

Chemical and Physical Foundations of Biological Systems Section

What This Section Tests

Applicants must be prepared to learn in medical school about the mechanical, physical, and biochemical functions of human tissues, organs, and organ systems and how these contribute to health and disease. This section tests applicants' preparation in biology, biochemistry, physics, general and organic chemistry that are building blocks for learning in medical school about:

- the physiological functions of the respiratory, cardiovascular, and neurological systems in health and disease; and
- molecular and cellular functions in health and disease.

This section aligns most closely with the Physical Sciences section of the old MCAT exam.

Foundational Concept 4

Complex living organisms transport materials, sense their environment, process signals, and respond to changes using processes that can be understood in terms of physical principles.

Foundational Concept 5

The principles that govern chemical interactions and reactions form the basis for a broader understanding of the molecular dynamics of living systems.

Content Categories

- Translational motion, forces, work, energy, and equilibrium in living systems
- Importance of fluids for the circulation of blood, gas movement, and gas exchange
- Electrochemistry and electrical circuits and their elements
- How light and sound interact with matter
- Atoms, nuclear decay, electronic structure, and atomic chemical behavior

Content Categories

- Unique nature of water and its solutions
- Nature of molecules and intermolecular interactions
- Separation and purification methods
- Structure, function and reactivity of biologically relevant molecules
- Atoms, nuclear decay, electronic structure, and atomic chemical behavior

Examples of ways examinees are asked to combine their knowledge of the foundational concepts listed above and their scientific reasoning skills to answer test questions:

- Identifying the relationship between the distribution of electric charges in the axon and the electric field lines they produce
- Recognizing the principles of flow characteristics of blood in the human body and applying the appropriate mathematical model to an unfamiliar scenario
- Changing experimental conditions of a test for proteins in a solution to prevent the formation of precipitates
- Selecting between the standard and Doppler ultrasound techniques for a given context, considering the appropriateness, precision, and accuracy of each technique
- Using, analyzing, and interpreting data in a graph to determine the half-life of a radioactive substance used to measure cardiac function

Foundational Concepts, or big ideas in sciences, lay the foundation for learning in medical school. This section of the exam is organized around 2 foundational concepts.

Content Categories are the topics and subtopics students need to know in order to demonstrate their understanding of the foundational concepts

Examinees are asked to combine their knowledge of the foundational concepts with four scientific inquiry and reasoning skills to solve problems.

- Reasoning with scientific principles, theories, and models
- Evaluating scientific explanations and principles
- Demonstrating understanding of important concepts in scientific research
- Interpreting patterns in data presented in tables, figures, and graphs