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Book Review: *Introduction to Modern Statistical Mechanics*

Introduction to Modern Statistical Mechanics. David Chandler. Oxford University Press, New York, 1987, 274 pp.

This book is a welcome addition to the textbook literature in statistical mechanics. It does not (and probably does not pretend to) replace some of the standard texts that cover the field more broadly, but it certainly supplements them with modern material presented very well. The author has managed to make this material accessible to students at the high undergraduate and beginning graduate level without requiring a tremendous amount of sophisticated antecedents. The book gives the student a real flavor of the issues in statistical mechanics as currently seen in the physical chemistry community.

The text requires a firm base in physical chemistry and the proper guidance of a knowledgeable instructor who can help the student to identify and separate assumptions from proven facts, who can define terminology that is used in the book but not clearly defined, and who can provide an overall picture of the aims of each section. Rather than a criticism, this is meant as a caveat: this text is not for self-learning, but is extremely good with appropriate direction.

The strongest portions of the book are those that deal with equilibrium statistical mechanics (this is, indeed, the major portion of the text). The early chapters cover fairly standard material (review of thermodynamics, equilibria, ensembles, ideal systems). This material is of course necessary and Chandler's coverage of it provides a good review for the student. I particularly found Chandler's treatment of ensembles refreshing: students usually find the idea of ensembles very difficult; the treatment in this book will help the student a great deal.

The author's touch is particularly good in his choice and coverage of topics in the subsequent chapters: phase transitions, Monte Carlo methods, and modern theories of classical fluids. The computer programs given in conjunction with the Monte Carlo chapter should be a lot of fun for

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students to play with. There is really no other text that covers these topics in the balanced way of this text and that manages to bring the student fairly up to date: the material comes to life and gives the student a taste of the current status of these fields.

The final chapter of the book is on nonequilibrium statistical mechanics. It provides a short introduction to this area of statistical mechanics and only deals with some of its very salient issues. In particular, it introduces time correlation functions, Onsager's regression hypothesis, and the fluctuation-dissipation theorem. This portion of the book is short and is, I believe, only meant to intrigue the student toward further study.

As I said at the beginning of this review, this book complements rather than replaces other texts, but it does so very well. There are many topics not covered that really are, in my view, an important part of ones' education in statistical mechanics. On the other hand, the choice of material that is covered is very well presented and current. The fact that this is a paperback edition at a relatively low cost adds to its attractiveness.

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