

THERMODYNAMICS OF MATERIALS - CME 471

Spring 2020

Instructor: Sara Kadkhodaei	Time: T-R 3:30 pm – 4:45 pm
Email: sarakad@uic.edu	Place: Lincoln Hall 315

Course Pages: UIC Blackboard

Office Hours: Tuesdays 4:45 pm – 5:30 pm after class, or email the instructor for questions.

Textbooks:

- David R. Gaskell, *Introduction to the Thermodynamics of Materials, 6th ed.*, Taylor & Francis Group, 2017
- Robert DeHoff, *Thermodynamics in Materials Science, 2nd ed.*, Taylor & Francis Group, 2006

References: This is a list of various interesting and useful books for extra readings.

- Chang L. Tien and John H. Lienhard, *Statistical Thermodynamics*, Hemisphere Publishing Corporation, 1979
- Zi-Kui Liu, *Computational Thermodynamics of Materials*, Cambridge University Press, 2016

Note: Both textbooks are on reserve in Daley Library for 2-hours checkout.

Note: Look into “Library Resources” on Blackboard for links to the electronic version of both the textbooks.

Restrictions: Only 3 students can use the e-books at a time. Please make sure to log out of them when not in use. You will be able to read the e-books online and download or print only a small number of pages, usually up to 10% of the total.

Prerequisites: CME 260 or CME 261

Grading Policy: Problem sets (30%), Midterm exams (30%), Final exam (30%), Project (10%) but may be subject to change.

Homework Policy: Every week or two due Thursday beginning of class. 20%/day late penalty up to 2 days. Problem set solutions are posted on Blackboard 48 hours after the due date. Discussion on problem sets is permitted but you are to do your own work.

Important Dates:

Midterm exam 1 Thursday, February 27, 2020
Midterm exam 2 Thursday, April 2, 2020
Final exam Tuesday, May 5, 2020

Note: Midterm exams might be combined into one.

Class Policy: Regular attendance is essential and expected.

Academic Honesty: Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation.

Disability Concerns: Any student should feel free to contact the Disability Resource Center (DRC) <https://drc.uic.edu/> or the instructor for any disability-related issue.

Course Outline:

1. Foundations

- (a) Laws of thermodynamics
- (b) Thermodynamic variables and their relationships
- (c) Conditions for equilibrium
- (d) Introduction to statistical thermodynamics
- (e) Specific heat in solids

2. Thermodynamics of materials

- (a) Unary heterogeneous systems
- (b) Multicomponent, homogeneous, non-Reacting systems
- (c) Multiphase equilibrium
- (d) Thermodynamics of reactions and processes

3. Advanced topics

- (a) Phase diagram calculation
- (b) CALPHAD modeling of thermodynamics