

**PHYSICS 430**  
**THERMODYNAMICS & STATISTICAL MECHANICS**

SPRING 2019 / Monday, January 7 – Friday, May 10

Last Day of Instruction / Thursday, May 2

Watanabe Hall 114 / TTh, 10:30AM - 11:45AM

**Instructor**

Dr. Chester Vause

Professor, Department of Physics & Astronomy

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Office Hours: After class or by appointment.

**Prerequisites**

“Physics 274, and Math 244 or Math 253A.” Note: “A grade of C (not C minus) or better is required in all pre-requisite courses.” (Source: University of Hawaii at Manoa Catalog)

**Textbook (Required)**

Thermal Physics, (2nd edition), Charles Kittel and Herbert Kroemer (W. H. Freeman & Co., Inc., 1980)

**Course**

Lecture material is of primary importance. Do not ignore what is discussed in class. Material may not be “word for word” in the textbook. Modifications, clarifications, will be the norm. Take good notes. Topics covered include: the maximum entropy principle, the laws of thermodynamics, the Gibbs probability distributions (microcanonical, canonical, and grand canonical), thermodynamic potentials, Planck, Debye, Fermi, Bose and Boltzmann ideal gases, paramagnetism, thermodynamic cycles, phase equilibrium (textbook Chapters 1-10). Omitted sections in chapters to be announced in class. Selected topics in other chapters may be included, time permitting.

**Student Learning Objectives**

These include:

- (1) An understanding of the probabilistic/statistical basis of many-particle macroscopic thermodynamic equilibrium from a microscopic perspective
- (2) The ability to calculate thermodynamic quantities from microscopic statistical mechanical models of macroscopic systems
- (3) To understand the extensive and intensive nature of thermodynamic variables and the relationships amongst these as expressed through partial differential identities, and how these are related to physical quantities that may be measured experimentally

**Suggested Problems**

Suggested problems will be assigned to give the student practice (not to be turned-in or graded). Some problems will be worked-out in class.

## Exams

Exams are closed-book, two student-generated note pages per new material (2 for Exam 1, 4 for Exam 2, 6 for Exam 3, 8 for Final Exam), and scientific calculator, only. No internet devices or electronic storage media. Exam dates are:

Exam 1	Thursday	February 7, 2019
Exam 2	Thursday	March 7, 2019
Exam 3	Thursday	April 11, 2019
Final Exam	Thursday	May 9, 2019, 9:45AM – 11:45AM

Each Exam is worth 1/4 (25%) contribution of the Total Score. Each Exam (including the Final Exam) is based on material covered since the previous Exam (not cumulative).

## Grade Scale

Letter grade is determined from the total score according to the following scale:

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*

## NOTICE

Be prepared to take the tests in-class as assigned. This is not negotiable. If you have time conflicts, decide if this course is your first priority. I do not “work around” student’s personal plans and schedules (work, travel and otherwise).

This course is a lecture format. If you come to class, plan to stay. Excessive coming and going will not be tolerated. If you are late, enter quietly through the back door. Do not disturb the class.

No electronic recording and no electronic storage of any kind (photography, video, electronic writing pads, etc.) of lectures and lecture board writing. Your focus is to take conventional “pencil and paper notes” in class.

No internet devices (electronic smart phones, pads/tablets, computers, etc.). Turn off your wireless telephones, etc., and PUT THESE AWAY. Do not attend to these during class (no texting, etc.) as such behavior is distracting to the instructor and your classmates. This restriction includes electronic books/textbooks.