Department of Materials Science and Engineering
University of Maryland, College Park

ENMA 461: Thermodynamics of Materials

Catalog Description: Thermodynamics of Materials is a basic theoretical material science and engineering course. It is devoted to analysis of fundamental material properties and processes for near equilibrium conditions.

Class Schedule: Chemical & Nuclear Building (CHE) 2118; TuTh 12:30 PM -1:45 PM

Instructor: Professor Yifei Mo
Office: 1137 Engineering Lab building (EGL #089)
yfmo@umd.edu 1-301-405-7613

Teaching Assistant: Changmin Shi cshi0830@terpmail.umd.edu

Textbook: *Thermodynamics in materials science*, 2nd edition, Robert DeHoff (Taylor & Francis, New York, 2006)

Course Description: Thermodynamics of materials is a basic theoretical material science and engineering course. It is devoted to analysis of fundamental material properties and processes for near equilibrium conditions. Principal concepts and applications of the thermodynamics are used to understand the properties of materials in the first two parts of the course. The statistics-mechanical approach is used to introduce the concepts of entropy and temperature. Phase equilibrium and phase transformations in single and multi-component systems will be covered. The phase diagrams, their construction and applications are considered for several materials. Thermodynamic analysis of examples of processing, synthesis and engineering of materials will be included.

Topics Covered:
- What is Thermodynamics and what is it for? (Ch.1,2);
- The laws of thermodynamics (Ch.3)
- Variables and relations (Ch.4)
- Equilibrium (Ch.5)
- Phase diagram: Unary, Heterogeneous (Ch.7)
- Statistical mechanics (Ch.6)
- Phase diagram: Multicomponent, Homogeneous (Ch.8)
- Phase diagram: Multicomponent, Heterogeneous (Ch.9)
- Phase diagram: Diagram Thermodynamics (Ch.10)
- Phase diagram: Reacting systems (Ch.11)
- Defects in crystals (Ch.13)
- Interfacial Energy (Ch.12)
- Extra topics – Electrochemistry (Ch.15)

Grading:

Midterm I	20%	(Ch.1-5, 12) TBA
Midterm II	20%	(Ch. 6-10) TBA
Final Exam	40%	(Comprehensive) Common Final Exam
Homework (paper and computation)	15%	
Pop quiz and course participation	5%	

Instructor Office hours: Tuesday 2:00-3:00pm and Wednesday 3:00-4:00pm
Room 1137, Engineering Lab Building, Bldg#089

TA Office hours: Tuesday 10:30-11:30 am & Wednesday: 12:30-1:30 pm
Location: Room 1127 Engineering Lab Building, Bldg#089

Homework is intended to give students a chance to practice with concepts and critical thinking skills. Students who complete the homework tend to do better on exams and in the course. Solutions will be provided for problems assigned.
Class attendance is required. Material not in the textbook will be covered and there will be multiple unannounced pop quizzes. A lack of attendance and/or class participation will affect grades.

Course Website: UMD Canvas https://myelms.umd.edu/

Snow Policy: If more than one lecture is missed due to snow causing the University of Maryland to close or open late, there will be a shortened make-up lecture via Adobe Connect.

Flipped Lectures: A few lectures may be flipped to allow more time to do related activities in class.

CourseEvalUM: Your participation in the evaluation of courses through CourseEvalUM is a responsibility you hold as a student member of our academic community. Your feedback is confidential and important to the improvement of teaching and learning at the University as well as to the tenure and promotion process. CourseEvalUM will be open for you to complete your evaluations for semester courses sometime in May. Please go directly to the website (www.courseevalum.umd.edu) to complete your evaluations. By completing all of your evaluations each semester, you will have the privilege of accessing online, at Testudo, the evaluation reports for the thousands of courses for which 70% or more students submitted their evaluations.

Academic Accommodations: If you have a documented disability, you should contact Disability Support Services 0126 Shoemaker Hall. Each semester students with documented disabilities should apply to DSS for accommodation request forms which you can provide to your professors as proof of your eligibility for accommodations. The rules for eligibility and the types of accommodations a student may request can be reviewed on the DSS web site at http://www.counseling.umd.edu/DSS/

Religious Observances: The University System of Maryland policy provides that students should not be penalized because of observances of their religious beliefs, students shall be given an opportunity, whenever feasible, to make up within a reasonable time any academic assignment that is missed due to individual participation in religious observances. It is the responsibility of the student to inform the instructor of any intended absences for religious observances in advance. Notice should be provided as soon as possible but no later than the end of the schedule adjustment period. Faculty should further remind students that prior notification is especially important in connection with final exams, since failure to reschedule a final exam before the conclusion of the final examination period may result in loss of credits during the semester. The problem is especially likely to arise when final exams are scheduled on Saturdays.

Academic integrity: The University of Maryland has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://shc.umd.edu/SHC/Default.aspx

The University of Maryland is one of a small number of universities with a student-administered Honors Code and an Honors Pledge, available on the web at http://www.shc.umd.edu/shc/honorpledgeuse.aspx. The code prohibits students from cheating on exams, plagiarizing papers, submitting the same paper for credit in two courses without authorization, buying papers, submitting fraudulent documents, and forging signatures. The University Senate encourages instructors to ask students to write the following signed statement on each examination or assignment: "I pledge on my honor that I have not given or received any unauthorized assistance on this examination (or assignment)."