Fall 2019

CHE 230-001: Chemical Engineering Thermodynamics I

Xiaoyang Xu

Chem Engineer Thermodynamics I - CHE 230 - 001

Instructor: Professor Xiaoyang Xu
Departments of Chemical and Material Engineering
Office: Tiernan Hall, 362
Email: xiaoyang@njit.edu
Phone: 973-596-5359

Class hours:

Type	Time	Days	Where	Date Range	Schedule Type	Instructors
Class	8:30 am - 10:35 am	Tuesday Friday	ME 221	Sep 3, 2019 - Dec 22, 2019	Lecture	Xiaoyang Xu (P)

Office Hour: Friday 11:00 am- 12:00 pm (Office: Tiernan Hall, 362)

TA and TA office hour: TBD

Estimated Workload: Lectures ~3 hours per week; quizzes/homework ~Please plan to spend a **minimum** of 10-12 hours per week on your homework problems for this course. Failure to meet this goal will seriously jeopardize your successful completion of this course and will harm your efforts in the junior and senior year.

Textbook: Introduction To Chemical Engineering Thermodynamics Chemical Engineering Thermodynamics **(ISBN# is 9780073104454)**

Supporting textbook: Donald P. Visco, Jr. Kevin D. Dahm "Fundamentals of Chemical Engineering Thermodynamics" ISBN: 9781111580711

Description: Thermodynamics is a science and, more importantly, an engineering tool used to describe processes that involve changes in temperature, transformation of energy, and the relationships between heat and work. The three introductory courses in the sophomore year, ChE 210, ChE230 and ChE240, and ChE 342 are the basic courses in chemical engineering fundamental principles. What you learn in these three courses will appear over and over again throughout your junior and senior courses. Therefore, it is in your best interest to learn these subjects well now.

Prerequisites: Chem 126, (or Chem 123), Math 112, Phys 111, (or Phys 106). Corequisite Math 211 (or Math 213). The Fundamentals of thermodynamics are applied to chemical engineering processes. Thermophysical properties and their engineering correlations are covered. Applications include chemical engineering and related fields such as environmental and biomedical engineering.

Course Goal: To help each student develop his/her problem solving ability and gain insight into the process of Problem solving, with emphasis on thermodynamics. Specifically, this course is designed to help students learn to·

- Apply conservation principles (mass and energy) to evaluate the performance of simple

engineering systems and cycles,
- Evaluate thermodynamic properties of simple homogeneous substances,
- Analyze processes and cycles using the second law of thermodynamics to determine maximum efficiency and performance,
- Discuss the physical relevance of the numerical values for the solutions to specific engineering problems and the physical relevance of the problems in general,
- Evaluate the validity of the numerical solutions for specific engineering problems.

Topics to be covered:

1. Basic concepts; heat & work; steam tables
2. Energy balances in open and closed systems, including reacting systems
3. Thermodynamics quantities: enthalpy, entropy, internal energy, free energies
4. Steady state and unsteady-state processes
5. First and second laws of thermodynamics
6. Engines and power systems; Carnot and Rankine cycles
7. Turbines, pumps, and compressors, and refrigerations
8. Maxwell's relations; thermodynamic transformations
9. PVT behavior of ideal gases; equations of state

Attendance: Attendance is mandatory. You must notify the instructor in advance if possible of any absence by sending an email stating the date and reason for the absence. If you are absent for up to two class periods because of illness or injury, an email message stating the reason for absence will be sufficient. If you are absent from more classes because of illness or injury, verification of a visit to a health care professional may be required. Two times class absence (without verification/notification) will disqualify your final exam for this course.

Homework: Problems will be assigned. Homework will not be graded but similar problems will be tested in quiz, midterm exam or final exam. You are strongly recommended to work on homework by yourself and bring questions to workshop or office hour.

Examinations

There will be two 90 mins examinations during the term and a 150 mins final examination. The exams will be closed-notes and closed-book unless otherwise announced. Tutorial reviews will be held prior to each exam.

Quizzes: There will be quizzes occasionally at the beginning of the class. If you miss the class, you will miss the quiz that day. There will be no makeup quiz! Close book and close notes!

Policy on exams (other than final): A student must have a compelling reason to miss an exam. Documentation of the reason (e.g., doctor's note) is needed for the instructor to consider giving a make-up exam. A student who cannot make it to an exam needs to either e-mail or call and leave a voice message for the instructor **before** the exam is held. A student missing (for any reason) the first two exams has to withdraw from the course. A single (comprehensive) make-up exam will be given on the reading day (TBD) for those who have missed an exam for documented/ legitimate reasons.

Policy on final exam: The final exam will be based on the entire course material. Students missing the final exam without a documented serious excuse fail the course. Students missing the final exam with a documented serious reason get an Incomplete.

Academic Dishonesty: Misrepresentation of a student's involvement in any required academic work will result in the instructor invoking the academic dishonesty policies of the university. This could result in an "F" grade being assigned for the course. Collaboration is expected for group activities, but not for individual assignments (such as exams). Instructions for each assignment should be followed. If in doubt, ask the instructor.

Grading:

Grades for the subject will be based on a total of 500 points:

ACTIVITIES	**POINTS**
Two 90 mins midterms exams	100 (each)
Quizzes	100
Final exam	200

Grading Scale (minimum cutoffs are firm):

85-100% (425-500 points) A

80-84.9% (400-424 points) B+

75-79.9% (375-399 points) B

70-74.9% (350-374 points) C+

65-69.9% (325-349 points) C

55-64.9% (275-324 points) D

<55% (<275 points) F

2019 Fall Semester Class Schedule:

September	2	Monday	Labor Day
September	3	Tuesday	First Day of Classes
September	7	Saturday	Saturday Classes Begin
September	9	Monday	Monday Classes Meet
September	13	Friday	Last Day to Add/Drop a Class
September	13	Friday	Last Day for 100% Refund, Full or Partial Withdrawal
September	14	Saturday	W Grades Posted for Course Withdrawals
September	16	Monday	Last Day for 90% Refund, Full or Partial Withdrawal – No Refund for Partial Withdrawal after this date
September	30	Monday	Last Day for 50% Refund, Full Withdrawal
October	21	Monday	Last Day for 25% Refund, Full Withdrawal
November	11	Monday	Last Day to Withdraw
November	26	Tuesday	Thursday Classes Meet
November	27	Wednesday	Friday Classes Meet
November	28	Thursday	Thanksgiving Recess Begins
December	1	Sunday	Thanksgiving Recess Ends
December	12	Thursday	Last Day of Classes. Saturday Classes Meet
December	13	Friday	Reading Day
December	14	Saturday	Final Exams Begin
December	20	Friday	Final Exams End
December	22	Sunday	Final Grades Due