
HMX Fundamentals Physiology

Understanding how the body works is essential for effectively treating patients. This course covers core physiology concepts and their relationship to the workings of the respiratory, cardiovascular, and renal systems. Participants will:

- Understand how the body reacts to stimuli to maintain steady-state conditions
- Learn fundamental concepts like partial pressure, flow through tubes, compliance, supply and demand, and acid-base balance and how they relate to the working of biological systems
- See how basic principles apply in real world and clinical settings

Topics Covered

Course Overview

- Course introduction
- Meet the faculty
- High level overview

Partial Pressure

- Partial pressure basics
- Partial pressures in the lungs and blood

Movement of Body Fluids

- Osmotic forces
- Starling forces
- Body fluid compartments
- Osmotic forces in the kidney

Flow Through Tubes

- Ohm's Law analogy
- Resistance
- Resistance - series vs. parallel
- Laminar vs. turbulent flow
- Air trapping

Compliance

- Compliance basics
- Surface tension
- Laplace's Law
- Surface tension and alveoli
- Elastic and surface forces in the lung

Supply and Demand

- Aerobic vs. anaerobic metabolism
- Oxygen delivery
- Ohm's Law application
- Fick principle

Transmural Pressure

- Transmural pressure basics
- Flexible tubes
- Cardiovascular applications
- Respiratory applications

Dynamic and Steady State Conditions

- Dynamic and steady state basics
- Dynamic conditions
- Pulmonary applications

Acid-Base

- Acid-base physiology
- Respiratory acid
- Metabolic acid
- Metabolic acid - elimination by kidney

Homeostasis

- Homeostasis basics
- Blood pressure
- Acid-base applications

Exercise - Integration

- Oxygen in exercise
- Respiratory quotient
- Anaerobic threshold
- Exercise - limits

Each HMX course is designed to give learners a solid foundation in the basic science principles that are relevant to human health and disease. Concepts are taught using whiteboard-style videos and animations and reinforced by interactive elements, true-to-life scenarios, and real patient cases to enhance learning.