METADATA

Title: Biophysics

Other Titles: -

Language: Greek

Authors: Fountos, G., Professor, UNIWA, Kounadi, E., Medical Physicist, GHA Korgialeneio - Benakeio HRC

ISBN: 978-618-228-081-2

Subject: NATURAL SCIENCES AND AGRICULTURAL SCIENCES, MEDICINE AND HEALTH SCIENCES, LIFE SCIENCES, BIOLOGICAL SCIENCES, ENGINEERING AND TECHNOLOGY

Keywords: Biophysics / Biopolymers / Biological fluids-Flow / Bioenergetics / Bioelectricity

Bibliographic Reference: Fountos, G., & Kounadi, E. (2023). Biophysics [Undergraduate textbook]. Kallipos, Open Academic Editions. http://dx.doi.org/10.57713/kallipos-316

Abstract

This particular book is not only addressed to engineers but also to those involved in the health sciences. Initially, there is a brief historical review and an introduction to the subject of Biophysics, which is compared to the subject of other related sciences, such as Medical Physics and Biology. The disciplines of Biophysics are also mentioned and analyzed. The purpose of the book is to develop Biophysics topics from the smallest structures, gradually reaching the larger and more complex ones. In more detail, it begins with issues dealt with by Biophysics regarding molecules and the intermolecular forces, the role and physical properties of water in biological systems, biopolymers (such as proteins, DNA, RNA, etc.), the cells, tissues, organs and even organisms. Special reference is made to the sensory Biophysics, the sensory receptors, the nerve impulse, the Na-K pump cycle, as well as the application of these to the Biophysics of vision and hearing. The physical properties of liquids (hydrostatic, osmotic pressure, hydrodynamics, laminar and turbulent flow), and how they affect biological systems are analyzed. Molecular transport phenomena in biological fluid solutions are also analyzed (diffusion, Fick's Laws, etc.). In addition, the effect of physical factors on living matter is discussed, such as ionizing and non-ionizing radiation, heat, electric current, etc. Apart from the above, the textbook deals with the biological applications of thermodynamics. The physical principles, the way of operation as well as the applications of many methods used in Biophysics are analyzed and discussed thoroughly. In particular, methods such as centrifugation, electrophoresis, chromatography, X-ray diffraction, nuclear magnetic resonance (NMR), optical and electron microscopy, infrared spectroscopy, Raman spectroscopy, Coulter cell counter, etc. are presented and discussed in detail.

The Project is funded by the National Development Programme 2021-2025 of the Ministry of Education and Religious Affairs and implemented by the Special Account for Research Funds of the National Technical University of Athens and the Hellenic Academic Libraries Link.