
**CURRICULUM/STATUTES & REGULATIONS
FOR
4 YEARS DEGREE PROGRAMME
IN
INTERNAL MEDICINE
(MD Internal Medicine)**



**UNIVERSITY OF HEALTH SCIENCES,
LAHORE**

1. Nomenclature Of The Proposed Course

The name of degree programme shall be MD Internal Medicine. This name is well recognized and established for the last many decades worldwide.

2. Course Title:

MD Internal Medicine

3. Training Centers

Departments of Internal Medicine (accredited by UHS) in affiliated institutes of University of Health Sciences Lahore.

4. Duration of Course

The duration of MD Internal Medicine course shall be four (4) years (first year in Part I and next three years in Part II) with structured training in a recognized department under the guidance of an approved supervisor.

The course is structured in two parts:

Part I is structured for the 1st calendar years. The candidate shall undertake training in Basic Medical Sciences, Behavioural Sciences, Biostatistics & Research Methodology. At the end of first year the examination shall be held in Basic Medical Sciences. The clinical training in fundamental concepts of Internal Medicine shall start from the 1st day of enrollment.

Part II is structured for 2nd, 3rd and 4th calendar years although the clinical training shall be started from 1st year. It has two components:

1. Clinical training in Internal Medicine
2. Research and thesis writing

The candidate shall undergo clinical training to achieve educational objectives of MD Internal Medicine (knowledge & skills) along with rotations in relevant fields. Research component and thesis writing shall be completed over the four years duration of the course. Candidate will spend total time equivalent to one calendar year for research during the training. Research

can be done as one block in 4th year of training or it can be done in the form of regular periodic rotations over four years as long as total research time is equivalent to one calendar year

5. Admission Criteria

For admission in MD Internal Medicine course, the candidate shall be required to have:

- MBBS degree
- Completed one year House Job
- One year experience in Internal Medicine/Allied Medical discipline in the given order of preference
- Registration with PMDC
- Passed Entry Test conducted by the University & aptitude interview by the Institute concerned
- Having up to the mark credentials as per UHS rules (no. of attempts in each professional, any gold medals or distinctions, relevant work experience, Rural/ Army services, research experience in a recognized institution, any research article published in a National or International Journal) may also be considered on case to case basis.

6. Registration and Enrollment

- Total number of students enrolled for the course must not exceed 2 per supervisor/year.
- The maximum number of trainees that can be attached with a supervisor at a given point of time (inclusive of trainees in all years/phases of MD training), must not exceed 6.
- Beds to trainee ratio at the approved teaching site shall be at least 5 beds per trainee.
- The University will approve supervisors for MD courses.
- Candidates selected for the courses after their enrollment at the relevant institutions shall be registered with UHS as per prescribed Registration Regulations.

7. Accreditation Related Issues of the Institution

A. Faculty

Properly qualified teaching staff in accordance with the requirements of Pakistan Medical and Dental Council (PMDC)

B. Adequate Space

Including class-rooms (with audiovisual aids), demonstration rooms, computer lab and clinical pathology lab etc.

C. Library

Departmental library should have latest editions of recommended books, reference books and latest journals (National and International).

- Accreditation of Internal Medicine training program can be suspended on temporary or permanent basis by the University, if the program does not comply with requirements for residents training as laid out in this curriculum.
- Program should be presented to the University along with a plan for implementation of curriculum for training of residents
 - Programs should have documentation of residents training activities and evaluation on monthly basis
- To ensure a uniform and standardized quality of training and availability of the training facilities, the University reserves the right to make surprise visits of the training program for monitoring purposes and may take appropriate action if deemed necessary.

AIMS AND OBJECTIVES OF THE COURSE

AIM

The aim of four years MD programme in Internal Medicine is to train residents to acquire the competency of a specialist in the field of Internal Medicine so that they can become good teachers, researchers and clinicians in their specialty after completion of their training.

GENERAL OBJECTIVES

MD Internal Medicine training should enable a resident in:

1. **History and Physical Examination** – The effective acquisition of a medical history and the performance of a comprehensive physical examination in patients with acute and chronic internal medicine diseases necessitating hospital admission.
2. **Case Presentations** - Students are expected to effectively record an initial history and physical examination and follow-up notes as well as deliver comprehensive oral presentations to their team members based on these written documents.
3. **Test Interpretation** – Basic understanding of routine laboratory and ancillary tests including complete blood count, chemistry panels, ECG, chest x-rays, pulmonary function tests, and body fluid cell counts. In addition, students will properly understand the necessity of incorporating sensitivity, specificity, pre-test probability and Bayes laws/theorem in the ordering of individual tests in the context of evaluating patients' signs and symptoms.
4. **Diagnostic Decision Making** – The formulation of a differential diagnosis with up-to-date scientific evidence and clinical judgment using history and physical examination data and the development of a prioritized problem list to select tests and make effective therapeutic decisions.
5. **Therapeutic Decision Making** – This objective includes assessing the risks, benefits, and costs of varying, effective treatment options; involving the patient in decision-making via open discussion; selecting

drugs from within classes; and the design of basic treatment programs and using critical pathways when appropriate.

6. **Core Internal Medicine Concepts** – The development of a basic understanding of core Internal Medicine concepts.

7. **Communication and Relationships with Patients and Colleagues**

The establishment of rapport with patients by identifying important psychosocial issues and providing patient-centered care through specific medical treatment as well as education. In addition, the development of effective communication skills demonstrating respect, compassion and integrity in working relationships with fellow students, house staff, faculty, nurses, and ancillary personnel. In each of these components, sensitivity to racial and cultural diversity should be demonstrated.

8. **Bioethics of Patient Care** – The development of a functional understanding of informed consent, advanced directives, and the physician-patient relationship.

9. **Self-directed Learning** – The identification of key information resources and the utilization of the medical literature to expand one's knowledge base and to search for answers to medical problems. They will keep abreast of the current literature and be able to integrate it to clinical practice.

10. **Preventive Medicine** – The promotion of health via adult immunizations, periodic health screening, and risk factor assessment and modification.

11. **Research and Scientific Knowledge** - Practice evidence-based learning with reference to research and scientific knowledge pertaining to their discipline through comprehensive training in Research Methodology.

SPECIFIC LEARNING OUTCOMES

Following competencies will be expected from a resident completing MD Internal Medicine training;

Inpatient Services: All residents will have rotations in intensive care, coronary care, emergency medicine, general medical wards, general medicine, ambulatory experiences etc. The required knowledge and skills pertaining to the ambulatory based training in following areas shall be demonstrated;

1. **Cardiology**
2. **Pulmonary Medicine**
3. **Endocrinology**
4. **Rheumatology**
5. **Gastroenterology & Hepatology**
6. **Nephrology**
7. **Haematological Disorders**
8. **Psychiatry**
9. **Inpatient Oncology & Palliative Care Services**
10. **Neurology**
11. **Dermatology**
12. **Critical Care Medicine**
13. **Geriatric Medicine**
14. **Reproductive Health**
15. **Evidence-based Medicine and Clinical Epidemiology**
16. **Health Screening and Prevention**
17. **Infectious Diseases**

Procedural Skills:

Residents must be able to perform competently all medical and invasive procedures essential for the practice of general internal medicine. This includes technical proficiency in taking informed consent, performing by using appropriate indications, contraindications, interpretations of findings and evaluating the results and handling the complications of the related procedures mentioned in the syllabus.

Additional Procedural Skills: Residents should be instructed in additional procedural skills that will be determined by the training environment, residents' practice expectations, the availability of skilled teaching faculty, and privilege delineation.

Interpretative skills: Residents should be able to interpret basic as well as advanced laboratory data as related to the disorder/disease.

Electives: In addition, the resident will elect rotations in a variety of electives including nutrition, nuclear medicine or any of the medicine subspecialty consultative services or clinics. They may choose electives from each medicine subspecialty and from offerings of other departments. Residents may also select electives at other institutions if the parent department does not offer the experiences they want.

Research :

All residents in the categorical program are required to complete an academic outcomes-based research project during their training. This project can consist of original bench top laboratory research, clinical research or a combination of both. The research work shall be compiled in the form of a thesis which is to be submitted for evaluation by each resident before end of the training. The designated Faculty will organize and mentor the residents through the process, as well as journal clubs to teach critical appraisal of the literature.

Outpatient Experiences:

Residents should demonstrate expertise in diagnosis and management of patients in acute care clinics and longitudinal clinic and gain experience in Dermatology, Geriatrics, Clinical immunology and allergy, Endocrinology, Gastroenterology, Hematology-Oncology, Neurology, Nephrology, Pulmonology, Rheumatology etc.

Interdisciplinary Medicine:

Adolescent Medicine, Dermatology, Emergency Medicine, General Surgery, Gynecology, Neurology, Occupational Medicine, Ophthalmology, Orthopedics and Sports Medicine, Otolaryngology, Physical Medicine and Rehabilitation, Urology.

Community Practice: Residents experience the practice of medicine in a non-academic, non-teaching hospital setting. The rotation may be used to try out a practice that the resident later joins, to learn the needs of referring physicians or to decide on a future career path.

Curriculum/Statutes & Regulations-MD Internal Medicine
REGULATIONS

1. Scheme of the Course

A summary of four years course in MD Internal Medicine is presented as under:

Course Structure	Components	Examination
Part I	<p style="text-align: center;">Basic Medical Sciences</p> <p>Anatomy, Physiology, Biochemistry, Pathology, Pharmacology, Behavioural Sciences and Biostatistics & Research Methodology.</p>	<p>Part-I examination at the end of 1st year of MD Internal Medicine programme</p> <ul style="list-style-type: none"> • Written: Paper I: MCQs Paper II: SEQs
Part II	<p style="text-align: center;"><u>Clinical component of Part II</u></p> <ul style="list-style-type: none"> • Professional Education in Internal Medicine: Training in Internal Medicine with compulsory/ optional rotations in Allied Medical Disciplines, starting from the first day of enrollment <p style="text-align: center;"><u>Research component of Part II</u></p> <ul style="list-style-type: none"> • Research and Thesis Writing: Research work / Thesis writing project must be completed and thesis be submitted before the end of training. 	<p>Part-II examination at the end of 4th year of MD Internal Medicine programme</p> <ul style="list-style-type: none"> • Written: Papers 1 & 2: Problem-based questions in the subject • Oral & Practical / Clinical Examination <ul style="list-style-type: none"> • OSCE • Clinical Examination (Long case / short cases) • Log Book <p>Part-II Thesis examination at the end of fourth (4th) year of MD Internal Medicine programme.</p>

2. Examinations

Part-I Examination

1. All candidates admitted in MD Internal Medicine course shall appear in Part-I examination at the end of 1st calendar year.
2. The examination shall be held on biannual basis.
3. The candidate who fails to pass the examination in 3 consecutive attempts availed or un-availed, shall be dropped from the course.
4. The examination shall have two components:

Paper-I MCQs (single best)	100 Marks
Paper-II SEQs	100 Marks
5. Subjects to be examined shall be Basic Sciences (Anatomy, Physiology, Biochemistry, Pathology, Pharmacology), Behavioural Sciences and Biostatistics & Research Methodology.
6. To be eligible to appear in Part-I examination the candidate must submit;
 - i. duly filled, prescribed Admission Form to the Controller of Examinations duly recommended by the Principal/Head of the Institution in which he/she is enrolled;
 - ii. a certificate by the Principal/Head of the Institution, that the candidate has attended at least 75% of the lectures, seminars, practical/clinical demonstrations;
 - iii. Examination fee as prescribed by the University
7. To be declared successful in Part-I examination the candidate must secure 60% marks in each paper.

Part-II Examination

1. All candidates admitted in MD Internal Medicine course shall appear in Part-II (clinical) examination at the end of structured training programme (at the end of fourth year) and having passed the Part-I examination.
2. The examination shall be held on biannual basis.
3. The candidate who fails to pass the examination within 7 years of enrollment shall be dropped from the course.
4. To be eligible to appear in Part-II examination the candidate must submit;
 - i. duly filled, prescribed Admission Form to the Controller of Examinations duly recommended by the Principal/Head of the Institution in which he/she is enrolled;
 - ii. a certificate by the Principal/Head of the Institution, that the candidate has attended at least 75% of the lectures, seminars, practical/clinical demonstrations;
 - iii. Original Log Book complete in all respect and duly signed by the Supervisor (for Oral & practical/clinical Examination);
 - iv. certificates of having passed the Part-I examination;
 - v. Examination fee as prescribed by the University.
5. The examination shall have the following components:

• Written	300 marks
• Oral & practical/clinical examination	300 marks
• Log Book Evaluation	200 marks (50 marks per year)
6. There shall be two written papers of 150 marks each.
7. Both papers shall have problem-based short/modified essay questions and MCQs.
8. Oral & practical/clinical examination shall have 300 marks for:
 - i. 1 Long Case 100
 - ii. 4 Short Cases 100 (25 marks each)
 - iii. OSCE 100
9. To be declared successful in Part-II examination the candidate must secure 60% marks in each component and 50% in each sub-component.

10. Only those candidates, who pass in theory papers, will be eligible to appear in the Oral & Practical/ Clinical Examination.
11. The candidates, who have passed written examination but failed in Oral & Practical/ Clinical Examination, will re-appear only in Oral & Practical / Clinical examination.
12. The maximum number of attempts to re-appear in oral & practical /clinical Examination alone shall be three, after which the candidate shall have to appear in both written and oral & practical/clinical examinations as a whole.
13. The candidate with 80% or above marks shall be deemed to have passed with distinction.
14. *Log Book/Assignments:* Through out the length of the course, the performance of the candidate shall be recorded on the Log Book.
15. The Supervisor shall certify every year that the Log Book is being maintained and signed regularly.
16. The Log Book will be developed & approved by the Advanced Studies & Research Board.
17. The evaluation will be maintained by the Supervisor (in consultation with the Co- Supervisor, if appointed).
18. The performance of the candidate shall be evaluated on annual basis, e.g., 50 marks for each year in four years MD Internal Medicine course. The total marks for Log Book shall be 200. The log book shall reflect the performance of the candidate on following parameters:
 - Year wise record of the competence of skills.
 - Year wise record of the assignments.
 - Year wise record of the evaluation regarding attitude & behaviour
 - Year wise record of journal club / lectures / presentations / clinico-pathologic conferences attended & / or made by the candidate.

3. Submission / Evaluation of Synopsis

- a). The candidates shall prepare their synopsis as per guidelines provided by the Advanced Studies & Research Board, available on UHS website.

- b). The research topic in clinical subject should have 30% component related to basic sciences and 70% component related to applied clinical sciences. The research topic must consist of a reasonable sample size and sufficient numbers of variables to give training to the candidate to conduct research, to collect & analyze the data.
- c). Synopsis of research project shall be submitted by the end of the 2nd year of MD program. The synopsis after review by an Institutional Review Committee shall be submitted to the University for consideration by the Advanced Studies & Research Board, through the Principal / Dean /Head of the institution.

4. Submission of Thesis

1. Thesis shall be submitted by the candidate duly recommended by the Supervisor.
2. The minimum duration between approval of synopsis and submission of thesis shall be one year, but the thesis can not be submitted later than 7 years of enrolment.
3. The research thesis must be compiled and bound in accordance with the Thesis Format Guidelines approved by the University and available on website.
4. The research thesis will be submitted along with the fee prescribed by the University.

5. Thesis Examination

1. All candidates admitted in MD course shall appear in Part-II thesis examination at the end of 4th year of their training course.
2. Only those candidates shall be eligible for thesis evaluation who have passed Part I and Part-II (clinical) Examinations.
3. The examination shall include thesis evaluation with defense.
4. The Vice Chancellor shall appoint three external examiners for thesis evaluation, preferably from other universities and from abroad, out of the panel of examiners approved by the Advanced Studies & Research Board. The examiners shall be appointed from respective specialty.

Specialists from allied medical disciplines may also be appointed/co-opted, where deemed necessary.

5. The thesis shall be sent to the external examiners for evaluation, well in time before the date of defense examination and should be approved by all the examiners.
6. After the approval of thesis by the evaluators, the thesis defense examination shall be held within the University on such date as may be notified by the Controller of Examinations. The Controller of Examinations shall make appropriate arrangements for the conduct of thesis defense examination in consultation with the supervisor, who will co-ordinate the defense examination.
7. The thesis defense examination shall be conducted by two External Examiners who shall submit a report on the suitability of the candidate for the award of degree. The supervisor shall act as coordinator.

6. Award of MD Internal Medicine Degree

After successful completion of the structured course of MD Internal Medicine and qualifying Part-I and Part-II examinations in totality, the degree with title MD Internal Medicine shall be awarded.

CONTENT OUTLINE

Part I MD Internal Medicine

1. Anatomy

General Organization of the Body

1. Anatomical nomenclature
2. Terms of position
3. Divisions of the body according to the regions and organ systems
4. Detailed Anatomy of the organ systems, their blood supply, nerve supply, lymphatic drainage and important gross relations to other organs
5. Developmental Anatomy and associated common congenital abnormalities
6. Cell biology, cell cycle, cellular differentiation and proliferation.
7. Tissues of Body: Light and electron microscopic details, structural basis of function, regeneration and degeneration of the organ systems.

General Features of Human Development

1. Features of mitotic and meiotic modes of cell division. Genetic consequences of meiotic division.
2. Abnormal mitotic and meiotic divisions of clinical importance.
3. Gametogenesis: origin of germ cells.
4. Oogenesis: prenatal and postnatal development of ova.
5. Spermatogenesis: proliferation and maturation of male germ cells. Abnormal gametes, their clinical significance.
6. Ovulation, fertilization and the consequences of fertilization.

Early Embryonic Development:

1. Cleavage, morula and blastocyst formation and implantation. Formation of the three primary germ layers.
2. List of the derivatives of the respective germ layers.

Period of the Growing Fetus:

Various stages and salient features of the fetus development

Extraembryonic Membranes:

Development, functions and anomalies of yolk sac, amnion, chorion, allantois, umbilical cord and placenta.

Development of the External Body Form:

Shaping of the head, neck, trunk and limbs. Common developmental anomalies associated with this.

The Branchial Apparatus:

Development and fate of the bronchial grooves, arches and pouches. Their derivatives and anomalies.

Teratogenesis:

Factors known to be involved in the development of congenital anomalies.
Concept of critical periods.

Structural and Functional Organization of the Tissues of Body
Classification of tissues and identification of various tissues in routine histological preparations under the light microscope.

The Epithelial Tissue

1. General structure, functions and classification of epithelia
2. Their location in the body
3. General characters of serous and mucous membranes
4. General structural features of exocrine and endocrine glands

The Connective Tissue

1. Cartilage
2. Structure of bone marrow. Cell lines seen in haemopoiesis.
3. Factors r required for bone growth.

The Muscular Tissue

1. Structural and functional differences between the smooth skeletal and cardiac types of muscle.
2. Fine structure of skeletal and cardiac muscle fibers, and its relationship to the mechanism of contraction.
3. Specialized conducting tissue of the heart.

The Neural Tissue

1. The neuron, morphology of the perikaryon and its processes.
2. Coverings of the axons in the peripheral nerves and the central nervous system.
3. Types of neuroglia and their functions.
4. Process of myelination in the peripheral nerves and the central nervous system.
5. Axon terminals and synapses. Nerve fiber degeneration and regeneration.

The Nervous System

Development of the nervous system and common developmental anomalies.

The Brain

1. Subdivisions of the brain.
2. External morphology of cerebellum, lobes, surface, sulci and gyri. External morphology of cerebellum and its subdivisions.
3. External morphology of midbrain, pons and medulla.
4. Different grey matter masses in the brain.
5. Ventricular system of the brain.
6. Circulation of cerebrospinal fluid and its composition.
7. Blood supply of the brain. Parts of the cranial dura, formation and drainage of dural sinuses.
8. Appearance of CT and MRI scans and identification of structures.
9. Cerebrum as seen in horizontal sections.

Cerebral Cortex

1. Gross and microscopic organization of the cortex, location of motor and sensory cortical areas.
2. Functions and blood supply of various regions. White matter of the cerebrum, definition of association, commissural and projection fibers and their role in cortical functioning. Internal capsule, location, fibre content and blood supply.

Limbic System

1. Core structures of the limbic system.
2. Other nuclei and pathways associated with the limbic system.
3. Functions of thalamus, hypothalamus and the limbic system.

Basal Ganglia

Subdivisions, connections, functions and effects of lesions.

Thalamus

Nuclear groups, afferent and efferent connections and their functional correlations.

Hypothalamus

1. The nuclei, afferent and efferent connections and their functional correlations.
2. Effects of lesions.

Internal Structure of Cerebellum

1. Cerebellar cortex: organization and functions.
2. Cerebellar nuclei: main connections.
3. Cerebellar peduncles, cerebellar afferent and efferent connections, functional correlations.
4. Effects of lesions.

Spinal Cord

1. External morphology, meninges and blood supply of the spinal cord. Relationship of the "segments" to vertebrae at different ages.
2. Internal structure of the spinal cord, organization of the grey and white matter.
3. Variations in the structure of the grey matter at different levels and location of the important nuclei.
4. Location of ascending and descending tracts, and their functions.
5. Effects of injury or disease.

Peripheral Nervous System

1. Anatomy and functions of cranial nerves with their intracranial and extracranial course and distribution.
2. Location of various cranial nerve nuclei.
3. Anatomy and functions of spinal nerves.
4. Foundation, course and distribution of a typical nerve.
5. Effects of lesions.

Organs of Special Senses

1. Development of special sense organs and common developmental anomalies of the eye, ear and nose.
2. Basic mechanisms of olfaction, taste, vision and hearing.
3. The nose skeleton, walls of the nasal cavity, morphological features, nasal conchae, meatuses, location of openings of the sinuses.
4. Mucosa of the nasal cavity, blood supply and nerve supply.
5. The paranasal sinuses, their location and general morphology.

Olfaction:

1. Structure of olfactory mucous membrane, receptors, olfactory pathway and its termination.
2. Characters of smell and its significance.

The Eye / Orbit

1. Walls, bony constituents and salient morphological features.
2. Disposition of the contents of the orbit including muscles, nerves and vessels. Structure and function of eyelids.
3. Conjunctival sac, lacrimal gland and lacrimal apparatus, structure and functions.
4. Orbicularis oculi muscle, attachments, nerve supply and functions.

Eyeball

1. Tunics of the eyeball and their anatomical constituents.
2. Microscopic anatomy of cornea and lens, layers of retina.
3. Chambers of the eye, boundaries and contents.
4. Formation, circulation and functions of aqueous humour, sinus venous sclerae (canal of Schlemm), filtration angle.
5. General morphological and structural features of refracting media.
6. Blood supply of retina.
7. The visual pathway and effect of lesions at different levels.
8. Pupillary light reflex and its pathway.
9. Accommodation, its mechanism and pathway.
10. Colour vision and colour blindness.
11. Photopic, scotopic and binocular vision.
12. Field of vision and stereoscopic vision.

The Ear

External ear:

1. Skeleton, general morphology of the auricle and the external acoustic meatus.
2. Blood supply and nerve supply of the external ear.
3. Tympanic membrane, size, shape, structure and nerve supply.

Middle ear (tympanic cavity):

Shape, size boundaries and contents.

Internal ear:

1. General morphology of bony labyrinth. Parts of membranous labyrinth, their general morphology, location of special sensory areas and nerve supply.

2. Mechanism of hearing, auditory receptors and auditory pathway.
3. Functions of the Vestibular apparatus.

Organ of Taste

1. Structure of taste buds and location.
2. Gustation receptors, gustatory pathway and its termination.

Gastrointestinal System

1. Development of the gastrointestinal tract and common developmental anomalies e.g. oesophageal fistulae, Meckel's diverticulum, atresias.
2. Rectal and associated urinary bladder anomalies related to partitioning of the cloaca.
3. Rotation of gut, physiological herniation and its withdrawal and related anomalies.
4. Development and partitioning of the coelomic cavity and formation of the diaphragm.
5. Parts, relations, history, functional correlation with structure, common pattern of blood supply, nerve supply and lymphatic drainage of the mouth, tongue and salivary glands, oesophagus, stomach, small intestine, appendix, colon (including caecum), rectum, anal canal, liver, gallbladder, bile ducts and pancreas.

Cardiovascular System

1. Development of the heart and vascular system and common developmental anomalies such as septal defects, patent ductus arteriosus, Fallot's tetralogy and coarctation of aorta.
2. Microscopic structure of the heart including conducting system
3. Characteristics of the cardiac muscle contraction, duration, refractory period, pacemaker and rhythmicity.
4. General structural features of atria, ventricles, conducting tissues, and valves of the heart and their relationship to cardiac function.
5. Blood supply of heart.
6. Structure and functions of the arteries, arterioles, capillaries and veins..

Urinary System

1. Development of the urinary system and common developmental anomalies.
2. Morphology, including microscopic structure of the nephron.
3. Relations, common pattern of blood supply, nerve supply and lymphatic drainage of the kidneys, ureters, urinary bladder, urethra and prostate.

Respiratory System

1. Development of the respiratory system and common developmental anomalies.
2. Histology of the trachea, bronchi and the lung.
3. Physiological anatomy and structure of the respiratory system.

Larynx

1. General form and skeleton of the larynx

2. Blood and nerve supply of the larynx

Endocrine and Reproductive System

Development and common developmental anomalies of the pituitary, thyroid, parathyroid, adrenal glands, testis, uterine tubes, ovary, uterus etc.

Musculoskeletal System

Functions of the skeletal system.

Bones

1. Identification of bony outlines on plain x-ray.
2. Classification of bones.
3. Bone growth and ossification.
4. Blood supply of all long and small bones of human body

Joints

1. Classification of joints
2. Factors contributing to the stability of joints.
3. Movements of the joints of shoulder, elbow, hip, knee and ankle.
4. Movements of the shoulder girdle as a whole, supination and pronation of forearm, inversion and aversion of foot and movements of fingers and thumb. Maintenance of normal posture

Muscles and Fasciae

1. Muscles of the human body
2. General disposition, nerve supply and effects of nerve lesions
3. Muscle attachments, group actions and nerve supply.

Body Cavities:

1. Abdominal, thoracic, cranial, pelvic cavity
2. A general description of the boundaries, land marks and surface anatomy of the internal organs and dermatomes of the body cavities
3. General disposition, morphology, relations, blood and nerve supply, lymph nodes and areas of drainage of the viscera contained in these cavities.
4. Identification of bony outlines on plain X-ray.

Common Laboratory Tests

1. Significance of the laboratory tests and their interpretation.
2. Biochemical, hormonal, enzymatic and immune assays.
3. Cytopathology e.g. liver function, kidney function, thyroid function and heart function.
4. Imaging techniques
5. Echo, Doppler, MRI, CT scan and ultrasound.
6. Electro-physiological investigations
7. ECG, EEG, EMG and ETT
8. Radio isotopic investigations
9. Definition of radio-isotopes and the general principles of their use in medical sciences.
10. Spirometry and pulmonary function tests.
11. G.I. Endoscopy.

2. Physiology

Cellular organization, structure function correlations and physiological alterations in the endocrine organ systems of body

Structural and Functional Organization of the Cells of the Body

- Concept of cells as the structural, functional and genetic units of the body.
- Composition of protoplasm, division into cytoplasm and nucleus.
- Role of macromolecules in the structural organization of the cell.
- Cell components with their role in cell function.
- Diversity of cell morphology as related to the varied functional demands. Physical activities of the living cells, intracellular movements, cellular locomotion, endocytosis and exocytosis.
- Basic concepts of the principles of transport through cell membrane, membrane potential and action potential.
- The cell cycle and cell division.
- Energy balance, metabolism & nutrition
- Uses of cell and tissue cultures.
- DNA and RNA structure and protein synthesis.

Blood:

- General properties and composition.
- Structure, production, functions and fate of red blood cells, white blood cells and platelets.
- Structure, formation, functions, and fate of haemoglobin.
- Blood volume and principles of its measurement.
- Disorders of blood.
- Blood groups (ABO, Rh and other systems), blood transfusion and exchange transfusion.
- Precautions and hazards of blood transfusion.
- Plasma proteins, their production and functions.
- Diagnosis of various types of anaemias and leukaemias.
- Values of various components of blood in different age groups e.g. haemoglobin, WBCs, hormones etc.
- Interpretation of complete blood picture, haematological changes in infectious and non infectious diseases

Cardiovascular System:

- Cardiac muscle: electrical and mechanical properties.
- Metabolism
- Origin of the HR beat, the electrical activity of the heart (normal and findings in cardiac and systemic diseases)
- Mechanism of production of heart sounds, their location, characters and relationship with the cardiac cycle.
- The normal electrocardiogram and characters of its various components. Significance of its parts, voltage and calibration,

principles and methods of recording, electrocardiographic leads and general information obtained from ECG.

- Physiology and abnormalities of apex beat.
- Cardiac output, amount, distribution, measurement, control, cardiac index and cardiac reserve.
- Echocardiography, exercise tolerance test and the basis of ETT.
- Patho-physiology of cardiac failure, valvular heart disease and hypertension. Interpretation of data of diagnostic tests.
- Dynamics of blood and lymph flow: biophysics
- Arterial and arteriolar circulation capillary circulation, lymphatic circulation and venous circulation
- Laws of haemodynamics governing flow, pressure and resistance in blood vessels.
- Arterial blood pressure, measurement and regulation.
- Vasomotor system and control of blood vessels.
- Characters of arterial pulse and venous pulse.
- Significance of central venous pressure.
- Mechanism of haemorrhage and shock.
- Coronary, cutaneous, splanchnic and peripheral circulation.
- Its measurement, control and special features, circulatory changes during muscular exercise
- Cardiovascular regulatory mechanisms local regulation
- Endothelium; systemic regulation by hormones and systemic regulation by nervous system.
- Circulation through special organs: organs: coronary circulation, cerebral circulation and pulmonary circulation.
- Cardiovascular homeostasis in health and diseases: exercise, gravity, shock, hypertension and heart failure.

Respiration:

- Pulmonary ventilation
- Mechanics of respiration, pulmonary volumes, capacities and pressures.
- Transport and exchange of oxygen and carbon dioxide.
- Regulation of respiration. (chemical and neural)
- Physiology of respiratory insufficiencies, hypoxia, dyspnoea, asphyxia and hypercapnia.
- Exercise hypoxia and cyanosis
- Physiological changes due to altitude and space travel
- Principles and methods of artificial respiration.
- Principles of pulmonary function tests.
- Interpretation of data of diagnostic tests.
- Cardiopulmonary resuscitation.
- Patho-physiology of respiratory failure.

Renal function:

- Renal circulation
- Glomerular filtration
- Tubular function
- Water excretion

- Acidification of urine
- Regulation of Na⁺ and K⁺ excretion
- Regulation of extracellular fluid composition and volume
- Homeostatic mechanisms to maintain
 - Tonicity
 - Volume
 - H⁺ concentration of ECF.

Endocrinology:

- General concepts of chemical nature, mechanism, site of action and functions of hormones of the hypothalamus, pituitary, thyroid, adrenal, parathyroid, pancreas, and pineal glands, ovaries and testis.
- Comprehensive knowledge of all hormones including their chemistry, biosynthesis, storage, release, transport, mechanism of inactivation mode and site of action, distribution, physiological and pathological activities and assessment of functions.
- Calcium homeostasis
- Effects of hypo- and hyperactivity of the endocrine glands.
- Production and functions of hormones related to the sex characters in the male and female.
- Endocrinology of the menstrual cycle.
- Role of hormones in pregnancy, parturition and lactation.
- Functions of placenta. Libido, impotence and infertility.
- Endocrine function of the kidney, heart, lung and gastrointestinal tract

Gastrointestinal function:

- Digestion and absorption
- Regulation of gastrointestinal function
- Motility: mastication, swallowing, gastric motility, intestinal motility and gall bladder motility.
- Secretory activity: formation, composition, function and control of saliva, gastric, pancreatic, bile and intestinal secretions.
- GIT hormones controlling activities: Functions of the stomach, pancreas, gall bladder, liver and large intestine. Formation and composition of faeces, mechanism of defecation.
- Circulation of bile. Principles and assessment of liver function tests. Interpretation of data, diagnostic tests.
- Hyperbilirubinaemia and congenital hyperbilirubinaemias.
- Control of hunger, appetite and its disorders.

Central Nervous System

- Motor cortex corticospinal and corticobulbar system.
- Basal ganglia
- Cerebellum

Autonomic Nervous System

- Overall functions of sympathetic and parasympathetic nervous systems. Autonomic reflex activity.

Functional Aspects of the Nervous System

- Sensory activity: Peripheral sensory receptors, sensory pathways, physiology of pain and disorders of sensations.
- Motor activity: corticospinal and extracortical pathways, cerebellum and Vestibular system.
- Motor neurons, motor units and neuromuscular junction.
- Disorders of motor activity.

Muscle and nerve physiology.

- Reflex activity: Monosynaptic stretch reflexes, polysynaptic withdrawal reflexes, general characters of reflexes.
- Electroencephalogram and its uses.
- Sleep, types, physiological changes during sleep.
- Speech mechanism and its disorders.
- Cerebrospinal fluid, cerebral circulation, metabolism and functions.
- Blood brain and blood CSF barriers.

3. Biochemistry

- Membrane biochemistry and signal transduction
- Gene expression and the synthesis of proteins
- Bioenergetics; fuel oxidation and the generation of ATP
- Enzymes and biologic catalysis
- Tissue metabolism

VITAMINS

- Classification, components, sources, absorption and functions (physiological and biochemical role).
- Daily requirements, effects of deficiency and hypervitaminosis.
- Salient morphologic features of diseases related to deficiency or excess of vitamins.

MINERALS

- Sources of calcium, phosphorous, iron, iodine, fluorine, magnesium and manganese.
- Trace elements and their clinical importance.
- Absorption and factors required for it.
- Functions and fate.

METABOLISM

- Metabolic rate and basal metabolic rate
- Factors influencing metabolic rate, principles of measurement.

Carbohydrates

- Classification and dietary sources.
- Digestion, absorption and utilization of dietary carbohydrates. Glucose tolerance test.
- Glycogenesis, glycolysis, gluconeogenesis, glycogenolysis, processes with the steps involved and effects of hormones.
- Citric acid cycle, steps involved, its significance and the common final metabolic pathway.
- Hexose monophosphate shunt: mechanism and significance.

Lipids

- Classification of simple, derived and compound lipids.
- Dietary sources.
- Digestion, absorption, utilization and control.
- Fatty acid oxidation with steps involved.
- Ketogenesis and its significance.
- Lipotropic factors and their actions. Lipoproteins, types and importance.

Proteins And Amino Acids

- Classification and dietary sources of proteins.
- Digestion, absorption, utilization and control.
- Fate of amino acids.
- Urea formation with steps involved.
- Functions and effects of deficiency.

Nucleoproteins:

- Structure and metabolism.

Pigment Metabolism

- Basic concept of endogenous and exogenous pigments.
- Causes of pigmentation and depigmentation.
- Disorders of pigment metabolism, inherited disorders, acquired disorders from deficiency or excess of vitamins, minerals, fats, carbohydrates, proteins etc.

Balanced Diet

- Requisites of an adequate diet.
- Role of carbohydrates, fats, proteins, minerals, vitamins and water in diet.
- Principles of nutrition as applied to medical problems
- Biotechnology and concepts of molecular biology with special emphasis on use of recombinant DNA techniques in medicine and the molecular biology of cancer

4. Pharmacology

- The Evolution of Medical Drugs
- British Pharmacopia
- Introduction to Pharmacology
- Receptors
- Mechanisms of Drug Action
- Pharmacokinetics
- Pharmacokinetic Process
 - Absorption
 - Distribution
 - Metabolism
 - Desired Plasma Concentration
 - Volume of Distribution
 - Elimination
 - Elimination rate constant and half life
 - Creatinine Clearance
- Drug Effect
 - Beneficial Responses

- Harmful Responses
- Allergic Responses
- Drug Dependence, Addiction, Abuse and Tolerance
- Drug Interactions
- Drug use in pregnancy and in children
- Autonomic Pharmacology

Basic concepts of pharmacokinetics and dynamics of:

- Autacoids and their antagonists
- Diuretics
- Cardiovascular Drugs e.g. cardiac glycosides, antiarrhythmic, antianginal and antihypertensive drugs
- Central Nervous System Drugs e.g. anxiolytics & hypnotics, antiepileptic, antiparkinsonians, opioid analgesics, antipsychotics & antidepressants
- Nonsteroidal Anti-inflammatory drugs and drugs used in gout
- Endocrine pharmacology including calcium homeostasis
- Gastrointestinal Tract pharmacology
- Respiratory pharmacology
- Drugs Acting on the Blood
- Chemotherapy
- Antibacterial, antimycobacterial, antiviral, antifungal and antiparasitic
- Immunopharmacology
- Vitamins and Antioxidants

5. Pathology

Pathological alterations at cellular and structural level along with brief introduction of Basic Microbiology and Haematological pathology as related to medicine

Cell Injury and adaptation

- Reversible and Irreversible Injury
- Fatty change, Pathologic calcification
- Necrosis and Gangrene

Cellular adaptation

- Atrophy, Hypertrophy,
- Hyperplasia, Metaplasia, Aplasia

Inflammation

- **Acute inflammation**
- Cellular components and chemical mediators of acute inflammation
- Exudates and transudate
- Sequelae of acute inflammation
- **Chronic inflammation**
- Etiological factors and pathogenesis
- Distinction between acute and chronic (duration) inflammation
- Histologic hallmarks

- Types of chronic inflammation, non-granulomatous and granulomatous, and their causes

Haemodynamic disorders

- Etiology, pathogenesis, classification and morphological and clinical manifestations of Edema, Haemorrhage, Thrombosis, Embolism, Infarction & Hyperaemia
- Shock; classification etiology, and pathogenesis, manifestations.
- Describe the compensatory mechanisms involved in shock
- Describe the pathogenesis and possible consequences of thrombosis
- Describe the difference between arterial and venous emboli

Neoplasia

- Dysplasia and Neoplasia
- Benign and malignant neoplasms
- Etiological factors for neoplasia
- Different modes of metastasis
- Tumor staging system and tumor grade

Immunity and Hypersensitivity

- Immunity
- Immune response
- Diagnostic procedures in a clinical microbiology laboratory
- Protective immunity to microbial diseases
- Tumour immunology
- Immunological tolerance, autoimmunity and autoimmune diseases.
- Transplantation immunology
- Hypersensitivity
- Immunodeficiency disorders
- Immunoprophylaxis & Immunotherapy

Haematopathology

- Normal blood picture & variation in disease

Microbiology

- A brief account of the classification of microorganisms .
- Role of Microbes In Various Human Diseases
- Infection source

Bacterial Growth and Death

- Names, habitat, modes of transmission/infection, pathogenic mechanism and pathological changes produced by bacteria, commonly causing human diseases in Pakistan
- Names of bacteria and diseases produced by bacteria not commonly found in Pakistan.
- Gram staining and AFB staining, Culture of blood and fluid; details regarding methodology in collection, transportation and preservation.
- Culture media for common pathogens and methods of culture.
- Special culture media. Basis of sensitivity tests.

Fungal Diseases

- Names, general morphological features, and diseases produced by fungi commonly found in Pakistan, including dermatophytes, maduromycosis and opportunistic infections.

Important Parasites;

- Names and modes of infection of parasitic diseases commonly found in Pakistan including amoebiasis, malaria, leishmaniasis, ascariasis, cestodiasis, ankylostomiasis, giardiasis, hydatid disease and guinea worm disease.
- Important Viruses
- Sterilization and disinfection
- Immunization
- Morphology: Identification of various shapes of bacteria and viruses under the microscope.
- Distribution, size, motility, reproduction and functions of bacteria and viruses.
- Nosocomial Infections
- Use Of Investigation And Procedures In Laboratory
- Sputum, Urine, Stool, Cerebrospinal Fluid(CSF), Pus, Aspirates

6. Biostatistics & Research Methodology

- Introduction to Bio-Statistics
- Introduction to Bio- Medical Research
- Why research is important?
- What research to do?
 - Selecting a Field for Research
 - Drivers for Health Research
 - Participation in National and International Research
 - Participation in Pharmaceutical Company Research
 - Where do research ideas come from
 - Criteria for a good research topic
- Ethics in Health Research
- Writing a Scientific Paper
- Making a Scientific Presentation
- Searching the Literature

7. Behavioural Sciences

- Bio-Psycho-Social (BPS) Model of Health Care
- Use of Non-medicinal Interventions in Clinical Practice
 - Communication Skills
 - Counselling
 - Informational Skills
- Crisis Intervention/Disaster Management
- Conflict Resolution
- Breaking Bad News
- Medical Ethics, Professionalism and Doctor-Patient Relationship
 - Hippocratic Oath

- Four Pillars of Medical Ethics (Autonomy, Beneficence, Non-maleficence and Justice)
- Informed Consent and Confidentiality
- Ethical Dilemmas in a Doctor's Life
- Delivery of Culturally Relevant Care and Cultural Sensitivity

- Psychological Aspects of Health and Disease
 - Psychological Aspect of Health
 - Psychological Aspect of Disease
 - Stress and its Management
 - Psychological Aspect of Pain
 - Psychological Aspect of Aging

Part II

MD Internal Medicine

Part II shall comprise three components:

1. Clinical (both didactic & practical skills and pocedures)
2. Research and Thesis writing
3. Log book

1. Clinical Component

Organ and System Competencies in;

1. Gastroenterology and Hepatology:

2. To provide Residents with opportunities to evaluate and manage patients with a wide variety of digestive disorders in an inpatient and outpatient setting. The Resident will act, under the supervision of the attending gastroenterologist, as a consultant to other clinical services.
3. To give Residents opportunities to learn about various aspects of a broad range of GI, liver and pancreatic disorders, with emphasis on the more common disorders.
4. To provide Residents with opportunities to learn the indications, contraindications, complications, limitations and alternatives for GI procedures.
5. Additional areas include knowledge of nutrition and nutritional deficiencies, and screening and prevention, particularly for colorectal cancer.
6. The general internist should have a wide range of competency in gastroenterology and should be able to provide primary and in some cases secondary preventive care, evaluate a broad array of gastrointestinal symptoms, and manage many gastrointestinal disorders.

Common Clinical Disorders

- Malabsorptive/Nutritional disorders
- Inflammatory Bowel Disease
- Irritable Bowel Syndrome
- Peptic Ulcer Diseases
- Malignancies of the Digestive System
- GI disorders and pregnancy
- Gastrointestinal Emergencies
- Indications/complications of GI procedures
- Viral hepatitis
- Chronic liver disease and Cirrhosis
- GI motility disorders
- Biliary disorders

- Pancreatic disorders

Common Clinical Presentations

- Abdominal distention
- Abdominal pain
- Abnormal liver function test
- Anorectal discomfort, bleeding, or pruritus
- Anorexia, weight loss
- Ascites
- Constipation
- Diarrhea
- Excess intestinal gas
- Fecal incontinence
- Food intolerance
- Gastrointestinal bleeding
- Heartburn
- Hematemesis
- Indigestion
- Iron-deficiency anemia
- Jaundice
- Liver failure
- Malnutrition
- Melena
- Nausea, vomiting
- Non-cardiac chest pain
- Swallowing dysfunction

Procedure Skills

- Flexible sigmoidoscopy
- Paracentesis
- Placement of nasogastric tube
- Sengstaken-Blakemore tube (optional)

Primary Interpretation of Tests

- Fecal leukocytes
- Test for occult blood

Ordering and Understanding tests

- 24-Hour esophageal motility studies and pH monitoring
- Assays for Helicobacter pylori
- Biopsy of the gastrointestinal mucosa
- Blood tests for autoimmune, cholestatic, genetic liver diseases
- Upper endoscopy
- Colonoscopy
- Computed tomography, magnetic resonance imaging, ultrasound of the abdomen
- Contrast studies (including upper gastrointestinal series, small-bowel follow through, barium enema)
- Culture of stool for ova, parasites
- D-Xylose absorption test and other small bowel absorption tests

- Endoscopic retrograde cholangio-pancreatography
- Esophageal manometry
- Examination for stool for ova, parasites
- Fecal electrolytes
- Fecal osmolality
- Interpretation of fecal occult blood tests.
- Gall bladder radionuclide scan
- Gastric acid analysis, serum gastrin level, secretin stimulation test
- Viral hepatitis serology
- Lactose and hydrogen breath tests
- Laparoscopy
- Laxative screen
- Liver biopsy
- Paracentesis and interpretation of ascitic fluid analysis
- Mesenteric arteriography
- Percutaneous transhepatic cholangiography
- Qualitative and quantitative stool fat
- Scans of gastric emptying
- Serum B12 and Schilling tests

2. PULMONARY MEDICINE

1. The resident must have expertise in understanding the neoplastic, inflammatory, and infectious disorders of the lung parenchyma, pleura, and airways; pulmonary vascular disease and its effect on the cardiovascular system
2. Detection and prevention of occupational and environmental causes of lung disease.
3. Other specialized areas include respiratory failure and sleep-disordered breathing.
4. The general internist should be able to evaluate and manage cough, dyspnea, fever with infiltrates, mass or nodule on the chest radiograph, pleurisy, and pleural effusion.
5. He or she should also be able to diagnose and manage patients with common respiratory infections; initiate the diagnostic evaluation of respiratory neoplasm; and manage the initial approach to patients with respiratory failure, including those in intensive care units.
6. The internist will usually be assisted by the pulmonary specialist for diagnostic procedures and complicated conditions such as advanced respiratory failure. If such expertise is not available, the internist, with additional training, may have to assume these roles.

Common Clinical Disorders

- Obstructive lung diseases: COPD, Bronchial Asthma.
- Adult and neonatal respiratory distress syndrome
- Pulmonary vascular disease: Pulmonary HTN, Pulmonary embolism.

- Lower Respiratory Infections: Community-Acquired Pneumonia, Hospital- Acquired Pneumonia, Chronic pneumonia, and complications of pneumonia
- Diffuse parenchymal lung disease
- Interstitial lung diseases
- Pulmonary disorders of immunosuppressed patients.
- Acute and chronic respiratory failure
- Staging and treatment of lung cancer.
- Diagnosis and management of pleural diseases.
- Sleep-disordered breathing.
- Diagnosis and management of hemoptysis.
- Pulmonary Database: History and Physical Examination, Imaging, Pulse Oximetry and Pulmonary Function Testing.
- Pulmonary Rehabilitation/home oxygen therapy, etc.
- Pulmonary Procedures: Bronchoscopy, Thoracentesis, Pleural Biopsy, Transthoracic Needle Biopsy of Lung

Common Clinical Presentations

1. Chest pain
2. Cough
3. Dyspnea
4. Excessive daytime sleepiness
5. Febrile patient with infiltrate
6. Hemoptysis
7. Nodule or mass on chest radiograph
8. Pleural effusion, pleurisy
9. Stridor, hoarseness
10. Wheezing

Procedure Skills

1. Arterial blood gas sampling
2. Endotracheal intubation
3. Monitoring of oxygen saturation
4. Skin test for anergy, tuberculosis
5. Spirometry and peak flow assessment
6. Pulmonary artery catheterization
7. Thoracentesis
8. Pleural biopsy

Primary Interpretation of Tests

1. Complete pulmonary function tests (spirometry; measurement of lung volumes, diffusing capacity, flow volume loop)
2. Pulmonary artery catheter readings
3. Ordering and Understanding Tests
4. Bronchoscopy, including lavage and biopsy
5. Cardiopulmonary exercise test
6. Computed tomography of thorax

7. Cytology, pathology of lung and pleural biopsy specimens
8. Diagnostic studies for venous thrombosis
9. Mediastinoscopy, mediastinotomy
10. Pleural fluid analysis
11. Pulmonary angiography
12. Sleep study
13. Ventilation/perfusion lung scans

3. HEMATOLOGY

The discipline of hematology relates to the care of patients with disorders of the blood, bone marrow, and lymphatic systems, including anemias, hematologic malignancies, and other clonal processes, and congenital and acquired disorders of hemostasis, coagulation, and thrombosis.

The general internist should be competent in:

1. The detection of abnormal physical, laboratory and radiologic findings relating to the lymphohematopoietic system
2. The assessment of the need for bone marrow aspirate and biopsy and lymph node biopsy
3. The initial diagnostic evaluation and management of the hemostatic and clotting system
4. The assessment of the indications and procedure for transfusion of blood and its separate components
5. Management of thrombo embolic disorders.
6. The management of therapeutic and prophylactic anticoagulation
7. The diagnosis and management of common anemias
8. The pharmacology and use of common chemotherapies
9. The management of neutropenia /immunosuppression
10. Principles of management of acute and chronic leukemias.
11. Management of gammopathies.

Common Clinical Disorders

- Anemias: General aspects and classifications
- Anaemia of pregnancy
- Pancytopenia, aplastic anemia, pure red cell aplasia
- Methemoglobinemia
- Iron overload
- Porphyrias
- Haemoglobinopathies
- Hemolytic anemias
- Qualitative or quantitative disorders of white blood cells
- Disorders of the spleen
- Acquired & inherited coagulation disorders
- Thrombosis and anti thrombotic drugs
- Transfusion of blood and blood components
- Adverse effects of blood transfusion
- Therapeutic aphaeresis

- Classification and differentiation of haematological malignancies
- Leukemias
- The myelodysplastic syndromes
- Myeloproliferative disorders
- Lymphoproliferative disorders
- Plasma cell dyscrasias
- Bone marrow transplants

Common Clinical Presentations

- Abnormalities of peripheral smear
- Bleeding, bruising, or petechiae
- Family history of anemia or bleeding disorder
- Lymphadenopathy
- Pallor or fatigue
- Recurrent infections or fever/neutropenia
- Splenomegaly
- Venous or arterial thrombosis, including recurrent thrombosis

Procedure Skills

- Making a peripheral smear
- Therapeutic phlebotomy
- Bone marrow aspiration and core biopsy (optional)
- Primary Interpretation of Tests
- Bone marrow aspiration and core biopsy (optional)

Ordering and Understanding Tests

- Evaluating common morphologic abnormalities on all the consults and outpatients as needed.
- Bone marrow aspirate, biopsy, and special stains
- Chromosome analysis-peripheral blood and bone marrow
- Clotting assay, including factor levels and mixing studies
- Hemoglobin electrophoresis
- Iron studies
- Lymph node biopsy and lymphoid cell immunophenotype
- Radiologic, sonographic, and nuclear studies to assess adenopathy, splenomegaly and red cell mass
- Serum and urine electrophoresis
- Vitamin B12 levels and Schilling test

4. INFECTIOUS DISEASES

1. Infectious disease medicine requires an understanding of the microbiology, prevention, and management of disorders caused by viral, bacterial, fungal, and parasitic infections, including the appropriate use of antimicrobial agents, vaccines, and other immunobiologic agents. Important elements include the environmental, occupational, and host factors that predispose to infection, as well as basic principles of the epidemiology and transmission of infection

2. The general internist should be able to provide appropriate preventive (including optimal use of immunization and chemoprophylaxis), diagnostic, and therapeutic care for most infections. He or she should also be able to evaluate symptoms that may be caused by a wide range of infectious disorders.
3. General internists should also learn about diagnostic and management approaches to patients with HIV infection.

Common Clinical Disorders

- Principles and practices of infection control and isolation.
- Common infectious diseases including their epidemiology, etiologic pathogens, pathogenesis, clinical manifestations, differential diagnosis, appropriate application and interpretation of diagnostic tests, treatment, and prophylaxis for:
 - Respiratory tract infections
 - Central nervous system infections
 - Cardiovascular infections
 - Fungal disease
 - Mycobacterial infections
 - Approach to the Patient with a Parasitic Infection
 - Malaria and Babesiosis
 - Soft tissue, bone, and joint infections
 - Fevers of unknown origin
 - Infections in immunocompromised hosts
 - Gastrointestinal tract infections
 - Genitourinary tract infections including sexually transmitted diseases.
 - Infections of indwelling venous and arterial catheters and prosthetic devices
 - Nosocomial infections, in intensive care and general care settings
 - Animal and human bite wounds.
 - Infections in drug users.
 - HIV infection and its associated complications
 - Travel-related infections, diagnosis, treatment, and prevention
 - Bioterrorism: identifying infections, and understanding public health aspects.
 - Bacillus anthracis (Anthrax)
 - Yersinia pestis (Plague)
 - Variola Major (Smallpox)
 - Francisella tularensis (Tularemia)
 - Clostridium botulinum (Botulism)
 - Filoviruses (Ebola, Marburg)
 - Arenaviruses (Lassa)
- Introduction to emerging infectious diseases
- Active Immunization against infectious diseases
- Recommended immunization of infants, children and adolescents.
Recommended immunization of adults
- Recommended immunizations for travelers.
- Hypersensitivity tests and desensitization.
- Basic principles of anti-infective therapy, including the use of antibacterial, antiviral, antifungal, anti-mycobacterial, and anti-parasitic agents with regard to mechanisms of action, spectra of activity, doses and regimens, drug

interactions, mechanisms of resistance, appropriate clinical applications, and adverse effects/toxicities.

Common Clinical Presentations

- Abdominal or pelvic pain
- Cellulitis
- Cervicitis, vaginal discharge
- Diarrhea
- Dysuria
- Facial or ear pain
- Fever, including fever in immunosuppressed patient
- Hepatitis
- Joint effusion
- Limb, sacral ulcers
- Lymphadenopathy
- Meningitis
- Penile discharge
- Prevention, public health concerns (immunization, susceptibility and exposure, prophylaxis)
- Productive cough, pulmonary infiltrate
- Rash (cellulitis, erythema, petechiae, purpura, tinea)
- Red eye
- Skin abscess
- Sore throat, painful swallowing
- Vomiting

Counseling Skills

- Alternative health practices
- HIV risk assessment
- Post-diagnosis counseling
- Substance abuse

Procedure Skills

- Aspiration of skin and soft tissue infections.
- Incision and drainage of superficial abscesses
- Interpretation of gram stained smears.
- Interpretation of microbiology susceptibility reports.
- Proper collection of culture specimens throat, cervix, vagina, rectum, urethra and blood
- Saline and potassium hydroxide preparation of vaginal fluid, skin scrapings
- Tuberculin and anergy panel skin tests

Ordering and Understanding Tests

- Antibiotic sensitivity testing and serum levels
- Biopsy of tissues
- CD4 lymphocyte counts

- Cerebrospinal fluid cell count, chemistry, VDRL, cryptococcal antigen, cytology
- Computed tomography, magnetic resonance imaging of the central nervous system
- Polymerase chain reaction ELISA and Western blot for detection of infectious diseases
- Serology for infections (e.g., Lyme disease, syphilis, etc.)

5. NEPHROLOGY

1. The general internist should be competent to evaluate and appropriately refer patients with glomerular disorders, asymptomatic urine abnormalities, tubulointerstitial diseases, renal vascular disease, renal failure, nephrolithiasis, tubular defects, and infections and neoplasms of the kidneys, bladder, and urethra, and should also be able to provide principle treatment for some of these conditions.
2. He or she should be able to manage fluid, electrolyte, and acid-base disorders
3. Understand the ways in which systemic diseases may affect the kidneys and recognize the potential nephrotoxicity of various therapeutic and diagnostic agents.
4. The general internist must also be familiar with guidelines for pre-dialysis management of patients with renal failure and be able to recognize indications for dialysis and for referral to a nephrologist. Although all general internists should know the indications for dialysis, in some cases (for example, if a nephrologist is unavailable), the general internists may be responsible for initiating and maintaining patients on peritoneal dialysis.

Common Clinical Disorders

- Fluid and electrolyte disorders
- Acid-base disorders
- Acute renal failure.
- Chronic renal failure
- Evaluation of renal function e.g. Urinalysis, urine protein-creatinine ratio, calculation of GFR.
- Obstructive uropathy.
- Renal stones and management of an acute renal colic.
- Urinary tract infection including pyelonephritis
- Tubulointerstitial disease.
- Chronic kidney disease.
- Glomerulonephropathies
- Nephrotic disease in primary renal disorders.
- Nephrotic disease from systemic disorders.
- Hypertension including hypertensive crises
- Diseases demonstrating nephritic and nephrotic components.
- Cystic diseases of the kidney.
- Multisystem diseases with variable kidney involvement.
- Medullary sponge kidney
- Effects of drugs on the kidneys.

- Principles of renal transplantation
- Urologic disorders e.g. Bladder outlet obstruction, detection of prostate cancer, and incontinence
- Renal function and disease in pregnancy.
- The kidney and aging.

Common Clinical Presentations

- Abnormalities noted on urinalysis (including proteinuria, hematuria, bacteriuria, pyuria and cylinduria)
- Complaints referable to bladder outlet (urgency, hesitancy)
- Dysuria
- Edema
- Flank or suprapubic pain or tenderness
- Frequency and complaints referable to increased or decreased urine volume
- Hematuria (gross)
- Hypertension
- Incontinence
- Presenting features of uremia
- Renal colic
- Renal mass or bruit

Procedure Skills

- Calculation of creatinine clearance
- Calculation of fractional excretion of sodium
- Peritoneal cavity aspiration per indwelling dialysis catheter
- Femoral temporary hemodialysis catheter placement
- Peritoneal dialysis catheterization
- Suprapubic bladder catheterization

Ordering and Understanding Tests

- 24-Hour urine excretion of calcium, oxalate, citrate, uric acid and protein
- Computed tomography, magnetic resonance imaging and angiography and ultrasound of the kidneys
- Creatinine clearance
- Cystometrography
- Cystoscopy
- Fractional excretion of sodium
- Intravenous pyelography
- Radionuclide renal scan
- Renal angiography and venography
- Renal biopsy
- Retrograde pyelography
- Serologic tests for evaluating glomerulonephritis
- Urinary calculus analysis
- Urine electrolytes (sodium, potassium, chloride)
- Urine/plasma osmolality

6. CARDIOLOGY

1. The general internist should be able to provide primary and secondary preventive care and initially manage the full range of cardiovascular disorders.
2. The need for additional competencies in cardiovascular disease will depend on the availability of a cardiologist in the primary practice setting.
3. In some communities, the general internist may be responsible for management of more complex cardiovascular disorders that require intensive hemodynamic monitoring (for example, balloon-tipped pulmonary artery catheters) in the intensive care unit.

Common Clinical Disorders

- Coronary Artery Diseases
- Chronic stable angina.
- Unstable angina.
- Care of post-CABG and post-PTCA patients.
- Myocardial infarction (covered mainly in the coronary care unit rotation).
- Care of post myocardial infarction patients.
- Congestive heart failure:
 - Chronic heart failure.
 - Systolic heart failure from various etiologies (ischemic/ non ischemic).
 - Diastolic heart failure.
- Pulmonary edema.
- Valvular heart disease.
- Infective endocarditis.
- Arrhythmias
 - Atrial fibrillation, atrial flutter and other common supraventricular arrhythmias.
 - Ventricular arrhythmias, sudden cardiac death and indications for AICD implantation.
 - Bradyarrhythmias and major indication of temporary and permanent pacing.
 - Basic understanding of pacemaker function.
- Indication and value of electrophysiologic testing.
- Adult congenital heart disease.
- Cardiomyopathies and myocarditis.
- Preoperative evaluation:
 - Assessing cardiac risk in patients undergoing non-cardiac surgeries.
 - Interventions to minimize cardiac risk in patients undergoing non-cardiac procedures.
- Hypertension:
 - Hypertensive urgencies and emergencies.
 - Management of chronic hypertension, especially patients with difficult to control hypertension.
 - Secondary hypertension.
- Aortic disease (aortic aneurysm).

- Venous thromboembolic disease / pulmonary embolism, pulmonary vascular disease, and chronic venous stasis.
- Arterial insufficiency
- Pericardial disease
- Dyslipidemia

Common Clinical Presentations

- Abnormal heart sounds or murmurs
- Chest pain
- Dyspnea
- Effort intolerance, fatigue
- Hypertension
- Intermittent claudication
- Leg swelling
- Peripheral vascular disease
- Risk factor modification
- Shock, cardiovascular collapse
- Syncope, lightheadedness

Procedure Skills

- Advanced cardiac life support
- Insertion of balloon-tipped pulmonary artery catheter (optional)
- Insertion of temporary pacemaker (optional)

Primary Interpretation of Tests

Stress electrocardiography (optional)

Ordering and Understanding Tests

- Ambulatory ECG monitoring
- Echocardiography
- Electrophysiology testing
- Left ventricular catheterization and coronary angiography
- Nuclear scan wall motion study
- Right ventricular catheterization (including flotation catheter)
- Stress electrocardiography and thallium myocardial perfusion scan
- Tilt-table physiology study Psychiatry

7. PSYCHIATRY

- Understanding of the prevention and treatment of mental disorders and associated emotional, behavioral and stress-related problems.
- Given a patient with a chief complaint residents will: a) perform a focused history, b) request appropriate diagnostic tests, c) formulate a set of working diagnoses, d) formulate appropriate treatment plans including referrals.
- In general internal medicine practice, management of risk factors for mental disorders and early diagnosis and intervention for established disease (primary and secondary prevention) are important elements.

- The general internist should have a wide range of competency in psychiatric disease, particularly as it is encountered in outpatient settings and should be able to diagnose symptoms and use pharmacotherapy, behavioral modification, and counseling to provide primary and secondary preventive care and initially manage many mental disorders.
- Patients hospitalized for general medical problems and those in the intensive care unit may have significant psychiatric co morbidity that contributes to general medical morbidity and length of stay. In these and all other settings, the general internist must be able to evaluate and manage psychiatric co morbidity effectively with appropriate specialty consultation.
- The range of competencies expected of a general internist will depend on the availability of psychiatrists in the primary practice setting.
- Refractory cases and patients with mental disorders requiring psychotherapeutic interventions will generally be referred to a psychiatric hospitalization.

Common Clinical Disorders

- Psychiatric assessment of common psychiatric disorders.
- Substance use disorders.
- Delirium, dementia and other cognitive disorders
- Geriatric psychiatric disorders
- Psychiatric problems associated with hospitalization and medical and surgical disorders

Common Clinical Presentations

- Agitation or excitement
- Anxiety
- Confusion
- Delusions or bizarre beliefs
- Depressed or sad mood
- Fatigue
- Hallucinations
- Insomnia
- Memory loss
- Poor hygiene or self-care
- Strange speech or behavior
- Suicide risk
- Suspiciousness or feelings of persecution
- Unexplained changes in personality or performance
- Unexplained physical symptoms suggesting somatization

Procedure Skills

- Depression inventory
- Mental status examination, including standardized cognitive examinations when indicated

- Ordering and Understanding Tests
- Electroencephalography
- Neuropsychological evaluation

8. ENDOCRINOLOGY, DIABETES, AND METABOLISM

1. The principal endocrine problems handled by the general internist include goiter, thyroid nodules, thyroid dysfunction, diabetes mellitus, hyper- and hypocalcemia, adrenal cortex hyper- and hypofunction, endocrine hypertension, gonadal disorders, hyper- and hyponatremia, certain manifestations of pituitary tumors, disorders of mineral metabolism, and hyperlipidemias.
2. Recognize Type 1 from Type 2 DM
3. Plan dietary therapy, oral hypoglycemic agents and insulin therapy for all diabetics, especially Type 2 DM patients
4. Plan and advice recommendations for weight loss
5. Understand the concept of tight control, standards of care and targets of control for both Type 1 and Type 2 DM patients
6. Learn the management of acute decompensation of diabetes, i.e. DKA, hyperosmolar state.
7. Learn how to use a multidisciplinary team approach to diabetes management (including role of cardiology, nephrology, ophthalmology and Podiatry).
8. Learn to interpret thyroid function tests, thyroid imaging and to initiate and follow patients on thyroid hormone replacement therapy.
9. Diagnosis, evaluation, differential diagnosis and management of overt and subclinical hyperthyroidism and hypothyroidism, thyroid storm and low uptake versus high uptake thyrotoxicosis.
10. Approach to thyroid nodules and thyroid cancer
11. Evaluate and develop treatment strategies for Pituitary disorders – pituitary tumors and hypopituitarism, diagnosis, difference between the various etiologies and replacement hormonal therapies.
12. Learn to approach adrenal diseases including Cushing's syndrome and adrenal insufficiency focus on acute and chronic adrenal insufficiency – diagnosis and management.
13. Evaluation, D/D and management of Hypercalcemia (focus on primary hyperparathyroidism) and Hypocalcemia, Osteoporosis, Osteopenia, Vitamin D deficiency.
14. Endocrine causes of secondary hypertension- Cost efficient evaluation and management.
15. Learn to recognize and treat Poly endocrine autoimmune syndromes.
16. Evaluate and treat male and female hypogonadism (focus on testosterone replacement Therapy.
17. HRT in females and related reproductive endocrine disorders.
18. Approach to endocrine incidentalomas – (pituitary, adrenal and thyroid with a focus on adrenal incidentalomas).
19. The general internist must be able to evaluate and manage common endocrine disorders and refer appropriately. He or she must also be able to evaluate and identify the endocrinologic implications of

abnormal serum electrolytes, hypertension, fatigue, and other nonspecific presentations.

20. The general internist plays a key role in managing endocrine emergencies, particularly those encountered in the intensive care unit, including diabetic ketoacidosis and hyperosmolar non ketotic stupor, severe hyper- and hypocalcemia and Addisonian crisis.

Common Clinical Disorders

- Pathophysiology of Type 1 & 2 diabetes
- Diagnostic criteria for Diabetes, Differentiate Type I vs. Type II
- Standards of care for a patient with Diabetes
- Targets of care for a patient with Diabetes
- Metabolic syndromes
- Importance & treatment of Metabolic syndrome
- Life style modifications in metabolic syndrome and diabetes
- Classes of oral anti hypoglycemic agents used and their mechanism of action. indications and contraindications for each class and side effects
- Insulin management in Type 1 and 2 DM
- Types of insulin available today (Rapid, Short, Intermediate, Basal, Premixed insulin preparations)
- Indications, contraindications, complications associated with insulin use
- Insulin protocols used in ICU setting including IV insulin therapy
- Acute diabetes complications, diagnosis and management
- Hyperlipidemia
- Combination therapy to treat diabetic dyslipidemia
- Thyroid function tests in diagnosing various thyroid dysfunction states.
- Interpretation of TSH, FT4, T3, T7, FTI, T3RU, Thyroglobulin
- Role of thyroid scan and radioactive iodine uptake – indications and contraindications for use
- Thyroid imaging – when to use it (ultrasound, CT scan, MRI. Role of PET scan)
- Hyperthyroidism; etiology, pathophysiology, clinical features, diagnosis and management
- Differentiate hyperthyroidism from thyrotoxicosis
- Differential diagnosis of hyperthyroidism (graves' disease vs toxic MNG, single hot nodule, thyroiditis etc)
- Thyroid hormone therapy
- Hypothyroidism: primary vs secondary hypothyroidism
- Diagnosis and management
- Thyrotoxic storm and myxedema coma
- Euthyroid sick syndrome
- Approach to thyroid nodules and thyroid cancer
- Endocrine hypertension
- Management – indications for surgery vs medical management
- Pheochromocytoma:
- Approach to adrenal diseases
- Adrenal insufficiency
- Cushing's disease
- Hypocalcaemia and hypercalcaemia

- Osteoporosis, osteopenia, vitamin D deficiency
- Incidentalomas:
- Hypopituitarism including pituitary tumors:
- Prolactinomas and Acromegaly
- Hirsutism
- Male and Female Hypogonadism
- Testosterone replacement therapy in males
- Update on the HRT in females
- Polyendocrine autoimmune syndromes

Common Clinical Presentations

- Asthenia
- Blood lipid disorders
- Breast discharge
- Change in menstrual, gonadal/sexual function
- Diarrhea
- Disorders of pigmentation
- Goiter (diffuse, nodular)
- Hirsutism
- Hypertension refractory to primary therapy
- Hypotension
- Incidentally discovered abnormalities in serum electrolytes, calcium, phosphate, or glucose
- Mental status changes
- Osteopenia
- Polyuria, polydipsia
- Signs and symptoms of osteopenia
- Symptoms of hyper- and hypoglycemia
- Symptoms of hypermetabolism
- Symptoms of hypometabolism
- Urinary tract stone
- Weight gain, obesity

Procedure Skills

- Dexamethasone suppression test (overnight)
- Home blood glucose monitoring
- ACTH stimulation test

Ordering and Understanding Tests

- Bone mineral analysis (densitometry)
- Fasting and standardized postprandial serum glucose concentrations
- Glycohemoglobin or serum fructosamine concentration
- Imaging studies of the sella turcica
- Microalbuminuria
- Serum alkaline phosphatase activity (for Paget's disease of bone)
- Serum and urine ketone concentrations (quantitative or qualitative)
- Serum and urine osmolalities

- Serum gonadotropin concentrations (follicle-stimulating hormone, luteinizing hormone)
- Serum lipid profile
- Serum phosphate concentration
- Serum prolactin concentration
- Serum testosterone concentration
- Serum thyroid function tests
- Thyroid scanning and ultrasound
- Urinary calcium, phosphate, uric acid excretion
- Urinary sodium, potassium excretion
- Urine metanephrine, VMA (vanillylmandelic acid), and total catecholamine levels

9. ALLERGY AND IMMUNOLOGY

1. An understanding of immunological basis and management of disorders related to hypersensitivity or altered reactivity caused by release of immunologic mediators or by activation of inflammatory mechanisms
2. The general internist should be able to offer primary care for several diseases involving altered immunity or hypersensitivity
3. For these diseases, the general internist should be able to initiate diagnostic evaluation and therapy with or without the help of a sub specialist.
4. The general internist should also be able to recognize many other diseases in which altered immunity plays an important role.

Common Clinical Presentations

- Anaphylaxis
- Conjunctival and bulbar inflammation, chemosis, ocular pruritus
- Dyspnea, cough, wheezing, sputum production, use of accessory muscles of respiration
- Nasal obstruction and pruritus, rhinorrhea, sneezing
- Skin wheeling, angioedema, bullous formation, eczematous and papular eruptions, morbilliform rashes, purpura, pruritus

Procedure Skills

- Spirometry and spirometric response to bronchodilators
- Wright-Giemsa stain of nasal and pulmonary secretions

Primary Interpretation of Tests

- Delayed-hypersensitivity skin tests
- Ordering and Understanding Tests
- Drug desensitization protocols
- Computed tomography of lungs, sinuses
- Immediate skin tests for IgE-mediated reactions to inhalants, food, certain drugs
- In vitro test for specific IgE

- Levels of complement component, C1 esterase inhibitor
- Methacholine inhalation challenge
- Patch tests
- Prick and intradermal skin tests
- Pulmonary function tests (including spirometry, lung volume, diffusion)
- Serum Immunoglobulin levels
- Serum theophylline levels
- T- and B-cell quantitation and subtyping (CD classification)
- Total eosinophil count

10. NEUROLOGY

1. The general internist should possess a broad range of competency in neurology and the knowledge should encompass the prevention and management of disorders of the central and peripheral nervous systems.
2. He or she should be able to perform and interpret a detailed neurologic examination, skilled in localization of the disease process and generation of a differential diagnosis and proper use of laboratory tests to efficaciously come to a correct diagnosis
3. Knowledge of therapeutics, surgical and medical and primary and secondary prevention of neurologic diseases and should be familiar with the presenting features, diagnosis, and treatment of common neurologic disorders and other conditions, such as headache, caused by non-neural dysfunction
4. The general internist may encounter neurologic disorders in various settings, including ambulatory care, hospital, long-term care, and home care.
5. In communities where a neurologist is not available, the general internist may be a consultant for some complex neurologic disorders (for example, control of status epilepticus).

Common Clinical Disorders

- Headache
- Facial Pain
- Inflammatory meningeal and encephalitic lesions
- Epilepsy
- Syncope and Dysautonomia
- Sensory Disturbances
- Weakness and Paralysis
- Transient Ischemic Attacks
- Stroke
- Intracranial and Spinal Space-Occupying Lesions.
- Nonmetastatic Neurologic Complications of Malignant Disease.
- Pseudotumor Cerebri
- Selected Neurocutaneous Diseases
- Movement Disorders

- Dementia
- Multiple Sclerosis
- Vitamin E Deficiency
- Spasticity
- Myelopathies in AIDS
- Myelopathy of Human T Cell Leukemia Virus
- Subacute Combined Degeneration of the Spinal Cord.
- Wernicke's Encephalopathy
- Stupor and Coma
- Head Injury
- Spinal Trauma
- Syringomyelia
- Motor Neuron Diseases
- Peripheral Neuropathies
- Discogenic Neck Pain
- Brachial and Lumbar Plexus Lesions
- Disorders of Neuromuscular Transmission
- Myopathic Disorders
- Periodic Paralysis Syndrome

Common Clinical Presentations

- Abnormal speech
- Abnormal vision
- Altered sensation
- Confusion
- Disturbed gait or coordination
- Dizziness, vertigo
- Headache
- Hearing loss
- Localized pain syndromes: Facial pain, radiculopathy
- Loss of consciousness
- Memory impairment
- Seizure
- Sleep disorder
- Tremor
- Weakness/paresis (generalized, localized)

Procedure Skills

- Caloric stimulation test
- Tensilon (edrophonium chloride) test (optional)
- Lumbar Puncture

Ordering and Understanding Tests

- Anticonvulsant drug levels
- Carotid Doppler echo scans
- Computed tomography, magnetic resonance imaging of central nervous system
- Digital intravenous angiography
- Electroencephalography, evoked potentials (visual, auditory, sensory)

- Electromyography, nerve conduction studies
- Muscle biopsy
- Myelography
- Screen for toxins, heavy metals
- Sleep study

11. DERMATOLOGY

1. Understanding the morphology, differential diagnosis and management of disorders of the skin, mucous membranes, and adnexal structures, including inflammatory, infectious, neoplastic, metabolic, congenital, and structural disorders.
2. Competence in medical and surgical interventions and dermatopathology are important facets.
3. The general internist should have a general knowledge of the major diseases and tumors of the skin. He or she should be proficient at examining the skin; describing findings; and recognizing skin, signs of systemic diseases, normal findings (including benign growths of the skin), and common skin malignancies.
4. The general internist should be able to diagnose and manage a variety of common skin conditions and make referrals where appropriate.

Common Clinical Disorders

- Primary and secondary lesions of skin
- Inflammatory and infective skin lesions
- Fungal infections
- Pruritus
- Bullous diseases
- Pyoderma/viral infections
- Papulosquamous disease
- Common dermatoses
- Skin cancer
- Skin biopsy technique
- Hair and nail disease

Common Clinical Presentations

- Abnormalities of pigmentation
- Eruptions (eczematous, follicular, papulovesicular, vesicular, vesiculobullous)
- Hair loss
- Hirsutism
- Intertrigo
- Leg ulcer
- Mucous membrane ulceration
- Nail infections and deformities
- Pigmented lesion
- Pruritus

- Purpura
- Skin papule or nodule
- Verrucous lesion

Procedure Skills

- Application of chemical destructive agents for skin lesions e.g., warts and molluscum, condyloma
- Incision, drainage, and aspiration of fluctuant lesions for diagnosis or therapy
- Scraping of skin (for potassium hydroxide, mite examination)
- Skin biopsy
- Cryotherapy

Primary Interpretation of Tests

- Microscopic examination for scabies, nits, etc.
- Tzanck smear

Ordering and Understanding Tests

- Dark-field microscopy
- Fungal culture
- Skin biopsy

12. RHEUMATOLOGY

1. Rheumatology and nonoperative orthopedics deal with the prevention, diagnosis, and management of crystalline diseases, systemic rheumatic diseases, spondyloarthropathies, vasculitis, inflammatory muscle disease, osteoporosis, osteoarthritis, recreational and sports injury, and soft-tissue diseases and trauma.
2. The goal of rheumatology is early diagnosis and treatment of these conditions to prevent disability and death.
3. The general internist needs to have competency in the initial diagnosis and management of acute arthritis and musculoskeletal disorders and in the long-term care of systemic disorders.
4. He or she must also be proficient in monitoring the effects of anti-inflammatory, immunosuppressive, and cytotoxic drugs.

Common Clinical Disorders

- Purine and uric acid metabolism and crystal-induced arthritis
- Autoimmune disorders (e.g. R.A., S.L.E., Scleroderma and vasculitis)
- Infectious and reactive arthritides
- Metabolic bone diseases e.g. Osteoporosis
- Bone and cartilage disorders e.g. Osteoarthritis
- Nonarticular and regional musculoskeletal disorders
- Inflammatory muscle diseases

- Miscellaneous rheumatic disorders
- Carpal tunnel syndrome (and Tarsal tunnel syndrome)
- Anserine and trochanteric bursitis
- Stenosing tenosynovitis
- Ganglion cysts
- Epicondylitis
- Minor sports-related injuries
- Overuse injuries
- Laboratory and diagnostic tests
- Radiographic imaging and other diagnostic procedures
- Drugs used in rheumatic diseases

Common Clinical Presentations

- Joint pain and/or swelling (acute or chronic, monoarticular or polyarticular)
- Muscle aches (localized or diffuse)
- Musculoskeletal weakness
- Nonarticular signs and symptoms of rheumatologic disease, such as Raynaud's phenomenon and skin rash
- Regional pain of the neck, shoulder, lower back, hip, knee, hands, or wrists
- Traumatic joint

Procedure Skills

- Demonstrate the ability to perform a complete joint examination.
- Therapeutic injection of corticosteroid and arthrocentesis for the knee joint.
- Therapeutic injection of corticosteroid to the periarticular structures (bursal) of the shoulder, knee, elbow, and foot
- Arthrocentesis of other joints (optional)
- Aspiration of a bursitis
- Aspiration of a ganglion cyst

Primary Interpretation of Tests

- Analysis of synovial fluid.
- Plain bone radiographs of joints and spine
- Ordering and Understanding Tests
- Anti-DNA, anti-Sm, anti-RNP, and anti-SS-A antibodies
- Antineutrophil cytoplasmic antibody (ANCA)
- Complement level
- Erythrocyte sedimentation rate
- Fluorescent antinuclear antibody (ANA)
- Rheumatoid factor
- Synovial analysis for crystals

13. ONCOLOGY

1. Medical oncology rotation shall prepare the internist in the diagnosis and management of benign and malignant lesions of the musculoskeletal system.
2. The general internist should have a wide range of competencies in the evaluation and management of neoplastic disease.
3. He or she must be able to identify patients at risk for malignancy and
4. counsel them regarding risk reduction and screening
5. Investigate clinical syndromes suggestive of underlying malignancy
6. Undertake the palliative care of patients with common solid and hematologic tumors
7. Identify neoplasms with a potential for cure and direct affected patients to the appropriate centers or providers and participate in the difficult decisions regarding all aspects of management, including diagnostic evaluation and screening, treatment and palliative care.
8. In addition, the general internist must be familiar with the administration, side effects and drug interactions of therapeutic agents commonly used for the treatment of malignant disease.
9. Whether a generalist assumes full responsibility for any or all of these functions will depend on the clinical setting of his or her practice.
10. The general internist should seek subspecialty consultation early in the care of patients with malignant disease who may be candidates for aggressive treatment with curative intent.

Common Malignant Disorders

- Breast cancer
- Lung cancer - small cell and non-small cell
- Colon cancer
- Prostate cancer
- Ovarian cancer
- Testicular cancer
- Other systemic malignancies common in Pakistan
- Pain management therapy
- Palliative care
- Chemotherapy
- Principles of cancer
- Supportive care
- Screening
- Tumor markers, Oncogenes and apoptosis
- Bone marrow transplantation

Common Clinical Presentations

- Anemia
- Ascites
- Bleeding
- Bowel obstruction
- Cough, hoarseness, hemoptysis
- Lymphadenopathy, soft tissue mass

- Organ enlargement, mass
- Pleural or peritoneal effusion of unknown cause
- Sensory polyneuropathy
- Superior vena cava syndrome
- Weight loss

Procedure Skills

- Bone marrow aspiration and biopsy (optional)
- Fine needle aspiration of thyroid and breast (optional)
- Intrathecal chemotherapy (optional)

Ordering and Understanding Tests

- Biopsy
- Bone marrow cytogenetics, immunophenotyping
- Cytology and pathology
- Diagnostic and interventional radiology
- DNA content and molecular markers of tumor tissue
- Estrogen and progesterone receptors
- Fiberoptic examinations
- Imaging studies, including computed tomography and magnetic resonance imaging, nuclear studies
- Serologic markers for tumors
- Ultrasound

14. GERIATRICS/REHABILITATIVE MEDICINE

1. Given an increasingly aging population and the focus on primary care practitioners as the major care providers, a solid working knowledge and understanding of the principles of geriatric medicine and long term care is essential for a well-trained general internist.
2. Geriatric aspects of psychiatric diseases
3. Adaptations and maladaptations to systemic diseases, including effects on the body systems and on laboratory and imaging studies with performance and interpretation of tests.
4. Demonstrate ability to perform assessment of needs and determine most appropriate level of care for each individual.
5. Demonstrate understanding of basic principles of: interdisciplinary teamwork; skin care and pressure ulcer prevention; health maintenance and preventive medicine; nutrition; ethics; clinical pharmacology; discharge planning and appropriate utilization of resources.
6. Understand principles of diagnosis and management of common infections in long term care; incontinence; delirium, dementia, cognitive impairment; behavior problems; disorders of vision, hearing, communication; falls; pressure ulcers.
7. Develop ability to assess ADL function and rehabilitation potential.

8. Understand indications for and risks of chemical and mechanical restraints and recognize need for use of least restrictive means of management.
9. Understand indications for and risks of psychotropic medication in this population and demonstrate ability to assess for unwanted effects.
10. Demonstrate basic understanding of the most common problems, by organ system, experienced by the elderly and disabled.

Common Clinical Disorders

Prevention	Adult preventive visit Adult immunizations Smoking Cessation
Eye	Low vision Cataract Blepharitis
ENT	Sinusitis Pharyngitis URI Cerumen impaction Hearing loss
Respiratory	Acute bronchitis COPD/chronic bronchitis Chronic cough Asthma/wheezing Pneumonia Influenza
Cardiovascular	Hypertension Coronary artery disease CHF Chest pain Palpitations Peripheral edema Post MI care Atrial fibrillation Deep vein thrombosis
Gastrointestinal	GE reflux Ulcer/gastritis Gastroenteritis/acute diarrhea Irritable bowel syndrome Constipation Hemorrhoids Diverticular disease Liver disease/jaundice

Renal	Renal insufficiency Nephrolithiasis Proteinuria Hematuria Pyelonephritis
Gynecology	Menopause Vaginitis, atrophic Vaginitis, infectious Breast mass Uterine fibroid
Urology	Incontinence UTI Prostatism Prostatitis Prostate mass
Musculoskeletal	Low back pain Osteoporosis Osteoarthritis Arthritis, other Knee pain Neck pain Overuse syndrome/tenosynovitis
Neurology	Delirium Headache Dementia Cerebrovascular disease Sleep disorder Parkinson's disease Gait ataxia Dizziness Multiple sclerosis Seizure disorder
Mental health	Depression Alcohol abuse Anxiety Adjustment disorder Somatization Panic disorder
Hematology/oncology/ Immunology	Anemia Cancer screening Systemic cancer care coordination Cancer diagnosis

Infectious disease	HIV Tuberculosis Malaria
Dermatology	Pressure ulcer Actinic keratosis Seborrheic keratosis Dermatitis Nevus/benplasm Tinea Varicella zoster Skin infection (abscess, cellulitis,
Endocrine	Diabetes mellitus, type II Hypothyroidism Hyperlipidemia Obesity Hyperthyroidism Diabetes mellitus, type I Hormone replacement therapy
Constitutional	Fatigue Unintentional weight loss Fever
Abuse/neglect	Elder abuse/neglect

Procedure Skills

- ADL and IADL Assessment
- Mini-Mental Status Exam (MMSE)
- Life Expectancy Estimate
- Geriatric Depression Scale (GDS)
- Decision-Making Capacity Assessment
- Mobility Status Assessment
- Righting Reflex Assessment
- Nutritional Status Assessment
- Medication Review with Recommendations
- Pressure Ulcer Risk Assessment/Prevention
- Pressure Ulcer Staging/Treatment
- Urinary Incontinence Assessment/Management

15. EMERGENCY MEDICINE AND CRITICAL CARE

1. Training in emergency medicine and critical care is crucial for the general internist.
2. Recognition/prioritization medical emergencies is the basic knowledge that should be acquired by the internist

3. Important aspects of this training include: identifying patients who are candidates for intensive care, the bedside approach to the critically-ill patient, knowledge of algorithms for diagnosis and management of common problems in the ICU, death and resuscitation issues, interaction with families

Skills and Procedures:

- Asthma management
- Evaluation of chest pain
- Evaluation of shortness of breath
- Airway management/tracheostomy Barotrauma
- Mechanical ventilation: indications, initial set-up, trouble shooting, weaning
- Critical care nutrition: indications, disease-specific nutrition, writing TPN orders
- Management of Ob/Gynae emergencies
- Oxygen transport: physiology, alterations in the critically-ill
- Arterial blood gases: approach to analysis, common alterations
- Hemodynamics: physiology, PA catheter, hemodynamic waveforms, trouble-shooting
- Critical care pharmacology: pressors / inotropes, antibiotic dosing, drug dosing in ARF
- Shock: pathophysiology, approach to resuscitation
- Fluid and electrolyte disturbances: sodium, potassium, magnesium, calcium
- Acute renal failure: approach differential diagnosis, management
- Coma: pathophysiology, neurological exam, differential diagnosis
- Wound care
- Splinting techniques
- Ophthalmologic emergency management
- Multiple organ dysfunction syndrome
- Acute CHF
- Ethical issues in the ICU
- Management of environmental emergencies
- Basic toxicology principles
- Sepsis prevention in the ICU
- Arterial line insertion
- Central venous catheterization
- Pulmonary artery catheterization
- Assistance in endotracheal intubation
- Cardiopulmonary resuscitation
- Ordering and rapid interpretation of laboratory tests

2. Thesis Component

RESEARCH/ THESIS WRITING

Total of one year will be allocated for work on a research project with thesis writing. Project must be completed and thesis be submitted before the end of training. Research can be done as one block in 4th year of training or it can be stretched over four years of training in the form of regular periodic rotations during the course as long as total research time is equivalent to one calendar year.

Research Experience

The active research component program must ensure meaningful, supervised research experience with appropriate protected time for each resident while maintaining the essential clinical experience. Recent productivity by the program faculty and by the residents will be required, including publications in peer-reviewed journals. Residents must learn the design and interpretation of research studies, responsible use of informed consent, and research methodology and interpretation of data. The program must provide instruction in the critical assessment of new therapies and of the medical literature. Residents should be advised and supervised by qualified staff members in the conduct of research.

Clinical Research

Each resident will participate in at least one clinical research study to become familiar with:

1. Research design
2. Research involving human subjects including informed consent and operations of the Institutional Review Board and ethics of human experimentation
3. Data collection and data analysis
4. Research ethics and honesty
5. Peer review process

This usually is done during the consultation and outpatient clinic rotations.

Case Studies or Literature Reviews

Each resident will write, and submit for publication in a peer-reviewed journal, a case study or literature review on a topic of his/her choice.

Laboratory Research

Bench Research

Participation in laboratory research is at the option of the resident and may be arranged through any faculty member of the Division. When appropriate, the research may be done at other institutions.

Research involving animals

Each resident participating in research involving animals is required to:

1. Become familiar with the pertinent Rules and Regulations of the University of Health Sciences Lahore i.e. those relating to "Health and Medical Surveillance Program for Laboratory Animal Care Personnel" and "Care and Use of Vertebrate Animals as Subjects in Research and Teaching".
2. Read the "Guide for the Care and Use of Laboratory Animals".
3. View the videotape of the symposium on Humane Animal Care.

Research involving Radioactivity

Each resident participating in research involving radioactive materials is required to:

1. Attend a Radiation Review session
2. Work with an Authorized User and receive appropriate instruction from him/her.

METHODS OF INSTRUCTION/COURSE CONDUCTION

As a policy, active participation of students at all levels will be encouraged.

Following teaching modalities will be employed:

1. Lectures
2. Seminar Presentation and Journal Club Presentations
3. Group Discussions
4. Grand Rounds
5. Clinico-pathological Conferences
6. SEQ as assignments on the content areas
7. Skill teaching in ICU, emergency and ward settings
8. Self study, assignments and use of internet
9. Bedside teaching rounds in ward
10. OPD & Follow up clinics
11. Long and short case presentations

In addition to the conventional teaching methodologies interactive strategies like conferences will also be introduced to improve both communication and clinical skills in the upcoming consultants. Conferences must be conducted regularly as scheduled and attended by all available faculty and residents. Residents must actively request autopsies and participate in formal review of gross and microscopic pathological material from patients who have been under their care. It is essential that residents participate in planning and in conducting conferences.

1. Clinical Case Conference

Each resident, except when on vacation, will be responsible for at least one clinical case conference each month. The cases discussed may be those seen on either the consultation or clinic service or during rotations in specialty areas. The resident, with the advice of the Attending Physician on the Consultation Service, will prepare and present the case(s) and review the relevant literature.

2. Monthly Student Meetings

Each affiliated medical college approved to conduct training for MD Internal Medicine will provide a room for student meetings/discussions such as:

- a. Journal Club Meeting
- b. Core Curriculum Meetings
- c. Skill Development

a. Journal Club Meeting

A resident will be assigned to present, in depth, a research article or topic of his/her choice of actual or potential broad interest and/or application. Two hours per month should be allocated to discussion of any current articles or topics introduced by any participant. Faculty or outside researchers will be invited to present outlines or results of current research activities. The article should be critically evaluated and its applicable results should be highlighted, which can be incorporated in clinical practice. Record of all such articles should be maintained in the relevant department.

b. Core Curriculum Meetings

All the core topics of Medicine should be thoroughly discussed during these sessions. The duration of each session should be at least two hours once a month. It should be chaired by the chief resident (elected by the residents of the relevant discipline). Each resident should be given an opportunity to brainstorm all topics included in the course and to generate new ideas regarding the improvement of the course structure

c. Skill Development

Two hours twice a month should be assigned for learning and practicing clinical skills.

List of skills to be learnt during these sessions is as follows:

1. Residents must develop a comprehensive understanding of the indications, contraindications, limitations, complications, techniques, and interpretation of results of those technical procedures integral to the discipline (mentioned in the Course outlines).
2. Residents must acquire knowledge of and skill in educating patients about the technique, rationale and ramifications of procedures and in obtaining procedure-specific informed consent. Faculty supervision of residents in their performance is required, and each resident's experience in such procedures must be documented by the program director.
3. Residents must have instruction in the evaluation of medical literature, clinical epidemiology, clinical study design, relative and absolute risks of disease, medical statistics and medical decision-making.
4. Training must include cultural, social, family, behavioral and economic issues, such as confidentiality of information, indications for life support systems, and allocation of limited resources.
5. Residents must be taught the social and economic impact of their decisions on patients, the primary care physician and society. This can be achieved by attending the bioethics lectures and becoming

- familiar with Project Professionalism Manual such as that of the American Board of Internal Medicine.
6. Residents should have instruction and experience with patient counseling skills and community education.
 7. This training should emphasize effective communication techniques for diverse populations, as well as organizational resources useful for patient and community education.
 8. Residents may attend the series of lectures on Nuclear Medicine procedures (radionuclide scanning and localization tests and therapy) presented to the Radiology residents.
 11. Residents should have experience in the performance of clinical laboratory and radionuclide studies and basic laboratory techniques, including quality control, quality assurance and proficiency standards.

3. Annual Grand Meeting

Once a year all residents enrolled for MD Internal Medicine should be invited to the annual meeting at UHS Lahore.

One full day will be allocated to this event. All the chief residents from affiliated institutes will present their annual reports. Issues and concerns related to their relevant courses will be discussed. Feedback should be collected and suggestions should be sought in order to involve residents in decision making.

The research work done by residents and their literary work may be displayed.

In the evening an informal gathering and dinner can be arranged. This will help in creating a sense of belonging and ownership among students and the faculty.

LOG BOOK

The residents must maintain a log book and get it signed regularly by the supervisor. A complete and duly certified log book should be part of the requirement to sit for MD examination. Log book should include adequate number of diagnostic and therapeutic procedures observed and performed, the indications for the procedure, any complications and the interpretation of the results, routine and emergency management of patients, case presentations in CPCs, journal club meetings and literature review.

Proposed Format of Log Book is as follows:

Candidate's Name: -----

Roll No. _____ Supervisor -----

The procedures shall be entered in the log book as per format

Procedures Performed

Sr.#	Date	Name of Patient, Age, Sex & Admission No.	Diagnosis	Procedure Performed	Supervisor's Signature
1					
2					
3					
4					

Emergencies Handled

Sr. #	Date	Name of Patient, Age, Sex & Admission No.	Diagnosis	Procedure/Management	Supervisor's Signature
1					
2					
3					
4					

Case Presented

Sr.#	Date	Name of Patient, Age, Sex & Admission No.	Case Presented	Supervisor's Signature
1				
2				
3				
4				

Seminar/Journal Club Presentation

Sr.#	Date	Topic	Supervisor's signature
1			
2			
3			
4			

Evaluation Record

(Excellent, Good, Adequate, Inadequate, Poor)

At the end of the rotation, each faculty member will provide an evaluation of the clinical performance of the fellow.

Sr.#	Date	Method of Evaluation (Oral, Practical, Theory)	Rating	Supervisor's Signature
1				
2				
3				
4				

EVALUATION & ASSESSMENT STRATEGIES

Assessment

It will consist of action and professional growth oriented ***student-centered integrated assessment*** with an additional component of ***informal internal assessment, formative assessment*** and measurement-based ***summative assessment***.

Student-Centered Integrated Assessment

It views students as decision-makers in need of information about their own performance. Integrated Assessment is meant to give students responsibility for deciding what to evaluate, as well as how to evaluate it, encourages students to '**own**' the evaluation and to use it as a basis for self-improvement. Therefore, it tends to be growth-oriented, student-controlled, collaborative, dynamic, contextualized, informal, flexible and action-oriented.

In the proposed curriculum, it will be based on:

- Self Assessment by the student
- Peer Assessment
- Informal Internal Assessment by the Faculty

Self Assessment by the Student

Each student will be provided with a pre-designed self-assessment form to evaluate his/her level of comfort and competency in dealing with different relevant clinical situations. It will be the responsibility of the student to correctly identify his/her areas of weakness and to take appropriate measures to address those weaknesses.

Peer Assessment

The students will also be expected to evaluate their peers after the monthly small group meeting. These should be followed by a constructive feedback according to the prescribed guidelines and should be non-judgmental in nature. This will enable students to become good mentors in future.

Informal Internal Assessment by the Faculty

There will be no formal allocation of marks for the component of Internal Assessment so that students are willing to confront their weaknesses rather than hiding them from their instructors.

It will include:

- a. Punctuality
- b. Ward work
- c. Monthly assessment (written tests to indicate particular areas of weaknesses)
- d. Participation in interactive sessions

Formative Assessment

Will help to improve the existing instructional methods and the curriculum in use

Feedback to the faculty by the students:

After every three months students will be providing a written feedback regarding their course components and teaching methods. This will help to identify strengths and weaknesses of the relevant course, faculty members and to ascertain areas for further improvement.

Summative Assessment

It will be carried out at the end of the programme to empirically evaluate **cognitive, psychomotor** and **affective domains** in order to award diplomas for successful completion of courses.

MD INTERNAL MEDICINE EXAMINATIONS

Part-I MD Internal Medicine

Total Marks: 200

All candidates admitted in MD Internal Medicine course shall appear in Part-I examination at the end of first calendar year.

Components of Part-I Examination:

Paper-I, 100 MCQs (single best, having one mark each)	100 Marks
Paper-II, 10 SEQs (having 10 marks each)	100 Marks

Topics included in paper:

Topics included in paper:	Paper-I	Paper-II
1. Anatomy	(20 MCQs)	(2 SEQs)
2. Physiology	(20 MCQs)	(2 SEQs)
3. Pathology	(20 MCQs)	(2 SEQs)
4. Biochemistry	(15 MCQs)	(1 SEQs)
5. Pharmacology	(10 MCQs)	(1 SEQ)
6. Behavioural Sciences	(10 MCQs)	(1 SEQ)
7. Biostatistics & Research Methodology	(05 MCQs)	(1 SEQ)

Part-II MD Internal Medicine

Total Marks: 1000

All candidates admitted in MD Internal Medicine course shall appear in Part-II examination at the end of structured training programme (end of 4th calendar year and after clearing Part-I examination).

There shall be two written papers of 150 marks each, Oral & Practical/ Clinical examination of 300 marks, log book assessment of 200 marks and thesis examination of 200 marks.

Part II MD Internal Medicine
Clinical Examination
Total Marks: 800

Topics included in paper 1

1. Pulmonary Medicine	(15 MCQs)
2. Cardiology	(15 MCQs)
3. Endocrinology and Metabolism	(15 MCQs)
4. Nephrology	(10 MCQs)
5. Infectious Disease	(10 MCQs)
6. Allergy and Immunology	(05 MCQs)
7. Geriatrics & Rehabilitation	(05 MCQs)

Topics included in paper 2

1. Emergency Medicine & Critical Care	(15 MCQs)
2. Gastroenterology & Hepatology	(15 MCQs)
3. Neurology	(10 MCQs)
4. Psychiatry	(10 MCQs)
5. Hematology	(10 MCQs)
6. Oncology	(05 MCQs)
7. Dermatology	(05 MCQs)
8. Rheumatology	(05 MCQs)

Components of Part II Examination**Theory**

Paper I	<u>150 Marks</u>	3 Hours
15 SEQs (No Choice)	75 Marks	
75 MCQs	75 Marks	
Paper II	<u>150 Marks</u>	3 Hours
15 SEQs (No Choice)	75 Marks	
75 MCQs	75 Marks	

Only those candidates, who pass in theory papers, will be eligible to appear in the Oral & Practical/ Clinical Examination.

OSCE**100 Marks**

10 stations each carrying 10 marks of 10 minutes duration; each evaluating performance based assessment with five of them interactive.

Clinical

200 Marks

Four short cases (each 25 marks)

100 Marks

One long case:

100 Marks

Log Book

200 Marks

Part II MD Internal Medicine

Thesis Examination

Total Marks: 200

All candidates admitted in MD Internal Medicine course shall appear in Part-II (thesis examination) at the end of 4th year of the programme and not later than 7th calendar year of enrolment. The examination shall include thesis evaluation with defense.

RECOMMENDED BOOKS

BASIC SCIENCES PART-I EXAMINATIONS

Anatomy

- General Anatomy By: Professor Tassaduq Hussain
- Embryology: Langman's Embryology
- Gross Anatomy: Clinical Anatomy By: Shell
- Basic Histology By: Jenquiera
- Neuroanatomy By: Snell

Behavioral Sciences

- Rana M.H., Ali S. Mustafa M.A. Handbook of Behavioral Sciences for Medical and Dental students. Lahore: university of Health Sciences.

Physiology

- Human Physiology By: Guyton

Research Methodology

- The Medical Research Handbook, planning a research project. Amar-Singh HSS, Azman Abu Bakar and Sondi Sararaks. © 2008, Kuala Lumpur. Online available at URL, <http://www.crc.gov.my/wp-content/uploads/documents/researchHandBook.pdf>

Pathology

- Microbiology By: Jawetz
- Haematology By: Hoffbrand Postgraduate Hematology
- Histopathology By: Robin's Pathology Basic Disease
- Chemical Pathology By: Bishop's

Pharmacology

- Review of Pharmacology By: Lippincott's Illustrated

Medicine:

1. Clinical Medicine: Textbook for Medical Students & Doctors. Kumar & Clark (editors). 6th edition (2006). Elsevier Saunders, Edinburgh.
2. Harrison's Principles of Internal Medicine by Eugene Braunwald. 16th Ed. McGraw-Hill
3. Davidson's Principles and Practice of Medicine by Nicholas A. Boon 20th edition. Churchill Livingstone

4. Hutchison's Clinical Methods in Medicine by Michael Swash. 21st edition. A. Saunders Ltd.
5. Bates' Guide to Physical Examination and History Taking by Peter G. Lippincott Williams & Wilkins
6. Medical Therapeutics. Washington Marwal
7. Current Medical Diagnosis 2008