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## Preface

Dear Instructor,

We are delighted that you have chosen our book for your course! Let us tell you how the book came to be, and what our guiding philosophy has been during its development.

“Healthcare and Biotechnology in the 21st Century” resulted from our experiences participating in Temple University’s General Education curriculum. Every Temple undergraduate student is required to take four courses in subjects outside their major. For example, all non-science and non-engineering majors are required to take two courses in science or technology and two courses in mathematics (numerical proficiency). We decided to institute a new course covering medical technology (our own field of expertise) that would draw on basic biologic, physics, chemistry, and engineering principles, discuss the scientific method, gently underline the value of a quantitative approach to life, and introduce and explain medical technologies that our students or their family members are likely to have encountered as patients.

Our search for an appropriate textbook made us realize that one did not exist. The available biomedical texts were all written for science or engineering majors. We decided to write our own course-pack, and have been using it for several years. The opportunity eventually came along for us to devote some additional time to revising the course pack, and to compile a book on these topics. Discussions with colleagues and publishers were encouraging, and this volume is the product of a recent surge in writing and editing activity.

We want to emphasize that the book is designed for use in an undergraduate-level course taught to non-science, non-engineering majors: students who are likely to have graduated high school convinced that they would never have to take another science course again, who probably did not take more than the minimum number of science courses in high school, and many who may consider their participation in this course to be a waste of time.

In planning this book, we were fully cognizant of research indicating that students not majoring in the sciences or engineering would not profit (learn) from a

traditional science or engineering textbook. Instead, we have presented overviews of the developments in biomedical technology, attempting to engage students in scientific and critical thinking. Our reasoning is that although the specific biomedical areas we cover will develop during the students' lifetimes, learning about evidence-based argumentation, peer review, and the inquiry-driven scientific method will stand the students in good stead for many more years.

That's why we have also tried to write the book in a language these students should understand. It's not the language used to communicate with scientists via a manuscript, but students who make an effort to broaden their vocabulary should have little difficulty following the text.

The first portion of the book introduces healthcare policy and its ramifications for the future, discusses how scientists and engineers think and work, shows how science impacts daily life, reveals how medical biotechnology is regulated in the United States, provides an introduction to a few of the technologies that enable modern health care biotechnology, and ends with a description of the events that can occur during a visit to a doctor. In some of the chapters we ask questions designed to encourage student involvement; the answers are not always obvious, and do not require prior scientific knowledge, but provide an opportunity for the instructor to guide discussion according to scientific principles. Feel free to use them or come up with new ones. And yes, we do have a point of view on certain hot-button issues, and that point of view may become obvious to the reader; if you don't agree with it, there's a great opportunity for a classroom debate! We do make an effort to present some alternative views, but emphasize prevailing scientific or data-driven opinions.

That foundation sets the stage for the second portion of the book, where we focus on specific healthcare biotechnologies, with some case histories mixed in to illustrate our points. This is where students will encounter the most "science" information. We realize that each instructor will tailor the amount of material that is taught to the level of the student body. With that in mind, we will advise that portions of Sects. 7.2 and 7.4–7.7 in Chap. 7 may prove difficult for students with poor backgrounds in science and mathematics. Chapters 10 and 12 contain vocabulary that may be unfamiliar to students who have not had prior courses in biology, and the instructor may wish to devote extra time to vocabulary development. Students will need to know the meanings of the words if they are to understand the concepts being presented.

The book is lengthy, and not all the topics can be covered in depth during a typical 14–15-week semester. Feel free to pick and choose according to your interests and your student body, and good luck with the course!

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