self-interest, the root cause of armed conflict in men and nations, will cease to operate; that anyone will willingly surrender what he has or not try to get what he wants; in short that human nature will ever become something other than it is? . . . In whatever direction the world may move, it will never be able to do without the final arbitrament of arms." *Nuclear Rites* would be a useful addition to the library of those interested in science policy.

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Introductory Statistical Mechanics

Roger Bowley
and Mariana Sánchez
Oxford U. P., New York, 1996.
289 pp. $59.95 hc ($29.95 pb)
ISBN 0-19-851794-7 hc
(0-19-851793-9 pb)

There are three approaches to thermal physics at the advanced undergraduate level. Each bears good news and bad news for the student. In a traditional approach, thermodynamics, with its elegance and generality, is introduced, carrying with it the new, mysterious mathematical concept, entropy. In the older microscopic approach, kinetic theory is introduced, making a direct appeal to familiar elementary mechanics but bringing along some worrisome simplifications and eventually some serious counting paradoxes. In the quantum approach, the ubiquitous presence of energy levels and quantum states is acknowledged immediately, and entropy, clearly defined, involves only a counting process. The downsides of the quantum approach are twofold: an immediate need to persuade the student of the unimportance of precise counts when dealing with large numbers and the postponement of thermodynamics and kinetic theory—almost as if they were applications.

Roger Bowley and Mariana Sánchez's *Introductory Statistical Mechanics* appears at first to follow the thermodynamics tradition. But that is deceptive: Its initial three chapters are actually self-contained minireviews of thermodynamics, probability and statistics, and the quantum approach then begins in earnest. Readers are assumed to be familiar with the kinetic theory of gases and introductory quantum mechanics.

As a long-time advocate of the quantum approach and user of Charles Kittel and Herbert Kroemer's *Thermal Physics* (Freeman, 1980), I am compelled to formulate this review as a comparison of the two books. Would I switch to Bowley and Sánchez next time I teach the course? No, I would take the unusual step of requiring both books.

First, a few words about *Thermal Physics*. Kittel and Kroemer complete the fundamentals of statistical physics and thermodynamics in ten chapters, followed by five chapters on applications. Physical arguments are made in defense of approximations, often at the apparent expense of mathematical rigor. The applications chapters are thorough, the one on semiconductors being especially detailed. The economy of style has led some of my students to complain about its readability, and some of my colleagues are critical of that same economy, presumably on broader stylistic grounds. My own unswerving appreciation of the logical development in *Thermal Physics* overcomes any such criticisms with which I might agree.

Applications are treated much more lightly in *Introductory Statistical Mechanics*, appearing mainly as a few examples in connection with fermions, bosons and the Planck distribution. Thus, Kittel and Kroemer would complement Bowley and Sánchez by providing many more practical, detailed examples from thermodynamics, electronics and cryophysics. Bowley and Sánchez would be an important complement to Kittel and Kroemer by providing a highly readable text to help students cope with the early development of the quantum approach. The newer text would also satisfy professors who wish to adopt a concise review of thermodynamics as a launching pad.

Bowley and Sánchez choose to bind a complete set of worked exercise solutions into their book. This will please any reader who has a discipline for self-study that includes an iron will not to peek. It will be a nuisance to those professors who, as I do, prefer to parcel out guidance, with homework exercises, in the hope that original thoughts and errors will be available to be graded.

In summary, *Introductory Statistical Mechanics* is clear and crisp and takes advantage of the best parts of the many approaches to the subject, all at some sacrifice of in-depth applications. It will complement any existing text that is heavier on applications; if a course is not intended to include many applications, the book will be a perfectly good stand-alone text. It is also a readable second source, something badly needed by students in their first encounter with any version of statistical physics.

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