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Spring 2019

CHE 611-102: Advanced Thermodynamics

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Advanced Thermodynamics ChE 611

Syllabus

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This course begins with reviewing the laws of thermodynamics. Specific focus is on phase equilibria, including liquid-gas, liquid-liquid, and solid-liquid systems. Students learn to develop and use phase diagrams, analyze complex thermodynamic systems, including those experiencing chemical reactions. Students learn using common thermodynamic references, including NIST Chemistry Webbook. Finally, energy and exergy-based analytical approaches are compared as related to engineering applications.

Text: D. A. McQuarrie, J. D. Simon. Molecular Thermodynamics. University Science books, Sausalito, CA, 1999.
ISBN 1-891389-05-X

Reference: Introduction to Chemical Engineering Thermodynamics by J.M. Smith, H.C. Van Ness, M.M. Abbott; M.T. Swihart, 8th edition, 2018
ISBN-13: 978-1259696527
ISBN-10: 1259696529

Grading is based on the following credits:

Quiz 1	29%
Quiz 2	29%
Project/presentation (group):	12%
Final:	30%

Assignments will be graded on the scale of 0-100%. Letter grade conversion: "A":>90%; "B+": 80 – 90 %; "B": 70 – 80 %; "C+": 60 – 70%; "C": 50 – 60 %; "F": <50%.

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Topics:

Week #	TOPICS
1	Intro; Zeroth Law; First Law
2	Properties of fluids, Equations of state
3	Entropy, Second Law
4	Third Law; T/D potentials, Maxwell Relations
Q1	Quiz
5	Intro to phase equilibria, chemical potential, fugacity
6	Vapor-Liquid Equilibrium; Intro to Liquid-Liquid Solutions
7	Activity; Solutions
8	Solid-Liquid Solutions, Colligative Properties
Q2	Quiz
9	Chemical Equilibrium
10	Exergy or availability
P	Project presentations