# Chem Engineer Thermodynamics I - CHE 230 - 001

**Instructor:** Professor Xiaoyang Xu
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**Class hours:**

| Type | Time | Days | Where | Date Range | Schedule Type | Instructors |
|---|---|---|---|---|---|---|
| Class | 1:00 pm - 2:20 pm | Tuesday Thursday | CULM Hall LECT 3 | Sep 4, 2018 - Dec 21, 2018 | Lecture | Xiaoyang Xu (P) |

**Office Hour:** Thursday 2:30 pm- 3:30 pm (Office: Tiernan Hall, 362)

**ChE 230-01 Workshop TA: TBD**

| Type | Time | Days | Where | Date Range | Schedule Type | Instructors |
|---|---|---|---|---|---|---|
| Class | 10:00 am – 10:50 pm | Thursday | Tiernan Hall LECT 2 | Sep 4, 2018 - Dec 21, 2018 | Lecture | TBD |

**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

**2018 Fall Semester Class Schedule:**

| | | | |
|---|---|---|---|
| September | 3 | Monday | Labor Day |
| September | 4 | Tuesday | First Day of Classes |
| September | 8 | Saturday | Saturday Classes Begin |
| September | 10 | Monday | Last Day to Add/Drop a Class |
| September | 10 | Monday | Monday Classes Meet |
| September | 10 | Monday | Last Day for 100% Refund, Full or Partial Withdrawal |
| September | 11 | Tuesday | W Grades Posted for Course Withdrawals |
| September | 17 | Monday | Last Day for 90% Refund, Full or Partial Withdrawal - No Refund for Partial Withdrawal after this date |
| October | 1 | Monday | Last Day for 50% Refund, Full Withdrawal |
| October | 22 | Monday | Last Day for 25% Refund, Full Withdrawal |
| November | 12 | Monday | Last Day to Withdraw |
| November | 20 | Tuesday | Thursday Classes Meet |
| November | 21 | Wednesday | Friday Classes Meet |
| November | 22 | Thursday | Thanksgiving Recess Begins |
| November | 25 | Sunday | Thanksgiving Recess Ends |
| December | 12 | Wednesday | Last Day of Classes |
| December | 13 | Thursday | Reading Day 1 |
| December | 14 | Friday | Reading Day 2 |
| December | 15 | Saturday | Final Exams Begin |
| December | 21 | Friday | Final Exams End |
| TBA | | | Final Grades Due |