ChemEng 141 - Chemical Engineering Thermodynamics

ZOOM:

Meeting ID: 922-424-582

Direct
link: https://berkeley.zoom.us/j/922424582?_ga=2.153493624.1382347534.1583857669-1908621770.1583857669 (Links to an external site.)

Please remember to turn your audio/video off unless you need to ask a question. The Zoom meeting will be open during all lectures, discussions, and office hours.

GRADESCOPE COURSE ENTRY CODE: 94YGBZ

Homeworks are due Thursdays at the end of lecture.

PIAZZA:

www.piazza.com/berkeley/spring2020/cbe141 (Links to an external site.)

Please address all HW and class material questions to the Piazza page. All posts are set as anonymous to students but not to instructors.

Lectures

9:30 – 11 AM; Tuesday, Thursday; Valley Life Sciences 2040

Instructors:

Professor Rui Wang, he/his, (ruiwang325@berkeley.edu)

110B Gilman Hall,

Office Hours: Thursdays 4:00-5:00 PM – in 110B Gilman

GSIs:

Nikhil Agrawal, he/his, (nikhil.agrawal@berkeley.edu) (OHs start from second week)

Office hours: Wednesdays 5:30-6:30 PM - Hildebrand 100D

Francis Cunningham, he/his, (fjc@berkeley.edu)

Office hours: Tuesdays 4-5 PM - Hildebrand 100D

Discussion Section:

Sections start from second week. These sections will be taught by a GSI and will serve as a complement to the weekly lectures with a special emphasis on homeworks.

Nikhil's

Monday, 10-11 and Wednesday 1-2 in Etcheverry 3113

Francis'

Thursday and Friday, 11-12 in Hearst Mining 310 and Hildebrand B51 respectively

Synopsis

In this course, we will pursue the study of thermodynamics from both conceptual and applied viewpoints. The conceptual perspective requires us to construct a broad intuitive foundation that provides us the ability to address the topics that thermodynamics spans. The applied perspective enables us how to actually use these concepts to solve problems of practical interest and thereby enhances our conceptual understanding.

Textbook

"Engineering and Chemical Thermodynamics", 2nd edition by Milo D. Koretsky

Grading Scheme:

30% problem sets assigned weekly;

due at the beginning of the lecture, 1 week after they are posted

30% one midterm March 3;

40% final exam

Regrade policy:

If you wish to dispute points on a homework or exam please scan and email the assignment to the GSIs within 1 week of the assignment being returned to you. Include an explanation of your dispute, and reference the solutions posted on bCourses if necessary.

Course Outline:

1. Introduction of thermodynamics: basic concepts, postulates and language
2. First law of thermodynamics: work and heat, reversible processes in closed systems and first law in open systems.
3. Carnot engine and refrigerator

4. Entropy and the second law of thermodynamics (part 1): concept of entropy from Carnot cycle
5. Entropy and the second law of thermodynamics (part 2): calculation of entropy change
6. Entropy and the second law of thermodynamics (part 3): microscopic view of entropy
7. Entropy and the second law of thermodynamics (part 4): second law in open systems, rankine cycle
8. Thermodynamic potentials: fundamental equations
9. Using thermodynamic potentials: calculation of fundamental and derived properties
10. Equations of state
11. Intermolecular forces
12. Phase equilibrium in one component system: equilibrium criterion, Clapeyron-Clausius equation
13. Thermodynamics of mixture: partial molar properties, Gibbs Duhem equation
14. Entropy of mixing and gas separation
15. Fugacity: calculation for pure substance, fugacity coefficient of mixture
16. Liquid phase mixture: ideal solution, Lewis-Randall rule and Henry's law, activity coefficient
17. Phase equilibrium (part 1): vapor liquid equilibrium (VLE)
18. Phase equilibrium (part 2): liquid-liquid equilibrium (LLE), metastability, surfactants
19. Phase equilibrium (part 3): colligative properties, osmotic pressure
20. Chemical reaction equilibrium (part 1): thermodynamics and kinetics, equilibrium constant
21. Chemical reaction equilibrium (part 2): calculation of equilibrium constant, multiphases, heterogeneous reactions
22. Chemical reaction equilibrium (part 3): equilibrium in electrochemical systems.

Learning disabilities

If you need accommodations for any physical, psychological, or learning disability, please notify one of the instructors outside of class.