Introduction to Statistical Mechanics

PHYS-4130 (Winter 2025)

Course Schedule

Week	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Topics
1		Jan. 6		Jan. 8		Jan. 10 A1→		• Motivation • Probability, combinatorics • Thermodynamics
2		Jan. 13		Jan. 15		Jan. 17 ↪**A1** A2→		• Two level systems • Fundamental Assumption • Equilibrium, Temperature
3		Jan. 20		Jan. 22		Jan. 24 ↪**A2** A3→		• Pressure, First law • Entropy, Second law • Heat Capacity, Third law
4		Jan. 27		Jan. 29		Jan. 31 ↪**A3**		• Canonical ensemble • Partition function • Free energy
5		Feb. 3		Feb. 5 **Midterm Exam 1**		Feb. 7 A4→		• Ideal gas • Gibbs paradox • Sackur-Tetrode equation
6		Feb. 10		Feb. 12		Feb. 14 ↪**A4** A5→		• Photon gas • Bose factor • Blackbodies, CMB
Reading week		Feb. 17		Feb. 19		Feb. 21		
7		Feb. 24		Feb. 26		Feb. 28 ↪**A5** A6→		• Identical particles • Fermi distribution, sea • Fermi surface; heat capacity
8		Mar. 3		Mar. 5		Mar. 7 ↪**A6**		• Motivation • Probability, combinatorics • Thermodynamics
9		Mar. 10		Mar. 12		Mar. 14 **Midterm 2** A7→		• Sommerfeld expansion • Bose distribution • Normal phase
10		Mar. 17		Mar. 19 *Away all week*		Mar. 21 ↪**A7** A8→		• Bose condensation • Atomic BECs • Superfluids
11		Mar. 24		Mar. 26		Mar. 28 ↪**A8**		• Phase transitions • Ising models • SSB
12		Mar. 31		Apr. 2		Apr. 4 *Last day of class*		• Order parameters • Mean-field theory • Epilogue

Legend: ↪ Hand in, → Hand out, A = Assignment