

Chemistry 2440, Thermodynamics and Statistical Mechanics

Instructor: Kenneth Jordan (jordan@pitt.edu)

Office: 330 Eberly Hall

Phone: (412) 624-8690

Course webpage: www.pitt.edu/~jordan/education/chem2440_2011

Lectures: M, W 5:30 PM – 6:45 PM, 228 Eberly Hall

Required Textbooks:

D.A. McQuarrie, *Statistical Mechanics* (c. 1976), ISBN: 060443669.

D. Chandler, *Introduction to Modern Statistical Mechanics* (c. 1988), ISBN: 0195042778

Grading: Two one-hour exams (25% each), final exam (40%), homework (10%).

Office Hours: Anytime I am free

Tentative Syllabus:

Week 1: Review of thermodynamics fundamentals (Chandler, Ch. 1)

Weeks 2: Conditions for equilibrium and stability (Chandler, Ch. 2)

Weeks 3-5: Statistical mechanics foundations (ensembles) (Chandler, Ch. 3; McQuarrie, Chs. 1-3)

Hourly Exam: February 9

Weeks 5-8: Applications of equilibrium statistical mechanics to non-interacting systems, I (Chandler, Ch. 4; McQuarrie, Chs. 4-6, 8, 11)
(i) harmonic Solids
(ii) ideal Gases

Week 9: Applications of equilibrium statistical mechanics to non-interacting systems, I (Chandler, Ch. 4; McQuarrie, Chs. 9-10)
(i) harmonic solids
(ii) ideal gases

Weeks 10-11: Classical statistical mechanics: theory and numerical simulation techniques (molecular dynamics, Monte Carlo) (Chandler, Chs. 6, 7; McQuarrie, Ch. 7)

Hourly Exam: March 21

Weeks 12-14: Application of equilibrium statistical mechanics to interacting systems (Chandler, Chs. 5, 7; McQuarrie, Chs. 12-14)

- (i) phase transitions
- (ii) imperfect gases and liquids

Week 15: Non-equilibrium statistical mechanics (Chandler, Ch. 8; McQuarrie, Chs. 20-22)

Final Exam: April 25