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| **Quality Assurance Unit** | **Tanta University**  **Faculty of Medicine** |

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| **Department of Chest diseases**  **Program Specifications** |
| **Master degree of Chest diseases** |
| **2023-2024** |

Chest Master Degree Program Specifications, 2023 - 2024 .

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| **University: Tanta** | **Faculty: Medicine** | **Department: Chest** |

**A- Basic Information**

1. **Program title : Chest Diseases**
2. **Program Code: CHEST 800**
3. **Program coordinator: Prof.**
4. **program internal evaluators: Prof. Fawzy Elemeiry**
5. **program external evaluators: Prof. Howayda El komy**
6. **Date of approval: / / 20**
7. **Departments offering the courses of program: Anatomy Histology, Physiology, Biochemistry, Public Health, Pathology, pharmacology, Microbiology, , , Internal Medicine, Chest diseases Faculty of medicine – Tanta University**

**B- Profesional Information**

**1 – Overall program aims**

The purpose of this curriculum is to provide the basis for training in the specialty of Respiratory Medicine to the level of award of a Certificate of Completion of Training. At this level, the doctor should have the knowledge, skills, attitudes and competencies to practice as an independent specialist practitioner, at Consultant level.

**2 – Intended learning outcomes (ILOs):**

**a. knowledge and understanding:**

By the, end of the program the candidate should be able to

a.1. Identify the basic science in relation to respiratory medicine.

a.2. Verify the various causes and pathogenesis of diseases in respiratory medicine.

a.3. Describe the methods of promoting health and preventing diseases in respiratory medicine, including nutrition, exercise, life styles, physiological health, genetic predisposition to disease, sanitation, environmental and work place hazards, preventive pharmacology and immunization.

a.4. Express the clinical manifestations and differential diagnosis of respiratory diseases with an emphasis on the incidence of the different manifestations and their relative importance in establishing the diagnosis, and the early manifestations of serious diseases (malignancy, emergencies).

a.5. Explain the scientific basis and interpretation of diagnostic studies with knowledge of the study / studies of choice in any specific situation and of the accuracy of the study in establishing diagnosis.

a.6. Express the principles, the indications, the relative advantages and disadvantages of various therapeutic modalities including mental health care and behavioral modification, nutritional therapy, pharmacotherapy, surgery, radiotherapy, immunotherapy and physical rehabilitation as applied to common clinical situations in respiratory medicine.

a.7. Express the principles of genetics, the role of genetics in health and disease and the basic principles of gene therapy and genetic counseling in respiratory medicine.

a.8. Summarize the theories and principles that govern ethical decision making in clinical practice and the major ethical dilemmas in respiratory medicine, particularly those that arise at the beginning and the end of life and from the rapid expansion of medical knowledge and technology.

a.9. Identify the relevant airways and pulmonary vascular structures and their relation to each other in order to help the candidate while performing invasive bronchoscopy or noninvasive imaging by all imaging techniques (e.g. CT, MSCT pulmonary angiography and MRI.

a.10. Identify the physiological basis of control of breathing (central & peripheral).

a.11. Specify information from different types of sample from the lung, view of the pathologist.

a.12. Summarize the classification, mode of action, indications, contraindications, interactions and adverse effects of drugs used in the field of pulmonary medicine especially asthma, COPD and Tuberculosis.

a.13. Outline the WHO International Health Regulations (2005).

a.14. Outline WHO Epidemic and Pandemic Alert and Responses (EPR).

a.15. Define and classify hormonal disorders related to chest diseases.

**b. Intellectual skills:**

By the end of the program the trainee will be able to:

**(b.1.) Data acquisition:**

b.1.1. Obtain and document a complete and a focused medical history for a patient with respiratory disease.

b.1.2. Perform and document a complete and a focused physical and mental status examination for a patient.

b.1.3. Perform an emergency - directed examination for patients with common respiratory emergencies.

b.1.4. Utilize sources of information in addition to the patient interview to augment the medical history. Such sources include family or friends, medical records and other health care professionals.

b.1.5. Identify anatomic landmarks on postmortem specimens.

b.1.6. Interpret results of physiologic tests such as pulmonary function tests, arterial blood gases and electrolyte analysis.

b.1.7. Define the place of bronchoalveolar lavage (BAL) and lung biopsy in the diagnostic work-up of diffuse lung disease.

b.1.8. Take a relevant history of a patient’s medication regimen.

**(b.2.) Data analysis and problem solving:**

b.2.1. Interpret patient symptoms and physical findings in terms of their anatomic, pathologic and functional diagnostic significances.

b.2.2. Identify problems, prioritize them, and generate a list of initial diagnostic hypotheses (differential diagnosis) for each problem.

b.2.3. Select the most appropriate and cost effective diagnostic and therapeutic producers for each problem.

b.2.4. Interpret the results of diagnostic procedures.

b.2.5. Use the results of all tests ordered to modify the problem list and the differential diagnosis accordingly.

b.2.6. Combine the clinical and investigational database, with the evidence based knowledge in clinical problem solving.

b.2.7. Assess different cardiac, renal and hepatic diseases andevaluate their impact on the chest.

**(b.3.) Skills related to treatment strategies:**

b.3.1. Recognize patients with immediately life-threatening conditions and institute appropriate initial therapy.

b.3.2. Recognize patients with serious conditions requiring critical care and institute course of management according guide lines available.

b.3.3. Design and apply rational therapeutic strategies for both acute and chronic conditions that take into account the various variables that influence these strategies.

b.3.4. Deal with complications of respiratory diseases.

b.3.5. Identify and manage patients with chronic conditions requiring long term follow-up, rehabilitation, or relief of pain.

b.3.6. Achieve consensus with the patient or the patient's relatives on the treatment plan selected.

b.3.7. Monitor the effectiveness of therapy by identifying clinical and investigative parameters to be used in assessing the patient's response to treatment and re-evaluate management plan accordingly.

**c. Professional and practical skills :**

By the end of the program the trainee will be able to:

**Communication skills:**

**(c.1.) Patient- doctor relationship**

c.1.1. Apply respect to all patients irrespective of their socioeconomic levels, culture or religious beliefs and use language appropriate to the patient's culture.

c.1.2. Conduct patient interviews that are characterized by patience and attentive listening.

c.1.3. Explain to the patient or the patient's relatives the nature of illness, the diagnostic plan, the treatment options and the possible complications in such a way that is easily understood, answers patient's questions,encourages discussion and promotes the patient's participation in decision making.

c.1.4. Write clear concise patient records: admission sheet, progress notes, physician orders, and referrals for consultation, discharge summary and follow-up notes.

c.1.5. Use appropriate skills and strategies of communication during difficult situations such as giving bad news and dealing with angry patients.

c.1.6. Discuss medical errors or professional mistakes honestly and openly in a way that promotes patient trust and self-learning.

**(c.2.) Relation to collaboration with healthcare professionals**:

c.2.1. Communicate effectively with other health care professionals to maximize patient benefits and minimize the risk of errors.

c.2.2. Respect the role and contributions of other health care professionals regardless of degree or occupation.

c.2.3. Undertake appropriate formal and informal consultations with colleagues and perform appropriate referrals to other health care professionals.

c.2.4. Write a concise and informative report on patient(s) conditions.

c.2.5.Work effectively as a member or a leader of an interdisciplinary team, and acquire the ability to develop and apply management plans for patients in collaboration with the members of the team.

c.2.6. Applygeneral measures to reduce spread of infection in hospital wards.

**d. General and transferable skills:**

by the end of the program the trainee will be able to

**(d.1.) Life-long learning:**

d.1.1. Show commitment to life-long self-learning.

d.1.2. Use the sources of biomedical information to remain current with advances in knowledge and practice.

d.1.3. Frame a question, search the literature and utilize the obtained information to solve a particular clinical problem or plan management of an individual patient according to the principles of Evidence-Based Medicine.

d.1.4. Know the principles of critical Appraisal of scientific research.

**(d.2.) Ethical behavior:**

d.2.1. Identify alternatives in difficult ethical choices, analyze considerations supporting different alternatives and formulate course of action that takes account of this ethical complexity.

d.2.2. Behave towards patients in a manner consistent with the ideals of profession.

d.2.3. Treat the patient as a person, not a disease, and understand that the patient is a person with beliefs, values, goals and concerns which must be respected.

d.2.4. Respect the patient's dignity, privacy, information confidentiality and autonomy.

d.2.5.Deliver care in a way that will allow the patient to feel he / she has received medical care in a caring, compassionate and human manner.

d.2.6. Maintain honesty and integrity in all interactions with patients, patient's families, colleagues and others with whom physicians must interact in their professional lives.

d.2.7. Maintain a professional image in manner, dress, speech and interpersonal relationships that is consistent with the medical profession's accepted contemporary standards in the community.

d.2.8. Be responsible towards work and in emergency situations.

d.2.9. Advocate the patient's interests over ones' own interests.

d.2.10. Provide care to patients who are unable to pay.

d.2.11. Recognize and effectively deal with unethical behavior of other members of the healthcare team.

d.2.12. The trainee should consider the cost implications of cost benefit of various treatment modalities.

**(d.3.) skills related to social and community context of healthcare:**

d.3.1. Define the Egyptian healthcare system and the community based resources and services and properly-utilize them to provide high quality and cost-effective patient and community care.

d.3.2. Participate actively in health promotion, disease prevention.

d.3.3. Deal appropriately with a specific community health problem.

**3- Academic standards adopted**

**Trainee’s duties and obligations**

* Trainees must attend at least 75% of lectures in pulmonology subjects. They should pass successfully through the first part and the second Fellowship Exam before being promoted to the third year of training.
* They should be actively involved and fully responsible for patient care including sharing in making decisions about diagnosis and management under supervision of the consultants.
* They must attend 75% of weekly meetings including clinical rounds, tutorials and journal clubs
* Their performance will be monitored and evaluated by trainers and a report made of their performance on monthly basis to The Egyptian Fellowship Board.
* All trainees will work as residents in the training specialty and they must fulfill all residents jobs defined by supervisors and trainers
* They should be responsible under supervision for outpatient and in patients' routine work.
* They must take supervised shifts according to the hospitals requirements and regulation.

**Specific Requirements and Obligations**

**1- Obligations towards the Admitted Patients:**

* The trainees will be responsible for supervised admission of patients from the outpatient department or emergency room.
* They will share in the completion of the following documents under supervision
* Complete history and physical examination form.
* Investigation requests, (laboratory, radiology, pathology, etc.).
* Reporting results of the investigations.
* The plan of management after consultation and approval from supervisors.
* Daily progress notes.
* Order and medication sheets
* Order the necessary diagnostic procedures
* Discussion of the case with the trainer and consultants
* Discharge summaries.
* Sick leaves and medical reports.
* The Trainee should inform the senior staff of any high risk patient admission.

**2- Obligations in the Outpatient Clinics:**

The trainees should attend the general pulmonology outpatient clinics and clinics related to the rotation in different subspecialties as requested by trainers and supervisory staff. They should participate in different patients' interviews and share in management under supervision.

**3- Mandatory Clinical and Academic Activities:**

The trainees shall be required to attend and participate in the mandatory academic and clinical activities of the department. Attendance and participation should not be less than 75% of the total number of activities within any training rotation / period including.

* Daily morning patients' rounds and meetings.
* Clinical round presentation, at least once weekly to cover various topics, problems, research, etc.
* Journal club meeting at least once monthly
* Clinico-pathological meeting, at least once monthly
* Interdepartmental Meetings
* Grand staff rounds

**4. The Log Book:**

The trainees must keep and update The Log Book where they record all activities and skills performed and learned during the training program. The activities should be dated and categorized to whether been performed by the trainee him/herself or as an assistant or participant. Each activity registered in the Log book should be counter signed by the trainer and finally the educational supervisor. The Trainer and educational supervisor shall sign the completed Log Book.

**5. The Research project:**

The trainees shall undertake at least one research project / audit during the training program under the guidance and supervision of their trainers. Such project or mini thesis should be written and presented before the trainee is accepted for admission to the final certifying examination.

**6.** **Before the completion of the training program,** the trainee should have completed satisfactorily the rotations described in the structure of the program and performed him/herself and assisted in the various requested procedures.

**7. Confidentiality and ethics:**

The trainee shall maintain the confidentiality and ethics of the medical profession. He shall maintain integrity and health relations with patients, their relatives, the medical, nursing and administrative staff.

**4 – Curriculum structure and content:**

**4-a- Program duration: at least 30 month *( 4 semesters each semester's duration is 16 weeks)*** from registration= 52 credit hours .

* **First Part:** 10 credit-hours In one semester .

[8 credit-hour obligatory , 1 credit-hour elective , 1 credit-hour scientific activity ]

* **Thesis:** 12 credit hours
* **Second Part:** 30 credit-hours

Divided equally to 3 semesters

(each semester 10 credit-hours = 8 credit-hour obligatory , 1 credit-hour elective , 1 credit-hour scientific activity )

**4-b- Program structures:**

The following points have to be covered:

**First Part: 10 credit-hours = as one semester :**

[8 credit-hour obligatory , 1 credit-hour elective , 1 credit-hour scientific activity ]

**The following points have to be covered:**

1. **Anatomy & embryology & Histology = 2** credit-hours .
2. **Physiology , Biochemistry & Public health, Prevention and social medicine = 2** credit-hours .
3. **Pathology , Pharmacology , Microbiology = 2** credit-hours .
4. **Internal medicine = 2** credit-hours.

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| **First semester** | |
| **Anatomy** | |
| * Embryology and development of the airways, lung and diaphragm | |
| * Surface anatomy of lung fissures, pleura, heart & vascular structures * CHEST WALL: Skeleton , joints, muscles,vessels,nerves,and Movements. | |
| * Lung and bronchial tree - Respiratory passages: anatomy and development of nose, paranasal sinuses ,pharynx, * larynx, trachea ,bronchi, bronchopulmonary * segments and structures of a single segment * For all vasculature ,innervation and lymph * Drainage | |
| * Pleura anatomy ,development and * Anomalies | |
| * Diaphragm and respiratory muscles and movements.- Anatomical basis of intercostals nerve block and aspiration of the chest. | |
| * Detailed anatomy of Mediastinum (including trachea &oesophagus) | |
| * Pericardium, heartand Pulmonary vessels | |
| * Pulmonary circulation (and incidence of congenital pathological shunts.) | |
| * Nerves of the thorax . * -Anatomy of the sensory pathway from the thorax( anatomy of chest pain). | |
| * Lymphatic drainage of the thorax | |
| **Histology** | |
| 1-Introduction  2-Cytology and cytogenetics  3-Epithelium  4- Blood and Haemopoeisis  5- Muscle tissue  6- Cardio vascular system  7- Lymphatic system  8- endocrine system  9- Respiratory system | |
| **Physiology** | |
| Physical properties of the lungs | |
| Mechanics of breathing | |
| Transport of respiratory gases | |
| Regulation of respiration & types of breathing | |
| Pulmonary circulation and pulmonary hypertension | |
| Ventilation / perfusion ration | |
| Hypoxia and cyanosis | |
| Acid – base balance | |
| Water and electrolyte Regulation | |
| Blood elements (RBCs, WBCs and platelets) | |
| Capillary circulation, body fluid formation and edema | |
| Glucose homeostasis | |
| **Biochemistry** | |
| Introduction to metabolism | |
| Carbohydrate metabolism | |
| Function of carbonic anhydrase | |
| Hormones | |
| Mineral metabolism | |
| Vitamins (daily requirement and deficiency) . | |
| Free radicals and anti-oxidants | |
| Food chemistry | |
| **Public Health** | |
| Epidemiology:  - General epidemiology of communicable diseases.  - Epidemiology of tuberculosis.  - Prevention and control of respiratory diseases esp. tuberculosis. | |
| Occupational health, Communication and health behavior: | |
| Demography and vital statistics related to chest diseases | |
| **Pathology** | | |
| Information from different types of sample from the lung, view of the pathologist | |
| Inflammation / repair | |
| Infective lung diseases – pathological view | |
| Specific infection | |
| Granuloma | |
| Approaches to idiopathic interstitial pneumonias, useful points for clinicians – pathological view | |
| Pathology of pre-neoplasia and common lung cancers | |
| Pathology of rare tumours | |
| Environmental , occupational pulmonary diseases –pathological view | |
| Airway diseases – pathological view | |
| Cyotology | |
| Pathology issues in respiratory intensive care | |
| Immunopathology | |
| **Pharmacology** |
| Antibiotics use and misuse in pulmonary infection | |
| Specific Anti tuberculous treatment | |
| Anti-viral drugs | |
| Anti-fungal drugs | |
| Drugs for treatment and Prophylaxis of asthma | |
| Drugs used in COPD. | |
| Steroids (phobia) | |
| **Microbiology** |
| Community acquired pneumonia, Hospital acquired pneumonia, ventilator associated pneumonia, pneumonia in immuno-compromized patients and fatal pneumonia |
| Fungal pulmonary infection |
| Mycobacteria tuberculosis and atypical mycobacterial pulmonary infection |
| Interplay between immunity and hypersensitivity in pulmonary tuberculosis |
| Viral pulmonary infection |
| **Internal Medicine** |
| Systemic and pulmonary hypertension |
| Rhumatic heart diseases |
| Ischemic heart diseases |
| Congenital heart diseases |
| Pericardial effusion and constrictive pericarditis |
| ECG, Echocardiography and exercise testing |
| Intervsional cardiac procedures |
| Diabetes and diabetic coma |
| Thyrotoxicosis, hypothyroidism and other hormonal disturbances with special reference to chest diseases |
| Renal failure |
| Liver cell failure |
| Collagen diseases |

**Second Part:** 30 credit-hours

1. Divided equally to 3 semesters ie. 2nd , 3rd ,4th courses [**CHEST 8005, 8006, 8007]**

(each semester 10 credit-hours = 8 credit-hour obligatory , 1 credit-hour elective , 1 credit-hour scientific activity )

**2nd semester**: **[ course ]** : **CHEST 8005**

**The following points have to be covered:**

| **Theoretical :** |  |
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| Asthma  (10 h) | * The Biology of Asthma . * Asthma: Epidemiology Pathophysiology, and Pathogenesis * Aspirin- and Exercise-Induced Asthma * Asthma: Clinical Presentation and Management * Allergic-BronchopulmonaryAspergillosis (Mycosis) |
| COPD; (10 h) | * Pathologic Features * Diagnostic Criteria andDifferential Diagnosis. * Epidemiology, Pathophysiology, and Pathogenesis * Clinical Course and Management. |
| other airway diseases (8h) | * Upper Airway Obstruction in Adults * Bronchiectasis * Cystic Fibrosis * Bronchiolitis * Bullous Disease of the Lung. |
| Smoking cessation  respiratory disease prevention (2 h) | * Smoking cessation * respiratory disease prevention |
| Skin testing (2 h) | * (tuberculin and allergy tests) |
| Respiratory infections excluding tuberculosis and non-tuberculous mycobacterial diseases (10 h) | * Community acquired pneumonia * Nosocomial Pneumonia. * Health care associated pneumonia. * Ventilator associated pneumonia. * Viral Infections of the Lung and Respiratory Tract * Protozoan Infections of the Thorax * Helminthic Diseases of the Lungs |
| Tuberculosis (TB) including extrapulmonary TB and non-tuberculous (opportunistic) mycobacterial diseases  (8 h) | * The Epidemiology, Prevention, and Control of Tuberculosis * The Microbiology, Virulence, and Immunology of Mycobacteria * Clinical Presentation and Treatment of Tuberculosis * Mycobacterial Infections and HIV Infection * Diseases due to Non-Tuberculous Mycobacteria |
| Pulmonary Radiology (5h) | * Principles of radiation physics, X-ray, CT scan Plain X-ray chest (normal CXR) * Plain X-ray chest (Abnormalities in CXR) * Ultrasound * CT Chest (normal, abnormalities ) * CT Chest (high resolution and multi slice), * CT angiogram, Multislices CT * MRI * Ventilation/Perfusion(Radio-active isotope) scan |
| Bronchoscopy (5 h) | * Background / introduction * Indications and contraindications of bronchoscopy * Evaluation, and Premedications * Monitoring and post-bronchoscopy evaluation * Normal findings via bronchoscopy * Abnormal findings via bronchoscopy * Interventional bronchocsopy * Rigid bronchoscopy |

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| **Practical :** |
| **Physical examination** |
| **History taking from patient** |
| **Physical examination** |
| **Appropriate investigations** |
| **Formulating an effective management plan** |
| **Dysponea** |
| **Classification of Dyspnoea** |
| **Causes of breathlessness** |
| **Differentiate cardiac, respiratory, neuromuscular and metabolic causes** |
| **pathogenesis of causes of dyspnoea** |
| **management / treatment of dyspnoea** |
| **Pharmacology of drugs used in dyspnoea** |
| **Relevant guidelines for management of dysponea** |
| **Cough** |
| **Causes of cough** |
| **How to formulate an appropriate differential diagnosis** |
| **Appropriate investigation of cough** |
| **ENT causes of cough** |
| **Management/treatment of cough linked to underlying diagnosis** |
| **Pharmacology of drugs used for treatment of cough** |
| **Relevant guidelines for management of cough** |
| **Causes of cough with normal & abnormal X-ray** |
| **Haemoptysis** |
| **Causes of haemoptysis** |
| **How to assess severity and formulate diagnostic strategy** |
| **How to formulate management plan, appropriate to degree of urgency** |
| **Need for interventional radiology/surgery** |
| **Relevant guidelines** |
| **Chest Pain** |
| **Causes of chest pain** |
| **Pathogenesis of chest pain** |
| **Differential diagnosis of causes of chest pain** |
| **Investigation (including ultrasound, closed and CT-guided pleural biopsy and medical thoracoscopy, among other investigations)** |
| **Pharmacology of drugs used in chest pain** |
| **Treatments and Management of chest pain** |
| **Relevant guidelines** |
| **Bronchial asthma** |
| **COPD** |
| **Bronchiectasis and suppurative lung diseases** |
| **Pneumonia** |
| **Pulmonary & extra pulmonary tuberculosis** |

**3rd semester: [course] CHEST 8006**

**The following points have to be covered**

| **Theoretical** |  |
| --- | --- |
| Occupational lung diseases | * Occupational Lung Disorders: General Principles and Approaches, * Asbestos-Related Lung Disease, * Chronic Beryllium Disease ,Hard-Metal Lung Diseases, Coal Workers’ Lung Diseases and Silicosis, Byssinosis * Occupational Asthma and Industrial Bronchitis |
| Environmental lung diseases | * Indoor and Outdoor Air Pollution., * High-Altitude Physiology and Clinical Disorders * Diving Injuries and Air Embolism, |
| Immunological and interstitial diseases.. Diffuse parenchymal lung diseases and orphan lung diseases | * Interstitial Lung Disease: A Clinical Overview and General Approach , * Systemic Sarcoidosis , * Idiopathic Pulmonary Fibrosis , * Hypersensitivity Pneumonitis, * Radiation Pneumonitis, * Pulmonary Manifestations of the Collagen Vascular Diseases. |
| Allergic and eosinophilic lung diseases excluding asthma | * The Eosinophilic Pneumonias |
| Pleuro-pulmonary manifestations of systemic/extrapulmonary disorders | * The relation between lung and GIT. * The relation between lung and Kidney * The relation between lung and heart. * The relation between lung and GIT. |
| Respiratory manifestations of immunodeficiency disorders | * Pulmonary manifestations of cancer patients. * Pulmonary manifestations of Human Immunodeficiency Virus |
| Pulmonary vascular diseases | * Pulmonary Circulation Pulmonary Hypertension and Cor- Pulmonale. * Pulmonary Thromboembolic Disease. * Pulmonary Vasculitis . |
| Pleural diseases | * Non-Malignant Pleural Effusions * Malignant Pleural Effusions * Pneumothorax * Malignant Mesothelioma and Other Pleura Tumors |
| Pleural procedures | * **Pleural biopsy and Thoracoscopy** |

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| **Practical** |
| **Pleural effusion & empyema** |
| **Pneumothorax** |
| **Pulmonary embolism** |
| **Pulmonary hypertension and corpulmonale** |
| **Interstitial lung diseases especially IPF and sarcoidosis** |
| **Pulmonary manifestations of systemic diseases** |
| **Pregnancy and different chest diseases** |
| **Pulmonary circulation** |
| **Assessment of intra-pleural and airway pressures** |

**4th semester[ Course] 8007 The following points have to be covered**

| **Theoretical** |  |
| --- | --- |
| Thoracic tumours | * The Solitary Pulmonary Nodule: A Systematic Approach * Non–Small Cell and small cell Lung Carcinoma * Primary Lung Tumors Other Than Bronchogenic Carcinoma: Benign and Malignant * Extrapulmonary Syndromes Associated with Lung Tumors |
| Diseases of chest wall, respiratory muscles and diaphragm | * Neuromuscular Diseases of the * Chest Wall And Effects of Neuromuscular Diseases on Ventilation * Management of Neuromuscular Respiratory Muscle Dysfunction |
| Mediastinal diseases | * Congenital Cysts of the Mediastinum: Bronchopulmonary Foregut Anomalies * Acquired Lesions of the Mediastinum: Benign and Malignant |
| Genetic and developmental disorders | * Genetic and developmental disorders |
| Lung transplantation | * Lung transplantation |
| Acute Respiratory failure | * Respiratory Failure: An Overview * Acute Respiratory Distress Syndrome: Pathogenesis, Clinical Features, Management, and Outcomes * Acute Lung Injury and the Acute Respiratory Distress Syndrome: |
| Respiratory pump failure | * Pathogenesis of Hypercapnic * Respiratory Failure in Patients with Lung and Chest Wall Disease . |
| Sleep related breathing disorders | * The Stages of Sleep and Changes in the Cardiorespiratory System During Sleep * Sleep Apnea Syndromes * Differential Diagnosis and Evaluation of Sleepiness |
| Intensive care and high dependency care units | * Oxygen Therapy and Oxygen Toxicity * Hemodynamic and Respiratory Monitoring in Acute Respiratory Failure * Principles of Mechanical Ventilation * Treatment of Agitation in ICU |
| Pulmonary exercise physiology and pulmonary rehabilitation | * Exercise * pulmonary rehabilitation |
| Home care (hospital at home and early discharge schemes) | * Home care (hospital at home and early discharge schemes) |
| Palliative care | * Palliative care |
| Patient oriented approach according to symptoms and signs | * Patient oriented approach according to symptoms and signs |
| Psychological factors and quality of life in respiratory diseases | * Psychological factors and quality of life in respiratory diseases |
| Respiratory epidemiology | * Respiratory epidemiology |
| Pulmonary Function testing | Ventilatory functions ,  Non respiratory functions of lung Respiratory muscle function  Spirometer and lung volumes  Airway resistance and conductance  Lung compliance (static and dynamic)  Lung diffusion  O2 and CO2 carriage by blood and their dissociation curves  Chloride shift phenomenon  Acid – base balance  Interpretation of ABGs |
| Pediatric pulmonary Medicine | * Pediatric pulmonary Medicine |

| **Practical** |
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| **Pulmonary Function testing** |
| * **Ventilatory functions** * **Non respiratory functions of the lung** * **Respiratory muscle function** * **Airway resistance and conductance** * **Lung compliance (static and dynamic)** * **Lung diffusion** * **Interpretation of spirometery** |
| **Acid – base balance**   * **Interpretation of ABGs** * **Critically ill patient with acid – base disturbance** * **O2 and CO2 carriage by blood and their dissociation curves** * **Chloride shift phenomenon** * **Hypoxia** |
| **Pulmonary exercise physiology** |
| **Acute respiratory failure** |
| **Respiratory devices** |
| **Sleep related breathing disorders** |
| **Chest Cases prepared for pulmonary or non-pulmonary surgery** |

**5-Courses included in the program:**

| **Scemester** | **Code** | **Course Title** | **Program ILOs** |
| --- | --- | --- | --- |
| **Covered** |
| 1st  Scemester | CHEST 8001 | Anatomy & Embryology and Histology | a.9., b.1.5 |
| CHEST 8002 | Physiology , Biochemistry and Public Health | a.10, b.1.6.  a.11, a.12, b.1.7., b.1.8. |
| CHEST 8003 | Pharmacology, Pathology, Microbiology | a.13, a.14  c.1.2.6 |
| CHEST 8004 | Internal Medicine | a.15, b.2.7 |
| 2nd ,3rd ,4th scemester | CHEST 8005  CHEST 8006  CHEST 8007 | Chest Diseases | a.1.-15., b.1., b.2., b.3., c.1., d.1., d.2. & d.3. |
| Thesis |  |  | 0.1.,b.2.5.c1.1.1,c.1.2.1,d.1.2.,d.2.1.,d.2.4.,d.3.3. |

|  | **program ILOs versus courses matrix** | | | | | | | | | | | | | | | | | | | | | | | |
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|  | **ILOS** | | | | | | | | | | | | | | | | | | | | | | | |
|  | **d** | | | **c** | | **b** | | | **a** | | | | | | | | | | | | | | |  |
| **4** | **3** | **2** | **1** | **2** | **1** | **3** | **2** | **1** | **15** | **14** | **13** | **12** | **11** | **10** | **9** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |  |
|  |  |  |  |  |  |  |  | **\*** |  |  |  |  |  |  | **\*** |  |  |  |  |  |  |  |  | **Anatomy and histology** |
|  |  |  |  |  | **\*** |  |  |  |  | **\*** | **\*** |  |  |  |  |  |  |  |  |  |  |  |  | **Public health** |
|  |  |  |  |  |  |  |  | **\*** |  |  |  | **\*** | **\*** |  |  |  |  |  |  |  |  |  |  | **Pathology, bacteriology and pharmacology** |
|  |  |  |  |  |  |  |  | **\*** |  |  |  |  |  | **\*** |  |  |  |  |  |  |  |  |  | **Physiology and biochemistry** |
|  |  |  |  |  |  |  | **\*** |  | **\*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **Internal med.** |
|  | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **\*** | **Chest diseases** |
|  | **\*** | **\*** | **\*** |  | **\*** |  | **\*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **\*** | **thesis** |
| **\*** | **\*** | **\*** | **\*** |  | **\*** | **\*** | **\*** |  |  |  |  |  |  |  |  |  |  | **\*** | **\*** |  |  |  |  | **Elective courses** |
| **\*** | **\*** | **\*** | **\*** | **\*** |  | **\*** |  |  |  |  |  |  |  |  |  |  | **\*** | **\*** |  |  | **\*** |  |  | **Scientific activities** |

**Academic Reference Standard (ARS)**

| program ILOs versus courses ARS | | | | | | | | | | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **d** | | | | **c** | | **B** | | | **A** | | | | | | | | | | | | | | | ILOs  ARS |
| **3** | | **2** | **1** | **2** | **1** | **3** | **2** | **1** | **15** | **14** | **13** | **12** | **11** | **10** | **9** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
|  | |  |  |  |  |  |  |  |  |  | \* | \* |  |  |  |  |  | \* |  |  | \* | \* |  | a1 |
|  | |  |  |  |  |  |  |  |  |  | \* |  | \* | \* |  |  |  |  | \* | \* | \* |  |  | a2 |
|  | |  |  |  |  |  |  |  |  |  | \* |  |  |  |  | \* | \* |  |  | \* |  |  |  | a3 |
|  | |  |  |  |  |  |  |  |  |  |  |  |  |  | \* | \* |  |  |  |  |  |  |  | a4 |
|  | |  |  |  |  |  |  |  | \* | \* |  |  |  |  |  |  |  |  |  |  |  |  |  | a5 |
|  | |  |  |  |  |  |  |  |  |  |  |  |  |  | \* | \* |  |  |  |  |  |  |  | a6 |
|  | |  |  |  |  |  | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b1 |
|  | |  |  |  |  |  | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | B2 |
|  | |  |  |  |  |  | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | B3 |
|  | |  |  |  |  |  |  | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | B4 |
|  | |  |  |  |  |  | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b5 |
|  | |  |  |  |  | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b6 |
|  | |  |  |  | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b7 |
|  | |  |  | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | c1 |
|  | |  |  | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | c2 |
|  | |  |  | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | c3 |
| \* | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d1 |
|  | | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d2 |
|  | | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d3 |
|  | | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d4 |
|  |  | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d5 |
| \* | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d6 |
|  | | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d7 |
|  | | \* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d8 |

**6. Program admission requirements:**

Candidates entering this program should pass successfully the M.B.B. Ch., with final total assessment at least (Good).

**7. Regulation for progression and program completion**

The general rules and regulations of assessment approved by Tanta University. In addition to the successful completion of the training program, all candidates must successfully pass two exams in order to get the M Sc. certificate.

**First Part Exam:**

Candidates are allowed to sit for the first part exam after:

1. Fulfill at least 75% of attendance of 1st semesters
2. Passing successfully semester exam.

The first part exam is a written, practical and oral exam.

**Thesis discussion:**

* ICDL and either Toeful or islet (with approved score from the faculty) are mandatory before thesis discussion.
* This should be done at least 1 months before entering the second part exam, discussion should be done in public and should be accepted.

**Second Part Exam:**

Candidates are allowed to sit for the second part exam after:

1. Passing successfully the first part exam.
2. Fulfill at least 75% of attendance of both 2nd , 3rd, 4th semesters
3. Passing successfully both semesters exams .
4. At least 1 month lag between thesis discussion and second part exam.

The second part exam is a written, oral and clinical exam.

**The structure of the examination:**

**The First Part Exam:**

* It aims to test candidate’s knowledge and intellectual skills in the applications of basic sciences that are related to the field of Pulmonary Medicine.
* The examination consists of 4 written papers: 3 Hours each in 4 days,
* Short questions, Multiple choice questions with a single best answer (problem solving question).
* Clinical, practical and oral exams will be conducted also according to the general rules of Tanta Faculty of Medicine.
* One of the staff members of Chest Department will share in the written, oral or practical exam of each specialty.

**The Second Part Exam:**

It aims to test candidates’ knowledge and skills in Pulmonary Medicine. In this exam, the entire curriculum will be covered.

The examination consists of written, Clinical and Oral exams

* ***Witten exam: one exam. two papers: (3 hours each).***

All papers are in Problem solving, MCQ format with one best correct answer and short essay questions. They are covering the whole Pulmonary Medicine curriculum.

* ***Clinical exam: 2 exam***

Clinical exam is composed of the following components:

1. **OSCE:**

OSCE exam is composed of cases with written answers from all candidates on specific clinical findings followed by discussion by at least 2 examiners.

1. **Short and Long Cases Exam:**

* The clinical exam remains the most important part of the examination as the long case evaluate the potential performance of the candidate in clinical practice while short cases assess clinical examination and interpretation skills.
* Each candidate is requested to see one short and one long case.
* During the long case exam, the candidate is observed in silence for the first part of the examination by at least two examiners where he/she is taking the history from the patient and performing physical examination and then the examiners asks him to present his findings in the history and examination and discuss his proposed differential diagnosis and management of the case.
* Marks are given according to a predetermined weighting of the components of the exam.
* ***Oral examination:*** Composed of oral two panels and traces panel.

1. **The oral exam** is the exam that tests the candidates’ ability to manage patients and explores his/her competencies in making an accurate diagnosis. It also assesses his attitudes and interpersonal communication skills. It is based on a set of topics with opening and supplementary questions. The question’s cards are prepared in advance together with expected ideal answer and allocated marks. This allows a good objective basis for marking.

The candidate usually rotates through two oral committees, each committee is composed of at least two examiners and cover two Pulmonary Medicine domains. Each examiner has 10-15 minutes with each candidate (40-60 minutes) for the whole oral exam.

1. **The tracing exam** is composed of cases presented to all candidates in the same time through data projector in a suitable room. The slides presents the candidates with plain XRC, CT, Pulmonary function reports, Arterial blood gases and other chest tracing. The aim of the exam is to test candidates’ interpretative abilities as related to pulmonary medicine diagnostic and therapeutic situations.

**8-Program assessment and evaluation:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Course | | Code | Credit hours | Semester | Written | Oral | Clinical | Total |
| First part | Anatomy and Histology | CHEST 8001 | 2 | First | 30 | 20 |  | 50 |
| Physiology Biochemistry and Public health | CHEST 8002 | 2 | First | 30 | 20 |  | 50 |
| Pathology, Pharmacology Microbiology | CHEST 8003 | 2 | First | 30 | 20 |  | 50 |
| Internal medicine | CHEST 8004 | 2 | First | 50 | 20 | 30 | 100 |
| Elective courses |  | 1 |  |  |  |  |  |
| Scientific activities |  | 1 |  |  |  |  |  |
| Thesis | |  | 12 |  |  |  |  |  |
| Second part | Courses on Chest Diseases | CHEST 8005 | 8 | Second | 2 papers:  Paper 1: 185  Paper 2:  185 | Traces:  80  Oral  80 | OSCE  50  Long case  120  Short case  50 | 750 |
| CHEST 8006 | 8 | Third |
| CHEST 8007 | 8 | Fourth |
| Elective courses |  | 3 |  |  |  |  |  |
| Scientific activities |  | 3 |  |  |  |  |  |
| Total |  |  | 52 |  | 510 | 240 | 250- | 1000 |

**Evaluation**

* Reports of program external and internal evaluators
* Questioner to students and stick holders
* Reports of faculty internal auditing system

Will be included in the annual program report , and action pane will be structured accordingly

**-Appendix courses specifications**

The ILOs of the course specifications included in the appendix are integral part of this course program.

**9-we certify that all of the information required to deliver this program is contained in the above specifications and will be implemented**

We verify that the above Program and the analysis of students and external evaluator opinions are accurate.

Program coordinator and head of department  
name…………………..signature……………….Date……………….

Head of quality assurance unit: name…………………..signature……………….Date……………….

**Appendix**

**1. Anatomy and Histology**

**1.1 Knowledge**

**By the end of the training, candidates should have adequate knowledge and deep understanding of**

* **The position of the trachea and major airways, the borders and surface anatomy of the lung and pleura**
* **The relevant airways and pulmonary vascular structures and their relation to each other in order to help the candidate while performing invasive bronchoscopy or non invasive imaging by all imaging techniques (e.g. CT, MSCT pulmonary angiography and MRI**
* **The structure of the medistinum and the relevant vascular and lymphatic drainage.**
* **The developmental basis of all congenital pulmonary malformations.**
* **Skills**
* **Identify anatomic landmarks on postmortem specimens**
* **Identify lung segments and vascular structure in CT and MSCT pulmonary angiogram.**
* **Identify normal and abnormal pulmonary, vascular and medistinal structure in X-ray, CT and MRI**
* **Topics**
* **Embryology of the airways and lung**
* **Surface anatomy of lung fissures, heart and vascular structures**
* **Anatomy of the lung and detailed anatomy of the medistinum**
* **Anatomy of the Aorta and Pulmonary vessels**
* **Anatomy of pulmonary circulation and the incidence of congenital pathological shunts.**
* **Histology of the bronchial mucosa and alveoli**

**2. Physiology and Biochemistry**

**2.1 Knowledge**

**By the end of the training, candidates should have adequate knowledge and deep understanding of**

* **The physiological basis of control of breathing (central & peripheral).**
* **The physiology and pathophysiology of O2 and CO2 transport in order to understand the various types of hypoxia**
* **The various respiratory & metabolic processes in order to evaluate normal and abnormal acid-base balance conditions.**
* **Skills**
* **Interpret results of physiologic tests such as pulmonary function tests, arterial blood gases and electrolyte analysis**
* **Interpret normal pressure tracing in central veins, right ventricle, pulmonary artery and pulmonary artery wedge pressure.**
* **Interpret respiratory muscle function tests**
* **Construct diet for Asthma and COPD patients**
* **Identify various types of O2 masks and O2 delivery systems.**

**2.3 Topics:**

**2.3.a. Physiology**

**2.3.a.1 Acid – base balance**

**2.3.a.2 Water and electrolyte Regulation**

**2.3.a.3 Blood elements (RBCs, WBCs and platelets)**

**2.3.a.4 Pulmonary hypertension**

**2.3.a.5 Capillary circulation, body fluid formation and edema**

**2.3.a.6 Glucose homeostasis**

**2.3.a.7 Regulation of respiration & types of breathing**

**2.3.b. Biochemistry**

**2.3.b.1 Introduction to metabolism**

**2.3.b.2 Carbohydrate metabolism**

**2.3.b.3 Function of carbonic anhydrase**

**2.3.b.4 Hormones**

**2.3.b.5 Mineral metabolism**

**2.3.b.6 Vitamins (daily requirement and deficiency).**

**2.3.b.7 Free radicals and anti-oxidants**

**2.3.b.8 Food chemistry**

**3. Lung Pathology**

* **Knowledge**
* **Information from different types of sample from the lung, view of the pathologist**
* **Approaches to idiopathic interstitial pneumonias, useful points for clinicians – pathological view**
* **Pathology of pre-neoplasia and common lung cancers**
* **Pathology of rare tumours**
* **Environmental and occupational pulmonary diseases – pathological view**
* **Pathology issues in respiratory intensive care**
* **Infective lung diseases – pathological view**
* **Airway diseases – pathological view**
* **Skills**
* **To define the place of bronchoalveolar lavage (BAL) and lung biopsy in the diagnostic work-up of diffuse lung disease**
* **To show that BAL cell differentials should not be interpreted in isolation, but in context with morphological features and particularly in context with the pattern of high resolution CT.**
* **To provide the keys for understanding the sensitivity and specificity of BAL findings for the major diffuse lung disease: when is BAL alone sufficient, when is biopsy needed.**
* **Be aware of radiologic-pathologic correlation for airway pathology.**
* **Understand how the various pathologic changes correlate with the various functional deficits that may be encountered for bronchiolar pathology.**
* **To be aware of how rare pulmonary neoplasms are categorized within the WHO/IASLC classification for lung and pleural tumours.**
* **To learn the clinical presentation, histology and prognostic significance of these entities.**
* **To gain insight into the pathogenesis of some of the rare entities and which should be regarded as neoplastic as opposed to reactive in nature.**

**4. Pulmonary Pharmacology**

**4.1 Knowledge**

**By the end of the training, candidates should have adequate knowledge and deep understanding of**

* **The classification, mode of action, indications, contraindications, interactions and adverse effects of drugs used in the field of pulmonary medicine especially asthma, COPD and Tuberculosis**
* **Drug pharmacodynamics and pharmacokinetics (absorption, bioavailability, distribution, biotransformation and excretion**
* **Pharmacogenetics**
* **Skills**
* **Take a relevant history of a patient’s medication regimen**
* **Assess the risks and benefits of prescribing an individualizes drug treatment regimen for a give pulmonary condition**
* **Monitor of the desired effects of patient’s drug therapy and also the side effects. From this he should be able to make appropriate modification to the treatment regimen**
* **Recognize and manage possible drug interactions (including treatment of concomitant diseases).**
* **Identify and interpret the importance of herbal remedies taken by patients**
* **Perform and interpret diagnostic tests to assess drug efficacy and safety**
* **Incorporate the principles of current evidence-based therapeutic guidelines into clinical practice**
* **Communicate with patients and their family members to improve treatment compliance and to ensure early recognition of possible adverse effects.**
* **Consider the cost effectiveness & feasibility of the prescribed treatment regimen.**
* **Topics**
* **Antibiotics use and misuse in pulmonary infection**
* **Specific Anti tuberculous treatment**
* **Steroid phobia**
* **Prophylactic therapy of asthma**
* **Drugs used in COPD.**

**5. Microbiology**

**5.1 Knowledge**

**By the end of the training, candidates should have adequate knowledge and deep understanding of**

* **Different pathogens involved in pulmonary infection**
* **The role of opportunistic pathogens in pulmonary infection in immunocompromized patients.**
* **The emergence of resistant forms of streptococcal organisms**
* **TB bacilli and the resistant forms**
  1. **Skills**
* **Perform Gram Stain and Identify different Gram positive and negative species.**
* **Recognise the different forms of culture media and apply culture for different specimens including: sputum, BAL, pleural fluid or tissue aspirate**
* **Perform ZeihlNeelsen Stain and recognize the modern bacteriological and immunological Methods used for investigating tuberculosis.**

**Topics**

* **Community acquired pneumonia, Hospital acquired pneumonia, ventilator associated pneumonia, pneumonia in immuno-compromized patients and fatal pneumonia**
* **Fungal pulmonary infection**
* **Mycobacteria tuberculosis and atypical mycobacterial pulmonary infection**
* **Interplay between immunity and hypersensitivity in pulmonary tuberculosis**
* **Viral pulmonary infection**

**6: Public health**

* **Knowledge**

**6.1.1 Infectiveness and transmission of respiratory diseases**

**6.1.2 Principles of disinfection and isolation**

**6.1.3 WHO International Health Regulations (2005)**

**6.1.4 WHO Epidemic and Pandemic Alert and Responses (EPR)**

**6.1.5 Diseases covered by EPR**

**6.1.6 List of notifiable diseases in own country**

**6.1.7 Financial burden of common respiratory diseases such as COPD including in-patient/out-patient costs and effects on days off work**

**6.1.8 Effects of smoking on respiratory diseases**

**6.1.9 Industrial compensation law e.g. asbestos-related diseases**

**6.2 Skills**

**6.2.1 Isolation procedures (tuberculosis, SARS and MRSA)**

**6.2.2 General measures to reduce spread of infection in hospital wards**

**6.2.3 Contact tracing for tuberculosis and tuberculin testing (skin and blood tests)**

**6.2.4 Organisation of hospital services in event of epidemics e.g. influenza and bio-terrorist attack**

**6.2.5 Vaccination (BCG, pneumococcus and influenza)**

**6.2.6 Delivery of smoking cessation programmes**

**6.2.7 Preparation of medico-legal reports**

**6.3 Behaviour and attitudes**

**6.3.1 Explain infection risks to contacts of sick patients**

**6.3.2 Explain hygiene measures to ward staff**

**6.3.3 Encourage smoking cessation sympathetically**

**6.3.4 Liaise with infection control and public health departments**

**6.3.5 Establish links with health economists**

**7. Internal Medicine:**

**7.1 Knowledge**

**7.1.1 Definition and classification of cardiac conditions leading to affection of the respiratory system.**

**7.1.2. Definition and classification hormonal disorders related to chest diseases.**

**7.1.3 Identify hepatic and renal relationship with chest diseases.**

**7.2 Skills**

**7.2.1 Clinical assessment of different cardiac, renal and hepatic diseases and their impact on the chest.**

**7.2.2 Differentiate different types of coma**

**7.2.3 Assessment of drug pharmacology used in Internal medicine and their pulmonary impact.**

**7.3 Topics**

**7.3.1 Systemic and pulmonary hypertension**

**7.3.2 Rhumatic heart diseases**

**7.3.3 Ischemic heart diseases**

**7.3.4 Congenital heart diseases**

**7.3.5 Pericardial effusion and constrictive pericardtis**

**7.3.6 ECG, Echocardiography and exercise testing**

**7.3.7 Intervsional cardiac procedures**

**7.3.8 Diabetes and diabetic coma**

**7.3.9 Thyrotoxicosis, hypothyroidism and other hormonal disturbances with special reference to chest diseases**

**7.3.10 Renal failure**

**7.3.11 Liver cell failure**

**7.3.12 Collagen diseases.**