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This unified treatment introduces upper-level undergraduates and graduate students to the concepts and methods of modern molecular spectroscopy and their applications to quantum electronics, lasers, and related optical phenomena. Starting with a review of the prerequisite quantum mechanical background, the text examines atomic spectra and diatomic molecules, including the rotation and vibration of diatomic molecules and their electronic spectra. A discussion of rudimentary group theory advances to considerations of the rotational spectra of polyatomic molecules and their vibrational and electronic spectra; molecular beams, masers, and lasers; and a variety of forms of spectroscopy, including optical resonance spectroscopy, coherent transient spectroscopy, multiple-photon spectroscopy, and spectroscopy beyond molecular constants. The text concludes with a series of useful appendixes. The processes in a single living cell are akin to that of a city teeming with molecular inhabitants that move, communicate, cooperate, and compete. In this Very Short Introduction, Philip Ball explores the role of the molecule in and around us - how, for example, a single fertilized egg can grow into a multi-celled Mozart, what makes spider's silk insoluble in the morning dew, and how this molecular dynamism is being captured in the laboratory, promising to reinvent chemistry as the central creative science of the century.

ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable. This text offers a balanced and integrated treatment of molecular biology, cell biology, and biochemistry and covers all topics as Wolfe's large book only in less detail.

Introduction to Molecular Biology focuses on the principles of polymer physics and chemistry and their applications to fundamental phenomena in biological sciences. It examines the structure, synthesis, and function of nucleic acids and proteins, as well as the physicochemical techniques necessary in determining the macromolecular structure, the kinetics and mechanism of enzyme action, the genetics of bacteria and their viruses, and the genetic code. It also considers the importance of precise quantitative analysis in biochemistry and biophysics, the architecture and function of biological macromolecules, and the unique mechanisms that regulate the cell's biological activity. Organized into five chapters, this book begins with an overview of proteins and their functional activity, from contractility and enzymatic catalysis to immunological activity, formation of selectively permeable membranes, and reversible binding and transport. It explains how such functions are related to molecular interactions and therefore fall within the purview of molecular biology. The book then proceeds with a discussion on the chemical structure of proteins and nucleic acids, the physicochemical techniques in measuring molecular size and shape, the mechanism of enzymatic reactions, the functions of DNA and RNA, and the mechanism of phase transition in polynucleotides. This book is intended for both biologists and non-biologists who want to be acquainted with the advances made in molecular biology, molecular genetics, and molecular biophysics during the 1950s and 1960s. Molecular simulation is a powerful tool in materials science, physics, chemistry and biomolecular fields. This updated edition provides a pragmatic introduction to a wide range of techniques for the simulation of molecular systems at the atomic level. The first part concentrates on methods for calculating the potential energy of a molecular system, with new chapters on quantum chemical, molecular mechanical and hybrid potential techniques. The second part describes methods examining conformational, dynamical and thermodynamical properties of systems, covering techniques including geometry-optimization, normal-mode analysis, molecular dynamics, and Monte Carlo simulation. Using Python, the second edition includes numerous examples and program modules for each simulation technique, allowing the reader to perform the calculations and appreciate the inherent difficulties involved in each. This is a valuable resource for researchers and graduate students wanting to know how to use atomic-scale molecular simulations. Supplementary material, including the program library and technical information, available through www.cambridge.org/9780521852524. Index of names acids. The achievements of molecular biology testify to the success of material science in a realm which, until recently, appeared totally enigmatic and mysterious. Further scientific developments should bring to mankind vast developments both in theoretical knowledge and in practical applications, namely, in agriculture, medicine, and technology. The purpose of this book is to explain molecular biophysics to all who might wish to learn about it, to biologists, to physicists, to chemists. This book contains descriptive sections, as well as sections devoted to rigorous mathematical treatment of a number of problems, some of which have been studied by the author and his collaborators. These sections may be omitted during a first reading. Each chapter has a selected bibliography. This book is far from an exhaustive treatise on molecular biophysics. It deals principally with questions related to the structures and functions of proteins and nucleic acids. M. V. Vol'kenshtein Leningrad, September, 1964

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of anthropological interest. More specifically, molecular anthropology is concerned with genetic evidence concerning human origins, migrations, and population relationships, including related topics such as the role of recent natural selection in human population differentiation, or the impact of particular social systems on patterns of human genetic variation. Organized into three major sections, An Introduction to Molecular Anthropology first covers the basics of genetics – what genes are, what they do, and how they do it – as well as how genes behave in populations and how evolution influences them. The following section provides an overview of the different kinds of genetic variation in humans, and how this variation is analyzed and used to make evolutionary inferences. The third section concludes with a presentation of the current state of genetic evidence for human origins, the spread of humans around the world, the role of selection and adaptation in human evolution, and the impact of culture on human genetic variation. A final, concluding chapter discusses various aspects of molecular anthropology in the genomics era, including personal ancestry testing and personal genomics. An Introduction to Molecular Anthropology is an invaluable resource for students studying human evolution, biological anthropology, or molecular anthropology, as well as a reference for anthropologists and anyone else interested in the genetic history of humans. Genetics today is inexorably focused on DNA. The theme of Introduction to Genetics: A Molecular Approach is therefore the progression from molecules (DNA and genes) to processes (gene expression and DNA replication) to systems (cells, organisms and populations). This progression reflects both the basic logic of life and the way in which modern biol This text for advanced undergraduate and graduate students guides the reader through a smooth progression from the most elementary ideas of molecular orbital theory to an understanding of the electronic structure, geometry, and reactivity of large molecules. It starts with simple molecules and proceeds to relatively large organometallic complexes. The slant is theoretical, but in the last chapter the authors strengthen the link between theory and experiment. Focusing on basic concepts, the authors take a qualitative approach, which enables this text to fill a void in the undergraduate curriculum. The book is intended as a core or supplementary text in an advanced chemistry course. Oksana Ableitner offers a practical, clearly structured and easy to understand introduction to complicated definitions and structures in chemistry and molecular biology for work in the molecular biology laboratory. The author is guided by her experience in working with students and uses many illustrations to visualize abstract knowledge. An understanding of this matter is an essential basis for successful work with DNA and RNA in order to ensure high quality results. For responsible activities in application - such as genetic research or the determination of various pathogens - it is essential to be confident in dealing with the basics of these sensitive, fast and specific analytical methods. This Springer essential is a translation of the original German 2nd edition essentials, Einführung in die Molekularbiologie by Oksana Ableitner, published by Springer Fachmedien Wiesbaden GmbH, part of Springer Nature in 2018. The translation was done with the help of artificial intelligence (machine translation by the serviceDeepL.com). A subsequent human revision was done primarily in terms of content, so that the book will read stylistically differently from a conventional translation. Springer Nature works continuously to further the development of tools for the production of books and on the related technologies to support the authors. This book explains molecular biology concepts clearly and in practical terms. It represents an invaluable introduction to molecular biology for undergraduates, postgraduates, researchers, lecturers, medics, nurses, teachers, scientists, editors, and all t Volume 1: General Introduction to Molecular Sciences Volume 2: Physical Aspects of Molecular Systems Volume 3: Electronic Structure and Chemical Reactivity Volume 4: Molecular Phenomena in Biological Sciences Presents the discoveries, basic scientific concepts, and sense of excitement that surround the revolution in molecular medicine. The scientific basis of molecular medicine is presented simply and directly, but at a level of technical detail sufficient for the reader to appreciate the power of recombinant DNA technology. The volume is clinically oriented throughout. Annotation copyrighted by Book News, Inc., Portland, OR This first introduction to the rapidly growing field of molecular magnetism is written with Masters and PhD students in mind, while postdocs and other newcomers will also find it an extremely useful guide. Adopting a clear didactic approach, the authors cover the fundamental concepts, providing many examples and give an overview of the most important techniques and key applications. Although the focus is one lanthanide ions, thus reflecting the current research in the field, the principles and the methods equally apply to other systems. The result is an excellent textbook from both a scientific and pedagogic point of view. Starting with just a few basic principles of probability and the distribution of energy, Introduction to Molecular Thermodynamics takes students on an adventure into the inner workings of the molecular world like no other, from probability to Gibbs energy and beyond, following a logical step-by-step progression of ideas. Molecular biotechnology continues to triumph, as this textbook testifies - edited by one of the academic pioneers in the field and written by experienced professionals. This completely revised second edition covers the entire spectrum, from the fundamentals of molecular and cell biology, via an overview of standard methods and technologies, the application of the various "-omics", and the development of novel drug targets,

right up to the significance of system biology in biotechnology. The whole is rounded off by an introduction to industrial biotechnology as well as chapters on company foundation, patent law and marketing. The new edition features: - Large format and full color throughout - Proven structure according to basics, methods, main topics and economic perspectives - New sections on system biology, RNA interference, microscopic techniques, high throughput sequencing, laser applications, biocatalysis, current biomedical applications and drug approval - Optimized teaching with learning targets, a glossary containing around 800 entries, over 500 important abbreviations and further reading. The only resource for those who are seriously interested in the topic. Bonus material available online free of charge: www.wiley-vch.de/home/molecbiotech A brief and accessible introduction to molecular biology for students and professionals who want to understand this rapidly expanding field. Recent research in molecular biology has produced a remarkably detailed understanding of how living things operate. Becoming conversant with the intricacies of molecular biology and its extensive technical vocabulary can be a challenge, though, as introductory materials often seem more like a barrier than an invitation to the study of life. This text offers a concise and accessible introduction to molecular biology, requiring no previous background in science, aimed at students and professionals in fields ranging from engineering to journalism—anyone who wants to get a foothold in this rapidly expanding field. It will be particularly useful for computer scientists exploring computational biology. A reader who has mastered the information in *The Processes of Life* is ready to move on to more complex material in almost any area of contemporary biology. This introduction to molecular biology is designed for students from a science background, as the text assumes knowledge of general biology and chemistry. It emphasizes gene function and control, and applies these processes to the big picture of cell function. "This book is an introductory course in molecular biology for mathematicians, physicists, and engineers. It covers the basic features of DNA, proteins, and cells but in the context of recent technological advances, such as next-generation sequencing and high-throughput screens, and their applications. This enables readers to move rapidly from the b This primer presents an introduction to molecular symmetry and point groups with an emphasis on their applications. The author has adopted a non-mathematical approach as far as possible. Revised edition of: *Introduction to molecular ecology* / Trevor J. C. Beebee, Graham Rowe. 2008. 2nd ed. *Molecular biophysics* is a rapidly growing field of research that plays an important role in elucidating the mysteries of life's molecules and their assemblies, as well as the relationship between their structure and function. *Introduction to Molecular Biophysics* fills an existing gap in the literature on this subject by providing the reader with th Easy to read, yet comprehensive, this is the perfect introduction into the molecular basis of disease and the novel treatment options that have become available. The authors, Jens Kurreck and Cy Stein, have both long-standing teaching experience on the subject, one from a biologist's angle, the other with a medical background. Together, they have produced a modern textbook for courses in *Molecular Medicine* that incorporates modules from immunology to signaling, from virology to gene therapy, and the latest development in personalized medicine. *Molecular Biology* is the story of the molecules of life, their relationships, and how these interactions are controlled. It is an expanding field in life sciences, and its applications are wide and growing. We can now harness the power of molecular biology to treat diseases, solve crimes, map human history, and produce genetically modified organisms and crops, and these applications have sparked a multitude of fascinating legal and ethical debates. In this *Very Short Introduction*, Aysha Divan and Janice Royds examine the history, present, and future of *Molecular Biology*. Starting with the building blocks established by Darwin, Wallace and Mendel, and the discovery of the structure of DNA in 1953, they consider the wide range of applications for *Molecular Biology* today, including the development of new drugs, and forensic science. They also look forward to two key areas of evolving research such as personalised medicine and synthetic biology. ABOUT THE SERIES: The *Very Short Introductions* series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable. Recently molecular biology has undergone unprecedented development generating vast quantities of data needing sophisticated computational methods for analysis, processing and archiving. This requirement has given birth to the truly interdisciplinary field of computational biology, or bioinformatics, a subject reliant on both theoretical and practical contributions from statistics, mathematics, computer science and biology. * Provides the background mathematics required to understand why certain algorithms work * Guides the reader through probability theory, entropy and combinatorial optimization * In-depth coverage of molecular biology and protein structure prediction * Includes several less familiar algorithms such as DNA segmentation, quartet puzzling and DNA strand separation prediction * Includes class tested exercises useful for self-study * Source code of programs available on a Web site Primarily aimed at advanced undergraduate and graduate students from bioinformatics, computer science, statistics, mathematics and the biological sciences, this text will also interest researchers from these fields. The *11th Hour Series* is designed to be used when a textbook doesn't make sense, when the course content is tough, or when you just want a better grade in the course. The authors cut through the fluff, get to what you need to know, and then help you understand it. Clinical correlations or everyday applications include examples from the real world to help students understand key concepts more readily. Dedicated web page, there 24 hours a day, will give extra help, tips, warnings of trouble spots, extra visuals and more. A quick check on what background students will need to apply helps equip them to conquer a topic. The most important information is highlighted and explained, showing the big picture and eliminating the guesswork. After every topic and every chapter, lots of opportunity for drill is provided in every format, multiple choice, true/false, short answer, essay. An easy trouble spot identifier demonstrates which areas need to be reinforced and where to find information on them. Practice midterms and finals prep them for the real thing. *Introduction to Molecular Genomics* introduces the college student to the fundamental concepts of molecular biology and genomics. The text puts an emphasis on important topics in the subject that contribute to the learner's understanding. These topics include molecular genomics,

biodiversity and molecular phenomenon behind evolution of species, modern molecular methods for enhanced genomics research, DNA modifications at the molecular level for transgenic animal species, the role of cell environment on the gene expression, to name a few. They have been designed to suit the requirements of taught courses in molecular biology, genomics and biochemistry. Key features - Covers basic concepts on key topics in molecular biology and genomics - Simple easy-to-read layout - Includes references for further reading - Includes a section on ethical aspects of scientific research

An Introduction to Human Molecular Genetics Second Edition Jack J. Pasternak

The Second Edition of this internationally acclaimed text expands its coverage of the molecular genetics of inherited human diseases with the latest research findings and discoveries. Using a unique, systems-based approach, the text offers readers a thorough explanation of the gene discovery process and how defective genes are linked to inherited disease states in major organ and tissue systems. All the latest developments in functional genomics, proteomics, and microarray technology have been thoroughly incorporated into the text. The first part of the text introduces readers to the fundamentals of cytogenetics and Mendelian genetics. Next, techniques and strategies for gene manipulation, mapping, and isolation are examined. Readers will particularly appreciate the text's exceptionally thorough and clear explanation of genetic mapping. The final part features unique coverage of the molecular genetics of distinct biological systems, covering muscle, neurological, eye, cancer, and mitochondrial disorders. Throughout the text, helpful figures and diagrams illustrate and clarify complex material. Readers familiar with the first edition will recognize the text's same lucid and engaging style, and will find a wealth of new and expanded material that brings them fully up to date with a current understanding of the field, including:

- * New chapters on complex genetic disorders, genomic imprinting, and human population genetics
- * Expanded and fully revised section on clinical genetics, covering diagnostic testing, molecular screening, and various treatments

This text is targeted at upper-level undergraduate students, graduate students, and medical students. It is also an excellent reference for researchers and physicians who need a clinically relevant reference for the molecular genetics of inherited human diseases.

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