



**Physics for the Life Sciences**, Martin Zinke-Allmang, Nelson Education Ltd., 2009, pp. 849, ISBN-10: 0-17-644259-6, Price: \$139.00

I first crossed paths with Prof. Zinke-Allmang's new book "Physics for the life Sciences" in the early Fall of 2006 when I was asked by the publisher to review the first few chapters of a prepublication manuscript. More specifically, I was asked to review the first three chapters in which the concepts of kinematics and force are introduced from a deliberately physiological perspective. In carrying out my assigned task, it quickly became obvious that I had before me a text unlike any other introductory physics text that I had ever come across. The physics was certainly mathematically "lighter" than the standard introductory texts such as Serway and Beichner's "Physics for Scientists and Engineers", in that Zinke-Allmang chose a non-calculus (i.e. algebra-geometry-trigonometry) platform for his book. However the book addressed an area of physics which was in sore need of some attention at the introductory level: a text specifically targeting the clinical and biological aspects of physics. This is a substantial market that so far has been largely ignored by the major publishers; at a minimum it includes the subset of all students in North American universities who will go on to major in health related disciplines and be required to take first year physics. Some partial attempts have been made to acknowledge this target audience, and one that comes to mind is James S. Walker's "Physics", now in its 4<sup>th</sup> edition. However, almost invariably these are texts which at their core were aimed primarily at physical science and engineering students, with occasional clinical references or problems sprinkled at the end of the chapters. Zinke-Allmang on the other hand, started with a clean sheet design with the health sciences student in mind and in addressing his/her needs, I believe he succeeds admirably.

The next phase of my exposure to Zinke-Allmang's book came in the Fall of '08 when I was in the process of selecting a text for my second year one semester course PHYS 2616 "The Physics of Hearing & Vision", which at my institution is primarily targeted at health sciences students such as those majoring in biology, kinesiology, human kinetics, biochemistry, and pre-medical studies. Based on the alternatives I had examined, I settled on Zinke-Allmang's text as the best fit, covering chapters 16 through 20, and as a special topic chapter 21 which introduces the concept of aerospace medicine. This course has just ended at the time of this writing. Chapter 16 is an interesting introduction to the phenomena of elastic behavior followed by the establishment of the conditions necessary for simple harmonic motion, from a physiological perspective. Axial bone compression under stress and modeling the leg as a physical pendulum in the act of walking, are two relevant physiological examples that the author exploits quite aptly. Chapter 17 is an introduction to acoustics as applied to the human auditory organ, and this reviewer especially appreciated the lengthy discussion of the Darwinian advantages of the amplifying properties of the middle ear. Chapter 18 is an introduction to geometric optics comparable in level to what would be found in other standard introductory physics texts, followed by an interesting discussion of the most frequent ophthalmic pathologies. In particular, the physical aspects of hyperopia (farsightedness) are well presented, with more abbreviated discussions of astigmatism, cataracts, and glaucoma, also thrown in for completeness. Chapter 19 is a short chapter on microscopy, in which the author deals effectively with the fundamentals of optical microscopy, but his treatment of electron microscopy is inadequate and could use some

expansion. In chapter 20, the author introduces the concept of color vision, touching among other things on the “psychological vs. physical” debate on the nature of color. A brief introduction to electromagnetic theory, and an interesting discussion on the physical interactions of solar radiation with the atmosphere are contained as well. The last chapter this reviewer tested in class was chapter 21, which effectively addresses two key challenges to long duration manned spaceflight (i.e. a return mission to Mars): the detrimental physiological effects of weightlessness on bone mass, and the anticipated in-transit absorption of high doses of ionizing radiation of cosmic and solar origin. This reviewer found the inclusion of mass spectrometry in this chapter somewhat irrelevant. The questions and problems at the ends of the chapters were generally found to adequately address the concepts contained in the chapters.

The publisher and author provide additional supporting materials one might expect in a product of this type, such as a printed student solutions manual, and in CD format an instructor’s solutions manual, and Power Point slides to accompany the lectures. This reviewer found that the slides were frequently very useful for lecturing, however they do contain their share of typographical errors. The text does have some weaknesses as well; perhaps the most substantial one being that in his attempt to present a unified view of medical/biological physics, the author omits any serious introduction to the crucial subjects of radiotherapy, nuclear medicine, and/or diagnostic radiological physics. By adding a chapter (or chapters) addressing these subjects in a future edition, the market footprint of this text should be significantly enhanced.

My overall impression is that this text represents a breath of fresh air in the somewhat stuffy introductory physics market in that the author is targeting a subset of the student population that other authors have either treated as an afterthought, or not at all. This reviewer is unaware of any other text in the North American market which specifically addresses this special target audience. Prof. Zinke-Allmang is to be commended for successfully taking on this difficult challenge.

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