YEREVAN HAYBUSAK UNIVERSITY

MARTIN G. ABRAHAMYAN

PHYSICS
AND
APPLICATIONS IN MEDICINE

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The textbook is composed in an accordance with the program of "Medical and Biological Physics" for medical universities. It consists of introduction to mathematics, of basic physics and of applications of physics in biology and medicine.

The textbook is intended for students, graduate students and lecturers.

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FOREWORD

This book is based upon a course of lectures on introductory physics in medicine given by me at Yerevan Haybusak University. It consists of basics of physics and some of important applications in medicine.

The course of physics for medical specialties should have biomedical and medical orientation, along with fundamentals of physics. One of the methodical difficulties of such courses is a combination of fundamental physics to biophysics. In this course biophysics is not separated but is stated parallel to physics in appropriate sections, as physics of live.

Living organisms exhibit properties not found in inanimate objects. They grow, reproduce, and decay. Many scientists in the 19th century believed that other laws governed the structure and organization of molecules in living matter than those of inanimate matter. It was thought that the large molecules found in living matter could be produced only by living organisms through a "vital force" that could not be explained by the existing laws of physics. Today we believe that there is no special vital force, and living organisms are governed by the laws of physics on all levels.

The description and principles of action of medical equipment's either are not included in this course, or they are presented very schematically, since their details are given in the notes to laboratory works on medical physics.

In these lectures some materials from textbooks by Davidovits, 2008 and by Remizov, 2012, are used, as well as some from the Wikipedia, the free encyclopedia. I express the gratitude to all these authors.

I would like to express my special gratitude to management of Yerevan Haybusak University, especially to its rector, Anait Harutyunyan, for the stimulating support of writing of this textbook, as well as for its publication.

I am grateful also to the professor of Yerevan State Medical University, S. Harutyunyan, for reading the manuscript and for valuable advices.

I would be grateful to the readers whose remarks will help to improve this textbook.

M.G. Abrahamyan Yerevan, May 2015

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