

Introduction to Biomedical Instrumentation

The Technology of Patient Care

This fully updated second edition provides readers with all they need to understand the use of medical technology in patient care. Incorporating the most recent changes in healthcare, regulations, standards, and technology, coverage is expanded to include new chapters on device testing, with a particular emphasis on safety inspections, and the interface of medical technology with the electronic medical record. A wide variety of medical instrumentation is discussed, focusing on device types and classifications and including individual manufacturers as examples. It is designed for readers with a fundamental understanding of anatomy, physiology and medical terminology, as well as electronic concepts such as voltage, current, resistance, impedance, analog and digital signals, and sensors. Additional documents and solutions to end-of-chapter questions accompany the book online, providing biomedical engineering technicians with the resources and tools they need to become knowledgeable and effective members of the patient care team.

Barbara L. Christe PhD is Associate Professor and Program Director of Healthcare Engineering Technology Management at Indiana University–Purdue University Indianapolis (IUPUI).

“Barbara Christe has excelled at updating this text to keep pace with today’s medical technology. The ‘For Further Exploration’ section in each chapter provides supplemental reference material and valuable links to the most up-to-date information, which transitions the text from an ‘Introduction to Biomedical Instrumentation’ to a living document. This book should be the go-to resource in all HTM educational programs.”

Ted Lucidi, The Pennsylvania State University

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The Technology of Patient Care

Second Edition

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Preface to Second Edition

This book is designed to introduce the reader to the fundamental information necessary for work in the clinical setting, supporting the technology used in patient care. Beginning technicians/technologists can use this book to develop a working vocabulary and fundamental knowledge of the Healthcare Technology Management (HTM) profession. Content includes a wide variety of medical technology, with an emphasis on device types and classifications; individual manufacturers are utilized as examples.

This work is intended for the reader with a fundamental understanding of anatomy, physiology, and medical terminology appropriate for their role in the healthcare field, and assumes the reader's understanding of electronic concepts, including voltage, current, resistance, impedance, analog and digital signals, and sensors. The material covered in this book will assist the reader in the development of his or her role as a knowledgeable and effective member of the patient care team. The second edition features revisions to all of the content to reflect changes in healthcare, regulations, standards, and technology. A new chapter addresses device testing, with emphasis on safety inspections. A second new chapter explores the interface of medical technology with the electronic medical record.

A vital connection exists between technology and the care of patients. In many cases, healthcare workers depend on technology to administer care or treatment or to make a diagnosis. This book helps readers understand how technology is tightly woven into

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patient care. The role of technical support for the medical team is, therefore, essential in the delivery of effective medical care.

The section of each chapter entitled “For Further Exploration” encourages readers to use the Internet to obtain in-depth information about a related topic. The questions are designed to push the reader to integrate concepts and ideas using external sources. Answers to the questions are not specifically available within the chapters. Research exercises encourage one of the most important professional skills – the ability to investigate topics that are not well understood. In the clinical setting, it is virtually impossible to be an expert about all technology and aspects of patient care. The ability to effectively search for information is vital.

For the second edition, I am in debt to those who have worked tirelessly to improve an understanding of the HTM profession, including Mary Logan, retired president of the Association for the Advancement of Medical Instrumentation (AAMI) and my colleagues in higher education, Steve Yelton and Joe Tabas. My gratitude extends to the graduates of my program who always respond positively when I reach out to them, especially Matt Dimino. Lastly, I am grateful to my sister for her unwavering support, and to her daughter, my niece Sarah, who taught me so much about healthcare from the patient perspective.

Those who support the technology used in patient care are a dedicated and selfless part of the workforce, offering a unique combination of technical skills and compassion for the sick. May this book be the beginning of a transformation that increases career awareness, improves enrollment in training programs, and expands the recognition the profession deserves.