

Preface

This book provides an elementary treatment of the solid-state electronic devices that are the foundation of modern electronic systems and information technology. The concepts and devices presented underlie semiconductor integrated circuit technology and virtually all of the industrial and consumer electronics products that are now so ubiquitous and indispensable to everyday life. From an academic point of view, electronics is a subject that today impacts and is important to almost every field of science and engineering due to its broad and cross-cutting interdisciplinary nature.

The aim of this textbook is to provide a concise exposition on the main electronic devices upon which most modern electronics is based, in addition to emerging trends and applications of this technology. The main audience is undergraduate and beginning graduate students in engineering and applied physics. However, the book was written so that anyone with first/second year university level physics and mathematics should be able to understand the material. Physics, chemistry, biology, engineering, and related fields are becoming more and more intertwined, and the text tries to use an approach that maintains accessibility to a wide audience. Readers of this book can expect to derive a solid foundation for understanding today's electronic devices and also be prepared for future developments and advancements in this far-reaching area of science and technology.

The contents are largely based on an undergraduate course I have taught at the University of Victoria and developed further during a brief study leave. I have attempted to constrain the treatment to those structures/devices that are most relevant to modern electronics. As a result, several topics and devices have not been included so as not to detract from the fundamental concepts. In several instances, straightforward extensions of the ideas presented can be found in one of the many excellent more advanced and comprehensive references available.

Chapters 1–4 cover the basic solid-state electronic structures and devices required for a one-term course. Chapter 5 on emerging areas and devices provides a glimpse into the future of electronics and also shows how the core electronics material of the previous chapters is being extended into new directions and leading to novel applications in many diverse areas. Appendix A provides a review of the

relevant physics of semiconductors needed to understand electronic devices and can be used as a starting point or simply referred to when necessary.

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An Introduction

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