | HV | S | Total | Time | C | HV | S | | | | | | |
| BLOCK | Anatomy | 21 | 6 | 3 | 30 | 30 min | 14 | 4 | 2 | 20 | 60 | 6 HRS | 90 | 10 HRS | |
| | Physiology | 21 | 6 | 3 | 30 | 30 min | 14 | 4 | 2 | 20 | 60 | 6 HRS | 90 | 10 HRS | |
| | Biochemistry | 21 | 6 | 3 | 30 | 30 min | 14 | 4 | 2 | 20 | 60 | 6 HRS | 90 | 10 HRS | |

| Weekly LMS Assessment | | | |
|------------------------------|---------|------------|--------------|
| Subjects | Anatomy | Physiology | Biochemistry |
| No of MCQs* | 30 | 30 | 30 |
| Marks/MCQ | 30 | 30 | 30 |
| *MCQ=1 Mark each, 1 min each | | | |

50% Questions/OSPE Stations/Viva Stations will be from Foundation Module and 50% Questions will be from MSK-1 Module

For Each assessment student will have to individually pass Theory and Practical components

Marks per Item

| | | | | | |
|--|--------|--------|--------|-----------|---------|
| MCQ=1 | EMQ= 5 | SAQ= 5 | SEQ= 9 | AVOSPE= 5 | OSPE= 3 |
| OSPE Time=1 Round of 40 Students =80 min | | | | | |
| 3 Round of 40 Students =240 min | | | | | |
| OSVE=Time per student=5mins | | | | | |

Final Annual Assessment (First professional Examinations) 2025(Batch 52)

- Total First Professional Marks: 900
- Continuous Internal Assessment (40%) =360 Marks
- Annual Marks: (60%) =540 Marks

A: First Professional Examination (60%)

| A: First Professional Examination (60%) Total marks = 540 Marks | | |
|---|-------------------------|-------------------------------------|
| Subjects | % Weightage of subjects | Marks distribution as per weightage |
| Anatomy | 35% | 188 Marks |
| Physiology | 31% | 166 Marks |
| Biochemistry | 21% | 114 Marks |
| Integrated Subjects Community Medicine & Public Health/Research Behavioural Sciences Pathology Pharmacology Radiology Family Medicine Surgery Medicine Gynae & Obs Orthopedics Pediatrics Surgery Ophthalmology Otorhinolaryngology | 7 % | 42Marks |
| Early Clinical Exposure ALPHA and General Education Cluster (GEC) | 6 % | 30 Marks |
| Total Marks | | 540 Marks |

B: Block wise Distribution of Marks

| Total Annual Professional Marks (60%) | BLOCK 1 Marks | BLOCK 2 Marks | BLOCK 3 Marks | Total Marks |
|--|----------------------|----------------------|----------------------|--------------------|
| 540Marks | 180 Marks | 180 Marks | 180 Marks | 540 Marks |

C: Subject wise marks breakup in Blocks

| Subjects | Block 1 | Block 2 | Block 3 | Total Marks |
|----------------------------|----------------|----------------|----------------|--------------------|
| Anatomy | 72 Marks | 68 Marks | 48 Marks | 188 Marks (35%) |
| Physiology | 40 Marks | 54 Marks | 72 Marks | 166 Marks (31%) |
| Biochemistry | 42 Marks | 34 Marks | 38 Marks | 114 Marks (21%) |
| Integrated Subjects | 26 Marks | 24 Marks | 22 Marks | 72 Marks (13%) |

D: Subject wise distribution of Marks for First year MBBS (Batch 52)

| Block | Subjects | Theory | Practical | Total marks | Total marks |
|--|------------------------------|---------------|------------------|--------------------|---------------------------------------|
| Block 1 (Core subjects + Integrated Subjects) | Anatomy | 37 marks | 35 marks | 72 marks | (Core subjects + Integrated Subjects) |
| | Physiology | 20 marks | 20 marks | 40 marks | |
| | Biochemistry | 17 marks | 25 marks | 42 marks | |
| | Total | 74 | 80 | 154 marks | |
| | Integrated Subjects | | | 26Marks | 154+26 = 180 marks |
| | Community Medicine /Research | 3Marks | | | |
| | Behavioural Sciences | 2 Marks | | | |

| | | | | | |
|---------------------------------------|------------------------------|--------------------|--------------------|-------------|--|
| 180 Marks | Pathology | 2 Marks | | | |
| | Pharmacology | 3 Marks | | | |
| | Radiology | 1 Mark | | | |
| | Gynae & Obs | 1 Mark | | | |
| | Medicine | 1 Mark | | | |
| | Family Medicine | 1 Mark | | | |
| | Paediatrics | 1 Mark | | | |
| | Surgery | 1 Mark | | | |
| | ECE | | 5 Marks | | |
| | ALPHA and GEC | | 5 Marks | | |
| Total marks | | 154+26 = 180 marks | | | |
| Block | Subjects | Theory | Practical | Total marks | Total marks |
| Block 2 | Anatomy | 33 marks | 35 marks | 68 marks | (Core subjects + Integrated Subjects) 156 +24 = 180 marks |
| | Physiology | 29 marks | 25 marks | 54 marks | |
| | Biochemistry | 14 marks | 20 marks | 34 marks | |
| | Total | 76 | 80 | 156 Marks | |
| (Core subjects + Integrated Subjects) | Integrated Subjects | | | 24 Marks | |
| | Community Medicine /Research | 2 Marks | | | |
| | Family Medicine | 1 Mark | | | |
| | Orthopedics | 2 Marks | | | |
| | Radiology | 2 Marks | | | |
| | Medicine | 2 Marks | | | |
| | Gynae & Obs | 1 Mark | | | |
| | Behavioural Sciences | 2 Marks | | | |
| | Pathology | 2 Marks | | | |
| | ECE | | 5 Marks | | |
| ALPHA and GEC | | 5 Marks | | | |
| 210 Marks | Total marks | | 156+24 = 180 marks | | |
| Block | Subjects | Theory | Practical | Total marks | Total marks |
| Block 3 | Anatomy | 23 marks | 25 marks | 48marks | (Core subjects + Integrated Subjects) |
| | Physiology | 42 marks | 30 marks | 72 marks | |
| | Biochemistry | 13 marks | 25 marks | 38 marks | |
| | Total | 78 | 80 | 158 marks | |
| (Core subjects + | Integrated Subjects | | | 22 Marks | |
| | Community Medicine | 1 Marks | | | |

| | | | | |
|---|----------------------|--------------------|---------|-----------------------|
| Integrated Subjects) 210 Marks | Behavioural Sciences | 1 Marks | | 158+22 = 180 marks |
| | Medicine | 1 Marks | | |
| | Family medicine | 1 Mark | | |
| | Gynae & Obs | 1 Mark | | |
| | Radiology | 1 Mark | | |
| | Pediatrics | 1 Mark | | |
| | Otorhinolaryngology | 1 Mark | | |
| | Ophthalmology | 1 Mark | | |
| | Pathology | 1 Marks | | |
| | Pharmacology | 1 Marks | | |
| | ECE | | 5 Marks | |
| | ALPHA and GEC | | 5 Marks | |
| Total marks | | 158+22 = 180 marks | | |
| GRAND TOTAL MARKS | | 540 Marks | | |

E: Block wise distribution of Marks for First year MBBS (Batch 52)
(Annual Professional Marks + CIA)

| Subject | Theory | | | Practical | | | Total Marks |
|---|--------------------------------------|-------------|-------|--------------------------------------|----------------|-------|-------------|
| | Component | No of Items | Marks | Component | No of Stations | Marks | |
| Block I Total Annual marks=180 | Section I- MCQ | 60x1 | 60 | LabOSPE | 5 X 5 | 25 | 180 |
| | Section II- SEQ | 6x5 | 30 | iOSPE | 3 X 5 | 15 | |
| | Total | | 90 | OSCE | 4 X 5 | 20 | |
| | | | | OSVE | 6 x 5 | 30 | |
| | | | | Total | | 90 | |
| CIA = 120 Marks | Continuous Internal Assessment (40%) | | 60 | Continuous Internal Assessment (40%) | | 60 | 120 |
| Total Annual marks+ CIA =180+120= 300 | Total Marks | | 150 | Total Marks | | 150 | 300 |

| | | | | | | | |
|--|---|------|-----|---|-------|-----|------------|
| Block II Total Annual marks=180 | Section I- MCQ | 60x1 | 60 | LabOSPE | 5 X 5 | 25 | 180 |
| | Section II- SEQ | 6x5 | 30 | iOSPE | 3 X 5 | 15 | |
| | Total | | 90 | OSCE | 4 X 5 | 20 | |
| | | | | OSVE | 6 x 5 | 30 | |
| | | | | Total | | 90 | |
| CIA = 120 Marks | Continuous Internal Assessment (40%) | | 60 | Continuous Internal Assessment (40%) | | 60 | 120 |
| Total Annual marks+ CIA =180+120= 300 | Total Marks | | 150 | Total Marks | | 150 | 300 |
| Block III Total Annual marks=180 | Section I- MCQ | 60x1 | 60 | LabOSPE | 5 X 5 | 25 | 180 |
| | Section II- SEQ | 6x5 | 30 | iOSPE | 3 X 5 | 15 | |
| | Total | | 90 | OSCE | 4 X 5 | 20 | |
| | | | | OSVE | 6 x 5 | 30 | |
| | | | | Total | | 90 | |
| CIA = 120 Marks | Continuous Internal Assessment (40%) | | 60 | Continuous Internal Assessment (40%) | | 60 | 120 |
| Total Annual marks + CIA =180+120= 300 | Total Marks | | 150 | Total Marks | | 150 | 300 |
| Grand Total Marks | | | | | | | 900 |

F: 1st Professional Examination 2025(Batch 52)

Block 1 Assessment Breakup

(Foundation & MSK-1 Module)

| Themes | Discipline | Theory | | | Practical (OSPE) | | | OSVE | Marks | Total Marks per subject | |
|--|---|--------------------------|--------------------------|-----------|---------------------------------------|-------------------------------------|------------------------------------|---|-----------|-------------------------|------------|
| | | No of MCQs (1 mark each) | No of SEQs (5 mark each) | Marks | No of LabOSPE Stations (5 marks each) | No of iOSPE Stations (5 marks each) | No of OSCE Stations (5 marks each) | OSVE (5 Marks each) (1Internal+1External) | | Marks | % |
| Core & Horizontally Integrated Subjects | Anatomy & Applied /Clinical | 22 | 3 | 37 | 3 | 1 | 1 | 2 | 35 | 72 | 40 |
| | Physiology & Applied/Clinical | 10 | 2 | 20 | 1 | 1 | - | 2 | 20 | 40 | 22 |
| | Biochemistry & Applied/clinical | 11 | 1 | 16 | 1 | 1 | 1 | 2 | 25 | 41 | 23 |
| Vertically Integrated Subjects | Community Medicine & Public Health/Research | 4 | - | 4 | - | - | - | - | - | 4 | 15 |
| | Behavioural Sciences | 2 | - | 2 | - | - | - | - | - | 2 | |
| | Pathology | 2 | - | 2 | - | - | - | - | - | 2 | |
| | Radiology | 1 | | 1 | | | | | | 1 | |
| | Gynae & Obs | 1 | | 1 | | | | | | 1 | |
| | Medicine | 1 | | 1 | | | | | | 1 | |
| | Family Medicine | 1 | | 1 | | | | | | 1 | |
| | Paediatrics | 1 | | 1 | | | | | | 1 | |
| | Surgery | 1 | | 1 | | | | | | 1 | |
| Pharmacology | 3 | - | 3 | - | - | | - | - | 3 | | |
| Spirally Integrated Subjects | ECE | - | - | - | - | - | 1 | - | 5 | 5 | |
| | ALPHA and GEC | - | - | - | - | - | 1 | - | 5 | 5 | |
| Total | | 75 | 6x5=30 | 90 | 5x5=25 | 3x5=15 | 4x5=20 | 6 x5=30 | 90 | 180 | 100 |
| Total | | | 90 | | | 90 | | | | 90+90=180 | |

G: 1st Professional Examination 2025 (Batch 52)

Block 2 Assessment

(MSK-2 & Blood/Immunity Module)

| Theme | Subject | Theory | | | Practical | | | OSVE | Marks | Total Marks per subject | |
|--|------------------------------------|--------------------------|--------------------------|-----------|---------------------------------------|-------------------------------------|------------------------------------|---------------------|------------------|-------------------------|------------|
| | | No of MCQs (1 mark each) | No of SEQs (5 mark each) | Marks | No of LabOSPE Stations (5 marks each) | No of iOSPE Stations (5 marks each) | No of OSCE Stations (5 marks each) | OSVE (5 Marks each) | | Total Marks | % |
| Core & Horizontally Integrated Subjects | Anatomy & Applied /Clinical | 18 | 3 | 33 | 3 | 1 | 1 | 2 | 35 | 68 | 37 |
| | Physiology & Applied/Clinical | 19 | 2 | 29 | 1 | 1 | 1 | 2 | 25 | 54 | 30 |
| | Biochemistry & Applied/clinical | 9 | 1 | 14 | 1 | 1 | - | 2 | 20 | 34 | 18 |
| Vertically Integrated Subjects | Community Medicine & Public Health | 2 | - | 2 | - | - | - | - | - | 2 | 13 |
| | Behavioural Sciences | 2 | - | 2 | - | - | - | - | - | 2 | |
| | Pathology | 2 | - | 2 | - | - | - | - | - | 2 | |
| | Family Medicine | 1 | - | 1 | - | - | - | - | - | 1 | |
| | Orthopedics | 2 | - | 2 | - | - | - | - | - | 2 | |
| | Radiology | 2 | - | 2 | - | - | - | - | - | 2 | |
| | Medicine | 2 | - | 2 | - | - | - | - | - | 2 | |
| | Gynae & Obs | 1 | - | 1 | - | - | - | - | - | 1 | |
| Spirally Integrated Subjects | ECE | - | - | - | - | - | 1 | - | 5 | 5 | |
| | ALPHA and GEC | - | - | - | - | - | 1 | - | 5 | 5 | |
| Total | | 60 | 6x5=30 | 90 | 5x5=25 | 3x5=15 | 4x5=20 | 6x5=30 | 90 | 180 | 100 |
| Total | | 90 | | | 90 | | | | 90+90=180 | | |

H: 1st Professional Examination 2025 (Batch 52)

Block 3 Assessment

(CVS & Respiratory Module)

| Themes | Discipline | Theory | | | Practical | | | OSVE | Marks | Total Marks per subject | |
|--|------------------------------------|--------------------------|--------------------------|------------|---------------------------------------|-------------------------------------|------------------------------------|---------------------|-----------|-------------------------|------------|
| | | No of MCQs (1 mark each) | No of SEQs (5 mark each) | Marks | No of LabOSPE Stations (5 marks each) | No of iOSPE Stations (5 marks each) | No of OSCE Stations (5 marks each) | OSVE (5 Marks each) | | Marks | % |
| Core & Horizontally Integrated Subjects | Anatomy & Applied /Clinical | 13 | 2 | 23 | 1 | 1 | 1 | 2 | 25 | 48 | 27 |
| | Physiology & Applied/Clinical | 27 | 3 | 42 | 2 | 1 | 1 | 2 | 30 | 72 | 40 |
| | Biochemistry & Applied/clinical | 8 | 1 | 13 | 1 | 1 | 1 | 2 | 25 | 38 | 21 |
| Vertically Integrated Subjects | Community Medicine & Public Health | 1 | - | 1 | - | - | - | - | - | 1 | 12 |
| | Behavioural Sciences | 1 | - | 1 | - | - | - | - | - | 1 | |
| | Pathology | 1 | - | 1 | - | - | - | - | - | 1 | |
| | Medicine | 1 | | 1 | | | | | | 1 | |
| | Family medicine | 1 | | 1 | | | | | | 1 | |
| | Gynae & Obs | 1 | | 1 | | | | | | 1 | |
| | Radiology | 1 | | 1 | | | | | | 1 | |
| | Pediatrics | 1 | | 1 | | | | | | 1 | |
| | Otorhinolaryngology | 1 | | 1 | | | | | | 1 | |
| | Ophthalmology | 1 | | 1 | | | | | | 1 | |
| | Pathology | 1 | | 1 | | | | | | 1 | |
| Pharmacology | 1 | - | 1 | - | - | - | - | - | 1 | | |
| Spirally Integrated Subjects | ECE | - | - | - | - | - | 1 | - | 5 | 5 | |
| | ALPHA and GEC | - | - | - | - | - | 1 | - | 5 | 5 | |
| Total | | 60 | 6x5=30 | 105 | 4x5=20 | 3x5=15 | 5x5=25 | 3x5=30 | 90 | 180 | 100 |
| Total | | 90 | | | 90 | | | | | 90+90=180 | |



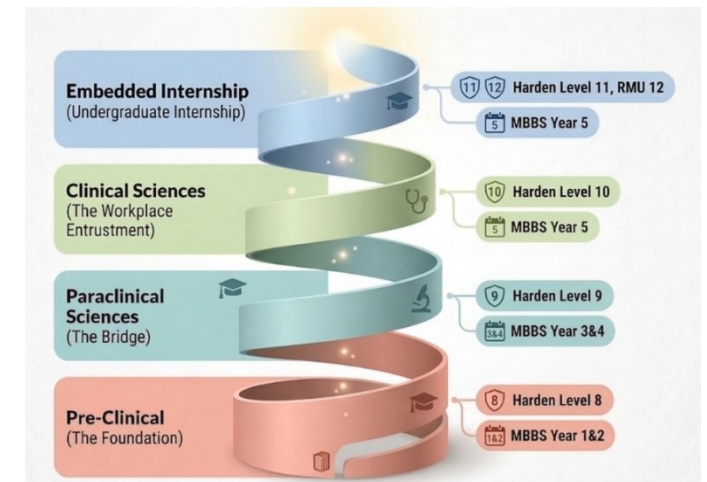
➔ SECTION – XI

RMU 12

Integrated Modular Curriculum 2026

Isolation to **Beyond Boundaries**

Feedback and Evaluation



Feedback and Evaluation

Rawalpindi Medical University is dedicated to advancing equality, diversity, and inclusion across all its activities, processes, and cultural practices, in line with its Public Sector Equality Duties. This commitment encompasses promoting equality and diversity for everyone, regardless of any protected characteristic, working pattern, family circumstance, socio-economic background, political belief, or any other irrelevant distinction. Where pertinent to the policy, decision-making panels will ensure a reasonable gender balance (with at least one man and one woman) and will actively consider the representation of other protected groups.

Principles Feedback from students is essential to inform the development of the University's programmes and to help shape all aspects of their current and future learning and broader experience. The University actively seeks and encourages students to share their views. Our approach aims to create openness, responsiveness and a sense of partnership.

How feedback is received

➤ **Informal Feedback**

Informal feedback is received by day-to-day dialogue between students and staff,

➤ **Formal Feedback**

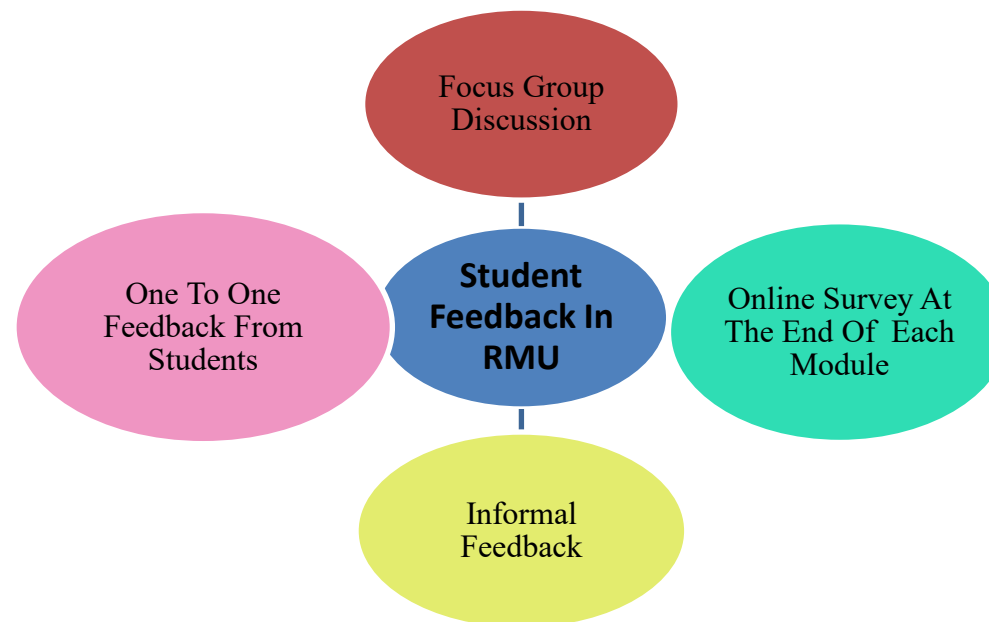
Feedback is received from students in more formal settings. These include:

- **Central survey campaign**

The University regularly invites students to participate in anonymous surveys (Appendix 1).

The central surveys take place after every module, after every Block and at the end of the academic year. This schedule enables the University to work in conjunction with the students and help to improve the teaching, learning and assessment methodologies.

- **Focus Group Discussion**
- **One To One Feedback from Students**



Appendix -I Student Feedback Proforma for 2024

(to be conducted after every module completion)

Module Content & Organization

| Questionnaire | Strongly Agree | Agree | Uncertain | Disagree | Strongly Disagree |
|---|----------------|-------|-----------|----------|-------------------|
| The module objectives were informed. | | | | | |
| At the beginning of module study guide was available. | | | | | |
| The module workload was manageable. | | | | | |
| The pace of the module was manageable. | | | | | |
| The module was well organized. | | | | | |
| Module started and ended on time. | | | | | |
| End of block feedback was taken | | | | | |

Learning Environment and Teaching Methods

| Questionnaire | Strongly Agree | Agree | Uncertain | Disagree | Strongly Disagree |
|--|----------------|-------|-----------|----------|-------------------|
| Lectures were delivered appropriately. | | | | | |
| Labs were conducted appropriately. | | | | | |
| Small group discussions were conducted appropriately | | | | | |
| Teaching sessions were as per schedule. | | | | | |
| CBLs were conducted appropriately | | | | | |
| Faculty was cooperative. | | | | | |
| Learning resources were communicated clearly | | | | | |
| SGDs were standardized between different batches | | | | | |

Quality of Delivery

| Questionnaire | Strongly Agree | Agree | Uncertain | Disagree | Strongly Disagree |
|------------------------------------|----------------|-------|-----------|----------|-------------------|
| The module stimulated my interest. | | | | | |
| Ideas were presented clearly. | | | | | |

Learning Resources

| Questionnaire | Strongly Agree | Agree | Uncertain | Disagree | Strongly Disagree |
|---|----------------|-------|-----------|----------|-------------------|
| Learning Material was provided / recommended. | | | | | |
| Learning Resources were available in the library. | | | | | |
| Digital / Web Based resources were available. | | | | | |
| Power points of lectures were available | | | | | |

Student Contribution

| Questionnaire | Strongly Agree | Agree | Uncertain | Disagree | Strongly Disagree |
|--|----------------|-------|-----------|----------|-------------------|
| I participated actively in the module. | | | | | |
| I believe I have made progress in this module. | | | | | |

Assessments

| Questionnaire | Strongly Agree | Agree | Uncertain | Disagree | Strongly Disagree |
|--|----------------|-------|-----------|----------|-------------------|
| Class tests were conducted regularly. | | | | | |
| Class tests were helpful | | | | | |
| Test difficulty was appropriate. | | | | | |
| Written Assessment was as per Table of Specifications. | | | | | |
| OSPE Exam was as per Table of Specification | | | | | |
| Table of Specification was shared | | | | | |

LMS and its working

| Questionnaire | Strongly Agree | Agree | Uncertain | Disagree | Strongly Disagree |
|------------------------------|----------------|-------|-----------|----------|-------------------|
| Easy Access to LMS | | | | | |
| Module Content was Available | | | | | |