



Department of Respiratory Care

Course Specification of Pulmonary Function Tests

Course No. (08 05 868)

2023/2024

LXXVI. Course Description:

This course provides a comprehensive foundation in patient assessment techniques specifically tailored for respiratory care. Students will develop effective patient communication skills, learn to take a focused patient history, and master the measurement and interpretation of vital signs. The course covers the principles of physical examination, including respiratory, cardiovascular, and neurological assessments. Emphasis is placed on identifying cardiopulmonary symptoms, understanding clinical laboratory studies, and recognizing the unique assessment needs of neonatal, pediatric, and older adult patients. Students will also learn about sleep-disordered breathing and the principles of accurate patient assessment documentation.

IV Course Content:

Distribution of Semester Weekly Plan of Course Topics/Items and Activities.

A – Theoretical Aspect:

S	Topics List	Subtopics List	No. of Weeks	Contact hours	
1	Indications for Pulmonary Function Testing	Pulmonary Function Tests Airway Function Tests Lung Volume and Ventilation Tests Diffusing Capacity Tests Blood Gases and Gas Exchange Tests Cardiopulmonary Exercise Tests Metabolic Measurements Indications for Pulmonary Function Testing Spirometry Lung Volumes Diffusing Capacity Blood Gases Exercise Tests Patterns of Impaired Pulmonary Function Obstructive Airway Diseases Restrictive Lung Disease Diseases of the Chest Wall and Pleura Neuromuscular Disorders Congestive Heart Failure Lung Transplantation Preliminaries to Patient Testing Testing During a Pandemic Before Patient Testing Patient Preparation (Pretest Instructions) Withholding Medications Smoking Cessation Other Patient Preparation Issues Anthropometric Measurements Physical Assessment Pulmonary History Test Performance and Sequence Technologist-Driven Protocols (Operator-Driven Protocols) ▪ Patient Instruction	1-2	4	

2	Spirometry	Vital Capacity Description Technique Significance and Pathophysiology Forced Vital Capacity, Forced Expiratory Volume, and Forced Expiratory Flow Description Technique Acceptability and Repeatability for Spirometry Results Significance and Pathophysiology Flow-Volume Curve Description Technique Significance and Pathophysiology Peak Expiratory Flow Description	3-4	4	
		Technique Significance and Pathophysiology Maximum Voluntary Ventilation Description Technique Significance and Pathophysiology Bronchodilator Responsiveness Testing ▪ Description ▪ Technique ▪ Significance and Pathophysiology			
3	Diffusing Capacity Tests	Carbon Monoxide Diffusing Capacity ▪ Description ▪ Techniques ▪ Significance and Pathophysiology	5	2	
4	Lung Volumes, Airway Resistance, and Gas Distribution Tests	▪ Lung volumes: functional residual capacity, residual volume, total lung capacity, and residual volume/total lung capacity ratio ▪ Airway resistance and conductance ▪ Gas distribution tests: single-breath nitrogen washout, closing volume, and closing capacity ▪ Multiple breath nitrogen washout, lung clearance index, and phase III slope analysis	6-7	4	
5	Med-term exam		8	2	
6	Bronchoprovocation Challenge Testing	▪ Methacholine Challenge ▪ Histamine Challenge ▪ Mannitol Challenge ▪ Exercise Challenge ▪ Eucapnic Voluntary Hyperventilation	9	2	
7	Specialized Test Regimens	▪ Respiratory muscle strength testing ▪ Exhaled nitric oxide ▪ Forced oscillation technique ▪ Preoperative pulmonary function testing ▪ Pulmonary function testing for social security disability ▪ Metabolic measurements: indirect calorimetry	10	2	

8	Pulmonary Function Testing Equipment	Volume-Displacement Spirometers Dry-Seal Spirometers Dry Rolling Seal Spirometers Bellows-Type Spirometers Flow-Sensing Spirometers Turbines Pressure-Differential Flow Sensors Heated-Wire Flow Sensors Pitot Tube Flow Sensors Ultrasonic Flow Sensors Flow Sensor Summary Portable (Office or Home) Spirometers Peak Flowmeters Body Plethysmographs Pressure Plethysmographs Flow Plethysmographs Breathing Valves Free Breathing and Demand Valves Directional Valves Gas-Sampling Valves Pulmonary gas Analyzers Oxygen Analyzers Infrared Absorption (CO ₂ , CO) Analyzers Emission Spectroscopy Analyzers Thermal Conductivity Analyzers Gas Chromatography Chemiluminescence Analyzers Gas-Conditioning Devices	11-12	4	
		Blood gas Analyzers, Oximeters, and Related Devices pH Electrodes P _{CO2} Electrodes P _{O2} Electrodes Point-of-Care Analyzers Transcutaneous P _{O2} and P _{CO2} Electrodes Spectrophotometric Oximeters Pulse Oximeters Reflective Spectrophotometers Computers for pulmonary function testing Data Acquisition and Instrument Control Pulmonary Function Data Storage and Programs			
9	Quality Systems in the Pulmonary Function Laboratory	- Quality manual - Quality system essentials - Path of workflow	13	2	
10	Reference Values and Interpretation Strategies	- Selecting and using reference values - Establishing what is abnormal - Pulmonary function testing interpretation, "bringing it all together" Interpretation algorithm	14	2	
11	General Review		15	2	
TOTAL			16	32	
Number of Weeks /and Units Per Semester			16 weeks	2 Credits	
B - Practical Aspect: (if any)					

S	Tasks/ Experiments	Number of Weeks	contact hours	
1	<u>Lab 1: Equipment Familiarization and Calibration:</u> • Introduction to PFT equipment components, setup procedures, and routine calibration verification.	1	2	c1
2	<u>Lab 2: Basic Spirometry:</u> • Practice in obtaining and interpreting flow-volume loops and spirometry parameters (FVC, FEV1, FEV1/FVC).	1	2	c2
3	<u>Lab 3: Spirometry Quality Assessment:</u> • Focus on patient effort, acceptability, and reproducibility of spirometry maneuvers.	1	2	c1
4	<u>Lab 4: Lung Volumes & Airway Resistance:</u> • Perform plethysmography or helium dilution for lung volumes (FRC, RV, TLC), and airway resistance measurements.	1	2	c3
5	<u>Lab 5: Diffusing Capacity (DLCO):</u> • Perform single-breath DLCO tests, understand gas mixtures, and interpret results.	1	2	c3
6	<u>Lab 6: Bronchoprovocation Challenge:</u> • Observe or simulate a methacholine challenge test procedure and data analysis.	1	2	c3
7	<u>Lab 7: Pre/Post Bronchodilator Testing:</u> • Perform spirometry before and after bronchodilator administration to assess reversibility.	1	2	c3
8	<u>Lab 8: Specialized Regimens:</u> • (Pick one or two) Explore tests like maximal inspiratory/expiratory pressures, 6-minute walk, or maximal voluntary ventilation.	1	2	c3
9	<u>Lab 9: PFT Interpretation: Obstructive vs. Restrictive Patterns:</u> • Analyze case studies with various PFT results, differentiating patterns.	2	2	c3
10	<u>Lab 10: PFT in Disease States:</u> • Focus on how PFTs change in common conditions (COPD, asthma, interstitial lung disease, etc.)	1	2	c3
11	<u>Lab 11: Equipment QC and Troubleshooting:</u> • Simulate equipment errors, practice troubleshooting, and review QC logs.	1	4	c2
12	<u>Lab 12: Patient Communication:</u> • Role-play scenarios explaining PFT procedures and basic results to diverse patients.	1	2	c2
13	<u>Lab 13: PFT Software and Report Generation:</u> • Practice using PFT software to enter data, analyze results, and generate reports.	1	2	c1-c3
14	<u>Lab 14: Mock PFT Session:</u> • Students perform a full PFT assessment (spirometry, lung volumes, DLCO) on a classmate or volunteer, including interpretation. • Practice how to write the PFT report.	1	2	c1-c3
15	<u>Final lab- Exam</u>	1	2	
TOTAL		15	30	-
Number of Weeks /and Units Per Semester		15 weeks	1 Credits	-

VI. Teaching strategies of the course:

109. Lecture method
110. Practical Evaluation
111. Physical Assessment
112. Clinical exam
113. Brainstorming
114. Demonstration
115. Case study discussions

II. Schedule of Assessment Tasks for Students during the Semester

Theoretical part

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	
1	Attendance and Activities	15 th week	5	5%	
2	Student assignment	5 th and 12 th week	5	5%	
3	Mid-term exam	7 th or 8 th week	10	10%	
4	Final exam	16 th -17 th week	40	40 %	
Total Theory Weight			60	60%	

Practical part

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	
1	Attendance and Attitude	14 th week	5	5%	
2	Semester work	1 st and 14 th week	10	10%	
3	Case report	13 th -14 th week	5	5%	
4	Final exam (Practical)	15 th week	20	20%	
Total Practical Weight			40	40%	

