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Book Review

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Instrumentation for Audiology and Hearing Science: Theory and Practice
Author: Shlomo Silman, Michele B. Emmer, Carol A. Silverman, & Alexa Brody
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Reviewed by Kuruvilla Mathew

I am very glad I got an opportunity to review this book as it has helped me refresh my physics basics knowledge with pictorial representation and great examples for any non-professional to understand. In addition, this book helped me to understand the connection between physics and audiology in more depth. This is a completely updated version from the original edition with new chapters added (assistive listening devices and vestibular assessment) and a reorganization of

material in a more appropriate manner.

This book contains solid, up-to-date fundamentals underlying audiologic and hearing science equipment, general physics, sound energy, AC & DC circuits, filtering & electrical impedance, analog & digital communication systems. Principles and theories underlying instrumentation are integrated with the function and clinical applications of clinical and research instrumentation specific to diagnostic audiology (acoustic immittance, audiometric testing, auditory evoked potentials testing, newborn hearing screening); rehabilitative audiology (amplification, assistive listening devices); vestibular assessment (ENG/VNG); and hearing sciences which will be very useful for recent graduates as well as for experienced Audiologists. Basic protocols for the use of instrumentation were described comprehensively, and this knowledge and understanding of audiological and hearing sciences instrumentation both facilitate and enhance successful applications of this instrumentation in our day-to-day practise.

Principles and theories function, and application of instrumentation (e.g., sound-level meters) used to calibrate instrumentation in audiology and hearing sciences, ANSI standards for interpreting results and establishing test protocols are furnished easily. Informed by Authors teaching, research, and clinical experiences, they have introduced basic concepts and applications to readers like me who have little formal training in mathematics, physics, electronics, computers, or engineering. Authors have attempted to provide explanations slowly and carefully, including only the necessary formulae and basic scientific principles so that students and clinicians can appropriately use the instrumentation and make valid, reliable, and accurate interpretations. New to this edition are instructor PowerPoint presentations for all chapters, practical step-by-step video demonstrations, and student PowerPoint explanations of how to construct direct- and alternating-current electrical circuits, and low-pass, high-pass, and band-pass filters enhances readers understanding of concepts. This text, using clear language and extensive figures and examples to describe complex concepts, prepares the students to understand more advanced concepts in audiology and in hearing sciences.

The basic concepts of general physics were discussed in Chapter 1, followed by the basic principles of direct current electrical energy in the next chapter. In Chapter 3, they present the foundations for alternating current electrical energy, followed by detailed information on filtering and electrical impedance in chapter 4. Chapter 5 describes the construction of communication systems and their evolution from analog to digital, followed by the concepts and principles of acoustic immittance in Chapter 6. Chapter 7 portrays amplification in terms of hearing aid components, standards governing quality control, amplification for children, advantages of bilateral hearing aid fittings, prevention and recovery from auditory deprivation, and binaural interference. The next chapter's purpose is to present a guide to assistive listening devices (ALDs), including the various types; underlying concepts; advantages and disadvantages; instrumentation and components; setup and installation; and specifications and verifications according to national and international standards. Chapter 9 discusses the principles underlying the recordings of eye movements; involved neurophysiologic mechanisms; types, components, and calibration of the instrumentation; advantages and disadvantages of ENG versus VNG; and the results of a VNG test battery on a normal subject to illustrate the clinical data that typically are obtained from such tests. In Chapter 10, they relate the principles and function of audiologic and hearing science instrumentation such as audiometers, acoustic immittance devices, otoacoustic emissions devices, and auditory evoked potentials devices, as well as stimuli used in these fields. In the last, Chapter 11, the authors made sure to address the calibration of audiological and hearing sciences instrumentation and the equipment for calibration, such as sound-level meters, 2-cc and 6-cc

couplers, artificial mastoids, and oscilloscopes. They also discussed the related calibration standards of the American National Standards Institute (ANSI).

The research tools used by hearing scientists and audiologists largely involve the same instrumentation used by audiologists for clinical and research purposes. This book can serve as a basic instrumentation text for AuD and PhD students and hearing scientists and audiologists. The authors made sure that this book is a basic reference for clinicians, educators, and researchers in audiology and hearing sciences and a tool for understanding material presented in more advanced instrumentation texts. It also can function as a supplementary text for doctoral courses in amplification. I want to conclude that the authors did a tremendous job in the making this book and will be an asset to our audiology field.