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Statistical Mechanics and the
Foundations of Thermodynamics



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Preface

These lectures present an introduction to classical statistical mechanics and its relation to thermodynamics. They are intended to bridge the gap between the treatment of the subject in the physics text books and in the modern presentations of mathematically rigorous results. (So it tries to supply many of the facts that are to be found between the lines both in Landau-Lifshitz Statistical Physics and Ruelles Statistical Mechanics).

We have put some emphasis on getting a detailed and logical presentation of the foundations of thermodynamics based on the maximum entropy principles which govern the values taken by macroscopic variables according to the laws of large numbers. These can be given a satisfactory formulation using the limits of the basic thermodynamic functions established in the modern work on rigorous results.

The treatment is reasonably self contained both concerning the physics and mathematics needed. No knowledge of quantum mechanics is presupposed. Since we present mathematical proofs of many technical facts about the thermodynamic functions perhaps the treatment is most digestive for the mathematically inclined reader who wants to understand the physics of the subject, but it is hoped that the treatment of the basis of thermodynamics is also clarifying to physically inclined readers.

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