PHYSICS 731
STATISTICAL PHYSICS II
SPRING 2022 / ON-LINE / WRITTEN LECTURE NARRATIVES
No In-Person Meetings
January 10 – May 13
Last Day of Instruction / May 4

Instructor
Dr. Chester Vause
Professor, Department of Physics & Astronomy
Watanabe Hall 434, 808-956-2989, cvause@hawaii.edu
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Prerequisites (UHM Catalog)
Physics 730

Textbook
 "Statistical Physics" (3ʳᵈ English ed., Part 1) Landau and Lifshitz Course of Theoretical
Physics, Volume 5, E. M. Lifshitz and L.P. Pitaevskii (Pergamon Press, Oxford, 1980)

Student Learning Outcomes
Among the student learning outcomes of this course are to:

(a) Understand the fundamental principles of equilibrium Statistical Mechanics as a
microscopic theory, and how this theory provides the foundation of macroscopic
Thermodynamics ("Laws of Thermodynamics"). (review)

(b) Develop and use various statistical equilibrium distributions, micro-canonical,
canonical, and grand canonical, formulated by Gibbs. (review)

(c) Derive the connection between statistical correlations (fluctuations) and
thermodynamic response functions, and thermodynamic extremum principles of various
thermodynamic potentials. (review)

(d) Apply the theory to various macroscopic phenomena, from microscopic models of
many-particle microscopic systems of macroscopic extent.

(e) Applications include the Fermi, Bose, photon, and phonon ideal quantum gases, the
classical ideal Boltzmann gas, paramagnetism, and elementary interacting systems such
as the non-ideal gas, and van der Waals theory. Thermodynamic theory of phase
transitions and critical phenomena, with applications to the liquid-gas system, liquid
crystals, ferromagnetism, polymer physics. Renormalization group methods are
introduced to solve these problems.

Assignments
Assignments are "take-home" and will be given from "time-to-time" as needed, typically to fill-in some gaps, or as an extention of the material covered. There is no Final Exam.

Grade Scale
The Letter Grade is determined from the average of the Assignment Scores:

A- (86%-90%)	A (91%-95%)	A+ (96%-100%)
B- (61%-70%)	B (71%-80%)	B+ (81%-85%)
C- (31%-40%)	C (41%-50%)	C+ (51%-60%)
	F (0%-20%)	D (21%-30%)

NO INCOMPLETE GRADE GIVEN

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