PHYS 1341/2341: Thermodynamics and Statistical Mechanics, Spring 2023

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

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

TA: Chris Ligato, OEH 108B, cjl105@pitt.edu

Book: Reif, *Fundamentals of Statistical and Thermal Physics*

Office Hours: Andrew: By appointment—please do not hesitate to email.
Chris: Tue 5-6pm, https://pitt.zoom.us/j/98445323059

Credit: 40% Homework quizzes* | 20% Midterm exam | 40% Final exam
*Last 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 10	Introduction 1	Jan 12	Probability/statistics 1
Jan 17	Micro/macrostates 2	Jan 19	Microcanonical ensemble 2
Jan 24	Temperature, entropy 3	Jan 26	Pressure 3
Jan 31	Heat capacity 4	Feb 2	State transitions 5
Feb 7	Heat engines 5	Feb 9	Refrigerators 5
Feb 14	Thermodynamic potentials 5	Feb 16	Thermodynamics survey
Feb 21	Canonical ensemble 6	Feb 23	**Midterm exam**
Feb 28	Kinetics 7	Mar 2	Partition function 7
Mar 7	**Spring break**	Mar 9	**Spring break**
Mar 14	Gibbs' paradox 7	Mar 16	Equipartition theorem 7
Mar 21	Non-ideal gases 8	Mar 23	Phase transitions 8
Mar 28	Critical points 8	Mar 30	Grand canonical ensemble 8
Apr 4	Chemical potential 8	Apr 6	Quantum gases 9
Apr 11	Quantum statistics 9	Apr 13	Blackbody radiation 9
Apr 18	Ising model 10	Apr 20	Conclusion
Apr 24-28 **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.