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CHE 611-102: 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.

Course materials are provided in Canvas [CHE611102](#)

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 (Links to an external site.) by J.M. Smith, H.C. Van Ness, M.M. Abbott; M.T. Swihart, 9th edition, 2022

ISBN10: 1260721477

ISBN13: 9781260721478

Grading is based on the following credits:

In-class assignments in Canvas	5%
Quiz 1	25%
Quiz 2	25%
Project/presentation (group):	10%
Final:	35%

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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Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by

cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu

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; Project teams formed
5	Quiz 1
6	Intro to phase equilibria, chemical potential, fugacity
7	Vapor-Liquid Equilibrium; Intro to Liquid-Liquid Solutions
8	Activity; Solutions; Project topics selected
9	Solid-Liquid Solutions, Colligative Properties
10	Quiz 2
11	Chemical Equilibrium
12	Exergy or availability
13	Project presentations
14	Review/Consultation