

Kerson Huang Statistical Mechanics Solution Manual

Statistical physics is a core component of most undergraduate (and some post-graduate) physics degree courses. It is primarily concerned with the behavior of matter in bulk-from boiling water to the superconductivity of metals. Ultimately, it seeks to uncover the laws governing random processes, such as the snow on your TV screen. This essential new textbook guides the reader quickly and critically through a statistical view of the physical world, including a wide range of physical applications to illustrate the methodology. It moves from basic examples to more advanced topics, such as broken symmetry and the Bose-Einstein equation. To accompany the text, the author, a renowned expert in the field, has written a Solutions Manual/Instructor's Guide, available free of charge to lecturers who adopt this book for their courses. Introduction to Statistical Physics will appeal to students and researchers in physics, applied mathematics and statistics.

This interesting book provides the physical and mathematical background for a theory describing the universe as a quantum superfluid, and how dark energy and dark matter arise. Presenting a novel theory spanning many different fields in physics, the key concepts in each field are introduced. The reader is only expected to know the rudiments of condensed matter physics, quantum field theory and general relativity to explore this fascinating new model of dark matter and dark energy as facets of a cosmic superfluid. Statistical Mechanics discusses the fundamental concepts involved in understanding the

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physical properties of matter in bulk on the basis of the dynamical behavior of its microscopic constituents. The book emphasizes the equilibrium states of physical systems. The text first details the statistical basis of thermodynamics, and then proceeds to discussing the elements of ensemble theory. The next two chapters cover the canonical and grand canonical ensemble. Chapter 5 deals with the formulation of quantum statistics, while Chapter 6 talks about the theory of simple gases. Chapters 7 and 8 examine the ideal Bose and Fermi systems. In the next three chapters, the book covers the statistical mechanics of interacting systems, which includes the method of cluster expansions, pseudopotentials, and quantized fields. Chapter 12 discusses the theory of phase transitions, while Chapter 13 discusses fluctuations. The book will be of great use to researchers and practitioners from wide array of disciplines, such as physics, chemistry, and engineering.

Unlike most other texts on the subject, this clear, concise introduction to the theory of microscopic bodies treats the modern theory of critical phenomena. Provides up-to-date coverage of recent major advances, including a self-contained description of thermodynamics and the classical kinetic theory of gases, interesting applications such as superfluids and the quantum Hall effect, several current research applications, The last three chapters are devoted to the Landau-Wilson approach to critical phenomena. Many new problems and illustrations have been added to this edition.

International Series of Monographs in Natural Philosophy

Introduction to Statistical Physics, Second Edition

Thermodynamics and an Introduction to Thermostatistics

Problems on Statistical Mechanics

Solutions Manual Introduction to Statistical Physics, Second Edition

Gauge fields are the messengers carrying signals between elementary particles, enabling them to interact with each other. Originating at the level of quarks, these basic interactions percolate upwards, through nuclear and atomic physics, through chemical and solid state physics, to make our everyday world go round. This book tells the story of gauge fields, from Maxwell's 1860 theory of electromagnetism to the 1954 theory of Yang and Mills that underlies the Standard Model of elementary particle theory. In the course of the narration, the author introduces people and events in experimental and theoretical physics that contribute to ideas that have shaped our conception of the physical world.

Volume 5.

This book explains the ideas and techniques of statistical mechanics-the theory of condensed matter-in a simple and progressive way. The text starts with the laws of thermodynamics and simple ideas of quantum mechanics. The conceptual ideas underlying the subject are explained carefully; the mathematical ideas are developed in parallel to give a coherent overall view. The text is illustrated with examples not just from solid state physics, but also from recent theories of radiation from black holes and recent data

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on the background radiation from the Cosmic background explorer. In this second edition, slightly more advanced material on statistical mechanics is introduced, material which students should meet in an undergraduate course. As a result the new edition contains three more chapters on phase transitions at an appropriate level for an undergraduate student. There are plenty of problems at the end of each chapter, and brief model answers are provided for odd-numbered problems. From reviews of the first edition: '...Introductory Statistical Mechanics is clear and crisp and takes advantage of the best parts of the many approaches to the subject' Physics Today Graduate-level text covers properties of the Fermi-Dirac and Bose-Einstein distributions; the interrelated subjects of fluctuations, thermal noise, and Brownian movement; and the thermodynamics of irreversible processes. 1958 edition.

Digital Design: International Version

Introduction to Modern Statistical Mechanics

States of Matter

Thermodynamics And Statistical Mechanics

Statistical and Thermal Physics

Suitable for advanced undergraduates and graduate students of physics, this uniquely comprehensive overview provides a rigorous, integrated treatment of

physical principles and techniques related to gases, liquids, solids, and their phase transitions. 1975 edition.

Essentials of Thermodynamics offers a fresh perspective on classical thermodynamics and its explanation of natural phenomena. It combines fundamental principles with applications to offer an integrated resource for students, teachers and experts alike. The essence of classic texts has been distilled to give a balanced and in-depth treatment, including a detailed history of ideas which explains how thermodynamics evolved without knowledge of the underlying atomic structure of matter. The principles are illustrated by a vast range of applications, such as osmotic pressure, how solids melt and liquids boil, the incredible race to reach absolute zero, and the modern theme of the renormalization group. Topics are handled using a variety of techniques, which helps readers see how concepts such as entropy and free energy can be applied to many situations, and in diverse ways. The book has a large number of solved examples and problems in each chapter, as well as a carefully selected guide to further reading. The treatment of traditional topics like the three laws of thermodynamics, Carnot cycles, Clapeyron equation, phase equilibria, and dilute solutions is considerably more detailed than usual. For example, the chapter on Carnot cycles discusses exotic cases like the photon cycle along with more practical ones like the Otto, Diesel and Rankine cycles. There is a

chapter on critical phenomena that is modern and yet highly pedagogical and contains a first principles calculation of the critical exponents of Van der Waals systems. Topics like entropy constants, surface thermodynamics, and superconducting phase transitions are explained in depth while maintaining accessibility for different readers.

Written by a world-renowned theoretical physicist, Introduction to Statistical Physics, Second Edition clarifies the properties of matter collectively in terms of the physical laws governing atomic motion. This second edition expands upon the original to include many additional exercises and more pedagogically oriented discussions that fully explain the concepts and applications. The book first covers the classical ensembles of statistical mechanics and stochastic processes, including Brownian motion, probability theory, and the Fokker–Planck and Langevin equations. To illustrate the use of statistical methods beyond the theory of matter, the author discusses entropy in information theory, Brownian motion in the stock market, and the Monte Carlo method in computer simulations. The next several chapters emphasize the difference between quantum mechanics and classical mechanics—the quantum phase. Applications covered include Fermi statistics and semiconductors and Bose statistics and Bose–Einstein condensation. The book concludes with advanced topics, focusing on the Ginsburg–Landau theory of the

order parameter and the special kind of quantum order found in superfluidity and superconductivity. Assuming some background knowledge of classical and quantum physics, this textbook thoroughly familiarizes advanced undergraduate students with the different aspects of statistical physics. This updated edition continues to provide the tools needed to understand and work with random processes.

With over 30 years of experience in both industrial and university settings, the author covers the most widespread logic design practices while building a solid foundation of theoretical and engineering principles for students to use as they go forward in this fast moving field.

Analele Universit??ii Bucure?ti

Memorial Volume For Kerson Huang

Statistical Physics

Principles and Practices Package

Statistical Physics of Particles

Statistical mechanics is one of the most exciting areas of physics today, and it also has applications to subjects as diverse as economics, social behavior, algorithmic theory, and evolutionary biology. Statistical Mechanics in a Nutshell offers the most concise, self-contained

introduction to this rapidly developing field. Requiring only a background in elementary calculus and elementary mechanics, this book starts with the basics, introduces the most important developments in classical statistical mechanics over the last thirty years, and guides readers to the very threshold of today's cutting-edge research. Statistical Mechanics in a Nutshell zeroes in on the most relevant and promising advances in the field, including the theory of phase transitions, generalized Brownian motion and stochastic dynamics, the methods underlying Monte Carlo simulations, complex systems--and much, much more. The essential resource on the subject, this book is the most up-to-date and accessible introduction available for graduate students and advanced undergraduates seeking a succinct primer on the core ideas of statistical mechanics. Provides the most concise, self-contained introduction to statistical mechanics Focuses on the most promising advances, not complicated calculations Requires only elementary calculus and elementary mechanics Guides readers from the basics to

the threshold of modern research Highlights the broad scope of applications of statistical mechanics

A thorough understanding of statistical mechanics depends strongly on the insights and manipulative skills that are acquired through the solving of problems. Problems on Statistical Mechanics provides over 120 problems with model solutions, illustrating both basic principles and applications that range from solid-state physics to cosmology. An introductory chapter provides a summary of the basic concepts and results that are needed to tackle the problems, and also serves to establish the notation that is used throughout the book. The problems themselves occupy five chapters, progressing from the simpler aspects of thermodynamics and equilibrium statistical ensembles to the more challenging ideas associated with strongly interacting systems and nonequilibrium processes. Comprehensive solutions to all of the problems are designed to illustrate efficient and elegant problem-solving techniques. Where appropriate, the authors incorporate extended discussions of

the points of principle that arise in the course of the solutions. The appendix provides useful mathematical formulae.

Solutions Manual Introduction to Statistical Physics, Second Edition Chapman & Hall

Phase space, ergodic problems, central limit theorem, dispersion and distribution of sum functions. Chapters include Geometry and Kinematics of the Phase Space; Ergodic Problem; Reduction to the Problem of the Theory of Probability; Application of the Central Limit Theorem; Ideal Monatomic Gas; The Foundation of Thermodynamics; and more.

A Modern Approach to Classical Theorems of Advanced Calculus Calculus on Manifolds

An Introduction to Thermodynamics and Statistical Mechanics From Operators to Path Integrals

Selected Papers of Kun Huang

A unique approach to quantum field theory, with emphasis on the principles of renormalization Quantum field theory is frequently approached from the perspective of particle physics. This book adopts a more general point of view and includes

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applications of condensed matter physics. Written by a highly respected writer and researcher, it first develops traditional concepts, including Feynman graphs, before moving on to key topics such as functional integrals, statistical mechanics, and Wilson's renormalization group. The connection between the latter and conventional perturbative renormalization is explained. Quantum Field Theory is an exceptional textbook for graduate students familiar with advanced quantum mechanics as well as physicists with an interest in theoretical physics. It features:

- * Coverage of quantum electrodynamics with practical calculations and a discussion of perturbative renormalization
- * A discussion of the Feynman path integrals and a host of current subjects, including the physical approach to renormalization, spontaneous symmetry breaking and superfluidity, and topological excitations
- * Nineteen self-contained chapters with exercises, supplemented with graphs and charts

While many scientists are familiar with fractals, fewer are familiar with scale-invariance and universality which underlie the ubiquity of their shapes. These properties may emerge from the collective behaviour of simple fundamental constituents, and are studied using statistical field theories. Initial chapters connect the particulate perspective developed in the companion volume, to the coarse grained statistical fields studied here. Based on lectures taught by Professor Kardar at MIT, this textbook demonstrates how such theories are formulated and studied.

Perturbation theory, exact solutions, renormalization groups, and other tools are

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employed to demonstrate the emergence of scale invariance and universality, and the non-equilibrium dynamics of interfaces and directed paths in random media are discussed. Ideal for advanced graduate courses in statistical physics, it contains an integrated set of problems, with solutions to selected problems at the end of the book and a complete set available to lecturers at www.cambridge.org/9780521873413.

A book about statistical mechanics for students.

' This book introduces an approach to protein folding from the point of view of kinetic theory. There is an abundance of data on protein folding, but few proposals are available on the mechanism driving the process. Here, presented for the first time, are suggestions on possible research directions, as developed by the author in collaboration with C C Lin. The first half of this invaluable book contains a concise but relatively complete review of relevant topics in statistical mechanics and kinetic theory. It includes standard topics such as thermodynamics, the Maxwell-Boltzmann distribution, and ensemble theory. Special discussions include the dynamics of phase transitions, and Brownian motion as an illustration of stochastic processes. The second half develops topics in molecular biology and protein structure, with a view to discovering mechanisms underlying protein folding. Attention is focused on the energy flow through the protein in its folded state. A mathematical model, based on the Brownian motion of coupled harmonic oscillators, is worked out in the appendix. Contents: Entropy Maxwell-Boltzmann Distribution Free Energy Chemical

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Potential Phase Transitions Kinetics of Phase Transitions The Order Parameter Correlation Function Stochastic Processes Langevin Equation The Life Process Self-Assembly Kinetics of Protein Folding Power Laws in Protein Folding Self-Avoiding Walk and Turbulence Convergent Evolution in Protein Folding

Readership: Graduate students, researchers and academics interested in statistical physics and molecular biology. Keywords: Statistical Physics; Protein Folding; Biophysics

Reviews: " My particularly favorite is the chapter on order parameters, explaining with simplicity and clarity this subject so frequently difficult and confusing for the beginning students ... the book makes a strong attempt to place the protein folding problem where it really belongs — in the context of fundamental statistical mechanics. Whether the attempt is successful or not is a matter of a reader's opinion, but the very direction is both timely and welcome. " Professor Alexander Grosberg University of Minnesota '

Thermodynamics and Statistical Mechanics
Introductory Statistical Mechanics

Statistical Mechanics

A Modern Approach to Quantum Mechanics

This book introduces an approach to protein folding from the point of view of kinetic theory. There is an abundance of data on protein folding, but few proposals are available on the mechanism driving

the process. Here, presented for the first time, are suggestion on possible research directions, as developed by the author in collaboration with C. C. Lin. The first half of this invaluable book contains a concise but relatively complete review of relevant topics in statistical mechanics and kinetic theory. It includes standard topics such as thermodynamics, the Maxwell-Boltzmann distribution, and ensemble theory. Special discussions include the dynamics of phase transitions, and Brownian motion as an illustration of stochastic processes. The second half develops topics in molecular biology and protein structure, with a view to discovering mechanisms underlying protein folding. Attention is focused on the energy flow through the protein in its folded state. A mathematical model, based on the Brownian motion of coupled harmonic oscillators, is worked out in the appendix.

The only text to cover both thermodynamic and statistical mechanics--allowing students to fully master thermodynamics at the macroscopic level. Presents essential ideas on critical phenomena developed over the last decade in simple, qualitative terms. This new edition maintains the simple structure of the first and puts new emphasis on pedagogical considerations. Thermostatistics is incorporated into the text without eclipsing macroscopic thermodynamics, and is integrated into the conceptual framework of physical theory.

From the reviews: "This book excels by its variety of modern examples in solid state physics, magnetism, elementary particle physics [...] I can recommend it strongly as a valuable source, especially to those who are teaching basic statistical physics at our universities." Physicalia

A new, updated and enhanced edition of the classic work, which was welcomed for its general approach and self-sustaining organization of the chapters. Written by a highly respected textbook writer and researcher, this book has a more general scope and adopts a more practical approach than other books. It includes applications of condensed matter physics, first developing traditional concepts,

including Feynman graphs, before moving on to such key topics as functional integrals, statistical mechanics and Wilson's renormalization group. The author takes care to explain the connection between the latter and conventional perturbative renormalization. Due to the rapid advance and increase in importance of low dimensional systems, this second edition fills a gap in the market with its added discussions of low dimensional systems, including one-dimensional conductors. All the chapters have been revised, while more clarifying explanations and problems have been added. A FREE SOLUTIONS MANUAL is available for lecturers from www.wiley-vch.de/textbooks.

Lectures on Statistical Physics and Protein Folding

Models and Modelers of Hydrogen

Statistical Physics of Fields

Fizică

Problems and Solutions on Thermodynamics and Statistical Mechanics

The Manchester Physics Series General Editors: D. J. Sandiford; F. Mandl; A. C. Phillips Department of Physics and Astronomy, University of Manchester Properties of Matter B. H. Flowers and E. Mendoza Optics Second Edition F. G. Smith and J. H. Thomson Statistical Physics Second Edition E. Mandl Electromagnetism Second Edition I. S. Grant and W. R. Phillips Statistics R. J. Barlow Solid State Physics Second Edition J. R. Hook and H. E. Hall Quantum Mechanics F. Mandl Particle Physics Second Edition B. R. Martin and G. Shaw The Physics of Stars Second Edition A. C. Phillips Computing for Scientists R. J. Barlow and A. R. Barnett Statistical Physics, Second Edition develops a unified treatment of statistical mechanics and thermodynamics, which emphasises the statistical nature of the laws of thermodynamics and the atomic nature of matter. Prominence is given to the Gibbs distribution, leading to a simple treatment of quantum statistics and of chemical reactions.

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Undergraduate students of physics and related sciences will find this a stimulating account of the basic physics and its applications. Only an elementary knowledge of kinetic theory and atomic physics, as well as the rudiments of quantum theory, are presupposed for an understanding of this book. Statistical Physics, Second Edition features: A fully integrated treatment of thermodynamics and statistical mechanics. A flow diagram allowing topics to be studied in different orders or omitted altogether. Optional "starred" and highlighted sections containing more advanced and specialised material for the more ambitious reader. Sets of problems at the end of each chapter to help student understanding. Hints for solving the problems are given in an Appendix.

A completely revised edition that combines a comprehensive coverage of statistical and thermal physics with enhanced computational tools, accessibility, and active learning activities to meet the needs of today's students and educators This revised and expanded edition of Statistical and Thermal Physics introduces students to the essential ideas and techniques used in many areas of contemporary physics. Ready-to-run programs help make the many abstract concepts concrete. The text requires only a background in introductory mechanics and some basic ideas of quantum theory, discussing material typically found in undergraduate texts as well as topics such as fluids, critical phenomena, and computational techniques, which serve as a natural bridge to graduate study. Completely revised to be more accessible to students Encourages active reading with guided problems tied to the text Updated open source programs available in Java, Python, and JavaScript Integrates Monte Carlo and molecular dynamics simulations and other numerical techniques Self-contained introductions to thermodynamics and probability, including Bayes' theorem A fuller discussion of magnetism and the Ising model than other undergraduate texts Treats ideal classical and quantum gases within a uniform framework Features a new chapter on transport coefficients and linear response theory Draws on findings from contemporary

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research Solutions manual (available only to instructors)

Inspired by Richard Feynman and J.J. Sakurai, *A Modern Approach to Quantum Mechanics* allows lecturers to expose their undergraduates to Feynman's approach to quantum mechanics while simultaneously giving them a textbook that is well-ordered, logical and pedagogically sound. This book covers all the topics that are typically presented in a standard upper-level course in quantum mechanics, but its teaching approach is new. Rather than organizing his book according to the historical development of the field and jumping into a mathematical discussion of wave mechanics, Townsend begins his book with the quantum mechanics of spin. Thus, the first five chapters of the book succeed in laying out the fundamentals of quantum mechanics with little or no wave mechanics, so the physics is not obscured by mathematics. Starting with spin systems it gives students straightforward examples of the structure of quantum mechanics. When wave mechanics is introduced later, students should perceive it correctly as only one aspect of quantum mechanics and not the core of the subject.

Lectures on elementary statistical mechanics, taught at the University of Illinois and at the University of Pennsylvania.

(With Commentary)

Introduction to Statistical Physics

Statistical Mechanics in a Nutshell

With Computer Applications, Second Edition

A Superfluid Universe

Moving from basic to more advanced topics, this popular core text has been revised and expanded to reflect recent advances. While giving readers the tools

needed to understand and work with random processes, it places greater focus on thermodynamics, especially the kinetics of phase transitions. The chapter on Bose–Einstein condensation has been revised to reflect improvements in the field. The edition also covers stochastic processes in greater depth, with a more detailed treatment of the Langevin equation. It provides new exercises and a complete solutions manual for qualifying instructors.

Statistical physics has its origins in attempts to describe the thermal properties of matter in terms of its constituent particles, and has played a fundamental role in the development of quantum mechanics. Based on lectures taught by Professor Kardar at MIT, this textbook introduces the central concepts and tools of statistical physics. It contains a chapter on probability and related issues such as the central limit theorem and information theory, and covers interacting particles, with an extensive description of the van der Waals equation and its derivation by mean field approximation. It also contains an integrated set of problems, with solutions to selected problems at the end of the book and a complete set of solutions is available to lecturers on a password protected website at www.cambridge.org/9780521873420. A companion volume, *Statistical Physics of Fields*, discusses non-mean field aspects of scaling and critical phenomena, through the perspective of renormalization group.

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This book uses elementary versions of modern methods found in sophisticated mathematics to discuss portions of "advanced calculus" in which the subtlety of the concepts and methods makes rigor difficult to attain at an elementary level. Atomic theory began more than two and a half millenia ago in Greece and India; but scientific details have emerged — albeit very rapidly — only in our century. This book conveys a glimpse of the grandeur of 20th century physics through nine essays and one interview on the models and modelers of a basic element of matter: the hydrogen atom. The basic ideas are simply presented and illustrated, the mathematical treatments are of a tutorial nature, and facsimile reproductions of ten key papers are included. Using the simple hydrogen atom, educators may use this book to initiate high school students into the grandeur of physics or motivate university students to become science-literate.

Quantum Field Theory

Essentials of Thermodynamics

Elementary Statistical Physics

Fundamental Forces of Nature

Mathematical Foundations of Statistical Mechanics

Professor Kerson Huang was a well respected theoretical physicist, who was also

well versed in English and Chinese literature. He was born in Nanning, China, on 15 March 1928, and he was a fellow at the IAS, Princeton, from 1955-1957 before joining the faculty of MIT. He remained there until he retired from teaching in 1999. His research in theoretical physics included works on Bose-Einstein condensation and quantum field theory. In his long and illustrious career, Prof. Huang has worked with many prominent physicists. In 1957, he published a theory known as the hard-sphere model for Bose gases with Nobel Laureates Chen-Ning Yang and Tsung-Dao Lee. With Noble Laureate Steven Weinberg, he studied the ultimate temperature and the thermodynamics of early universe. While he was at Princeton, he also worked with atomic bomb developer J. Robert Oppenheimer. In recently years, Prof. Huang had been a visiting professor at Nanyang Technological University in Singapore, and worked on both biophysics and quantum cosmology. This memorial volume is dedicated to Prof. Huang who passed away peacefully at home on September 1, 2016 at the age of 88. The volume features the recollections of Prof. Huang by his former colleagues and students, including Profs Chen-Ning Yang and Samuel Ting, as well as their reflections on Prof. Huang's achievements in the various subdivisions of physics.

Treating mechanics through a clearly written introduction of the theory of microscopic bodies based on the fundamental atomic laws, this book contains a

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brief but self-contained discussion of thermodynamics and the classical kinetic theory of gases. An introduction to the modern theory of critical phenomena is featured that is concise and pedagogically orientated. This second edition contains up-to-date coverage of recent major advances and important applications, such as superfluids and the Quantum Hall Effect. A large part of the text is devoted to selected applications of statistical mechanics and its value as an illustration of calculating techniques.

This introductory textbook for standard undergraduate courses in thermodynamics has been completely rewritten to explore a greater number of topics, more clearly and concisely. Starting with an overview of important quantum behaviours, the book teaches students how to calculate probabilities in order to provide a firm foundation for later chapters. It introduces the ideas of classical thermodynamics and explores them both in general and as they are applied to specific processes and interactions. The remainder of the book deals with statistical mechanics. Each topic ends with a boxed summary of ideas and results, and every chapter contains numerous homework problems, covering a broad range of difficulties. Answers are given to odd-numbered problems, and solutions to even-numbered problems are available to instructors at www.cambridge.org/9781107694927.

This textbook covers the basic principles of statistical physics and

thermodynamics. The text is pitched at the level equivalent to first-year graduate studies or advanced undergraduate studies. It presents the subject in a straightforward and lively manner. After reviewing the basic probability theory of classical thermodynamics, the author addresses the standard topics of statistical physics. The text demonstrates their relevance in other scientific fields using clear and explicit examples. Later chapters introduce phase transitions, critical phenomena and non-equilibrium phenomena.

The Story of Gauge Fields

This book provides a comprehensive exposition of the theory of equilibrium thermodynamics and statistical mechanics at a level suitable for well-prepared undergraduate students. The fundamental message of the book is that all results in equilibrium thermodynamics and statistical mechanics follow from a single unprovable axiom — namely, the principle of equal a priori probabilities — combined with elementary probability theory, elementary classical mechanics, and elementary quantum mechanics.