

PHYSICS 430
THERMODYNAMICS & STATISTICAL MECHANICS
SPRING 2022 / ONLINE / WRITTEN LECTURE NARRATIVES
10:30am-11:45am No In-Person Meetings
January 10 – May 13
Last Day of Instruction / May 4

Instructor

Dr. Chester Vause
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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 TAKE-HOME EXAMS. The schedule is below, and is subject to change. Instructions will be given on the exam cover page. Basically, one uses the textbook, lectures notes, your own personal notes, and a calculator and a table of integrals. No other sources of material are allowed. By taking these exams, you are abiding to the conditions set forth. The exams will be sent as a pdf file. It is preferable that your finished exam be scanned and returned to the instructor as a pdf file. If this is not possible, paper copy may be delivered to the instructors office, as will be noted in the specific exam directions.

Exam 1	Given: Tuesday, February 8	Due: Thursday, February 10
Exam 2	Given: Tuesday, March 22	Due: Thursday, March 24
Exam 3	Given: Tuesday, April 26	Due: Thursday, April 28
Final Exam	NO FINAL EXAM Scheduled	

Each Exam is based on material covered since the previous Exam. Each Exam is worth 1/3 of the final grade total score:

$$\text{TOTAL SCORE}(\%) = (1/3) * (\text{EX1}(\%) + \text{EX2}(\%) + \text{EX3}(\%))$$

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

The written lecture narratives are the intellectual property of the instructor, and are for your personal use only. It is not to be shared or distributed to any one in any form, in any media.

Be prepared to take the exams 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).