

ME 501: STATISTICAL THERMODYNAMICS

Fall 2019 2:30-3:20 pm MWF Room WANG 2599

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Lectures and Reading Assignments

Normand M. Laurendeau = NML

Lect.	Date	Subject	Reading Assignment
1	M, Aug 19	Introduction, Overview of Course	NML, pp. 1-4
2	W, Aug 21	Introduction to Quantum Mechanics and the Schrödinger Wave Equation (SWE)	NML, pp. 69-86
3	F, Aug 23	SWE Solutions: Particle in a Box	NML, pp. 86-95
4	M, Aug 26	SWE Solutions: The Hydrogen Atom I	NML, pp. 108-115
5	W, Aug 28	SWE Solutions: The Hydrogen Atom II	
6	F, Aug 30	SWE Solutions: The Hydrogen Atom III	
	M, Sept 2	LABOR DAY, NO CLASS	
7	W, Sept 4	Structure of Multielectron Atoms I	NML, pp. 115-121
8	F, Sept 6	Structure of Multielectron Atoms II	
9	M, Sept 9	Separation of the SWE for a Two-Particle System	NML, pp. 97-100
10	W, Sept 11	SWE Solutions: Rotational and Vibrational Energy Levels for a Diatomic Molecule	NML, pp. 100-108
11	F, Sept 13	Molecular Structure	NML, pp. 121-131
12	M, Sept 16	Molecular Structure II	NML, pp. 131-141
13	W, Sept 18	Molecular Structure III	NML, pp. 141-146
14	F, Sept 20	Introduction to Statistical Thermodynamics, Concept of Microstates and Macrostates	NML, pp. 29-37
15	M, Sept 23	Statistical Models	NML, pp. 7-22
16	W, Sept 25	Bose-Einstein and Fermi-Dirac Statistics I	NML, pp. 37-43
17	F, Sept 27	Bose-Einstein and Fermi-Dirac Statistics II	NML, pp. 37-43
18	M, Sept 30	The Dilute Limit, Corrected Maxwell-Boltzman Statistics	NML, pp. 45-47
19	W, Oct 2	The Partition Function	NML, pp. 47-51
20	F, Oct 4	Calculation of Thermodynamic Properties from the Partition Function I	NML, pp. 51-57
	M, Oct 7	OCTOBER BREAK, NO CLASS	
21	W, Oct 9	Calculation of Thermodynamic Properties from the Partition Function II	NML, pp. 51-57

22	F, Oct 11	Separation of Energy Modes	NML, pp. 157-168
23	M, Oct 4	Monatomic and Diatomic Ideal Gas, Internal Partition Functions, Population Distributions	NML, pp. 169-175
24	W, Oct 16	Diatomic Ideal Gas, Internal Partition Functions, Population Distributions	NML, pp. 175-192
25	F, Oct 18	Calculation of Thermodynamic Properties for Polyatomic Ideal Gases	NML, pp. 192-200
26	M, Oct 21	Analysis of Nonreacting Gas Mixtures	NML, pp. 205-211
27	W, Oct 23	EXAM 1: LECTURES 1-19, HWs 1-4	
28	F, Oct 25	Analysis of Reacting Gas Mixtures I	NML, pp. 211-214
29	M, Oct 28	Analysis of Reacting Gas Mixtures II	NML, pp. 214-221
30	W, Oct 30	Laser Diagnostic Measurement of Gas Phase Properties in Flows	NML, pp. 223-241
31	F, Nov 1	Structure of Crystalline Solids	NML, pp. 259-268
32	M, Nov 4	Phonon Structure of Crystalline Solids	
33	W, Nov 6	The Electron Gas	NML, pp. 268-274
34	F, Nov 8	Elementary Kinetic Theory: The Maxwell-Boltzmann Distribution and Effusion	NML, pp. 289-295
35	M, Nov 11	Effusion and Ideal Gas Pressure	NML, pp. 295-300
36	W, Nov 13	Binary Collision Theory	NML, pp. 302-305
37	F, Nov 15	EXAM 2: LECTURES 20-30, HWs 5-6	
38	M, Nov 18	Fundamentals of Molecular Transport	NML, pp. 305-318
	W, Nov 20	Statistical Mechanics for Systems of Dependent Particles: The Canonical Ensemble	NML, pp. 339-349
	F, Nov 22	The Grand Canonical Ensemble I	NML, pp. 349-357
39	M, Nov 25	The Grand Canonical Ensemble II	
40	W, Nov 27	THANKSGIVING VACATION: NO CLASS	
41	F, Nov 29	THANKSGIVING VACATION: NO CLASS	
42	M, Dec 2	Behavior of Real Gases and Liquids: The Virial Equation of State and the Second Virial Coefficient	NML, pp. 354-369
43	W, Dec 4	Behavior of Real Gases and Liquids: The Third Virial Coefficient and Property Defects	NML, pp. 369-373
44	F, Dec 6	Course Review	
45	TBD	TBD	