

Thermodynamics of the Earth System - EAS 3603 - Fall 2020

Note: This is the tentative plan I very much hope to follow. Adjustments to testing dates, number of exams, exam drop policies, homework, grading percentages etc. may be necessary as we deal with COVID19.

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Time and place for office hours to be determined

Lectures: MW 2:00-3:15 pm, Klaus 1443

Text: Physical Chemistry for the Chemical and Biological Sciences
By Raymond Chang, ISBN 978-1891389061

Office Hours: Ellery Ingall- Tentatively MTW 10-11 am probably via Bluejeans.
Or by socially distant appointment – send me an email to work out time

Grading: Exams 70%
Homework 30% (**Official Notice** – last homework due Nov. 23)

There will be 3 exams during the semester and a final exam. Of these 4 exams, the lowest score will be dropped.

Absences: If for any reason you cannot take an exam (sickness, family obligations, job interview, arrest, etc.), it will be considered your “dropped” exam. In the rare circumstance that you will be absent for an additional exam or you have a GT documented official absence, you must obtain the instructor’s approval at least one week BEFORE the scheduled date to make up the exam. To obtain permission, you must provide relevant documentation. Remember that you must ask for permission in advance in all but unanticipated emergency situations. Finally, in emergency situations (death in the family, illness requiring sudden hospitalization, etc.) you should go to the Dean of Students –the good folks there will assist you.

Exam Dates: September 16
October 19
November 18

Final: December 7, 2:40 pm – 5:30 pm (Final is comprehensive)

Honor Code: The instructor and students in this class are bound by the Georgia Tech Academic Honor Code. The instructor will make available copies of previous examinations and/or other appropriate assignments, samples, and readings. Unauthorized use of any previous semester course materials is prohibited in this course. Using these materials will be considered a direct violation of academic policy and will be dealt with according to the GT Academic Honor Code. The complete text of the Academic Honor Code may be found at <http://osi.gatech.edu/content/honor-code>

Web Page: Class materials will be posted on Canvas

Tentative Lecture/Worksheet Topics/Relevant Book Chapter

- 1 Gas Laws, Chap. 1, 2
- 2 Equations of State, Non-ideal gases, Chap. 1, 2
- 3 Work Chap. 4
- 4 First Law, Internal Energy, Enthalpy Chap. 4
- 5 Heat capacity, Gas Expansion Chap. 4
- 6 Adiabatic Processes, Hess' Law Chap. 4
- 7 Enthalpy, Entropy Chap. 5
- 8 Entropy, Carnot cycle Chap. 5
- 9 Entropy Chap. 5
- 10 Entropy, Mixing, Phase Transition Chap. 5
- 11 Gibbs Free Energy Chap. 6
- 12 Clapeyron Equations Chap. 6
- 13 Phase Rule, Components Chap. 6
- 14 Concentrations, Raoult's and Henry's Law Chap. 7
- 15 Henry's Law, Chemical Potential Chap. 7
- 16 Activity Composition Relationships Chap. 7, 8
- 17 IAP/Ksp, Van't Hoff equation
- 18 Calcium carbonate in the ocean
- 19 Freezing point depression, Boiling point elevation Chap. 7
- 20 Osmosis Chap. 7
- 21 Balanced Redox equations
- 22 Redox Chap. 10
- 23 Ecological Redox sequence
- 24 pe-pH
- 25 Atmospheric thermodynamics