

## Chem Engineer Thermodynamics I - CHE 230 - 002

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

Type	Time	Days	Where	Date Range	Schedule Type	Instructors
Class	10:00 am - 11:25 pm	Tuesday Friday	Cullimore Hall LECT 3	Jan 16, 2018 - May 10, 2018	Lecture	Xiaoyang Xu (P)

**Office Hour:** Friday 11:30 am- 12:30 pm; Tiernan Hall, 362

**ChE 230-02 Workshop TA:** Nick (Yung-Hao Tsou), [yt99@njit.edu](mailto:yt99@njit.edu)

Type	Time	Days	Where	Date Range	Schedule Type	Instructors
Class	11:30 am – 12:25 pm	Wednesday	Kupfrian Hall 106	Jan 16, 2018 - May 10, 2018	Lecture	Nick (Yung-Hao) Tsou

### TA office hour:

**Nick Tsou: Monday 4:00- 4:45 pm, Tiernan Hall 421**

**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 (ISBN-13: 978-1259696527); 8<sup>th</sup> edition; (note: That's ok if you have 7<sup>th</sup> edition)

**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:

<b>ACTIVITIES</b>	<b>POINTS</b>
Two 90 mins midterms exams	100 (each)
Quizzes	100
Final exam	200

Grading Scale (minimum cutoffs are firm):

80-100%	(400-500 points)	A
75-79.9%	(375-399 points)	B+
70-74.9%	(350-374 points)	B
65-69.9%	(325-349 points)	C+
60-64.9%	(300-324 points)	C
50-59.9%	(250-299 points)	D
<50%	(<250 points)	F

**2018 Spring Semester Class Schedule:**

January 15	Monday	Martin Luther King, Jr. Day
January 16	Tuesday	First Day of Classes
January 20	Saturday	Saturday Classes Begin

January	22	Monday	Last Day to Add/Drop Classes
January	22	Monday	Last Day for 100% Refund, Full or Partial Withdrawal
January	23	Tuesday	W Grades Posted for Course Withdrawals
January	29	Monday	Last Day for 90% Refund of Tuition (no refund for fees), Full or Partial Withdrawal - no refund for partial withdrawal after this date
February	12	Monday	Last Day for 50% Refund of Tuition (no refund for fees), Full Withdrawal
March	5	Monday	Last day for 25% Refund of Tuition (no refund for fees), Full Withdrawal
March	11	Sunday	Spring Recess Begins - No Classes Scheduled - University Open
March	18	Sunday	Spring Recess Ends
March	30	Friday	Good Friday - No Classes Scheduled - University Closed
April	2	Monday	Last Day to Withdraw
May	1	Tuesday	Friday Classes Meet
May	1	Tuesday	Last Day of Classes
May	2	Wednesday	Reading Day
May	3	Thursday	Reading Day
May	4	Friday	Final Exams Begin
May	10	Thursday	Final Exams End
May	12	Saturday	Final Grades Due