PHYS 1341/2341: Thermodynamics and Statistical Mechanics, Spring 2024

Class: Tue/Thu 9:30-10:45am, 11 Thaw

Professor: Andrew Mugler (he/him), 206 Allen, andrew.mugler@pitt.edu

TA: Lucia Kapitánová, OEH 302, luk22@pitt.edu

Book: Reif, *Fundamentals of Statistical and Thermal Physics*
(on reserve at Science and Engineering Library, Benedum Hall)

Office Hours: Andrew: Wed 1-2pm, 206 Allen
Lucia: Tue 3-4pm, 517 Allen

Credit: 40% Homework quizzes* | 20% Midterm exam | 40% Final exam
*15 min on Thu, random HW problem, possibly modified
*Makeup quiz must be excused in advance and taken within 1 week

Homework quiz | Exam | Pre-recorded | No class

Jan 9	Introduction 1		Jan 11	Probability/statistics 1		
Jan 16	Micro/macrostates 2		Jan 18	Microcanonical ensemble 2	*	
Jan 23	Temperature, entropy 3		Jan 25	*	Pressure 3	
Jan 30	Heat capacity 4		Feb 1	State transitions 5	*	
Feb 6	Heat engines 5		Feb 8	Refrigerators 5	*	
Feb 13	Thermodynamic potentials 5		Feb 15	Thermodynamics survey	*	
Feb 20	Canonical ensemble 6		Feb 22	**Midterm exam**		
Feb 27	Kinetics 7		Feb 29	Partition function 7	*	
Mar 5	**Spring break**		Mar 7	**Spring break**		
Mar 12	Gibbs' paradox 7		Mar 14	Equipartition theorem 7	*	
Mar 19	Non-ideal gases 8		Mar 21	Phase transitions 8	*	
Mar 26	Critical points 8		Mar 28	Grand canonical ensemble 8	*	
Apr 2	Chemical potential 8		Apr 4	*	Quantum gases 9	
Apr 9	Quantum statistics 9		Apr 11	Ising model 10	*	
Apr 16	Special topics/Review		Apr 18	Special topics/Review		
Apr 22-27	**Final exam** (day/time TBD)					

Learning Objectives:
- Demonstrate understanding of the concepts, principles, and laws of thermodynamics and statistical mechanics.
- Describe a physical situation using multiple representations as necessary, such as written conceptual statements, mathematical equations, diagrams, and graphs, and be able to translate from one representation to another.
- Apply mathematical concepts and methods such as probability and statistics, algebra, calculus, and trigonometry as necessary to analyze and solve problems.
- Use physical reasoning and units to obtain order-of-magnitude estimates.

Academic Integrity is of paramount importance. Violations will not be tolerated.
Disability Resources and Services are available for accommodations.
Title IX mandatory reporters include professors. I am required to report violations.