

Spring 2023

MTSE 602 - 102: Thermodynamics of Materials

Trevor Tyson

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Thermodynamics of Materials (MTSE 602)

Course Outline

Prof. Trevor A. Tyson

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Office: Room 484 Tiernan Hall

- Class will meet on Tuesday from 6:00 to 9:00 PM in Faculty Memorial Hall Room 209 (3 Credits)
- Office hour is Tuesday 5:00 to 6:00 PM (or by appointment)
- Class WWW page can be found at <http://web.njit.edu/~tyson/mtse602.html> (under construction)
- Assignments are due each week at the beginning of class
- Textbook: *Introduction to the Thermodynamics of Materials* (6th Edition) by D. R. Gaskell and D. E. Laughlin
- Supplementary Texts:
 - (1) *Thermodynamics of Materials* Vol I and II, by D. V. Ragone (Wiley)
 - (2) *Thermal Physics* by C. Kittel and H. Kroemer (2nd Edition, Freeman)
 - (3) *Thermodynamics* by E. Fermi (Dover)
 - (4) *Physical Chemistry* by R. A. Albert and R. A. Silbey (3rd Edition, Freeman)
- Study Guides:
 - (1) Schaum's Outline Series: *Thermodynamics* (2nd Edition, McGraw-Hill)
 - (2) *REA's Problem Solvers: Thermodynamics* (REA)

Grade Decomposition

Homework	10%	(Posted on the class website, after lectures)
Quizzes	10%	
Exam I	10%	
Midterm Exam	20%	
Final Exam	25%	(comprehensive)
Class Project	25%	

Grade Cutoffs

87% – A
82% – B+
72% – B
65% – C+
55% – C
45% – D
Below 45% – F

Class Project Details

Find paper relevant to material covered in class
Read and research paper (look-up references)
Present paper in class in 15 min. talk
Write 7 page report (1.5 space, not including figures)
See list of research project papers on main class WWW page

Honor Code Violations or Disruptive Behavior: NJIT has a zero-tolerance policy for cheating of any kind and for disruptive student behavior. Violations will be reported to the Dean of Students. The penalties range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT. Avoid situations where your own behavior could be misinterpreted as dishonorable.

- **Students are required to agree to the NJIT Honor Code on each exam and quiz.** By taking an exam or quiz you agree to abide by the code.

Turn off all smart and cellular phones, wireless devices, computers, and messaging devices of all kinds during classes and exams. Please do not eat, drink, or create noise in class that interferes with the work of other students or instructors.

Homework problems are posted on the class web site

TOPIC	TEXT STUDIES
Week 1 (Jan. 17 to 23) Introduction and Definition of Terms The First Law of Thermodynamic	Chapter 1 Chapter 2
Week 2 (Jan. 24 to Jan. 30) The Second Law of Thermodynamics	Chapter 3
Week 3 (Jan. 31 to Feb. 6) The Statistical Interpretation of Entropy	Chapter 4
Week 4 (Feb. 7 to Feb.13) Fundamental Equations and Relationships	Chapter 5
Exam I (Feb.14)	
Week 6 (Feb. 14 to Feb. 20) Heat Capacity Enthalpy, Entropy and the Third Law of Thermodynamic	Chapter 6
Week 7 (Feb. 21 to Feb. 27) Phase Equilibrium in a One-Component System	Chapter 7
Week 8 (Feb. 28 to March 6) The Behavior of Gases	Chapter 8
Week 9 (March 7 to 13) The Behavior of Solutions	Chapter 9
Spring Break March 13 to March 18	Spring Break
Week 10 (March 21 to March 27) Gibbs Free Energy- Composition and Phase Diagram of Binary Systems	Chapter 10
Midterm Exam, March 21nd	
Week 11 (March 28 to April 3) Reactions and Transformation of Phases	Chapter 11
April 3 Last Day to Drop Class	
Week 12 (April 4 to April 10) Reactions Involving Pure Condensed Phases and a Gaseous Phase	Chapter 12

Week 13 (April 11 to April 17) Reaction Equilibria in Systems Containing Components in Condensed Solution	Chapter 13
Week 14 (April 18 to April 24) Thermodynamics of Phase Transformations	Chapter 15
Week 15 (April 25 to May 1)	Adjustment/Extra Material
Reading Days: May 3 and 4	
Final Exam Period: May 5 to May 11	