Preface

We are delighted and deeply honored to author the *Voet, Voet, & Pratt Fundamentals of Biochemistry*, International Adaptation, for its sixth edition. As long-time users of this textbook, we cherish its focus on the structural nature of biochemistry and the depth with which the chemistry that drives life on Earth is presented. We started this project with the goal of substantively updating the prior edition while remaining faithful to the central principle that structure = function, continuing in the spirit of the previous authors. Many of the choices we have made are designed to renew the textbook for contemporary students who approach learning quite differently than in years past. Our goal is to elevate this foundational textbook to an integrative and effective learning platform for the modern biochemistry student.

Perhaps the most striking change to the textbook is a massive update to the art program, for which we have produced more than 400 new renderings of figures and graphics. These are modern, more effective renderings that better enable understanding of the subject matter. We have also included many new figures, which in large part are due to the current explosion in the number and quality of biomolecular structures. Researchers are depositing new X-ray crystallographic and NMR structures at accelerating rates. A revolution is also occurring with the development of cryoEM methods that allow for the elucidation of high-resolution structures of large, multiprotein complexes. Such cryoEM techniques have also illustrated the dynamic behavior and transient species that exist in some of the most complex and amazing biochemical processes (see example Figure 25.25).

Learning biochemistry is heavily dependent on the visualization and perception of how chemistry is organized in three-dimensional space. As such, we have embedded interactive versions of molecular structures in the text to allow students to easily manipulate and better understand the complex structure of biomolecules. These interactives are integrated seamlessly into the etext; students require no additional software or instruction to make use of them. A number of videos have also been embedded in the etext that illustrate approximations of allosteric motions, highlighting the dynamic nature of protein function.

In the sixth edition, we have also focused on streamlining the student experience to better focus attention on the critical subject matter, integrating topics contextually rather than presenting them as separate elements. We have also reorganized the text to curate biochemical methods in one consolidated section, to allow the chapter material to be presented contiguously and without interruption. This provides a comprehensive, organized, and easily referenced presentation of up-to-date methods that are relevant for the modern biochemical field.

We also believe that the effectiveness of a text is not only dependent upon presenting material well but also on improved facilitation of self-assessment. Students are more successful when they are easily able to recognize what they do not understand. To streamline this process, terminal and enabling learning outcomes have been added throughout the text and these are scaffolded such that outcomes will scale with the content. For particularly critical and/or challenging learning outcomes, in-line and interactive assessments (Check Your Understanding) have been developed to provide self-assessment right where it can have the most impact. We have also identified 10 challenging concepts that students find especially difficult and have targeted these with additional interactive figures, animations, and short video presentations to provide students with curated learning resources in a familiar and convenient format.

It is our hope that both students and faculty will continue to benefit from the extraordinary quality and legacy of this text and that this substantive evolution of its structure and presentation will better foster the interest and excellence of the students that have the benefit of engaging with it.

What's New in the Sixth Edition

Fundamentals of Biochemistry, International Adaptation, sixth edition, provides a solid biochemical foundation that is rooted in chemistry while continuing in the tradition of presenting complete and balanced coverage that is clearly written and relevant to human health and disease. This edition includes new pedagogy and enhanced visuals that better adapt the text for the modern student, including a focus on enhanced self-assessment tools and scaffolding of learning outcomes throughout the text.

Key pedagogical changes:

- Focus on modern search for and development of life on other worlds
- Introduction of "partially ionizable" category in amino acids

- Addition of P_{II} strand as regular secondary structure
- Reorganization and revision of catalytic mechanics
- Updates to translation mechanics and inclusion of ensemble cryoEM structures
- Scaffolded learning outcomes in each section that both streamline and elevate the effectiveness of student learning
- In-line Check Your Understanding exercises offer self-assessment where most relevant and challenge students to contextualize and combine topics
- Re-established narrative throughout the text to focus on the chemical nature of life
- Refreshed material to reinforce the integration of chemistry content
- Updated material to reflect modern discoveries and techniques in biochemistry
- Increased focus on engagement and contextual learning
- Overall art update with integrated, interactive molecular structures
- More digital resources to support 10 of the most common challenging topics for students
- Organized and updated methods section consolidates and streamlines student learning
- Contextualized Biochemistry in Focus sections add new content and accentuate understanding of the material with contextualized examples where relevant
- Global Insights added at the end of all chapters that will include recent developments and historical perspectives

Key changes to the Table of Contents:

- Updated Table of Contents with the number of chapters reduced
- Material involving nucleic acids, previously covered in Chapters 3 and 24 of fifth edition, is now in Chapter 6, a consolidated chapter on DNA structure, to better serve a first semester biochemistry curriculum
- Biomacromolecular structures are now presented as a consolidated series in Chapters 4 through 7
- Content on protein function (previously covered in the Chapter 7), as well as newly developed content, has been presented separately and where contextually relevant in a series of new Biochemistry in Focus sections
- Topics on gluconeogenesis are now presented with glycolysis in Chapter 13
- DNA repair and recombination has been reorganized into a chapter separate from that of DNA replication (Chapters 22 and 23, respectively)
- DNA-protein interactions have been presented in context as part of regulation of gene expression in Chapter 26 which has been moved online
- Methods content spread throughout the text has been updated and consolidated into an organized Methods Appendix

Online Resources for Success

Student Resources

This set of 12 exercises engages students with real-world datasets, guiding them through specific questions that require retrieving information from online databases and utilizing software tools for data analysis.

Case Studies: A set of 33 case studies designed around problem-based learning, aimed at deepening students' understanding of biochemical concepts through real-world scenarios and critical thinking. Each case presents data from the literature and asks questions that require students to apply principles to novel situations, often involving topics from multiple chapters in the textbook.

Instructor Resources

PowerPoint Slides contain all images and tables in the text, optimized for viewing onscreen. The figures are optimized for classroom projection, with bold leader lines and large labels.

Test Bank with over 1,400 questions in a variety of question types (multiple choice, matching, fill in the blank, and short answer). Each question is keyed to the relevant section in the text and is rated by difficulty level.

Classroom Response Questions ("Clicker Questions") are interactive questions designed for classroom response systems to facilitate classroom participation and discussion. These questions can also be used by instructors as prelecture questions that help gauge students' knowledge of overall concepts, while addressing common misconceptions.

Solutions to all problems are available. Instructor resources are password protected.

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This edition marks a substantial update to the organization and substance of the text, and as such, has been years in the making. Along the way, we have worked with a gifted collection of colleagues who have provided their support, knowledge, and expertise in bringing the vision of this edition to fruition. Foremost, we would like to thank our team of Wiley editors, marketers, production staff, and others who played an essential role in the successful launch of this revision. In particular, we would like to thank our Developmental Editor Karen Trost, who tirelessly slogged through every word, sentence, and paragraph with us. We would also like to thank Paul Thomas (PANTHER Project) for assistance with genomics

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