
CURRICULUM/STATUTES & REGULATIONS

FOR

5 YEARS DEGREE PROGRAMME

IN

PULMONOLOGY
(MD PULMONOLOGY)



UNIVERSITY OF HEALTH SCIENCES, LAHORE

STATUTES

Nomenclature Of The Proposed Course

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

Course Title:

MD Pulmonology

Training Centers

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

Duration of Course

The duration of MD Pulmonology course shall be five (5) years with structured training in a recognized department under the guidance of an approved supervisor.

After admission in MD Pulmonology Programme the resident will spend first 6 Months in the relevant Department of Pulmonology as **Induction period** during which resident will get orientation about the chosen discipline and will also undertake the **mandatory workshops** (Appendix E). The research project will be designed and the **synopsis** be prepared during this period.

On completion of Induction period the resident will start formal training in the Basic Principles of Internal Medicine for 18 Months. During this period the resident must get the research synopsis approved by AS&RB. At the end of 2nd years, the candidate will take up Intermediate Examination.

During the 3rd, 4th, & 5th years, of the Program, there will be two component of the training

- 1) Clinical training in Pulmonology
- 2) Research and thesis writing

The candidate shall undergo clinical training to achieve educational objectives of MD Pulmonology (knowledge & skills) along with rotations in the relevant fields. Which will be carried out during the 4th & 5th years of the Programm. The Clinical training shall be completed based. There shall be generic specialty specific

competencies & shall be assessed by Continuous Internal Assessment (Appendix F&G)

Research Component and thesis writing shall be completed over the five years duration of the course. Candidates will spend total time equivalent one calendar year for research during the training. Research can be done as one block or it can be done in the form of regular periodic rotation over five years as long as total research time is equivalent to one calendar year.

Admission Criteria

Applications for admission to MD Training Programs of Pulmonology will be invited through advertisement in print and electronic media mentioning closing date of applications and date of Entry Examination.

Eligibility: The applicant on the last date of submission of applications for admission must possess the:

- i) Basic Medical Qualification of MBBS or equivalent medical qualification recognized by Pakistan Medical & Dental Council.
- ii) Certificate of one year's House Job experience in institutions recognized by Pakistan Medical & Dental Council Is essential at the time of interview. The applicant is required to submit House Certificate from the concerned Medical Superintendent that the House Job shall be completed before the Interview.
- iii) Valid certificate of permanent or provisional registration with Pakistan Medical & Dental Council.

Registration and Enrollment

- As per policy of Pakistan Medical & Dental Council the number of PG Trainees/ Students per supervisor shall be maximum 05 per annum for all PG programmes including minor programmes (if any).
- 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.

Accreditation Related Issues of the Institution

1. Faculty

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

2. Adequate Space

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

3. Library

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

- Accreditation of Pulmonology 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 five years MD programme in Pulmonology is to train residents to acquire the competency of a specialist in the field of Pulmonology so that they can become good teachers, researchers and clinicians in their specialty after completion of their training.

GENERAL OBJECTIVES

MD Pulmonology training should enable a student to:

- Access and apply relevant knowledge to clinical practice:
 - Maintain currency of knowledge
 - Apply scientific knowledge in practice
 - Appropriate to patient need and context
 - Critically evaluate new technology
- Safely and effectively performs appropriate clinical skills & procedures:
 - Consistently demonstrate sound clinical skills
 - Demonstrate procedural knowledge and technical skill at a level appropriate to the level of training
 - Demonstrate manual dexterity required to carry out procedures
 - Adapt their skills in the context of each patient and procedure
 - Maintain and acquire new skills
 - Approach and carries out procedures with due attention to safety of patient, self and others
 - Critically analyze their own clinical performance for continuous improvement
- Design and implement effective management plans:
 - Recognize the clinical features, accurately diagnose and manage pulmonary problems

- Formulate a well-reasoned provisional diagnosis and management plan based on a thorough history and examination
- Formulate a differential diagnosis based on investigative findings
- Manage patients in ways that demonstrate sensitivity to their physical, social, cultural and psychological needs

- Recognize disorders of the pulmonary system and differentiate those amenable to medical treatment
- Effectively recognize and manage complications
- Accurately identify the benefits, risks and mechanisms of action of current and evolving treatment modalities
- Indicate alternatives in the process of interpreting investigations and in decision-making
- Manage complexity and uncertainty
- Consider all issues relevant to the patient
- Identify risk
 - Assess and implement a risk management plan
- Critically evaluate and integrate new technologies and techniques.

- Organize diagnostic testing, imaging and consultation as needed:
 - Select medically appropriate investigative tools and monitoring techniques in a cost-effective and useful manner
 - Appraise and interpret appropriate diagnostic imaging and investigations according to patients' needs
 - Critically evaluates the advantages and disadvantages of different investigative modalities

- Communicate effectively:
 - Communicate appropriate information to patients (and their family) about procedures, potentialities and risks associated with surgery in ways that encourage their participation in informed decision making
 - Communicate with the patient (and their family) the treatment options including benefits and risks of each
 - Communicate with and co-ordinate health management teams to achieve an optimal surgical environment
 - Initiate the resolution of misunderstandings or disputes
 - Modify communication to accommodate cultural and linguistic sensitivities of the patient

- Recognize the value of knowledge and research and its application to clinical practice:
 - Assume responsibility for self-directed learning
 - Critically appraise new trends in Pulmonology
 - Facilitate the learning of others

- Appreciate ethical issues associated with Pulmonology:
 - Consistently apply ethical principles
 - Identify ethical expectations that impact on medico-legal issues
 - Recognize the current legal aspects of informed consent and confidentiality
 - Be accountable for the management of their patients.

- Professionalism by:
 - Employing a critically reflective approach to Pulmonology
 - Adhering with current regulations concerning workplace harassment
 - Regularly carrying out self and peer reviewed audit
 - Acknowledging and have insight into their own limitations
 - Acknowledging and learning from mistakes
- Work in collaboration with members of an interdisciplinary team where appropriate:
 - Collaborate with other professionals in the selection and use of various types of treatments assessing and weighing the indications and contraindications associated with each type
 - Develop a care plan for a patient in collaboration with members of an interdisciplinary team
 - Employ a consultative approach with colleagues and other professionals
 - Recognize the need to refer patients to other professionals.
- Management and Leadership
 - Effective use of resources to balance patient care and system resources
 - Identify and differentiate between system resources and patient needs
 - Prioritize needs and demands dealing with limited system resources.
 - Manage and lead clinical teams

- Recognize the importance of different types of expertise which contribute to the effective functioning of clinical team
- Maintain clinically relevant and accurate contemporaneous records

- Health advocacy:
 - Promote health maintenance of patients
 - Advocate for appropriate health resource allocation

SPECIFIC LEARNING OUTCOMES

Residents completing MD Pulmonology training will have formal instruction, clinical experience, and will be able to demonstrate competence in the evaluation and management of adult and paediatric patients and applying scientific principles for the identification, prevention, treatment and rehabilitation of following acute and chronic pulmonary disorders:

- Obstructive lung diseases, including asthma, bronchitis, emphysema, bronchiectasis
- Pulmonary malignancy – primary and metastatic
- Pulmonary infections, including tuberculous, fungal, and those in the immuno-compromised host, e.g., human immunodeficiency virus-related infections
- Diffuse interstitial lung disease
- Pulmonary embolism and pulmonary embolic disease
- Pulmonary vascular disease, including primary and secondary pulmonary hypertension and the vasculitis and pulmonary hemorrhage syndromes
- Occupational and environmental lung diseases
- Iatrogenic respiratory diseases, including drug-induced disease
- Acute lung injury, including radiation, inhalation, and trauma
- Pulmonary manifestations of systemic diseases, including collagen vascular diseases that are primary in other organs
- Pulmonary physiology and pathophysiology in systemic diseases
- Disorders of the pleura and the mediastinum
- Sleep disorders, including the recognition and differential diagnosis of common sleep symptoms, the effects of sleep on pulmonary diseases and treatments, the utility and interpretation of cardiopulmonary monitoring,

critical review of polysomnographic reports, and management of sleep-disordered breathing

- Management of the immuno-suppressed patient
- Genetic and developmental disorders of the respiratory system, including cystic fibrosis
- Pulmonary rehabilitation
- Pulmonary neoplasia and oncological practice
- Manage general medical problems & respiratory problems faced in Intensive Care Unit, including respiratory and haemodynamic monitoring & support.
- Manage patients on invasive and non-invasive mechanical ventilation.
- After discharge from the critical care unit
- Understanding of Basic respiratory sciences including respiratory mechanics, cell and molecular biology and immunology, as they relate to pulmonary disease
- Conduct research and able to impart patient & public education relevant to the field of Respiratory Medicine.
- Teaching residents is our highest priority: not just teaching pulmonary and critical care medicine, but teaching how to convey knowledge and enthusiasm for learning to others. Residents choosing to pursue a career as outstanding clinician-educators have opportunities to develop their teaching skills during their residency, and receive training in curriculum design and effective teaching methods.

Professional Skills:

Residents shall learn professional skills in:

- Patient Management including eliciting pertinent history, performing physical examination, ordering and interpreting the result of appropriate investigations and thereby deciding and implementing appropriate treatment plan by maintaining follow up
- Psychosocial and emotional effects of acute and chronic illness on patients and their families
- Management of end of life issues and palliative care
- Quality improvement and patient safety activities

Procedural and Technical Skills:

Residents shall learn technical and procedural skills in:

- Flexible fiberoptic bronchoscopy procedures

- Pulmonary function tests to assess respiratory mechanics and gas exchange, including spirometry, flow volume studies, lung volumes, diffusing capacity, arterial blood gas analysis, and exercise studies
- Administer medical gases, humidification and aerosol medications
- Perform postural drainage and maintain bronchopulmonary hygiene
- Endotracheal intubation and maintaining artificial airways
- Management of mechanically ventilated patients and perform cardiopulmonary resuscitation
- Pleural aspiration and pleural biopsy
- The examination and interpretation of sputum, bronchopulmonary secretions, pleural fluid
- Chest tubes and drainage systems
- Nutritional support
- The examination and interpretation of lung tissue for infectious agents, cytology, and histopathology
- Imaging techniques commonly employed in the evaluation of patients with critical illness and/or pulmonary disorders
- Practice infection control procedures and perform continuous quality improvement.

REGULATIONS

Scheme of the Course

A summary of five years course in MD Pulmonology is presented as under:

Course Structure	Components	Examination
At the End of 2nd year MD Pulmonology Programme	<ul style="list-style-type: none"> • Principles of Internal Medicine • Relevant Basic Science (Physiology, Pharmacology, Pathology) 	<p><u>Intermediate Examination</u> at the end of 2nd Year of M.D. Pulmonology Programme</p> <p>Written MCQs = 300 Marks Clinical, TOACS/OSCE & ORAL = 200 Marks</p> <p style="text-align: right;">Total = 500 Marks</p>
At the end of 5th year MD Pulmonology Programme	<p style="text-align: center;"><u>Clinical Component</u></p> <p>Professional Education in Pulmonology</p> <p>Training in Pulmonology with compulsory/ optional rotations.</p> <p style="text-align: center;"><u>Research component</u></p> <p>Research work / Thesis writing must be completed and thesis be submitted atleast 6 months before the end of final year of the programme.</p>	<p><u>Final Examination</u> at the end of 5th year of M.D. Pulmonology Programme.</p> <p>Written = 500 Marks Clinical, TOACS/OSCE & ORAL = 500 Marks Contribution of CIS = 100 Marks Thesis Evaluation = 400 Marks</p> <p style="text-align: right;">Total = 1500 Marks</p> <p>Thesis evaluation and defence at the end of 5th of M.D. Pulmonology Programme.</p>

***Intermediate Examination of M.D. Pulmonology
(at the end of 2nd calendar year of the programme)***

All candidates admitted in M.D. Pulmonology course shall appear in Intermediate examination at the end of 2nd calendar year.

Eligibility Criteria:

The candidates appearing in Intermediate Examination of the M.D. Pulmonology Programme are required:

- a) To have submitted certificate of completion of mandatory workshops.
- b) To have submitted certificate of completion of first two years of training from the supervisor/ supervisors of rotations.
- c) To have submitted CIS assessment proforma from his/her own supervisor on 03 monthly basis and also from his/her supervisors during rotation, achieving a cumulative score of 75%.
- d) To have submitted certificate of approval of synopsis or undertaking / affidavit that if synopsis not approved with 30 days of submission of application for the Intermediate Examination, the candidate will not be allowed to take the examinations and shall be removed from the training programme.
- e) To have submitted evidence of payment of examination fee.

Intermediate Examination Schedule and Fee

- a) Intermediate Examination at completion of two years training, will be held twice a year.

- b) There will be a minimum period of 30 days between submission of application for the examination and the conduction of examination.
- c) Examination fee will be determined periodically by the University.
- d) The examination fee once deposited cannot be refunded / carried over to the next examination under any circumstances.
- e) The Controller of Examinations will issue Roll Number Slips on receipt of prescribed application form, documents satisfying eligibility criteria and evidence of payment of examination fee.

Components of Intermediate Examination

Written Examination	= 300 Marks
Clinical, TOACS/OSCE & ORAL	= 200 Marks
Total	= 500 Marks

Written:

MCQs 100 (2 marks each MCQ)

SEQs 10 (10 Marks each SEQ)

Total = 300 Marks

Components of Theory Paper

Principles of Internal Medicine = 70 MCQs 7 SEQs

Specialty specific	= 10 MCQs	1 SEQs
Basic Sciences	= 20 MCQs	2 SEQs
• Physiology	= 8 MCQs	1 SEQs
• Pharmacology	= 4 MCQs	-----
• Pathology	= 8 MCQs	1 SEQ

Clinical, TOACS/OSCE & ORAL

Four Short Cases	= 100 Marks
One Long Case	= 50 Marks
Toacs/OSCE & Oral	= 50 Marks

Total = 200 Marks

Declaration of Results

The Candidate will have to score 50% marks in written, clinical and Toacs/OSCE & Oral components and a cumulative score of 60% to be declared successful in the Intermediate Examination.

A maximum total of four consecutive attempts (availed or unavailed) will be allowed in the Intermediate Examination during which the candidate will be

allowed to continue his training program. If the candidate fails to pass his Intermediate Examination within the above mentioned limit of four attempts, the candidate shall be removed from the training program, and the seat would fall vacant, stipend/ scholarship if any would be stopped.

Final Examination M.D. Pulmonology

At the end of 5th Calendar year of the Programme

Eligibility Criteria:

To appear in the Final Examination the candidate shall be required:

- i) To have submitted the result of passing Intermediate Examination.
- ii) To have submitted the certificate of completion of training, issued by the Supervisor which will be mandatory.
- iii) To have achieved a cumulative score of 75% in Continuous Internal assessments of all training years.
- iv) To have got the thesis accepted and will then be eligible to appear in Final Examination.
- v) To have submitted no dues certificate from all relevant departments including library, hostel, cashier etc.
- vi) To have submitted evidence of submission of examination fee.

Final Examination Schedule and Fee

- a) Final examination will be held twice a year.
- b) The candidates have to satisfy eligibility criteria before permission is granted to take the examination.
- c) Examination fee will be determined and varied at periodic intervals by the University.

- d) The examination fee once deposited cannot be refunded / carried over to the next examination under any circumstances.
- e) The Controller of Examinations will issue an Admittance Card with a photograph of the candidate on receipt of prescribed application form, documents satisfying eligibility criteria and evidence of payment of examination fee. This card will also show the Roll Number, date / time and venue of examination.

All candidates admitted in M.D. Pulmonology course shall appear in Final (clinical) examination at the end of structured training programme (end of 5th calendar year), and having passed the Intermediate examinations.

Written Part	= 500 Marks
Clinical, TOACS/OSCE & ORAL	= 500 Marks
Contribution Internal Assessment	= 100 Marks
Thesis Examination	= 400 Marks
Total	= 1500 Marks

Written Papers:

Paper 1	= 100 MCQs	5 SEQs
Paper 2	= 100 MCQs	5 SEQs

Clinical and Oral

4 Short Cases	= 200 Marks
1 Long Case	= 100 Marks

Toacs/OSCE & Oral	= 200 Marks
Total	= 500 Marks

Declaration of Result

For the declaration of result

- I. The candidate must get his/her Thesis accepted.
- II. The candidate must have passed the final written examination with 50% marks and the clinical and Toacs/OSCE & Oral securing 50% marks. The cumulative passing score from the written and clinical/ oral examination shall be 60%.
- III. The MD degree shall be awarded after acceptance of thesis and success in the final examination.
- IV. On completion of stipulated training period, irrespective of the result (pass or fail) the training slot of the candidate shall be declared vacant.

Submission / Evaluation of Synopsis

1. The candidates shall prepare their synopsis as per guidelines provided by the Advanced Studies & Research Board, available on university website.
2. 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.

3. 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.

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.
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.

Thesis Examination

- a) The candidate will submit his/her thesis at least 06 months prior to completion of training.
- b) The Thesis along with a certificate of approval from the supervisory will be submitted to the Registrar's office, who would record the date / time etc. and get received from the Controller of Examinations within 05 working days of receiving.
- c) The Controller of Examinations will submit a panel of eight examiners within 07 days for selection of four examiners by the Vice Chancellor. The

Vice Chancellor shall return the final panel within 05 working days to the Controller of Examinations for processing and assessment. In case of any delay the Controller of Examinations would bring the case personally to the Vice Chancellor.

- d) The Supervisor shall not act as an examiner of the candidate and will not take part in evaluation of thesis.
- e) The Controller of Examinations will make sure that the Thesis is submitted to examiners in appropriate fashion and a reminder is sent after every ten days.
- f) The thesis will be evaluated by the examiners within a period of 06 weeks.
- g) In case the examiners fail to complete the task within 06 weeks with 02 fortnightly reminders by the Controller of Examinations, the Controller of Examinations will bring it to the notice of Vice Chancellor in person.
- h) In case of difficulty in find an internal examiner for thesis evaluation, the Vice Chancellor would, in consultation with the concerned Deans, appoint any relevant person as examiner in supersession of the relevant clause Regulations.
- i) There will be two internal and two external examiners. In case of difficulty in finding examiners, the Vice Chancellor would, in consultation with the concerned Deans, appoint minimum of three, one internal and two external examiners.
- j) The total marks of thesis evaluation will be 400 and 60% marks will be required to pass the evaluation.

- k) The thesis will be considered accepted, if the cumulative score of all the examiners is 60%.
- l) The clinical training will end at completion of stipulated training period but the candidate will become eligible to appear in the Final Examination at completion of clinical training and after acceptance of thesis. In case clinical training ends earlier, the slot will fall vacant after stipulated training period.

Award of MD Pulmonology Degree

After successful completion of the structured courses of MD Pulmonology and qualifying Intermediate & Final examinations (written Clinical, TOACS/OSCE & ORAL and Thesis), the degree with title MD Pulmonology shall be awarded.

CONTENT OUTLINE

MD Pulmonology

Basic Sciences:

Student is expected to acquire comprehensive knowledge of Physiology, Pathology (Microbiology), Pharmacology relevant to the clinical practice appropriate for Pulmonology.

1. Physiology

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

- Regulation of respiration
- Mechanics of Ventilation
- Respiratory circulation
- Inhalation kinetics
- Gas transport & gas exchange
- Respiratory adjustments in health, disease & exercise
- Lung compliance & airway resistance
- Physiology of oxygen therapy
- Acid base balance, fluid & electrolytes
- Respiratory defences
- Metabolic functions & Surfactant
- Respiratory changes in muscular exercise
- Hypoxia, cyanosis, anoxia, asphyxia, dyspnoea, collapse of the lung
- Artificial respiration
- Therapeutic uses of oxygen
- Effects of respiration on circulation
- ABG Interpretation
- Pulmonary function tests. Basic Principles
- Advanced Principles & Clinical Application
- Cardiac physiology for pulmonologists
- Properties of cardiac muscle
- Origin and propagation of cardiac impulse
- The cardiac cycle
- The heart sounds.
- Regulation of cardiac function.
- The special excitatory and conductive system of the heart and abnormalities of the cardiac rhythms
- Brief description of normal and abnormal ECG
- Membrane biochemistry and signal transduction
- Gene expression and the synthesis of proteins
- Bioenergetics; fuel oxidation and the generation of ATP
- Carbohydrate metabolism
- Lipid metabolism

- Nitrogen metabolism
- Enzymes and biologic catalysis
- Tissue metabolism
- Biotechnology and concepts of molecular biology with special emphasis on use of recombinant DNA techniques in medicine and the molecular biology of cancer
- General principles of biochemical investigations
- Basic techniques in molecular biology
- Cloning and gene analysis
- Immunochemical techniques
- Protein chemistry and enzymology
- Cloning & PCR
- Protein chemistry and quantification
- Electrophoretic techniques; PAGE
- Immunoblotting
- Raising and purifying antibodies
- ELISA

2. Pharmacology

- The Evolution of Medical Drugs
- British Pharmacopia
- Pharmacokinetic Processes
- Pharmacodynamic Process
- Drug Effect
- Beneficial Responses
- Harmful Responses
- Allergic Responses
- Drug Dependence, Addiction, Abuse and Tolerance
- Drug Interactions
- Drugs used in cardio-respiratory diseases
- Oxygen therapy
- Inhalation kinetics & Aerosol / medical gases / humidification therapy (includes their physical, chemical & pharmacological aspects)
- Steroids therapy
- Antibiotics therapy
- Bronchodilator therapy

- Anti tuberculosis therapy
- Cancer chemotherapy

3. Pathology

Pathological alterations at cellular and structural level in infection, inflammation, ischaemia, neoplasia and trauma affecting the ear, nose and upper respiratory tract

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 and causes of chronic inflammation, non-granulomatous & granulomatous,

Haemodynamic disorders

- Etiology, pathogenesis, classification and morphological and clinical manifestations of Edema, Haemorrhage, Thrombosis, Embolism, Infarction & Hyperaemia
- Shock; classification etiology, and pathogenesis, manifestations.
- Compensatory mechanisms involved in shock
- Pathogenesis and possible consequences of thrombosis
- 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 Immunology laboratory
- Protective immunity to microbial diseases
- Tumour immunology
- Immunological tolerance, autoimmunity and autoimmune diseases.
- Transplantation immunology
- Hypersensitivity
- Immunodeficiency disorders
- Immunoprophylaxis & Immunotherapy

Related Microbiology

- Role of microbes in various respiratory disorders
- Infection source
- Nosocomial infections
- Bacterial growth and death
- Pathogenic bacteria
- Vegetative organisms
- Spores
- Important viruses
- Important parasites
- Sources of infection
- Asepsis and antisepsis
- Infection prevention
- Immunization
- Personnel protection from communicable diseases
- Use of investigation and procedures in laboratory
- Basics in allergy and immunology

Special Pathology

- Pathophysiology in different diseases and effects on lung function:

- Intrathoracic airways obstruction (asthma, chronic bronchitis, emphysema)
- Extra-thoracic airways obstruction (fixed, variable)
- Restrictive ventilatory defects (pulmonary fibrosis, diseases of the chest wall, neuromuscular disorders)
- Allergy & lung
- Bronchial asthma
- Chronic obstructive pulmonary diseases
- Lung injury
- Adult respiratory distress syndrome (ARDS)
- Systemic diseases & lung
- Congenital anomalies in lung
- Tumours
- Pulmonary tuberculosis
- Pulmonary embolism and infarction
- Bronchiectasis
- Occupational lung disease (pneumoconioses, asbestosis, farmers lung, asthma, extrinsic allergic alveolitis)
- Pleural tumours
- Pleural infection
- Empyema
- SARS and other infectious pulmonary disorders
- Congenital anomalies and oesophageal cancers
- Stricture oesophagus
- Achalasia cardia
- Mediastinal infections
- Tumours in mediastinum
- Thymus tumours
- Cardiac disease (secondary to lung disease and hypertension; secondary to left ventricular failure or mitral stenosis)
- Pericardial infections and tamponade.
- Hypoxaemia (ventilatory failure, v/q inequality, anatomical shunts)
- Hypercapnia (disorders of the respiratory centre, respiratory nerves and muscles, disorders of the chest wall, airways and lung parenchyma)
- Hyperventilation (acidaemia, psychogenic)

MD Pulmonology **Basic Principles of Internal Medicine**

After initial 6 months of Induction, the resident will start training in basic Principles of Internal Medicine for 18 months. Resident should get exposure in the following organ and system competencies (listed below) while considering and practicing each system in terms of: -

- Medical ethics
- Professional values, student teachers relationship
- Orientation of in-patient, out-patients and pulmonary labs
- Approach to the patient
- History taking
- General physical examination
- Systemic examination
- Routine investigations
- Special investigations
- Diagnostic and therapeutic procedures

Course Contents:

1. Cardiovascular Medicine

Common and / or important Cardiac Problems:

- Arrhythmias
- Ischaemic Heart Disease: acute coronary syndromes, stable angina, atherosclerosis
- Heart Failure
- Hypertension – including investigation and management of accelerated hypertension
- Valvular Heart Disease
- Endocarditis
- Aortic dissection
- Syncope
- Dyslipidaemia

Clinical Science:

- Physiological principles of cardiac cycle and cardiac conduction

- Pharmacology of major drug classes: beta blockers, alpha blockers, ACE inhibitors, Angiotensin receptor blockers (ARBs), anti-platelet agents, thrombolysis, inotropes, calcium channel antagonists, potassium channel activators, diuretics, anti-arrhythmics, anticoagulants, lipid modifying drugs, nitrates, centrally acting anti-hypertensives

2. Dermatology;

Common and / or Important Problems:

- Cellulitis
- Cutaneous drug reactions
- Psoriasis and eczema
- Skin failure: e.g. erythroderma, toxic epidermal necrolysis
- Urticaria and angio-oedema
- Cutaneous vasculitis
- Herpes zoster and Herpes Simplex infections
- Skin tumours
- Skin infestations
- Dermatomyositis
- Scleroderma
- Lymphoedema

Clinical Science:

- Pharmacology of major drug classes: topical steroids, immunosuppressants

3. Diabetes & Endocrine Medicine

Common and / or Important Diabetes Problems:

- Diabetic ketoacidosis
- Non-acidotic hyperosmolar coma / severe hyperglycaemia
- Hypoglycaemia
- Care of the acutely ill diabetic
- Peri-operative diabetes care

Common or Important Endocrine Problems:

- Hyper/Hypocalcaemia
- Adrenocortical insufficiency
- Hyper/Hyponatraemia
- Thyroid dysfunction
- Dyslipidaemia

- Endocrine emergencies: myxoedemic coma, thyrotoxic crisis, Addisonian crisis, hypopituitary coma, phaeochromocytoma crisis

Clinical Science:

- Outline the function, receptors, action, secondary messengers and feedback of hormones
- Pharmacology of major drug classes: insulin, oral anti-diabetics, thyroxine, anti-thyroid drugs, corticosteroids, sex hormones, drugs affecting bone metabolism

4. Gastroenterology and Hepatology

Common or Important Problems:

- Peptic Ulceration and Gastritis
- Gastroenteritis
- GI malignancy (oesophagus, gastric, hepatic, pancreatic, colonic)
- Inflammatory bowel disease
- Iron Deficiency anaemia
- Acute GI bleeding
- Acute abdominal pathologies: pancreatitis, cholecystitis, appendicitis, leaking abdominal aortic aneurysm
- Functional disease: irritable bowel syndrome, non-ulcer dyspepsia
- Coeliac disease
- Alcoholic liver disease
- Alcohol withdrawal syndrome
- Acute liver dysfunction: jaundice, ascites, encephalopathy
- Liver cirrhosis
- Gastro-oesophageal reflux disease
- Nutrition: indications, contraindications and ethical dilemmas of nasogastric feeding and EG tubes, IV nutrition, re-feeding syndrome
- Gall stones
- Viral hepatitis
- Auto-immune liver disease
- Pancreatic cancer

Clinical Science:

- Laboratory markers of liver, pancreas and gut dysfunction
- Pharmacology of major drug classes: acid suppressants, anti-spasmodics, laxatives, anti-diarrhoea drugs, aminosalicylates, corticosteroids, immunosuppressants, infliximab, pancreatic enzyme supplements

5. Renal Medicine

Common and / or Important Problems:

- Acute renal failure
- Chronic renal failure
- Glomerulonephritis
- Nephrotic syndrome
- Urinary tract infections
- Urinary Calculus
- Renal replacement therapy
- Disturbances of potassium, acid/base, and fluid balance (and appropriate acute interventions)

Clinical Science:

- Measurement of renal function
- Metabolic perturbations of acute, chronic, and end-stage renal failure and associated treatments

6. Respiratory Medicine

Common and / or Important Respiratory Problems:

- COPD
- Asthma
- Pneumonia
- Pleural disease: Pneumothorax, pleural effusion, mesothelioma
- Lung Cancer
- Respiratory failure and methods of respiratory support
- Pulmonary embolism and DVT
- Tuberculosis
- Interstitial lung disease
- Bronchiectasis
- Respiratory failure and cor-pulmonale
- Pulmonary hypertension

Clinical Science:

- Principles of lung function measurement
- Pharmacology of major drug classes: bronchodilators, inhaled corticosteroids, leukotriene receptor antagonists, immunosuppressants

7. Allergy

Common or Important Allergy Problems

- Anaphylaxis
- Recognition of common allergies; introducing occupation associated allergies
- Food, drug, latex, insect venom allergies
- Urticaria and angioedema

Clinical Science

- Mechanisms of allergic sensitization: primary and secondary prophylaxis
- Natural history of allergic diseases
- Mechanisms of action of anti-allergic drugs and immunotherapy
- Principles and limitations of allergen avoidance

8. Haematology

Common and / or Important Problems:

- Bone marrow failure: causes and complications
- Bleeding disorders: DIC, haemophilia
- Thrombocytopenia
- anticoagulation treatment: indications, monitoring, management of over-treatment
- Transfusion reactions
- Anaemia: iron deficient, megaloblastic, haemolysis, sickle cell,
- Thrombophilia: classification; indications and implications of screening
- Haemolytic disease
- Myelodysplastic syndromes
- Leukaemia
- Lymphoma
- Myeloma
- Myeloproliferative disease
- Inherited disorders of haemoglobin (sickle cell disease, thalassaemias)
- Amyloid

Clinical Science:

- Structure and function of blood, reticuloendothelial system, erythropoietic tissues

9. Immunology

Common or Important Problems:

- Anaphylaxis (see also 'Allergy')

Clinical Science:

- Innate and adaptive immune responses
- Principles of Hypersensitivity and transplantation

10. Infectious Diseases

Common and / or Important Problems:

- Fever of Unknown origin
- Complications of sepsis: shock, DIC, ARDS
- Common community acquired infection: LRTI, UTI, skin and soft tissue infections, viral exanthema, gastroenteritis
- CNS infection: meningitis, encephalitis, brain abscess
- HIV and AIDS including ethical considerations of testing
- Infections in immuno-compromised host
- Tuberculosis
- Anti-microbial drug monitoring
- Endocarditis
- Common genito-urinary conditions: non-gonococcal urethritis, gonorrhoea, syphilis

Clinical Science:

- Principles of vaccination
- Pharmacology of major drug classes: penicillins, cephalosporins, tetracyclines, aminoglycosides, macrolides, sulphonamides, quinolones, metronidazole, anti-tuberculous drugs, anti-fungals, anti-malarials, anti-helminthics, anti-virals

11. Medicine in the Elderly

Common or Important Problems:

- Deterioration in mobility
- Acute confusion
- Stroke and transient ischaemic attack
- Falls
- Age related pharmacology
- Hypothermia
- Continence problems
- Dementia
- Movement disorders including Parkinson's disease
- Depression in the elderly
- Osteoporosis
- Malnutrition

- Osteoarthritis

Clinical Science:

- Effects of ageing on the major organ systems
- Normal laboratory values in older people

12. Musculoskeletal System

Common or Important Problems:

- Septic arthritis
- Rheumatoid arthritis
- Osteoarthritis
- Seronegative arthritides
- Crystal arthropathy
- Osteoporosis – risk factors, and primary and secondary prevention of complications of osteoporosis
- Polymyalgia and temporal arteritis
- Acute connective tissue disease: systemic lupus erythematosus, scleroderma, poly- and dermatomyositis, Sjogren's syndrome, vasculitides

Clinical Science:

- Pharmacology of major drug classes: NSAIDs, corticosteroids, immunosuppressants, colchicines, allopurinol, bisphosphonates

13. Neurology

Common or Important Problems:

- Acute new headache
- Stroke and transient ischaemic attack
- Subarachnoid haemorrhage
- Coma
- Central Nervous System infection: encephalitis, meningitis, brain abscess
- Raised intra-cranial pressure
- Sudden loss of consciousness including seizure disorders (see also above syncope etc)
- Acute paralysis: Guillain-Barré, myasthenia gravis, spinal cord lesion
- Multiple sclerosis
- Motor neuron disease

Clinical Science:

- Pathophysiology of pain, speech and language

- Pharmacology of major drug classes: anxiolytics, hypnotics inc. benzodiazepines, anti-epileptics, anti-Parkinson's drugs (anti-muscarinics, dopaminergics)

14. Psychiatry

Common and /or Important Problems:

- Suicide and parasuicide
- Acute psychosis
- Substance dependence
- Depression

Clinical Science:

- Principles of substance addiction, and tolerance
- Pharmacology of major drug classes: anti-psychotics, lithium, tricyclic antidepressants, mono-amine oxidase inhibitors, SSRIs, venlafaxine, donepezil, drugs used in treatment of addiction (bupropion, disulpharam, acamprosate, methadone)

15. Cancer and Palliative Care

Common or Important Oncology Problems:

- Hypercalcaemia
- SVC obstruction
- Spinal cord compression
- Neutropenic sepsis
- Common cancers (presentation, diagnosis, staging, treatment principles): lung, bowel, breast, prostate, stomach, oesophagus, bladder)

Common or Important Palliative Care Problems:

- Pain: appropriate use, analgesic ladder, side effects, role of radiotherapy
- Constipation
- Breathlessness
- Nausea and vomiting
- Anxiety and depressed mood

Clinical Science:

- Principles of oncogenesis and metastatic spread
- Apoptosis
- Principles of staging
- Principles of screening

- Pharmacology of major drug classes in palliative care: anti-emetics, opioids, NSAIDs, agents for neuropathic pain, bisphosphonates, laxatives, anxiolytics

16. Clinical Genetics

Common and / or Important problems:

- Down's syndrome
- Turner's syndrome
- Huntington's disease
- Haemochromatosis
- Marfan's syndrome
- Klinefelter's syndrome
- Familial cancer syndromes
- Familial cardiovascular disorders

Clinical Science:

- Structure and function of human cells, chromosomes, DNA, RNA and cellular proteins
- Principles of inheritance: Mendelian, sex-linked, mitochondrial
- Principles of pharmacogenetics
- Principles of mutation, polymorphism, trinucleotide repeat disorders
- Principles of genetic testing including metabolite assays, clinical examination and analysis of nucleic acid (e.g. PCR)

17. Clinical Pharmacology

Common and / or Important problems:

- Corticosteroid treatment: short and long-term complications, bone protection, safe withdrawal of corticosteroids, patient counselling regarding avoid adrenal crises
- Specific treatment of poisoning with:
 - Aspirin,
 - Paracetamol
 - Tricyclic anti-depressants
 - Beta-blockers
 - Carbon monoxide
 - Opiates
 - Digoxin
 - Benzodiazepines

Clinical Science:

- Drug actions at receptor and intracellular level
- Principles of absorption, distribution, metabolism and excretion of drugs
- Effects of genetics on drug metabolism
- Pharmacological principles of drug interaction
- Outline the effects on drug metabolism of: pregnancy, age, renal and liver impairment

Investigation Competencies

Outline the Indications for, and Interpret the Following Investigations:

- Basic blood biochemistry: urea and electrolytes, liver function tests, bone biochemistry, glucose, magnesium
- Cardiac biomarkers and cardiac-specific troponin
- Creatine kinase
- Thyroid function tests
- Inflammatory markers: CRP / ESR
- Arterial Blood Gas analysis
- Cortisol and short Synacthen test
- HbA1C
- Lipid profile
- Amylase
- Full blood count
- Coagulation studies
- Haemolysis studies
- D dimer
- Blood film report
- Blood / Sputum / urine culture
- Fluid analysis: pleural, cerebro-spinal fluid, ascitic
- Urinalysis and urine microscopy
- Auto-antibodies
- Chest radiograph
- Abdominal radiograph

- Joint radiographs (knee, hip, hands, shoulder, elbow, dorsal spine, ankle)
- ECG
- Peak flow tests
- Full lung function tests

More Advanced Competencies;

- Viral hepatitis serology
- Stool testing
- HIV testing
- Ultrasound
- Detailed imaging: Barium studies, CT, CT pulmonary angiography, high resolution CT, MRI
- Echocardiogram
- 24 hour ECG monitoring
- Ambulatory blood pressure monitoring
- Exercise tolerance test
- Cardiac perfusion scintigraphy
- Tilt testing
- Neurophysiological studies: EMG, nerve conduction studies, visual and auditory evoked potentials
- Bone scan

Procedural Competencies

- The trainee is expected to be competent in performing the following procedures by the end of core training. The trainee must be able to outline the indications for these interventions. For invasive procedures, the trainee must recognize the indications for the procedure, the importance of valid consent, aseptic technique, safe use of local anaesthetics and minimization of patient discomfort.
- Venepuncture
- Cannula insertion, including large bore
- Arterial blood gas sampling
- Lumbar Puncture
- Pleural tap and aspiration

- Intercostal drain insertion: Seldinger technique
- Ascitic tap
- Abdominal paracentesis
- Central venous cannulation
- Initial airway protection: chin lift, Guedel airway, nasal airway, laryngeal mask
- Basic and, subsequently, advanced cardiorespiratory resuscitation
- Bronchoscopy
- Cytology: pleural fluid, ascitic fluid, cerebro-spinal fluid, sputum
- DC cardioversion
- Urethral catheterization
- Nasogastric tube placement and checking
- Electrocardiogram
- Temporary cardiac pacing by internal wire or external pacemaker

Specialty training in Pulmonology

Specific Program Content

1. Specialized training in Pulmonology
2. Compulsory rotations
3. Research & thesis writing
4. Maintaining of Log-book

1. Specialized training in Pulmonology

- Diagnosis & evaluation
- History & examination
- Symptoms & signs in respiratory medicine
- Diagnostic approach to common respiratory problems (dyspnoea, haemoptysis, chest pain, etc)
- Imaging in respiratory diseases e.g. chest x-ray, CT scan & ultrasound, MRI, PET scan & nuclear medicine
- Pulmonary function tests
 - Spirometry
 - Static lung volumes
 - Diffusion capacity
 - Bronchoprovocation Tests
 - Cardiopulmonary exercise testing
 - Six minutes walk test
 - Impairment & disability assessment
- Pleural procedures
 - Pleural aspiration
 - Pleural biopsy
 - Intercostal drainage
 - Pleuroscopy
- Bronchoscopy & associated procedures

Obstructive lung diseases

- Approach to a patient with obstructive &/ or bullous diseases
- COPD
- Chronic bronchitis

- Emphysema
- Asthma (Incl. Occupational / exercise / drug induced, ABPA)
- Bronchiectasis & cystic fibrosis
- Upper & central airways diseases

Occupational disorders

- General principles
- Asbestos-related lung disease
- Coal workers lung disease
- Occupational asthma
- Byssinosis
- Industrial bronchitis
- Chronic beryllium and hard metal lung disease
- Toxic inhalation
- Miscellaneous

Environmental disorders

- Air pollution
- Pulmonary disorders related to high altitude
- Diving injuries
- Air embolism
- Thermal lung injury
- Acute smoke inhalation

Drug induced lung disorders

- Diseases due to non-chemotherapeutic agents
- Diseases due to chemotherapeutic agents

Interstitial & inflammatory lung diseases

- An overview of interstitial lung diseases
- Systemic sarcoidosis
- Idiopathic pulmonary fibrosis
- Hypersensitivity pneumonitis
- Radiation pneumonitis
- Eosinophilic pneumonias
- Pulmonary manifestations of collagen vascular disorders
- Others

Depositional & infiltrative disorders

- Pulmonary histiocytosis X
- Pulmonary lymphangiomyomatosis and tuberous sclerosis
- In born errors of metabolism and lungs

Alveolar disorders

- Alveolar haemorrhage syndrome
- Pulmonary alveolar proteinosis

Disorders of pulmonary circulation

- Pulmonary hypertension
- Cor-pulmonale
- Pulmonary thrombembolism
- Pulmonary oedema/ ARDS
- Pulmonary vasculitis
- Pulmonary AV malformations

Disorders of pleural space

- Pleural effusions
- Pneumothorax
- Pleural tumors

Tuberculosis (TB) and Opportunistic diseases

- Causes of TB and other opportunistic mycobacterial diseases
- Multi-drug resistant TB
- Investigation including imaging and use of various pleural biopsy techniques, skin tests and gamma interferon tests
- Differential diagnosis of TB and opportunistic mycobacterial diseases
- Treatment and management of patients with
- Infection control
- Tuberculin skin testing
- Role of appropriate tests in diagnosis
- Pulmonary disease in the immuno-compromised host
- HIV/AIDS
- Transplant patients
- Patients on immunosuppressive drugs
- Immunodeficiency patients.
- Causes of immuno-compromise in patients

- Causes of lung disease in immuno-compromised patients
- Investigation of lung disease in immuno-compromised patients
- Differential diagnosis of lung disease in immuno-compromised patients
- Treatment and management of lung disease in immuno-compromised patients
- Pharmacology of drugs used
- Interpretation of other appropriate lung function tests

Diseases of mediastinum, Chest wall, tumors & cysts

- Mediastinitis & pneumomediastinum
- Disorders of chest walls
- Neuromuscular disorders
- Surgical aspects of pulmonology
- Chest trauma
- Lung transplantation
- Sleep control & sleep disorders

Neoplasms of lung

- Solitary pulmonary nodule
- Small cell and non-small cell ca
- Other lung tumors
- Extra-pulmonary manifestations of lung tumors

Acute respiratory failure

- Lung failure
- Systemic inflammatory response and multiple organ dysfunction syndrome
- Acute respiratory failure in surgical patient
- Respiratory distress syndrome in newborn
- Nutrition in respiratory failure
- Oxygen therapy & oxygen utility
- Upper airways management (intubation)
- Mechanical ventilation

Respiratory manifestations of extra-pulmonary disorders

- Cardiac diseases
- Renal diseases
- Abdominal diseases
- Hematologic diseases

- Endocrine diseases
- Obstetric & gynecologic diseases
- Transplant & immunodeficiency disorders (HIV)
- Paediatric aspects of pulmonology

Haemodynamics & respiratory monitoring

Critical care situation

- Sedation & analgesia in ICU
- Infectious diseases of lungs (pulmonary TB, pneumonia, viral & fungal infection etc)
- Ethics in critical care situation
- Prevention, palliation & pulmonary rehabilitation
- Intensive care medicine
- Advanced airway & ventilator management
- Care of the patient on ventilator
- Cardiovascular problems in ICU
- Renal, fluid & electrolyte problems & acid base balance in ICU
- Infectious disease problems in ICU

Procedures in critical care medicine

- Airway management & intubation
- Central venous catheter
- Arterial line placement & care
- Tracheostomy
- Cardiopulmonary resuscitation

Paediatric Pulmonary medicine

- Reactive airway disease
- Recurrent pneumonia / pulmonary infections
- Tuberculosis
- Sleep disorder breathing
- Allergy
- Wheezing, apnea and hypoventilation
- Asthma and wheezing disorders
- Chronic lung disease of prematurity
- Congenital malformations of the respiratory tract
- Cystic fibrosis

- Acute and chronic infection
- Recurrent croup
- Vocal cord dysfunction
- Bronchiectasis
- Tracheostomy
- Nasal and sinus disorders
- Asthma management and education
- Laryngo, tracheo or bronchomalacia
- Exercise intolerance/ limitation and shortness of breath
- Bronchopulmonary dysplasia (BPD)
- Oxygen and ventilator dependency
- Chest wall and pulmonary abnormalities or dysfunction
- Aerosol therapy
- Practical procedures and investigations
- Pharmacology and therapeutics

2. Compulsory rotations in the relevant fields for 3-6 months

Clinical training experiences are described below:

1. Intensive Care Units

On this 3 month rotation, the resident shall develop competence in the differential diagnosis and management of the critically ill, and learn to integrate these clinical skills with the biomedical instrumentation of bedside hemodynamic measurements, right heart catheterization, measurement and computation of gas exchange variables, cardiac output determination, and all aspects of mechanical ventilation and airway care. These principles, and those governing fluid therapy, nutritional support, and antimicrobial therapy in severely ill patients, shall be reviewed extensively.

2. Outpatient Services

Pulmonary outpatient training shall be provided during the entire residency in a continuity to review findings and to discuss patient care issues. Residents shall assume primary responsibility for managing their patients

3. Bronchoscopy/PFT Service

Residents shall perform bronchoscopy in a dedicated bronchoscopy suite using state of the art equipment and quickly become proficient at: airway inspection, bronchoalveolar lavage, endobronchial biopsy, transbronchial lung biopsy and transbronchial needle aspiration (TBNA). In addition to performing

bronchoscopy, residents shall be instructed in interpreting pulmonary function tests and learn airway mechanics, cardiopulmonary exercise testing, and bronchoprovocation challenge testing.

4. Pulmonary Consultation Service

The resident shall learn to assess all types of primary data that contribute to the accurate diagnosis of lung disease: pulmonary function tests, chest radiographs and computerized tomography, ventilation-perfusion lungs scans, pulmonary histopathology and cytology, and the bacteriology of respiratory pathogens.

5. Lung Transplantation

This popular rotation shall provide residents with an intense introduction to the selection of transplant candidates and the management of these patients after transplantation. Residents shall perform a number of bronchoscopies on lung transplant patients and work with a dedicated group of lung transplant physicians.

6. Sleep Medicine Rotation

The rotation in sleep medicine shall allow residents to learn basic principles of sleep-disordered breathing. Residents will learn a multidisciplinary approach to sleep medicine and learning the basics of sleep physiology and polysomnogram interpretation.

7. Pulmonary Rehabilitation / DOT Rotation

This rotation shall expose residents to issues in rehabilitation of patients with chronic pulmonary diseases as well as the use of non-invasive ventilation in patients with neuromuscular disease and respiratory muscle weakness. Residents shall also be required to maintain currency of knowledge in tuberculosis and chest diseases with special reference to DOT therapy in Pakistan

8. Elective experiences in chest radiology, Cardiology and Thoracic surgery for 1 month each in the relevant departments

RESEARCH/ THESIS WRITING

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 5th year of training or it can be stretched over five 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 surgical 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. Attend genetic clinics and rounds for at least one month.
9. Attend sessions of genetic counseling
10. Self study, assignments and use of internet
11. Bedside teaching rounds in ward
12. OPD & Follow up clinics
13. 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 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 Pulmonology 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 Pulmonology 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 pg. 10).
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.
10. 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.
11. Each resident will observe and participate in each of the following procedures, preferably done on patients firstly under supervision and then independently (pg.10)

3. Annual Grand Meeting

Once a year all residents enrolled for MD Pulmonology 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: -----

Supervisor -----

Roll No. -----

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

Residents should become proficient in performing the related procedures. After observing the technique, they will be observed while performing the procedure and, when deemed competent by the supervising physician, will perform it independently. They will be responsible for obtaining informed consent, performing the procedure, reviewing the results with the pathologist and the attending physician and informing the patient and, where appropriate, the referring physician of the results.

Procedures Performed

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

Pulmonary 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				

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 degrees for successful completion of courses.

Intermediate Examination MD Pulmonology

Total Marks: 500

All candidates admitted in MD Pulmonology course shall appear in Intermediate examination at the end of 2nd calendar year.

There shall be one written paper of 300 marks each, Clinical, TOACS/OSCE & ORAL of 200 marks.

Components of Intermediate Examination

Written Examination	= 300 Marks
Clinical, TOACS/OSCE & ORAL	= 200 Marks
Total	= 500 Marks

Written:

MCQs 100 (2 marks each MCQ)

SEQs 10 (10 Marks each SEQ)

Total = 300 Marks

Components of Theory Paper

Principles of Internal Medicine	= 70 MCQs	7 SEQs
Specialty specific	= 10 MCQs	1 SEQs
Basic Sciences	= 20 MCQs	2 SEQs
• Physiology	= 8 MCQs	1 SEQs

- Pharmacology = 4 MCQs -----
- Pathology = 8 MCQs 1 SEQ

Clinical, TOACS/OSCE & ORAL

- Four Short Cases = 100 Marks
- One Long Case = 50 Marks
- Toacs/OSCE & Oral = 50 Marks

Total = 200 Marks

Final Examination MD Pulmonology
Total Marks: 1500

All candidates admitted in MD course shall appear in Final examination at the end of structured training programme (end of 5th calendar year) and after clearing Intermediate examinations.

There shall be two written papers of 250 marks each, Clinical, TOACS/OSCE & ORAL of 500 marks, Internal assessment of 100 marks and thesis examination of 400 marks.

Topics included in paper 1

1. Obstructive lung diseases (15 MCQs)
2. Occupational disorders (15 MCQs)
3. Environmental disorders (15 MCQs)
4. Interstitial & inflammatory lung diseases (15 MCQs)
5. Tuberculosis (TB) and Opportunistic diseases (15 MCQs)
6. Depositional & infiltrative disorders (10 MCQs)
7. Disorders of pulmonary circulation (10 MCQs)
8. Drug induced lung disorders (05 MCQs)

Topics included in paper 2

1. Paediatric Pulmonary medicine (25 MCQs)
2. Disorders of pleural space, mediastinum & Chest wall (20 MCQs)
3. Neoplasms of lung (20 MCQs)
4. Acute respiratory failure (15 MCQs)
5. Respiratory manifestations of extra-pulmonary disorders (10 MCQs)
6. Critical care in Pulmonology (10 MCQs)

Components of Final Examination

Theory

Paper I	<u>250 Marks</u>	3 Hours
5 SEQs	50 Marks	
100 MCQs	200 Marks	
Paper II	<u>250 Marks</u>	3 Hours
5 SEQs	50 Marks	
100 MCQs	200 Marks	

The candidates, who pass in theory papers, will be eligible to appear in the Clinical, TOACS/OSCE & ORAL.

<u>Clinical</u>	<u>500 Marks</u>
Four short cases	200 Marks
One long case	100 Marks
TOACS/OSCE & ORAL	200 Marks

Continuous Internal Assessment

100 Marks

Thesis Examination

400 Marks

All candidates admitted in MD courses shall appear in thesis examination at the end of 5th calendar year of the MD programme. The examination shall include thesis evaluation with defense.

RECOMMENDED BOOKS

1. Color atlas & text of pulmonary pathology by Cagle
2. Diseases of chest imaging diagnosis based on pattern classification by Matsushima ;2007
3. Handbook of tuberculosis 3 vols-set by Kaufmann; 2008
4. Nunns applied respiratory physiology by Lumb; 2006
5. Respiratory emergencies by Fein; 2006
6. Teaching atlas of chest imaging by Parker; 2006
7. The chest x-ray differential diagnosis in conventional radiology by Burgener ;2006
8. Critical care medicine the essentials by Marini; 2006
9. Irwin & rippe's intensive care medicine by Irwin ; 2008
10. Oh's intensive care medicine by Bersten; 2007
11. The ICU book by Marino; 2007
12. The washington manual of critical care by Kollef; 2008
13. Practical pulmonary & critical care medicine: diseases management by Mosenifar; 2006
14. Pulmonary pathophysiology: the essentials by West;2008
15. Rau's respiratory care pharmacology by Gardenhire; 2008
16. Mechanical ventilation: clinical applications and pathophysiology by Papadakos; 2008

APPENDIX "E"
(See Regulation 9-iii)

MANDATORY WORKSHOPS

1. Each candidate of MD/MS/MDS program would attend the 04 mandatory workshops and any other workshop as required by the university.
2. The four mandatory workshops will include the following
 - a. **Research Methodology**
 - b. **Statistical Methods**
 - c. **Communication Skills**
 - d. **Introduction to Computer / Information Technology and Software programs**
3. The workshops will be held on 03 monthly basis.
4. An appropriate fee for each workshop will be charged.
5. Each workshop will be of 02 - 05 days duration.
6. Certificates of attendance will be issued upon satisfactory completion of workshops.

APPENDIX "F"
(See Regulation 9xxiii, 13, 14 & 16)

CONTINUOUS INTERNAL ASSESSMENTS

a) Workplace Based Assessments

Workplace based assessments will consist of Generic as well as Specialty Specific competency Assessments and Multisource Feedback Evaluation.

Generic Competency Training & Assessments

The Candidates of all MD / MS / MDS programs will be trained and assessed in the following five generic competencies.

i. Patient Care.

- a. Patient care competency will include skills of history taking, examination, diagnosis, plan of investigation, clinical judgment, plan of treatment, consent, counseling, plan of follow up, communication with patient / relatives and staff.
- b. The candidate shall learn patient care through ward teaching, departmental conferences, morbidity and mortality meetings, core curriculum lectures and training in procedures and operations.
- c. The candidate will be assessed by the supervisor during presentation of cases on clinical ward rounds, scenario based discussions on patient management, multisource feedback evaluation, Direct Observation of Procedures (DOPS) and operating room assessments.
- d. These methods of assessments will have equal weightage.

ii. Medical Knowledge and Research

- a. The candidate will learn basic factual knowledge of illnesses relevant to the specialty through lectures/discussions on topics selected from the syllabus, small group tutorials and bed side rounds.
- b. The medical knowledge/skill will be assessed by the teacher during case based discussions and presentations to the supervisor.
- c. The candidate will be trained in designing research project, data collection, data analysis and presentation of results by the supervisor.

- d. The acquisition of research skill will be assessed as per regulations governing thesis evaluation and its acceptance.

iii. **Practice and System Based Learning**

- a. This competency will be learnt from journal clubs, review of literature, policies and guidelines, audit projects, medical error investigation, root cause analysis and awareness of healthcare facilities.
- b. The assessment methods will include case studies, presentation in morbidity and mortality review meetings and presentation of audit projects if any.
- c. These methods of assessment shall have equal weight-age.

iv. **Communication Skills**

- a. These will be learnt from role models, supervisor and workshops.
- b. They will be assessed by direct observation of the candidate whilst interacting with the patients, relatives, colleagues and with multisource feedback evaluation.

v. **Professionalism as per Hippocratic Oath**

- a. This competency is learnt from supervisor acting as a role model, ethical case conferences and lectures on ethical issues such as confidentiality, informed consent, end of life decisions, conflict of interest, harassment and use of human subjects in research.
- b. The assessment of residents will be through multisource feedback evaluation according to proformas of evaluation and its' scoring method.

Specialty Specific Competencies

- i. The candidates will be trained in operative and procedural skills according to a quarterly based schedule.
- ii. The level of procedural competency will be according to a competency table to be developed by each specialty.

iii. The following key will be used for assessing operative and procedural competencies:

a. **Level 1 Observer status**

The candidate physically present and observing the supervisor and senior colleagues

b. **Level 2 Assistant status**

The candidate assisting procedures and operations

c. **Level 3 Performed under supervision**

The candidate operating or performing a procedure under direct supervision

d. **Level 4 Performed independently**

The candidate operating or performing a procedure without any supervision

iv. **Procedure Based Assessments (PBA)**

a. Procedural competency will assess the skill of consent taking, preoperative preparation and planning, intraoperative general and specific tasks and postoperative management

b. Procedure Based assessments will be carried out during teaching and training of each procedure.

c. The assessors may be supervisors, consultant colleagues and senior residents.

d. The standardized forms will be filled in by the assessor after direct observation.

e. The resident's evaluation will be graded as satisfactory, deficient requiring further training and not assessed at all.

f. Assessment report will be sub

g. A satisfactory score will be required to be eligible for taking final examination.

Multisource Feedback Evaluation

- i. The supervisor would ensure a multisource feedback to collect peer assessments in medical knowledge, clinical skills, communication skills, professionalism, integrity, and responsibility.
- ii. Satisfactory annual reports will be required to become eligible for the final examination

b) Completion Of Candidate's Training Portfolio

- i. The Candidate's Training Portfolio (CTP) will be published (or computer based portfolio downloadable) by the university.
- ii. The candidates would either purchase the CTP or download it from the KEMU web site.
- iii. The portfolio will consist of the following components
 - a) Enrollment details.
 - b) Candidate's credentials as submitted on the application for admission form.
 - c) Timeline of scheduled activities e.g dates of commencement and completion of training, submission of synopsis and thesis, assessments and examination dates etc (**Appendix H**)
 - d) Log Book of case presentations, operations and procedures recorded in an appropriate format and validated by the supervisor.
 - e) Record of participation and presentations in academic activities e.g lectures, workshops, journal clubs, clinical audit projects, morbidity & mortality review meetings, presentation in house as well as national and international meetings.
 - f) Record of Publications if any.
 - g) Record of results of assessments and examinations if any
 - h) Synopsis submission proforma and IRB proforma and AS&RB approval Letter
 - i) Copy of Synopsis as approved by AS&RB
- iv. Candidates Training Portfolio shall be assessed as per proforma given in "**Appendix-G**".

Supervisor's Annual Review Report.

This report will consist of the following components:-

- i. Verification and validation of Log Book of operations & procedures according to the expected number of operations and procedures performed (as per levels of competence) determined by relevant board of studies.
- ii. A 90 % attendance in academic activities is expected. The academic activities will include: Lectures, Workshops other than mandatory workshops, Journal Clubs, Morbidity & Mortality Review Meetings and Other presentations.
- iii. Assessment report of presentations and lectures
- iv. Compliance Report to meet timeline for completion of research project.
- v. Compliance Report on Personal Development Plan.
- vi. Multisource Feedback Report, on relationship with colleagues, patients.
- vii. Supervisor will produce an annual report based on assessments as per proforma in appendix-G and submit it to the Examination Department.
- viii. 75 % score will be required to pass the Continuous Internal Assessment on annual review.

APPENDIX " G "

(See Regulation 9ix, 9xxiii-d, 10, 11, 14 & 16)

Supervisor's Evaluation

PROFORMA FOR CONTINUOUS INTERNAL ASSESSMENTS

1. Generic Competencies			
(Please score from 1 – 100. 75% shall be the pass marks)		Component Score	Score achieved
i.	Patient Care	20	
ii.	Medical Knowledge and Research	20	
iii.	Practice and System Based Learning		
	• Journal Clubs	04	
	• Audit Projects	04	
	• Medical Error Investigation and Root Cause Analysis	04	
	• Morbidity / Mortality / Review meetings	04	
iv.	Communication Skills		
	• Informed Consent	10	
	• End of life decisions	10	
v.	Professionalism		
	• Punctuality and time keeping	04	
	• Patient doctor relationship	04	
	• Relationship with colleagues	04	
	• Awareness of ethical issues	04	
	• Honesty and integrity	04	
2. Specialty specific competencies			
Please score from 1 – 100. 75% shall be the pass marks			Score achieved
Operative Skills / Procedural Skills			
3. Multisource Feedback Evaluation (Please score from 1 – 100. 75% shall be the pass marks)			
4. Candidates Training Portfolio (Please score from 1 – 100.75% shall be the pass marks)			
(Please score from 1 – 100. 75% shall be the pass marks)		Component Score	Score achieved
i.	Log book of operations and procedures	25	
ii.	Record of participation and presentation in academic activities	25	
iii.	Record of publications	25	
iv.	Record of results of assessments and examinations	25	