



LIAQUAT NATIONAL HOSPITAL AND MEDICAL COLLEGE
Institute for Postgraduate Medical Studies & Health Science



LOCOMOTOR-II MODULE

31th August 2026 TO 19th September 2026



STUDY GUIDE FOR LOCOMOTOR-2 MODULE

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Module name: *Locomotor - II*Year: *Three*Duration: *3 weeks (Aug- Sep 2026)*

Timetable hours: Lectures, Case-Based Learning (CBL), Clinical Rotations, Field visit, learning experience in LNH outreach centers, Practical, Demonstrations and Self-Study

MODULE INTEGRATED COMMITTEE

MODULE COORDINATOR:	Prof. Saima Zainab (Community Medicine)
MODULE CO-COORDINATOR:	Dr. Yusra Nasir (DHPE)

DEPARTMENTS & RESOURCE PERSONS FACILITATING LEARNING

BASIC HEALTH SCIENCES	CLINICAL AND ANCILLARY DEPARTMENTS
ANATOMY Prof. Zia-ul-Islam	ORTHOPAEDICS Dr. Muhammad Kazim Rahim
COMMUNITY MEDICINE Prof. Saima Zainab	RADIOLOGY Dr. Muhammad Misbah Tahir
FORENSIC MEDICINE Prof. Syed Mukkaram Ali	RHEUMATOLOGY Dr. Tahira Perveen
PATHOLOGY Prof. Naveen Faridi	INTERNAL MEDICINE Prof. Kaleem Ullah Makki
PHARMACOLOGY Prof. Tabassum Zehra	
LONGITUDINAL CURRICULUM: <i>Leadership & Bioethics (Prof. Sobia Ali)</i> <i>Patient Safety (Prof. Sana Anwar)</i>	
<i>Research (Prof. Saima Zainab)</i> <i>Communication (Dr. Afifa Tabbasum)</i>	
DEPARTMENT OF HEALTH PROFESSIONS EDUCATION - Prof. Nighat Huda - Prof. Sobia Ali - Dr. Afifa Tabassum - Dr. Yusra Nasir - Dr. Asra Zia - Dr. Maryam Fatima	
STUDY GUIDE COMPILED BY: Department of Health Professions Education	

INTRODUCTION

WHAT IS A STUDY GUIDE?

It is an aid to:

- Inform students how the student learning program of the module has been organized
- Help students organize and manage their studies throughout the module
- Guide students on assessment methods, rules, and regulations

THE STUDY GUIDE:

- Communicates information on the organization and management of the module. This will help the student to contact the right person in case of any difficulty.
- Defines the objectives which are expected to be achieved at the end of the module.
- Identifies the learning strategies such as Interactive Lectures, small group teachings, clinical skills, demonstrations, tutorials, and case-based learning that will be implemented to achieve the module objectives.
- Provides a list of learning resources such as books, computer-assisted learning programs, web-links, and journals, for students to consult to maximize their learning.
- Highlights information on the contribution of continuous and module examinations on the student's overall performance.
- Includes information on the assessment methods that will be held to determine every student's achievement of objectives.
- Focuses on information about examination policy, rules, and regulations.

CURRICULUM FRAMEWORK

Students will experience an integrated curriculum similar to previous modules.

INTEGRATED CURRICULUM comprises system-based modules such as Foundation II, Blood II, Locomotor II, Respiratory system-II, CVS-II, and GIT Liver II which links basic science knowledge to clinical problems. Integrated teaching means that subjects are presented as a meaningful whole. Students will be able to have a better understanding of basic sciences when they repeatedly learn about clinical examples.

LEARNING EXPERIENCES: Case-based integrated discussions, and skills acquisition in the skills lab. Computer-based assignments, learning experiences in clinics, wards, and outreach centers

INTEGRATING DISCIPLINES OF LOCOMOTOR MODULE-II

LEARNING METHODOLOGIES

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

- Interactive Lectures
- Tutorial
- Case- Based Learning (CBL)
- Clinical Experiences
 - Clinical Rotations
- Skills session
- Self-Directed Learning

INTERACTIVE LECTURES: In a large group, the Interactive Lectures introduce a topic or common clinical conditions and explains the underlying phenomena through questions, pictures, videos of patients' interviews, exercises, etc. Students are actively involved in the learning process.

TUTORIAL: This format helps students to clarify concepts, and acquire skills or desired attitudes. Sessions are structured with the help of specific exercises such as patient cases, interviews, or discussion topics. Students exchange opinions and apply knowledge gained from Interactive Lectures, tutorials, and self-study. The facilitator's role is to ask probing questions, summarize, or rephrase to help clarify concepts.

CASE-BASED LEARNING (CBL): A small group discussion format where learning is focused on a series of questions based on a clinical scenario. Students discuss and answer the questions by applying relevant knowledge gained previously in clinical and basic health sciences during the module and constructing new knowledge. The CBL will be provided by the concerned department.

CLINICAL LEARNING EXPERIENCES: In small groups, students observe patients with signs and symptoms in hospital wards, clinics, and outreach centers. This helps students relate knowledge of the module's basic and clinical sciences and prepare for future practice.

- **CLINICAL ROTATIONS:** In small groups, students rotate in different wards like Medicine, Pediatrics, Surgery, Obs & Gyne, ENT, Eye, Family Medicine clinics, outreach centers & Community Medicine experiences. Here students observe patients, take histories and perform supervised clinical examinations in outpatient and inpatient settings. They also get an opportunity to observe medical personnel working as a team. These rotations help students relate basic medical and clinical knowledge in diverse clinical areas.

SKILLS SESSION: Skills relevant to the respective module are observed and practiced where applicable in the skills laboratory.

SELF-DIRECTED LEARNING Students assume responsibilities for their learning through individual study, sharing and discussing with peers, and seeking information from Learning Resource Center, teachers, and resource persons within and outside the college. Students can utilize the time within the college's scheduled hours of self-study.

LOCOMOTOR -2 MODULE

INTRODUCTION

For MBBS third-year students, the locomotor-2 module concentrates on knowledge and skills required for diagnosis, treatment, and prevention of conditions affecting the musculoskeletal system, ranging from common disorders of bone and cartilage to severely disabling limb trauma, accidents, and disasters. The Locomotor-2 module learning objectives take into consideration previously acquired pertinent knowledge in the Locomotor module of MBBS the first year. The module integrates with related disciplines such as Community Medicine, Forensic Medicine, Microbiology, Pathology and Pharmacology. It is expected that different learning experiences would help students build new knowledge, and enhance students' understanding and motivation to seek further knowledge.

COURSE TOPICS, OBJECTIVES, AND TEACHING STRATEGIES

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

ANATOMY

TOPICS & OBJECTIVES	LEARNING STRATEGIES
Gross & histological features of bones	Interactive Lecture
• Describe the processes of bone remodeling and bone growth	
• Name the different histological regions of bone	
• Explain the process of bone turnover	
• Describe the calcification processes of cartilage and bone	

COMMUNITY MEDICINE

TOPICS & OBJECTIVES	LEARNING STRATEGIES
1. Accidents, Injury, and its Prevention	Interactive Lecture
• Describe accidents	
• Describe the epidemiology of accidents and injury	
• Explain the risk factors for different types of injuries	
• Discuss measures for the prevention and control of accidents and injury	
2. Disaster management	Interactive Lecture
• Describe disaster	
• Enumerate the steps in planning a disaster management	
• Describe the steps of the surveillance cycle	
3. Sports medicine	Interactive Lecture/ Tutorial
• Describe sport medicine	
• Explain the role of sports physician in the practice of sports medicine	
• Discuss the female triad	
• Describe the pharmacological & legal aspects of Ergogenic aids in athletes	
4. Travel Medicine	
• Describe travel medicine	
• Describe epidemiology in travel medicine	
• Explain the risk for travelers	
• List the pathogens causing common traveler's diseases	
• Discuss the control measures for disease prevention among travelers	
• Discuss the role of international health regulation for travelers	
5. Ergonomics	Interactive Lecture
• Describe the concept of Ergonomics in Occupational Health	
• Describe the role of ergonomics science in the workplace	

FORENSIC MEDICINE

TOPICS & OBJECTIVES	LEARNING STRATEGIES
1. Personal identity-I (Forensic odontology)	Interactive Lecture/Tutorial
• Define complete and partial identification	
• Describe the different methods of identification via Third party, Subjective, and Objective	
• Discuss the role of identification in living and dead bodies with examples	
• Describe the parameters of identification	
• Mention the criteria for the determination of race	
• Determine age from Odontological data and X-rays	
2. Personal identity II (Age estimation by Radiology)	Interactive Lecture/Tutorial
• Discuss sex determination and intersex states	
• Highlight the role of dactylography in the identification	
• Describe the medico-legal importance of age	
• Explain the medicolegal importance of general examination and ossification data in age determination	
• Determine age in at least 3 x-rays of long bones	Interactive Lecture/Tutorial
3. Personal identity- III (Sex determination from bones)	
• Describe the molecular basis of DNA	
• Explain the DNA Typing techniques (RFLP, PCR, STR, MT DNA, Y Chromosome Analysis)	
• Discuss the methods of collection and uses of DNA evidence	
• Justify the use of DNA in forensic sciences	
• Discuss the features of male vs female skeleton	
• Determine sex from the following bones:	
i. Skull	
ii. Mandible	
iii. Thorax	
iv. Pelvis	
• Describe the determination of sex in intersex states	Interactive Lecture
4. Personal identity-IV (Osteometric indices)	
• Explain the identification of dead and decomposed bodies	
• Discuss the medico-legal importance of scars, acquired and congenital deformities, tattoo marks, and hair in the identification	Interactive Lecture
• Describe the role of Osteometric indices of bones in the determination of age, sex, and race	
5. Mass disasters	Interactive Lecture
• Define Mass disasters according to World Health Organization	

• Describe Triage and its types i.e. Simple, advanced, and Reverse	
• Explain the methods of identification of decomposed bodies, mutilated & burnt bodies, skeletal & fragmentary remains	
• Describe Super-imposition photography	
6. Firearm Injuries lecture –I	Interactive Lecture
• Describe basic terms related to ballistics & its types, types of cartridges/projectiles, and parts of a firearm weapon	
• List the types of gunpowder	
• Explain the mechanism of fire in firearm weapons	Interactive Lecture
7. Firearm injuries lecture – II	
• Describe characteristic features of the wound of entry and exit of firearms	
• Estimate distance of fire	
• List the features of fabricated firearm injuries	
• Explain the postmortem findings in cases of firearm injuries	

ORTHOPAEDICS

TOPICS & OBJECTIVES	LEARNING STRATEGIES
1. Types of Fractures	Interactive Lecture
• Classify different types of fractures	
• Discuss the general principles of management of the fracture	
• Describe the specific types of fractures (hip, Colles', and pelvic fractures)	
• Describe the therapeutic measures for different fractures, the principles of fracture treatment in children and common complications of fractures	
• Discuss the principles of fracture fixation	
2. Presenting problems and investigations of Musculoskeletal diseases	
• Describe the presenting problems and investigations of Musculoskeletal diseases	

PATHOLOGY

TOPICS & OBJECTIVES	LEARNING STRATEGIES
1. Overview of bone disease	Interactive Lecture
• Discuss briefly the matrix and cell components (osteoblast, osteoclast. Osteocytes) of bone	
• Summarize development, homeostasis, and remodeling of bone.	
2. Developmental Disorders of Bone and Cartilage	Interactive Lecture/ Tutorial
• Discuss	
i. Defect in nuclear proteins & transcription factors (Brachydactyly, Cleidocranial dysplasia)	
ii. Defects in hormones & signal transducing Proteins (Achondroplasia)	

iii. Defects in extracellular structural proteins (Osteogenesis Imperfecta), diseases associated with mutations of Types II, IX, X, and XI collagen)	
iv. Defect in metabolic pathways (Osteopetrosis).	
3. Acquired disorders of bone & cartilage I	
• Define osteopenia & osteoporosis	
• Categorize generalized osteoporosis	
• Discuss the pathophysiology of postmenopausal & senile osteoporosis	
• Describe the clinical & morphological features of osteoporosis	
• Define Paget disease (otitis deformans)	
• List the three phases of Paget disease	
• Discuss the pathogenesis of Paget disease	
• Describe the clinical & morphological features of Paget disease	
4. Acquired disorders of bone & cartilage II	
• Define rickets & osteomalacia.	
• Discuss the morphology & clinical features of rickets & osteomalacia.	
• Discuss the role of parathyroid hormone in calcium homeostasis.	
• Describe the morphological features of hyperparathyroidism.	
• Define renal osteodystrophy.	
• Discuss the pathogenesis of renal dystrophy	
5. Fractures & osteonecrosis	
• Define fractures	
• List the types of fractures	
• Describe the mechanism of bone repair after fractures	
• Define osteonecrosis	
• List the conditions that cause osteonecrosis	
• Discuss the morphology & clinical course of osteonecrosis	
6. Osteomyelitis	
• Define osteomyelitis	
• List the organisms causing osteomyelitis with various predisposing factors.	
• Discuss the route & causes of pyogenic osteomyelitis.	
• Describe the morphological & clinical features of pyogenic osteomyelitis.	
• Discuss briefly mycobacterial osteomyelitis & skeletal syphilis	
7. Bone Tumors and Tumor-Like Lesions I	
• Discuss briefly Osteoid Osteoma and Osteoblastoma	
• Describe the pathogenesis, morphology, and clinical course of Osteosarcoma, Osteochondroma, Chondromas, and Chondrosarcoma	
8. Bone Tumors and Tumor-Like Lesions II	
• Describe the pathogenesis, morphology, and clinical course of Ewing Sarcoma, Giant Cell Tumor, and Aneurysmal Bone Cyst.	
• Discuss Fibrous Cortical Defect, Non-Ossifying Fibroma, Fibrous Dysplasia, and Metastatic Tumors.	
9. Degenerative joint disease (osteoarthritis)	
• Define osteoarthritis	
• Describe the pathogenesis of osteoarthritis	
• Discuss morphological & clinical features of osteoarthritis	

Interactive
Lecture

Interactive
Lecture

Interactive
Lecture

Interactive
Lecture/
Tutorial

Interactive

10. Autoimmune joint disease (Rheumatoid arthritis)	Lecture Case-Based Learning
• Define rheumatoid arthritis (RA)	
• Describe the pathogenesis & morphological features of RA	
• Discuss clinical & specific laboratory diagnostic features of RA	
• Discuss treatment & complications of RA	Interactive Lecture
11. Types of arthritis	
• Describe the pathophysiology of arthritis based on their types	Case-Based Learning
12. Crystal-induced arthritis (Gout & pseudo gout) Joint tumors & tumor-like conditions	
• Classify gout.	
• Describe the pathogenesis, morphology & clinical features of gout & pseudo-gout	
• Discuss briefly ganglion & synovial cyst	Tutorial
• Discuss pathogenesis, morphology & clinical features of tenosynovial giant cell tumor	
13. Synovial fluid analysis in arthritis	Interactive Lecture
• Correlate synovial fluid analysis with their representative disease	
14. Cartilage tumors	Interactive Lecture
• Describe osteochondroma, chondroma, and osteosarcoma	

PHARMACOLOGY

TOPICS & OBJECTIVES	LEARNING STRATEGIES
1. Pharmacology of Eicosanoids	Small Group Discussion
• Classify eicosanoids	
• Discuss the synthesis, receptor mechanisms, and organ system effects of eicosanoids	Interactive Lecture/ SDL
2. Pain Management/ Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)-1	
• Discuss the rationale of pain management	
• Classify NSAIDs	Interactive Lecture/ SDL
• Describe their basic and clinical pharmacology	
3. Pain Management-II (Opioid Analgesics)	
• Discuss the role of opioids in the management of moderate to severe pain	Interactive Lecture/ SDL
• Classify narcotic analgesics	
• Describe the basic and clinical pharmacology of narcotic analgesics	
4. Anti-Rheumatic Agents-I & II	Interactive Lecture/SDL
• Classify the drugs used in the treatment of rheumatoid arthritis and osteoarthritis	
• Discuss their basic and clinical pharmacology	
5. Drug Used in Osteoporosis and Osteomalacia	Interactive Lecture/SDL
• Describe the rationale for the management of osteoporosis & osteomalacia	
• Classify the drugs used in the treatment of osteoporosis and osteomalacia	
• Discuss their basic and clinical pharmacology	Interactive Lecture
6. Drugs Used in Gout	
• Describe the Importance of management of gout	
• Describe the drugs used in the treatment of gout	Interactive Lecture
• Discuss their mode of action, pharmacokinetics, and adverse effects	
7. Pain Management	

• Discuss the basic and clinical pharmacology of NSAIDs, opioids, and others used in pain management.	Tutorial
Case-Based	Case-Based Learning/ Tutorial
• Classify the drugs used in the management of rheumatoid arthritis and osteoarthritis.	
• Discuss the basic and clinical pharmacology of drugs used in rheumatoid arthritis and osteoarthritis.	

RADIOLOGY

TOPICS & OBJECTIVES	LEARNING STRATEGIES
1. Imaging of musculo-skeletal system	Interactive Lecture
• Explain the role of radiologic imaging in musculo-skeletal system diseases	
• Describe the principles of MRI, isotope bone scans and CT scans	

RHEUMATOLOGY

TOPICS & OBJECTIVES	LEARNING STRATEGIES
1. Osteoarthritis	Interactive Lecture
• Describe the clinical features, differential diagnoses and investigations for Osteoarthritis	
• Discuss the outline of management plan for the condition	
2. Osteoporosis, Rickets and Osteomalacia	
• Describe the etiology, clinical features, differential diagnoses and investigations for each of the conditions	
• Discuss the outline of management plan for the conditions	
3. Musculoskeletal diseases (Inflammatory Arthritis)	
• Describe the clinical features, laboratory tests, and imaging of the following musculoskeletal diseases:	
i. Rheumatoid Arthritis	
ii. Seronegative Spondylo-arthropathies	

LONGITUDINAL CURRICULUM

TOPICS & OBJECTIVES	LEARNING STRATEGIES
1. Research	Lecture/ Tutorial
• Non-Parametric tests D	
• Developing tables & writing results	
• Chi square test/Non-Parametric tests on SPSS	Lecture
2. Patient Safety	
• Body fluid exposure and waste management	Small groups Discussion
3. Leadership	
• Leader vs Manager I-Lead	
4. Bioethics	Small groups
• Ethical use of Artificial Intelligence (Recorded on LMS)	
5. Communication skills	
• Writing communication-patient notes (SOAP notes)	

Apart from attending daily scheduled sessions, students too should engage in self-study to ensure that all the objectives are covered



SUBJECT	RESOURCES
ANATOMY	<u>TEXTBOOKS</u> 1. K.L. Moore, Clinically Oriented Anatomy
COMMUNITY MEDICINE	<u>TEXTBOOKS</u> 1. Preventive and Social Medicine by K Park 2. Community Medicine by M Illyas 3. Basic <i>Statistics</i> for the Health Sciences by Jan W Kuzma
FORENSIC MEDICINE	<u>TEXTBOOKS</u> 1. Nasib R. Awan. Principles and practice of Forensic Medicine 1st ed. 2002. 2. Parikh, C.K. Parikh's Textbook of Medical Jurisprudence, Forensic Medicine and Toxicology. 7th ed.2005. <u>REFERENCE BOOKS</u> 3. Knight B. Simpson's Forensic Medicine. 11th ed.1993. 4. Knight and Pekka. Principles of forensic medicine. 3rd ed. 2004 5. Krishan VIJ. Textbook of forensic medicine and toxicology (principles and practice). 4th ed. 2007 6. Dikshit P.C. Textbook of forensic medicine and Toxicology. 1st ed. 2010 7. Polson. Polson's Essential of Forensic Medicine. 4th edition. 2010. 8. Rao. Atlas of Forensic Medicine (latest edition). 9. Rao. Practical Forensic Medicine 3rd ed, 2007. 10. Knight: Jimpson's Forensic Medicine 10th 1991, 11th ed. 1993 11. Taylor's Principles and Practice of Medical Jurisprudence. 15th ed. 1999 <u>CDs:</u> 1. Lectures on Forensic Medicine. 2. Atlas of Forensic Medicine. <u>WEBSITES:</u> www.forensicmedicine.co.uk
PATHOLOGY	<u>TEXTBOOKS</u> 1. Robbins & Cotran, Pathologic Basis of Disease, 9th edition. 2. Rapid Review Pathology, 4th edition by Edward F. Goljan MD <u>WEBSITES:</u> 1. http://www.hematology.org/Educators/High-School.aspx#a2 2. http://imagebank.hematology.org/
PHARMACOLOGY	A. <u>TEXTBOOKS</u> 1. Lippincott Illustrated Pharmacology 2. Basic and Clinical Pharmacology by Katzung

ASSESSMENT METHODS:

- MCQs (Multiple Choice Questions)
- **Objective Structured Practical/Clinical Examination (OSPE or OSCE)**
- MCQs and unobserved OSPE will be conducted on the LNH&MC Moodle platform
- Observed OSPE will constitute multiple examiner-based stations

Internal Evaluation

- Students will be assessed comprehensively through multiple methods.
- 20% marks of internal evaluation will be added to JSMU final exam. That 20% includes mid-module & end of module examinations, mid-term & pre-professional examinations.

Formative Assessment

Individual departments may hold quizzes or short answer questions to help students assess their learning. The marks obtained are not included in the internal evaluation

For JSMU Examination Policy, please consult the JSMU website!

More than 75% attendance is needed to sit for the internal and final examinations



LNH&MC EXAMINATION RULES & REGULATIONS

- Students must report to the examination hall/venue, 30 minutes before the exam.
- The exam will begin sharply at the given time.
- No student will be allowed to enter the examination hall after 15 minutes of the scheduled examination time.
- Students must sit according to their roll numbers mentioned on the seats.
- Cell phones are strictly not allowed in the examination hall.
- If any student is found with a cell phone in any mode (silent, switched off, or on) he/she will not be allowed to continue their exam.
- No students will be allowed to sit in exams without University Admit Card, LNMC College ID Card, and Lab Coat.
- Students must bring the following stationary items for the exam: Pen, Pencil, Eraser, and Sharpener.
- Indiscipline in the exam hall/venue is not acceptable. Students must not possess any written material or communicate with their fellow students.

EXAM SCHEDULE:

WEEK	3 RD YEAR	DATE
WEEKS 3	LOCOMOTOR - II	31 th Aug 2026
		19 th Sep 2026
Upcoming modules • Respiratory Module II • GIT Liver Module II		

