



AMITY UNIVERSITY
— UTTAR PRADESH —

COURSE CURRICULUM

Course Title: CARDIOVASCULAR & RESPIRATORY PHYSIOLOGY

Credit Units: 05

Course Level: PG

Course Code:

L	T	P/ S	SW/ FW	TOTAL CREDIT UNITS
4	0	2	0	5

Course Objectives:

The physiological functions of systems of human body with special emphasis on cardiovascular & respiratory system & their application in medicine at an elementary level.

Pre-requisites: Knowledge of anatomy & physiology.

Course Contents/Syllabus:

	Weightage (%)
Module I Cardiovascular System	10

<ul style="list-style-type: none"> • Anatomy and General Function: Electron microscopical structure; Intercalated disc and its structural and functional significance; Sarcotubular system; Role of regulatory proteins in the contraction of myocardium; Functional unit – Contractile apparatus, Sarcomere. • Electrical activity of Heart and Cardiac Efficiency : Conduction system; Performance of Heart muscle; Determination of cardiac output by Ballistocardiography; Electrocardiogram – its significance, different leads, relationship in physical exercise and training; Cardiac vector and its determination; Cardio-Axiograph 	
Module II : : Cardiac efficiency by Exercise	5
<p>Cardiac efficiency by Exercise: Tolerance Test etc.</p>	
Module III Autonomic Nervous System	15
<ul style="list-style-type: none"> • Chemical and reflex action by receptor system; • Cardiovascular homeostasis; • Cardiovascular reflexes – Sino-aortic mechanism; Cardiopulmonary receptors, Viscero-vescularal, Somato vascular and Viscero-cardiac reflexes. 	
Module IV : Cardiac Metabolism and the role of neurohormones	20
<ul style="list-style-type: none"> • Regional circulation – Coronary, Cerebral and Pulmonary in health and disease. • Myocardial necrosis and Myocarditis : Heart failure, Ischaemic damage, coronary bypass, coronary angioplasty, Cytotoxic necrosis, Cardiotoxins – important 	

cardiotoxic substances, Cardiotoxic Drugs and their effects	
Module V	20
<ul style="list-style-type: none"> • Action potential, chemotransmitters and ionic basis. • Principles of ECG; Evolution of unipolar and bipolar lead system, Depolarization and repolarization sequence in single cardiac muscle fiber in volume conductor and reason for upright wave for repolarization (T wave), Einthoven triangle Einthoven law, normal ECG (wave, interval, origin and duration). Changes in configuration of ECG in 12 leads in a normal person, vector cardiography, principle vectors and vector loop generated during cardiac cycle, Mean electrical axis, method of its calculation, right and left axis deviation, physiological and pathological conditions for axis deviation, Conduction defects in heart and their ECG appearance, Atrial and ventricular arrhythmias. • Cardiac cycle, Heart sounds, arterial pulse and jugular venous pressure changes during cardiac cycle. • Cardiac output, its regulation and measurement. • Peripheral circulation; Organization and innervations, Flow velocity and resistance (precapillary and post capillary Biophysical principle applicable to blood vessels, Venous and lymphatic circulation, Regulation of peripheral circulation. • Heart rate, vagal tone, regulation of heart rate. • Blood pressure, factors affecting BP and determinants of blood pressure, Regulation of BP, High and low blood, pressure, shock, Circulation through different regions: cerebral, coronary, pulmonary, fetal, splanchnic 	
Module VI: Respiratory System	
<ul style="list-style-type: none"> • Basic Principles: The atmosphere – Evolution of the atmosphere; Biological consequence of an oxidizing environment; Turn over rates of atmospheric gases; 	15

<p>Oxygen, ozone and ultraviolet screening; Evolution and adaptation.</p> <ul style="list-style-type: none"> • Morphology of lung: Elastic forces, lung volumes, Pressure/volume relationship of the lung and thoracic cage; measurement of compliance and lung volumes; elastic recoil of the lungs and thoracic cage; Principle of Lung function tests. • Respiratory system resistance : Physical principles of gas flow and resistance; Respiratory system resistance; Factors affecting respiratory resistance; Muscular control of airway diameter; Work of breathing; Respiratory gas equation and alveolar air equation; Alveolar ventilation and perfusion ratio. • Non respiratory functions of the lung: Filtration, Defense against inhaled substances; the endocrine lung. 	
<p>Module VII: Respiratory functions in altered conditions</p>	
<ul style="list-style-type: none"> • Respiratory function in pregnancy; The lungs before birth, Events at birth; Neonatal lung function; Respiratory distress syndrome; Sudden infant death; • Respiratory function during exercise and sleep. Respiration in closed environments and space: Respiration in closed system anesthesia; submarine, space, microgravity and biosphere. • Respiration in high altitude, Hypoxia, Hyperoxia and Oxygen toxicity : Respiratory system response to altitude, altitude illness; Biochemical changes in hypoxia; Mechanism of hypoxia cell damage; Hyperoxia at normal atmospheric pressure; Hyperbaric oxygenation; • Oxygen toxicity; Defense against oxygen derived free radicals. • Physiology of pulmonary disease: Ventilatory failure; Airway disease; pulmonary vascular disease. 	<p>10</p>

Module VIII: Artificial Ventilation:	
<ul style="list-style-type: none"> • Method used for resuscitation; Physiological effects of artificial ventilation; Ventilator induced lung injury; Non-invasive ventilation. • Lung transplantation: Clinical aspect; Physiological effects of lung transplant. Respiratory system & Immune function. 	5

Student Learning Outcomes: On completion of the study of this subject the student should be able to understand:

The physiological functions of systems of human body with special emphasis on cardiovascular & respiratory system, Demonstrate comprehensive understanding of physiology as well as that of the applied disciplines;

Demonstrate adequate knowledge of the current developments in medical sciences as related to physiology.

Pedagogy for Course Delivery: The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of cardiorespiratory physiology.

Lab/ Practicals details, if applicable:

List of Experiments:

- Examination of arterial pulse
- Recording of Blood pressure & effect of posture
- Electrocardiography

- Clinical examination of cardiovascular system.
- Pulmonary function tests; recording of normal spirogram, FEV
- To record the chest movements by a stethograph and to study the effects of speech, swallowing, coughing, breathe holding and hyperventilation
- Clinical examination of respiratory system
 - Artificial respiration and cardio pulmonary resuscitation (CPR).

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	End Term Examination
80	20	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	Components	Attendance	Class test	Home Assignment	Case/Presentation
Weightage (%)	Weightage (%)	5	15	5	70

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment				End Term Examination
Components (Drop down)	Attendance	Practical Test	Home Assignment	Case/Presentation	Practical Paper
Weightage (%)	5	15	5	5	70

Text:

1. Guyton, A., Text Book of Medical Physiology, Elsevier Publication,
2. Ganong, W.F., Reviews of Medical Physiology, Lange Publication
3. Khurana, I., Text Book of Physiology, Elsevier Publication
4. Berne V, Principles of Physiology, Elsevier Mosby Publication.
5. Lippincott W & Wilkins, Medical Physiology (Clinical Medicine), Rhodes & Bell.
6. Biomedical Instrumentation & Measurements, by L. Cromwell, F.J. Weibell & E.A. Pfeiffer; Prentice-Hall of India Pvt Ltd.
7. Biophysics and Biophysical Chemistry, by D.Das. Academic Publishers.
8. Samson Wright's Applied Physiology. Edited by C.A. Keele. E Neil & N. Toels. Oxford University Press.
9. Physiology of Respiration by J.H. Comroe. Year Book Medical Publishers.