Thermodynamics and Statistical Mechanics

PHYS 2305, Spring 2018

Lecturer: Prof. Dmitri Krioukov
Office: 227 177 Huntington Ave
Email: dima@northeastern.edu
Lecture hours: Tue, Fri, 9:50-11:30 AM
Classroom: 227 Richards Hall
Office hours: Tue, 3:00 PM - 6:00 PM. Appointments may be scheduled for students who cannot make the official hours.
Textbook: *Thermal Physics*, 2nd Edition, by C. Kittel and H. Kroemer
Prerequisites: PHYS 1155 or PHYS 1165 or PHYS 1175, and MATH 2321
Course description and objectives: Thermodynamics and Statistical Mechanics is a one-semester calculus-based physics course. The objective is to understand the physics of large collections of particles. The course focuses on the laws of thermodynamics, entropy and equilibrium, classical and quantum gasses, statistical mechanics, and phase transitions.

Grading

Your course grade will be based on three components: Proof of TRACE Evaluation (10%), Homework (20%), Midterm Exam (30%), and Final Exam (40%). The letter grade will be determined as follows: A (92-100), A- (88-92), B+ (85-88), B (80-85), B- (70-80), C+ (68-70), C (64-68), and C- (60-64).

Reading and Homework

This syllabus includes information on the required course reading and homework assignments. It is **VERY IMPORTANT** that you read and understand the material in the text before coming to class. There will be 10 homework assignments. Solutions to homework problems and exams will be posted on Blackboard.

Need Help?

1. Come to the office hours, Tue 3:00 PM - 6:00 PM at 227 177 Huntington.
2. Use the Blackboard course discussion forum to ask and discuss your course-related questions with other students who are strongly encouraged to help.
3. The Physics Workshop offers free help sessions by physics doctorate students. You can drop in at the times indicated on the Physics Workshop Schedule available at https://web.northeastern.edu/ipl/the-ipl-experience/physics-workshop/
4. Peer tutoring by undergraduate students is available on a first-come/first-serve basis. Follow the instructions at https://undergraduate.northeastern.edu/peer-tutoring/

Academic Integrity Policy

The Northeastern University Policy on Academic Honesty can be found at:
http://www.northeastern.edu/osccr/academic-integrity-policy/

Tentative Course Schedule

Week 1 (Jan 9, 12):	Introduction; Chapter 1, States of a Model System
Week 2 (Jan 16, 19):	Chapter 2, Entropy and Temperature Homework 1: chapter 2, problems 1, 2, 3, 4, 5, 6
Weeks 3-4 (Jan 23, 26, 30; Feb 2):	Chapter 3, Boltzmann Distribution and Helmholtz Free Energy Homework 2: chapter 3, problems 1, 2, 3, 4, 7, 8, 9, 11
Week 5 (Feb 6, 9):	Chapter 4, Thermal Radiation and Planck Distribution Homework 3: chapter 4, problems 1, 2, 4, 5, 6, 7
Week 6 (Feb 13, 16):	Chapter 5, Chemical Potential and Gibbs Distribution Homework 4: chapter 5, problems 1, 3, 4, 6, 8, 10, 11, 15
Week 7 (Feb 20, 23):	Chapter 6, Ideal Gas Homework 5: chapter 6, problems 1, 2, 3, 6, 12, 13, 14, 15
Week 8 (Feb 27, Mar 2):	**MIDTERM EXAM** (Feb 27: review; Mar 2: exam)
Week 9:	**Spring Break**
Week 10 (Mar 13, 16):	Midterm aftermath; Homework 5 problems
Week 11 (Mar 20, 23):	Chapter 7, Fermi and Bose Gases Homework 6: chapter 7, problems 3, 5, 6, 8, 11, 12, 14
Week 12 (Mar 27, 30):	Chapter 8,9, Gibbs Free Energy and Enthalpy
Week 13 (Apr 3, 6):	Chapter 8, Work and Heat Homework 7: chapter 9, problem 1; chapter 8, problems 1, 2, 3, 5, 6, 7
Week 14 (Apr 10, 13):	Chapter 10, Phase Transitions Homework 8: chapter 10, problems 1, 2, 3
Week 15 (Apr 17):	Review
Week 16 (TBA):	**FINAL EXAM**