

Tentative Schedule:

This is the *tentative* outline and timeline for the course. The selection and progression of topics will likely not change significantly, but the precise timing is only a guess and may change. This is a *live document* that I will update as we go along. I also highlight the relevant chapters for each lecture in the book by Reif. Topics in blue are “bonus material” that you *will not be tested on*.

MONDAY	WEDNESDAY	FRIDAY
<div>Jan 20th</div> Martin Luther King Day	22nd 1 Probability review (Reif Ch.1)	24th 2 Probability review (cont.) (Reif Ch.1)
27th 3 States, ensembles, fundamental postulate (classical) (Reif 2.1-2.4)	29th 4 States, ensembles, fundamental postulate (quantum) & density of states (DOS) (Reif 2.1-2.5)	31st 5 Interaction between macro. bodies: thermal, mechanical, general (Reif 2.6-2.8)
<div>Feb 3rd</div> 6 Quasi-static processes and inexact differentials (Reif 2.9-2.11)	5th 7 Thermal interaction between macro. bodies: temperature & entropy (Reif 3.1-3.5)	7th 8 Temperature and entropy, sharpness of the probability distribution (Reif 3.3, 3.7)
10th 9 Reversible/irreversible processes, general interaction between macro. bodies: thermal & mechanical equilibrium, entropy and heat (Reif 3.2, 3.8, 3.9, 3.12)	12th 10 Comments on entropy, main results of statistical thermodynamics, heat capacity, extensive/intensive quantities (Reif 3.10, 3.11, 4.4, 4.7)	14th 11 Applications of macro. thermodynamics: Ideal gases (Reif 5.1-5.4)

MONDAY	WEDNESDAY	FRIDAY
17th 12 Thermodynamic potentials (Reif 5.5, Reif 8.1-8.3)	19th 13 Free energy minimization, Maxwell relations, specific heat (Reif 8.1-8.3, Reif 5.5-5.7)	21st 14 Entropy, internal energy, free expansion (Reif 5.8-5.9)
24th 15 Free expansion & Joule-Thomson process (Reif 5.9-5.10)	26th 16 Heat engines & refrigerators (Reif 5.11-5.12)	28th 17 Midterm 1. Covers Lectures 1-11
Mar 3rd 18 Canonical ensemble & the partition function (Z), applications (Reif 6.1-6.3)	5th 19 Canonical ensemble: applications & connection to thermo. (Reif 6.3-6.6)	7th 20 Canonical ensemble: connection to thermo. & microcanonical ensemble, grand chemical potential (Reif 6.6-6.7,6.9)
10th 21 Grand canonical ensemble, Ensembles from maximum entropy (Reif 6.9)	12th 22 Ideal gases redux, Gibbs paradox, identical particles (Reif 7.1-7.3)	14th 23 Validity of classical approximation, equipartition theorem & applications (Reif 7.4-7.6)
17th 24 Specific heat of solids: Einstein model, paramagnetism (Reif 7.7, 7.8)	19th 25 Selected topics in the kinetic theory of gases (Reif 7.9-7.13)	21st 26 Extended office hour, Introduction to ferromagnetism
24th Spring Break	26th Spring Break	28th Spring Break

MONDAY	WEDNESDAY	FRIDAY
31st 27 Quantum ideal gases: Maxwell-Boltzmann, Bose-Einstein, & Fermi-Dirac statistics (Reif 9.1-9.2)	Apr 2nd 28 Quantum ideal gases (cont.) (Reif 9.3,9.5-9.7)	4th 29 Midterm 2. Covers Lectures 12-25
7th 30 Classical limit, single-particle density of states (DOS) (Reif 9.4,9.8,9.9)	9th 31 Single-particle DOS (cont.), quantum corrections to ideal gas equation of state (Reif 9.9, 9.10)	11th 32 Fermi gas & theory of metals (Reif 9.16, 9.17)
14th 33 Fermi gas & theory of metals (cont.) (Reif 9.16, 9.17)	16th 34 Bose gas and Bose-Einstein condensation	18th 35 Black-body radiation (Reif 9.13-9.15)
21st 36 TBD	23rd 37 TBD	25th 38 TBD
28th 39 TBD	30th 40 TBD	May 2nd 41